Taxon and Assessor details				
Category	Fishes and Lampreys (freshwater)			
Taxon name	Ameiurus melas			
Common name	black bullhead			
Assessor	Bella Japoshvili			
Risk screening context				
Reason and socio-economic benefits	The species have been inroduced to a number of countries in Europe where it established			
Risk assessment area	South Caucasus			
Taxonomy	Actinopteri (ray-finned fishes) > Siluriformes (Catfishes) > Ictaluridae (North American freshwater			
Native range	North America			
Introduced range	Europe, South America			

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
1. l	Domest	ication/Cultivation			
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20	Yes	Welcomme, R. L. (Ed.). (1988). International introductions of inland aquatic species (Vol. 294). Food & Agriculture Org.	Very high
2	1.02	generations? Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	for example Krogman, R. M., Fischer, J. R., Quist, M. C., Steuck, M. J., & Marron, M. M. (2011). Historical trends in ictalurid catfish commercial harvest in the upper Mississippi River. In American	High
3	1.03	Does the taxon have invasive races,	Yes	Fisheries Society Symposium (Vol. 77, pp. 000-000). Congeners such as A. nebulosus	Very high
_		varieties, sub-taxa or congeners?		(https://www.cabi.org/isc/datasheet/94468)	
2. (, distribution and introduction risk			
4	2.01	How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range?	High	Results of climmatch algorithm	Medium
5	2.02	What is the quality of the climate matching data?	Low	Due to low accuracy of local climate data	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	No	Not yet recorded in wild in RA area	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	>1	Hitchicker, independent spread and also recreational purpose (e.g. Kutsokon, I., Kvach, Y., Dykyy, I., & Dzyziuk, N. (2018). The first report of the brown bullhead Ameiurus nebulosus (Le Sueur, 1819) in the Dniester River drainage, Ukraine. BioInvasions	High
8	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)?	No	No documented evidence	High
3. i	Invasive	e elsewhere			
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	e.g. Cucherousset, J., Paillisson, J., Carpentier, A., & Chapman, L. J. (2007). Fish emigration from temporary wetlands during drought: the role of physiological tolerance. Fundamental and Applied Limnology-Archiv fur Hydrobiologie. 168(2), 169-178.	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	For review - CABI, 2021. Ameiurus melas (bighead carp). https://www.cabi.org/isc/datasheet/94466 (accessed October 2021)	High
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	No documented evidence	Medium
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	No	No documented evidence	Medium
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	No documented evidence	Low
B	Biology	//Ecology			
		able (or persistence) traits			
			No	Not a harmful species	High
15	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	Reviewd in - CABI, 2021. Ameiurus melas (bighead carp). https://www.cabi.org/isc/datasheet/94466 (accessed October 2021)	Medium
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	Yes	Tha species is preadotr and the RA are is inhabited a large number of potential pray spacies	Very high
17	4.04	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?	Yes	Cucherousset, J., Paillisson, J., Carpentier, A., & Chapman, L. J. (2007). Fish emigration from temporary wetlands during drought: the role of physiological tolerance. Fundamental and Applied Limnology-Archiv fur Hydrobiologie, 168(2), 169-178.	High
18	4.05	Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA	Yes	CABI, 2021. Ameiurus melas (bighead carp). https://www.cabi.org/isc/datasheet/94466 (accessed October 2021)	Medium
	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	No documented evidence for negative effect on ecosystem services though this seems to be due to to lack of study	Low
	4.07	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA	No	Not such pests or infectious agents are known from the RA area	Medium
21	4.08	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area?	Yes	Cvijanović, G., Lenhardt, M., Hegediš, A., Gačić, Z., & Jarić, I. Ameiurus melas (rafinesque)-pest or possibility. In eifac symposium on interactions between social, economic and ecological objectives of inland commercial and recreational	High

22	4.09	Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity?	No	https://www.fishbase.de/summary/Ameiurus-melas.html	Medium
	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)?	Yes	Not well documented, Usually reported from slowly moving rivers (Page, L.M. and B.M. Burr, 1991. A field guide to freshwater fishes of North America north of Mexico. Houghton Mifflin Company, Boston. 432 p. (Ref. 5723))	Low
24	4.11	Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa?	Yes	Indicated (CABI, 2021. Ameiurus melas (bighead carp). https://www.cabi.org/isc/datasheet/94466 (accessed October 2021) but not well documented	Low
25	4.12	Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)?	Yes	Not well documented. However it is reported that the escaped individuals were source for established populations	Low
		e exploitation	r		1
	5.01	Is the taxon likely to consume threatened or protected native taxa in the RA area?	Yes	Reviewd in CABI, 2021. Ameiurus melas (bighead carp). https://www.cabi.org/isc/datasheet/94466 (accessed October	Medium
27	5.02	Is the taxon likely to sequester food resources (including nutrients) to the	Yes	CABI, 2021. Ameiurus melas (bighead carp). https://www.cabi.org/isc/datasheet/94466 (accessed October	High
		detriment of native taxa in the RA area?		2021)	
	Reprodu				
28	6.01	Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?	Yes	Kottelat, M., & Freyhof, J. (2007). Handbook of European freshwater fishes. Publications Kottelat.	Very high
29	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	CABI, 2021. Ameiurus melas (bighead carp). https://www.cabi.org/isc/datasheet/94466 (accessed October	Very high
30	6.03	Is the taxon likely to hybridise naturally with native taxa?	Yes	Walter, R. P., Gnyra, E. S., Söderberg, L. I., & Heath, D. D. (2014). Rapid genetic identification of brown bullhead (Ameiurus nebulosus), black bullhead (Ameiurus melas) and their hybrids. Conservation Genetics Resources, 6(3), 507-509.	High
31	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	No	Page, L.M. and B.M. Burr, 1991. A field guide to freshwater fishes of North America north of Mexico. Houghton Mifflin Company, Boston. 432 p.	High
32	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	No	Page, L.M. and B.M. Burr, 1991. A field guide to freshwater fishes of North America north of Mexico. Houghton Mifflin Company, Boston. 432 p.	Very high
33	6.06	Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)?	No	Novomeská, A., & Kováč, V. (2009). Life-history traits of non-native black bullhead Ameiurus melas with comments on its invasive potential. Journal of Applied Ichthyology, 25(1), 79-84.	Medium
34	6.07	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	1	Copp, G. H., Tarkan, A. S., Masson, G., Godard, M. J., Koščo, J., Kováč, V., & Blackwell, B. G. (2016). A review of growth and life-history traits of native and non-native European populations of black bullhead Ameiurus melas. Reviews in Fish Biology and Fisheries. 26(3). 441-469.	High
		al mechanisms	r		1
35	7.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable	>1	Hitchhiker, natural increase of distribution, human mediated due to recreational purpose	Medium
36	7.02	Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)?	Yes	Western South Caucasian lowland (Colchis) is accessible through watercourses	High
37	7.03	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal?	No	No such evidnece exists.	High
38	7.04	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?	No	Not known from the close proximity, i.e. from the areas with direct connection via watercourse	High
39	7.05	Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?	Yes	Due to active swimming abilities, Juveniles can easily dispese through water currents	High
40	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	No	Species is not known as long distance migrant for reproduction. While no populations are known to close proximity of RA area, than no such expectation	High
41	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No	No such acases are known	High
42	7.08	Is dispersed in the KA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both	Yes	Not well documented though expected	Low
		unintentional or intentional) likely to be			
	7.09	Is dispersal of the taxon density dependent?	No	Not known, not documented	Low
44	8.01	re attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle?	No	Not a documented vidence	Medium
45	8.02	Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being considered.]	Yes	temperature, dissolved oxygen, turbidity and salinity - Cucherousset, J., Paillisson, J., Carpentier, A., & Chapman, L. J. (2007). Fish emigration from temporary wetlands during drought: the role of physiological tolerance. Fundamental and Applied Limnology-Archiv fur Hydrobiologie, 168(2), 169-178.	High

46	8.03	Can the taxon be controlled or eradicated in	No	No such a practice exists	Medium
		the wild with chemical, biological, or other			
		agents/means?			
47	8.04	Is the taxon likely to tolerate or benefit from	No	No such evidence exists	Low
		environmental/human disturbance?			
48	8.05	Is the taxon able to tolerate salinity levels	Yes	Though not well documented	Low
		that are higher or lower than those found in			
		its usual environment?			
49	8.06	Are there effective natural enemies	No	No such species are present in the RA area	High
		(predators) of the taxon present in the RA			
С. (Climate	e change			
		change			
50	9.01	Under the predicted future climatic	No change	Professional judgement	Medium
		conditions, are the risks of entry into the RA			
		area posed by the taxon likely to increase,			
		decrease or not change?			
51	9.02	Under the predicted future climatic	No change	Professional judgement	Medium
		conditions, are the risks of establishment			
		posed by the taxon likely to increase,			
		decrease or not change?			
52	9.03	Under the predicted future climatic	No change	Professional judgement	Low
		conditions, are the risks of dispersal within			
		the RA area posed by the taxon likely to			
		increase, decrease or not change?			
53	9.04	Under the predicted future climatic	Higher	Professional judgement	Low
		conditions, what is the likely magnitude of			
		future potential impacts on biodiversity			
		and/or ecological integrity/status?			
54	9.05	Under the predicted future climatic	Higher	Professional judgement	Medium
		conditions, what is the likely magnitude of			
		future potential impacts on ecosystem			
		structure and/or function?			
55	9.06	Under the predicted future climatic	Higher	Professional judgement	Medium
		conditions, what is the likely magnitude of			
		future potential impacts on ecosystem			
		services/socio-economic factors?			

Statistics	
Scores	
BRA	33.0
BRA Outcome	-
BRA+CCA	39.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	11.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	6.0
B. Biology/Ecology	22.0
4. Undesirable (or persistence) traits	8.0
5. Resource exploitation	7.0
6. Reproduction	4.0
7. Dispersal mechanisms	0.0
8. Tolerance attributes	3.0
C. Climate change	6.0
9. Climate change	6.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	5
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2
6. Reproduction	9
7. Dispersal mechanisms 8. Tolerance attributes	9
C. Climate change	6
9. Climate change Sectors affected	6
	12
Commercial Environmental	12
Species or population nuisance traits	12
Species of population nuisance traits	19
Thresholds	
Thresholds	
BRA+CCA	
Confidence	-
Confidence BRA+CCA	0.61
BRA+CCA BRA	0.61
BRA CCA	0.64
	0.42

Date and Time 04/05/2022 11:48:30

Taxon and Assessor details	axon and Assessor details					
Category	Fishes and Lampreys (freshwater)					
Taxon name	Ameiurus melas					
Common name	name black bullhead					
Assessor	Giorgi Epitashvili					
Risk screening context						
Reason and socio-economic benefits	Economic benefits from Ameiurus spp. aquaculture occurred primarily within eastern Europe					
Risk assessment area	South Caucasus					
Taxonomy	Ameiurus melas (Rafinesque, 1820)					
Native range	Native to Canada, USA and Mexico					
Introduced range	Black bullhead have been introduced to Europe, South America and many states in the USA and					
	https://www.fishbase.de/summary/ameiurus-melas.html					

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
1. L		ication/Cultivation			
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	The black bullhead (Ameiurus melas; family Ictaluridae) is a scaleless fish found naturally in waters from southern Canada to Mexico, from the Rocky Mountains to the Western slopes of the Appalachians (Smith 1985). It has, however, been stocked in many areas outside of its natural range (Smith 1985).	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	Black bullheads are not generally considered an important gamefish in Texas, though they are readily fished for by anglers in the Panhandle, and in far East Texas. A variety of baits may be used to catch them, but worms are usually the best. The largest specimen reported to date in Texas was 5.15 pounds.	Medium
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	In Europe A. melas forms dense stunted populations which makes it unpopular. Several countries report adverse ecological impact after introduction.	Very high
2. (Climate	, distribution and introduction risk			
4		How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range?	Medium	World Map of the Köppen-Geiger climate classification	Medium
5	2.02	What is the quality of the climate matching data?	Medium	World Map of the Köppen-Geiger climate classification	Medium
6	2.03	Is the taxon already present outside of captivity in the RA area?	No	No such fact has been detected	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	This species may be introduced by humans for aquacultural purposes.	Medium
8	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)?	No	There is no evidence at this stage that this species has been established around the SC region.	Medium
3.1	Invasive	e elsewhere			
5	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	A. melas is known to have introduced to many European countries, but established self-sustaining populations have only been confirmed for the Belgium Province of Wallonie, and the Netherlands (Verreycken et al. 2010), Austria (Wiesner et al. 2010), Germany (Wolter and Röhr 2010), Czech Republic (Musil et al. 2008), England (Wheeler 1978; this study), France (Copp 1989; Cucherousset et al. 2008), Hungary (Bódis et al. 2012), Italy (Pedicillo et al. 2009), Poland (Nowak et al. 2010a, 2010b), Portugal (Gante and Santos 2002; Ribeiro et al. 2006), Romania (Wilhelm 1998; Gaviloaie and Falka 2006), Serbia (Cvijanović et al. 2005), Slovakia (Koščo et al. 2010) and Spain (Miranda et al. 2010: De Minuel et al. 2014). Switzerland (Wittenherer 2005) and	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	In natural waters, the introductions have resulted in many cases in economically profitable fisheries, although most introductions have failed or led to unwanted consequences in the form of reduced or collapsed native fish stocks (Turchini et al., 2008).	Very high
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	According to cabi.org, the impact on aquaculture is assessed as positive.	High
	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem services?	Yes	In water bodies used by anglers, their perception of the angling value may be reduced by the species' presence (Aislabie et al. 2019). For instance a fishery in North London succumbed to this highly efficient invader, and the local angling club had lost one of	High
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	Yes	Benthivorous fish in shallow, aquatic systems have been correlated with increased turbidity and declines in macrophyte production and wildlife use (Braig & Johnson 2003).	High
B. I	Biology	y/Ecology			
		able (or persistence) traits	1		1
14	4.01	Is it likely that the taxon will be poisonous or pose other risks to human health?	Yes	A. melas can cause a painful sting if pectoral spines puncture human flesh due to the small amounts of venom at theends of spine, which can cause pain for up to a week (Etnier and Starnes, 1993; Rose, 2006; Aislabie et al. 2019).	Very high
		Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	Black bullheads tend to be found in high local abundance, their behaviour could therefore interfere with accompanying species and negatively affect the behaviour of native predators and prey (cabi.org).	Very high
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	Yes	There are meny endemic and threathened species in the SC region which would be affected by A. melas e.g. Salmo spp. Luciobarbus capito, Acipenser spp, etc.	High

12 14 Is the taxon adaptative interms of climitstic and other involved or condel mysels in terms of climitstic and other involved or condel mysels the Amera? Yes This species has been accessfully established in some European involved or condel mysels the Amera? High 44 5 In the species index to support the Amera? Investigation is involved in some curves and mysels in the Amera? High 44 5 In the species index to support the Amera? Investigation is involved in some curves (a.m. High in carry structure (a.m. High index to structure (a.m. High in carry structure (a.m. High index to structure (a.m. High in carry structure (a.m. High index to structure (a.m. High index to structure (a.m. High index to structure (a.m. High index to structure (a.m. High index to structure (a.m. High index to structure (a.m. High index to structure (a.m. High index to structure (a.m. High index to structure (a.m. High index to structure (a.m. High index to structure (a.m. High index to structure (a.m. High index to structure (a.m. High index to structure (a.m. High index to structure (a.m. High index to structure (a.m. High index tostructure (a.m. High index to structure (a.m. High in	17					
enhancing is possible and the possible of the set		4.04		Yes		High
Image: include in conditional the RA analytic in construction is needed to assess Analytics population transfa and Reduin in the invade of its RA analytics in the RA analytics in some regions. Medium Medium 4.65 5.6 1.					countries and such a thing is expected in the Caucasus as well.	
18 18 18 bit is bit bit bit bit bit bit bit is bit bit bit is bit is bit bit bit bit			enhancing its potential persistence if it has			
structure(uncloin in alguable coopystems II it. Impacts, such as define of near-or intervents (near). 19 ADD Is the transmittery to every address in plant. Near Structure register, and an explose in summer controls (near). Near 21 ADD Is Life transmittery to every address in plant. Near Structure register, and an explose in summer controls (near). Near 21 ADD Is Life transmittery to every address in a structure register. Low Near 21 ADD Is Life transmittery to every address in a structure register. Near Near Near Low 21 ADD Is Life transmittery to every address in a			invaded or could invade the RA area?			
Image: Section of the index of a section in the D area Image: Section D area Image: SectionD area Image: Section D area Im	18	4.05	Is the taxon likely to disrupt food-web	Yes	Investigation is needed to assess Ameiurus population trends and	Medium
19 16 5. In the starn likely to event abverse impacts Yes Similar cases have already been reported in some countries (e.g. including and the same is expected to happen in the SC region. High 20 4.67 5.1 It likely that the taxen will hole, and/or including and/or including and/or including and/or including and/or including agents that are endown (in the SC region. Low 21 4.68 5.1 It likely that the taxen will hole, and/or including agents that are endown (in the SC region. Low 21 4.68 5.1 It likely that the taxen will hole, and/or including (including including includi			structure/function in aquatic ecosystems if it		impacts, such as decline of reservoir water quality and food web	
In uccystem excitate excitate in the 8.4 area? In UK and the same is expected to happen in the SC region. Commentation 4.07 IS if likely that the text own (in the st, and/or excitate and excitat			has invaded or is likely to invade the RA		structure alteration in some regions.	
20 4.07 [Ust It likely that the taxon will hold, anyor Not applicable Such data is not available for the SC region. Low 21 4.00 intellibut an endiance in the Anyor Not applicable Such data is not available for the SC region. Low 21 4.00 the Rates Not applicable Such data is not available for the SC region. Low 22 4.00 the Rates Not applicable Such data is not available for the SC region. Low 23 4.00 the Rates Not applicable Such data is not available for the SC region. Low 24 4.01 the Rates Installing sectors Medium Not applicable Such data is not available for the SC region. Not applicable 24 1.11 State sectors Not applicable Such association available sociation ava	19	4.06	Is the taxon likely to exert adverse impacts	Yes	Similar cases have already been reported in some countries (e.g.	High
20 4.07 [Ust It likely that the taxon will hold, anyor Not applicable Such data is not available for the SC region. Low 21 4.00 intellibut an endiance in the Anyor Not applicable Such data is not available for the SC region. Low 21 4.00 the Rates Not applicable Such data is not available for the SC region. Low 22 4.00 the Rates Not applicable Such data is not available for the SC region. Low 23 4.00 the Rates Not applicable Such data is not available for the SC region. Low 24 4.01 the Rates Installing sectors Medium Not applicable Such data is not available for the SC region. Not applicable 24 1.11 State sectors Not applicable Such association available sociation ava			on ecosystem services in the RA area?		in UK) and the same is expected to happen in the SC region.	-
set as a vector or, recognized pests and infectious agents that are requires in the Applicable Sub applicable	20	4.07	Is it likely that the taxon will host, and/or	Not applicable	Such data is not available for the SC region.	Low
infertious agents that are endemic in the RA Role is infertious agents that are endemic in the RA response of the SC region. Low Low </td <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>						
21 4.06 [5] If likely that the taxon with hot, and/or and tax used taxon with hot, and/or and tax used for model pression increases and the sector for, model pression (novel) Low Low 22 4.00 [6] If likely that the taxon with actual and pression (novel) Max length is 66.0 cm TL male/unsexed, common length 1.26.6 cm TL male/unsexed, common length 1.26.6 cm TL male/unsexed, max, published weight: 3.6 kg. This species Very high 23 4.10 15 the taxon capable of subtating itset it in a taxon with local for anaxyoture propose. Inhomosome of water values (row for anaxyoture) of proposed taxon capable of subtating itset it in a taxon with response model of subtating itset its in taxon with response model of subtating itset its in taxon with response model of subtating itset its in taxon with response model of subtating itset its in taxon with response model of subtating itset its in taxon with response model of subtating itset its in taxon with response model of subtating itset its in taxon with response model of subtating itset its in taxon with response model of subtating itset its in taxon with response model of subtating itset its in taxon with response model of subtating itset its in taxon with response model of subtating itset its in the fact and with response model of subtating itset its in the fact and with response its in the fact and response its in the fact its not known Low 25 50.11 50.11 50.11 50.11 50.11 50.11 50.11 50.11 50.11 50.11 50.11 50.11						
sit to a victor for, recognized pests and interclose spents that are absent from (now) Max kength is 66.0 cm TL male/unsexed, common length - 26.6 Very high cm TL male/unsexed, max, published weight of the substance caseble of substanting test in a substance caseble of substanting test in a substance is used for auxacultural purposes. Not kength is 66.0 cm TL male/unsexed, common length - 26.6 Very high cm TL male/unsexed, max, published weight over soft substance in cesses and small to larger runs; impoundments, under substance caseble of substanting test in a substance in cesses and small to larger runs; impoundments, under substance in cesses and small to larger runs; impoundments, under substance in cesses and small to larger runs; impoundments, under substance in the substance of the substance in the substance is and substance in the substance is the substance in the	21	4.08		Not applicable	Such data is not available for the SC region.	Low
Infectious agents that are absent from (novel to b) the 8A area? Infectious agents that area absent from (novel b) the RA area? Ves Infection (applit) is 6.0.0 mL inductions (applit) induc				not applicable		2011
In the RA area2 Ves Note Register Re						
22 4.09 Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity? Yes Max length is 56.0 cm TL maik/unsexed, common length: 26.6 kg. This species is used for autocultural surproses. In the species is and the species in the species of turbidity (e.g. excretion of by-products) or behaviours (e.g. excretion of by-products) or behaviours (figura adverse conditions) No 25 25 15 15 15 15 15 15 26 26 26 16 16 16 <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td></td<>						
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23 4.01 Is the taxon spable of sustaining test in a mape of water velocity conditions (e.g. versattle in habits use)? No Initiabits pools, backwaters, and sluggish current spin pools material spin points in the special spin points in the spin point in						
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24 4.1 B it likely that the taxon's mode of existence Yes A. melas has high potential impact on water quality. Ameluns (e.g. feeding) will reduce habitat quality for native taxa? Yes A. melas has high potential impact on water quality. Ameluns (Bela and Johnson, 2003). Very high 25 4.12 Is the taxon likely to maintain a viable population even when present in low (Bela and Johnson, 2003). Very high Very high 26 5.01 Is the taxon likely to comume threatened or protected native taxa in the RA area? Yes The probability of this is high if the species is distributed in the region. The following species may be impacted: Salmo spp. Very high 27 5.02 Is the taxon likely to bothic parental care and or or brack quarts Yes Maximum length of parental care in A. melas is 29 days. Medium defium 26 5.01 Is the taxon likely to hothic parental care and or or brack quarts Yes Maximum length of parental care in A. melas is 29 days. Medium defium 26 6.02 Is the taxon likely to hothic parental care and or or brack quarts No Such a fact is not known. Low 26 6.03 Is the taxon likely to hothic parental care and or or brack quarts No Such a fact is not known. Low 26 1s the taxon likely to produce vablat gametes No						
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43 7.09 Is dispersal of the taxon density dependent? Not applicable Such data is not available Low	39 40 41	7.05 7.06 7.07	occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous	No	This species does not occurring in the SC region. This species does not occurring in the SC region. This species does not occurring in the SC region and at this stage	Very high Very high
	39 40 41	7.05 7.06 7.07	occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both	No	This species does not occurring in the SC region. This species does not occurring in the SC region. This species does not occurring in the SC region and at this stage	Very high Very high
	39 40 41 42	7.05 7.06 7.07 7.08	occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be	No No	This species does not occurring in the SC region. This species does not occurring in the SC region. This species does not occurring in the SC region and at this stage it is impossible to determine.	Very high Very high Low

44	8.01	Is the taxon able to withstand being out of	No	This species could not exist without water	High
		water for extended periods (e.g. minimum of			-
		one or more hours) at some stage of its life			
		cycle?			
45	8.02	Is the taxon tolerant of a wide range of	Yes	A. melas has considerable tolerance to water pollution, turbidity,	Very high
		water quality conditions relevant to that		low oxygen concentration, elevated temperatures and a range of	
		taxon? [In the Justification field, indicate the		pH values.	
		relevant water quality variable(s) being			
46	8.03	Can the taxon be controlled or eradicated in	Yes	The application of trapping and electric fishing to controlling black	High
		the wild with chemical, biological, or other		bullhead Ameiurus melas was relatively effective in a French lake	
		agents/means?		as no compensatory responses were recorded. In contrast,	
				compensatory responses were detected in A. melas populations	
				elsewhere following mass removals.	
47	8.04	Is the taxon likely to tolerate or benefit from	Yes	This species has spread by humans in many regions of the world.	Very high
		environmental/human disturbance?			
48	8.05	Is the taxon able to tolerate salinity levels	No	A. melas is typicall freshwater species and not found in salt waters.	High
		that are higher or lower than those found in			
		its usual environment?			
49	8.06	Are there effective natural enemies	Yes	There are several potential predators distributed in the SC region	Very high
		(predators) of the taxon present in the RA		which can controll A. melas population: Esox lucius, Sander	
		area?		lucioperca, Silurus glanis, Salmo spp, etc.	
		e change			
		change Under the predicted future climatic	No change	Own judgement	Madium
50	9.01	conditions, are the risks of entry into the RA	No change	Own judgement	Medium
		area posed by the taxon likely to increase,			
51	9.02	decrease or not change? Under the predicted future climatic	No change	Own judgement	Medium
51	5.02	conditions, are the risks of establishment	No change	own judgement	neulum
		posed by the taxon likely to increase,			
		decrease or not change?			
52	9.03	Under the predicted future climatic	No change	Own judgement	Medium
52	5.05	conditions, are the risks of dispersal within	no chunge		
		the RA area posed by the taxon likely to			
		increase, decrease or not change?			
53	9.04	Under the predicted future climatic	No change	Own judgement	Medium
		conditions, what is the likely magnitude of		·	
		future potential impacts on biodiversity			
		and/or ecological integrity/status?			
					Medium
54	9.05	Under the predicted future climatic	No change	Own judgement	Medium
54	9.05	Under the predicted future climatic	No change	Own judgement	Medium
54	9.05		No change	Own judgement	Medium
54	9.05	Under the predicted future climatic conditions, what is the likely magnitude of	No change	Own judgement	healan
	9.05 9.06	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem	No change	Own judgement Own judgement	Medium
		Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?			
		Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? Under the predicted future climatic			

Statistics	
Scores	
BRA	26.5
BRA Outcome	-
BRA+CCA	24.5
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	14.5
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	0.0
3. Invasive elsewhere	10.5
B. Biology/Ecology	12.0
4. Undesirable (or persistence) traits	8.0
5. Resource exploitation	7.0
6. Reproduction	1.0
7. Dispersal mechanisms	-4.0
8. Tolerance attributes	0.0
C. Climate change	-2.0
9. Climate change	-2.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	5
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2
6. Reproduction	
7. Dispersal mechanisms	9
8. Tolerance attributes	6
C. Climate change	6
9. Climate change	6
Sectors affected Commercial	7
Environmental	12
	12
Species or population nuisance traits	/

Thresholds	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.69
BRA	0.71
CCA	0.50
Date and Time	
02/05/20	022 16:11:33

axon and Assessor details					
Category	Fishes and Lampreys (freshwater)				
Taxon name	Ameiurus melas				
Common name black bullhead					
Assessor	Tatia Kuljanishvili				
Risk screening context					
Reason and socio-economic benefits	Introduced species in Europe				
Risk assessment area	South Caucasus				
Taxonomy	Ameiurus melas				
Native range	Central eastern Nort America				
Introduced range	Europe				
URL	https://www.fishbase.se/summary/Ameiurus-melas.html				

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			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
1. L		ication/Cultivation			1
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	Is used in aquaculture	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	Has been transported live for improvement of fish stocks in Europe (Ribiero et al 2006)	Very high
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	Yes, for example A. nebulosus	Very high
2. (Climate	, distribution and introduction risk			
4	2.01	How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range?	High	They are somehow similar. Out of 18 stations 4, 3 and 6 stations landed on values of 7, 8 and 9	Medium
5	2.02	What is the quality of the climate matching data?	Medium	Quality is medium	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	No	No. The species has never been spoted outside its captivity in RA area. There are no documented records of it.	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	>1	Aquaculture, recreational fisheries	High
8	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)?	Yes	This species is present in Turkey and is likely to enter RA	Very high
3.1	1	e elsewhere			1
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	It has been living in European cpuntries for more than a century "Ebro and Tagus drainages (Iberian Peninsula), most drainages of France, locally in Italy, the Netherlands and Germany; distribution could be wider" https://www.fishbase.se/summary/Ameiurus-	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	Impacts native fish species by predation (Leunda et al 2008) and comperition with other predators (kreutzenberger et al 2008)	Very high
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	Yes	Markovic et al 2012 considered A. melas as species impacting serbian aquaculture	High
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	Yes	1) Affects water quality; 2) can be transmitting diseases; Holcik, 1991; Moyle and Light, 1996; Vitule et al., 2009	High
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	No information is available about the socio-economic impact of the given species.	Low
B. I	Biology	y/Ecology			
4. l	Undesir	able (or persistence) traits			
14	4.01	Is it likely that the taxon will be poisonous or pose other risks to human health?	No	Not poisonous. Does not pose risks to human helth See: https://fishbase.mnhn.fr/summary/Ameiurus-melas.html	Very high
	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	Yes "Amongst the life history and ecological attributes that seem to characterize the success of the black bullhead as an invasive species are: high fecundity, parental care of the offspring, voracious and versatile feeding habits, habitat and water quality flexibility (withstanding water temperatures as high as 30° C, high turbidity, a wide range of pH and even hypoxia) and tolerance to pollution, as has been shown for many other invasive fish species in Mediterranean catchments (Alcaraz et al., 2005; Vila-Gispert et al., 2005; Ribeiro et al., 2008). These characteristics constitute a real rather than a notential threat for	Very high
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	does not parasite See: https://fishbase.mnhn.fr/summary/Ameiurus-melas.html	Very high
17	4.04	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?	Yes	it can "withstanding water temperatures as high as 30° C, high turbidity, a wide range of pH and even hypoxia"https://www.ucm.es/data/cont/docs/568-2013-11-22- Leundaetal2008.pdf	Very high
	4.05	Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA area?	Yes	it can "withstanding water temperatures as high as 30° C, high turbidity, a wide range of pH and even hypoxia"https://www.ucm.es/data/cont/docs/568-2013-11-22- Leundaetal2008.pdf	Medium
	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes	"In view of the continued reports of non-native range expansions by the species in Europe, it is highly likely that the distribution and impact to native communuties and ecosystem services of the species will increase."	Medium
20	4.07	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA	No	No information avalable.	Low

21					
	4.08	Is it likely that the taxon will host, and/or	Yes	It is likely. Even though, not studied, the risk is still there.	Medium
		act as a vector for, recognised pests and			
		infectious agents that are absent from (novel			
17	4.09	to) the RA area? Is it likely that the taxon will achieve a body	Yes	Yes: Max length : 66.0 cm TL male/unsexed; common length :	Very high
. 2	4.09	size that will make it more likely to be	Tes	26.6 cm TL male/unsexed; max. published weight: 3.6 kg. See:	very nigh
		released from captivity?		https://fishbase.mnhn.fr/summary/Ameiurus-melas.html	
3	4.10	Is the taxon capable of sustaining itself in a	No	Inhabits pools, backwaters, and sluggish current over soft	Medium
		range of water velocity conditions (e.g.		substrates in creeks and small to large rivers; impoundments,	. iouium
		versatile in habitat use)?		oxbows, and ponds. See:	
4	4.11	Is it likely that the taxon's mode of existence	Yes	"The black bullhead is a benthivorous fish inhabiting standing	Very high
		(e.g. excretion of by-products) or behaviours		waters with soft bottom substrata (Keith & Allardi, 2001), and its	
		(e.g. feeding) will reduce habitat quality for		activity is known to generate turbidity (Braig & Johnson, 2003).	
		native taxa?		"http://brosse.sebastien.free.fr/2008_Kreutzenberger%20et%20al	
	4 1 7	Is the tayon likely to maintain a viable	Vaa	J%20Fish%20Biol.pdf	High
Э	4.12	Is the taxon likely to maintain a viable population even when present in low	Yes	Yes.It is highly possible since their mating behaviour, which includes building the nest, guarding and airaing their eggs.	High
		densities (or persisting in adverse conditions		includes building the nest, guarding and anality their eggs.	
		by way of a dormant form)?			
. F	Resourd	ce exploitation			
	1		Yes	Leunda et al 2008	High
		protected native taxa in the RA area?			_
7	5.02	Is the taxon likely to sequester food	Yes	" Taking into account black bullhead's voracity and aggressive	Very high
		resources (including nutrients) to the		behaviour, the diet similarity might lead to an unfavourable	
		detriment of native taxa in the RA area?		competition for the same food resources, subsequently, displacing	
				native fishes to suboptimal food resources. Some effects of exotic	
				ichthyophagous fishes, such as on competition and predation, are	
				habitat-dependent and might be favoured by habitat	
				degradation."https://www.ucm.es/data/cont/docs/568-2013-11- 22-Leundaetal2008.pdf	
. F	Reprodu	uction		<u></u>	
		Is the taxon likely to exhibit parental care	Yes	Both males and females guard and fan the nests	Very high
		and/or to reduce age-at-maturity in response			
_		to environmental conditions?			
9	6.02	, , , , , , , , , , , , , , , , , , , ,	No	No info avalable information. However, we can asume hat the	Low
_	6.02	or propagules (in the RA area)?	No	probability of this is low due to the climatic conditions in RA.	Vorschich
U	6.03	Is the taxon likely to hybridise naturally with native taxa?	No	No. It is not documented and is unlikely.	Very high
1	6.04	Is the taxon likely to be hermaphroditic or to	No	No. Their spawning habits are expressed on the following link:	Very high
-	0.04	display asexual reproduction?		https://fishbase.mnhn.fr/summary/Ameiurus-melas.html	very night
2	6.05	Is the taxon dependent on the presence of	No	No. Can complete their life cycle without presence of another	Very high
-		another taxon (or specific habitat features)	-	taxon.	,
		to complete its life cycle?			
3	6.06	Is the taxon known (or likely) to produce a	Yes	Females produce between 2,000 and 3,800 eggs.	Medium
		large number of propagules or offspring			
		within a short time span (e.g. < 1 year)?			
4	6.07			1-3 years	
	0.07	How many time units (days, months, years)	2	1-5 years	Very high
	0.07	does the taxon require to reach the age-at-	2		Very high
7 5		does the taxon require to reach the age-at- first-reproduction?	2	1-5 years	Very high
	Dispers	does the taxon require to reach the age-at- first-reproduction? al mechanisms			
	Dispers	does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal	2 One	Aquaculture	Very high Very high
	Dispers	does the taxon require to reach the age-at- first-reproduction? al mechanisms			
5	Dispers	does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the		Aquaculture it is possible, since the aquaculture and recriational fisheries is	
5	Dispers 7.01	does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more	One	Aquaculture it is possible, since the aquaculture and recriational fisheries is very popular in the area, and stocking of non-native species is not	Very high
5	7.01	does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)?	One Yes	Aquaculture it is possible, since the aquaculture and recriational fisheries is very popular in the area, and stocking of non-native species is not well monitored.	Very high Low
5 6	Dispers 7.01	does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively	One	Aquaculture it is possible, since the aquaculture and recriational fisheries is very popular in the area, and stocking of non-native species is not well monitored. No. Does not attach itself to hard substrata, this species do not	Very high
5 6	7.01	does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship	One Yes	Aquaculture it is possible, since the aquaculture and recriational fisheries is very popular in the area, and stocking of non-native species is not well monitored.	Very high
5 6	7.01	does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances	One Yes	Aquaculture it is possible, since the aquaculture and recriational fisheries is very popular in the area, and stocking of non-native species is not well monitored. No. Does not attach itself to hard substrata, this species do not	Very high
5 6 7	Dispers 7.01 7.02 7.03	does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal?	One Yes No	Aquaculture it is possible, since the aquaculture and recriational fisheries is very popular in the area, and stocking of non-native species is not well monitored. No. Does not attach itself to hard substrata, this species do not have morphological traits that will allow them to do so.	Very high Low Very high
5 6 7	7.01	does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to	One Yes	Aquaculture it is possible, since the aquaculture and recriational fisheries is very popular in the area, and stocking of non-native species is not well monitored. No. Does not attach itself to hard substrata, this species do not have morphological traits that will allow them to do so. No. As far as we know this fish has not brought in the area as	Very high
6	Dispers 7.01 7.02 7.03	does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal?	One Yes No	Aquaculture it is possible, since the aquaculture and recriational fisheries is very popular in the area, and stocking of non-native species is not well monitored. No. Does not attach itself to hard substrata, this species do not have morphological traits that will allow them to do so.	Very high Low Very high
5 6 7 8	Dispers 7.01 7.02 7.03	does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules	One Yes No	Aquaculture it is possible, since the aquaculture and recriational fisheries is very popular in the area, and stocking of non-native species is not well monitored. No. Does not attach itself to hard substrata, this species do not have morphological traits that will allow them to do so. No. As far as we know this fish has not brought in the area as	Very high Low Very high
5 6 7 8	7.02 7.03 7.04	does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as	One Yes No	Aquaculture it is possible, since the aquaculture and recriational fisheries is very popular in the area, and stocking of non-native species is not well monitored. No. Does not attach itself to hard substrata, this species do not have morphological traits that will allow them to do so. No. As far as we know this fish has not brought in the area as inseminated eggs. So it is not likely.	Very high Low Very high Very high
5 6 7 8	7.02 7.03 7.04	does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA	One Yes No	Aquaculture it is possible, since the aquaculture and recriational fisheries is very popular in the area, and stocking of non-native species is not well monitored. No. Does not attach itself to hard substrata, this species do not have morphological traits that will allow them to do so. No. As far as we know this fish has not brought in the area as inseminated eggs. So it is not likely.	Very high Low Very high Very high
5 6 7 8 9	Dispers. 7.01 7.02 7.03 7.04 7.05	does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?	One Yes No No Yes	Aquaculture it is possible, since the aquaculture and recriational fisheries is very popular in the area, and stocking of non-native species is not well monitored. No. Does not attach itself to hard substrata, this species do not have morphological traits that will allow them to do so. No. As far as we know this fish has not brought in the area as inseminated eggs. So it is not likely. Is not documented but I assume it is possible.	Very high Low Very high Very high High
5 6 7 8 9	7.02 7.03 7.04	does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to	One Yes No	Aquaculture it is possible, since the aquaculture and recriational fisheries is very popular in the area, and stocking of non-native species is not well monitored. No. Does not attach itself to hard substrata, this species do not have morphological traits that will allow them to do so. No. As far as we know this fish has not brought in the area as inseminated eggs. So it is not likely.	Very high Low Very high Very high
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46	8.03	Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	Yes	yes but it is costy and sometimes inefective	Low
47	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	Yes	yes very tolerant to pollution (Leunda et al 2008)	Very high
48	8.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	No	No information avalable	Low
		Are there effective natural enemies (predators) of the taxon present in the RA	No	No effective natural enemies present in RA.	Very high
		e change change	_		
		Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?	Increase	It was hypotheses that climate change might alert the mechanisms of transportation and introduction of non-native species. Commercial and recreational activities will increase, that itself increases the propagule pressure levels of non-native	Very high
51	9.02	Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	Increase	it is a warmwater fish. with increasing temperatures, risks of establishment increases	Very high
52	9.03	Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change?	Increase	With increased temperatures It can distribute to higher altitudes as well	High
53	9.04	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	Higher	They will be widely distributed and since their abundance the impacts on biodiversity will be higher	Very high
54	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Higher	Magnitude of potential impacts on ecosystem structure and function seems higher	High
55	9.06	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	Higher	Magnitude of potential impacts on ecosystem services-socio- economic factors seems higher	Very high

Statistics	
Scores	
BRA	35.0
BRA Outcome	-
BRA+CCA	47.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	19.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	14.0
B. Biology/Ecology	16.0
4. Undesirable (or persistence) traits	8.0
5. Resource exploitation	7.0
6. Reproduction	1.0
7. Dispersal mechanisms	-2.0
8. Tolerance attributes	2.0
C. Climate change	12.0
9. Climate change Answered Questions	12.0
Answered Questions Total	
A. Biogeography/Historical	55 13
1. Domestication/Cultivation	3
2. Climate, distribution and introduction risk	
3. Invasive elsewhere	5 5
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	
6. Reproduction	2
7. Dispersal mechanisms	9
8. Tolerance attributes	6
C. Climate change	6
9. Climate change	6
Sectors affected	
Commercial	14
Environmental	17
Species or population nuisance traits	18
Thresholds	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.81
BRA	0.80
CCA	0.92

Date and Time 20/05/2022 15:33:04

Taxon and Assessor details	
Category	Fishes and Lampreys (freshwater)
Taxon name	Anguilla anguilla
Common name	European eel
Assessor	Bella Japoshvili
Risk screening context	
Reason and socio-economic benefits	The first NNS risk scrining project for South-Caucasian fishes.
Risk assessment area	South Caucasus
Taxonomy	Animalia/Chordata/Actinopterygii/Anguilliformes/Anguillidae/Anguilla/A. anguilla
Native range	Europe
Introduced range	Caspian Sea basin
URL	

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
1. C	Domest	ication/Cultivation			
1	1.01	Has the taxon been the subject of	Yes	Gousset, B. (1990). European eel (Anguilla anguilla L.) farming	Very high
		domestication (or cultivation) for at least 20		technologies in Europe and in Japan: Application of a comparative	
		generations?		analysis. Aquaculture, 87(3-4), 209-235.	
2	1.02	Is the taxon harvested in the wild and likely	Yes	The individuals are caught in the wild and then threated in	High
	-	to be sold or used in its live form?		captivity to artificially induce the maturation (Mordenti, O., Di	5
				Biase, A., Bastone, G., Sirri, R., Zaccaroni, A., & Parmeggiani, A.	
				(2013). Controlled reproduction in the wild European eel (Anguilla	
3	1.03	Does the taxon have invasive races,	No	anguilla): two populations compared. Aquaculture international, Not known	High
5	1.05		NO		nign
2 6		varieties, sub-taxa or congeners?			
		, distribution and introduction risk			lue a
4	2.01	How similar are the climatic conditions of the	High	Climmatch algorithm - very similar	High
		Risk Assessment (RA) area and the taxon's			
		native range?			
5	2.02	What is the quality of the climate matching	Medium	No exhaustive data distribution data is available	High
		data?			
6	2.03	Is the taxon already present outside of	Yes	Kuljanishvili et al., 2021	Medium
L		captivity in the RA area?			
7	2.04	How many potential vectors could the taxon	>1	It can be translocated by human dirctly or migrate through the	Very high
		use to enter in the RA area?		chenelled system	
8	2.05	Is the taxon currently found in close	No	No evidence of viable (established) populations in RA	Medium
		proximity to, and likely to enter into, the RA		······································	
		area in the near future (e.g. unintentional			
		and intentional introductions)?			
2 7	nu na ni u	e elsewhere			
			NIE	Na such an suidenas suista	M a allo una
9	3.01	Has the taxon become naturalised	No	No such an evidence exists	Medium
		(established viable populations) outside its			
10	3.02	In the taxon's introduced range, are there	Yes	Evans, D. W., & Matthews, M. A. (1999). Anguillicola crassus	High
		known adverse impacts to wild stocks or		(Nematoda, Dracunculoidea); first documented record of this	
		commercial taxa?		swimbladder parasite of eels in Ireland. Journal of Fish Biology,	
				55(3), 665-668.	
11	3.03	In the taxon's introduced range, are there	No	No such an evidence	High
		known adverse impacts to aquaculture?			
12	3.04	In the taxon's introduced range, are there	Yes	Expected but not documented evidence	Low
		known adverse impacts to ecosystem			
13	3.05	In the taxon's introduced range, are there	No	No such an evidence	Medium
_		known adverse socio-economic impacts?	-		
B. E	Biology	y/Ecology			
		able (or persistence) traits			
		Is it likely that the taxon will be poisonous or	No	No such an evidence exists	High
		pose other risks to human health?			
15	4.02	Is it likely that the taxon will smother one or	No	No such an evidence exist	High
- 5	1.02				
		more native taxa (that are not threatened or			
1.0	4.02	protected)?	NI-	Consider in ant supplie	Mara hiah
10	4.03	Are there any threatened or protected taxa	No	Species is not prasite	Very high
		that the non-native taxon would parasitise in			1
		the RA area?			
17	4.04	the RA area? Is the taxon adaptable in terms of climatic	No	European eel need to migrate into the ocean for spowning. There	Medium
17	4.04	the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus	No	is no evidence that it can adapt the migration through the Black-	Medium
17	4.04	the RA area? Is the taxon adaptable in terms of climatic	No		Medium
17	4.04	the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus	No	is no evidence that it can adapt the migration through the Black-	Medium
		the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has	No	is no evidence that it can adapt the migration through the Black-	Medium
		the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web		is no evidence that it can adapt the migration through the Black- Caspian sea channales or spawn locally.	
		the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?		is no evidence that it can adapt the migration through the Black- Caspian sea channales or spawn locally.	
18		the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA	No	is no evidence that it can adapt the migration through the Black- Caspian sea channales or spawn locally. No such an evidence	Medium
18	4.05	the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts		is no evidence that it can adapt the migration through the Black- Caspian sea channales or spawn locally.	
18 19	4.05 4.06	the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	is no evidence that it can adapt the migration through the Black- Caspian sea channales or spawn locally. No such an evidence No any reason and not any evdence exists	Medium High
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18 19	4.05 4.06	the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and	No	is no evidence that it can adapt the migration through the Black- Caspian sea channales or spawn locally. No such an evidence No any reason and not any evdence exists	Medium High
18 19 20	4.05 4.06 4.07	the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA	No No	is no evidence that it can adapt the migration through the Black- Caspian sea channales or spawn locally. No such an evidence No any reason and not any evdence exists No such potential parasite or pests is known from RA area	Medium High High
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e.g. feeding will reduce habitat quality for native that any interaction a viable sub-bias of the start of the s	24			NO	No such an evidence	High
Inside tas2 No No such information available Low 25 4.2 Sin the consume threatment or the information available Low Low 2 2.5 4.2 Sin the consume threatment or the information available Low 2 2.5 2.5 1.5 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>						
25 4.2 (1) Is the taxon likely to maintain a violation in devine conditions No No such information available Low 26 5.01 (2) Is the taxon likely to consume threatend or Ves Fel is predator and within the RA area a number of third taxon to the RA area? High 27 5.01 (2) Is the taxon likely to consume threatend or Ves Fel is predator and within the RA area? High 27 5.01 (2) Is the taxon likely to consume threatend or Ves Fel is predator and within the RA area? Headian 26 (2) Is the taxon likely to consume threatend or Ves No No Devider, C. 1970. Synapsis of hiological data of the eld Anguilla social taxon likely to produce viable agentes No Devider, C. 1970. Synapsis of hiological data of the eld Anguilla social taxon likely to produce viable agentes No Devider, C. 1970. Synapsis of hiological data of the eld Anguilla social taxon likely to produce viable agentes No Devider, C. 1970. Synapsis of hiological data of the eld Anguilla social taxon likely to produce viable agentes No No Devider, C. 1970. Synapsis of hiological data of the eld Anguilla social taxon likely to produce viable agentes No No Devider, C. 1970. Synapsis of hiological data of the anguilla social taxon likely to produce viable agentes No Devider, C. 1970. Synapsis of hiological data of the anguilla social taxon lison taxon lison taxon lison taxon likely to produce ag						
population even when present in low densities (or persisting in Asive accordance) Provide a domain femi? 3.8 Sector	25			No	No such information available	Low
Deside Construction Construction 02 50.0 <td>-</td> <td></td> <td></td> <td>-</td> <td></td> <td></td>	-			-		
S. Resource exploitation Solury Formulation Formulation <td></td> <td></td> <td>densities (or persisting in adverse conditions</td> <td></td> <td></td> <td></td>			densities (or persisting in adverse conditions			
25 5.01 Is the taxon likely to consume threatened or protected native taxon in the A area? Yes Eel is predator and within the A harea there are a number of threatened species including fishes and investore threat additional fishes and investore in the A area? No No <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>						
Implementation Implementation Implementation Implementation Implementation 25 20 Set to consider the sequences frood mutation set in the XA area? No No available and mutation set in the XA area? Medium 28 6.01 Is the toxon likely to produce value space mutation mutations. No No available mutations. No 28 6.01 Is the toxon likely to produce value space mutation. No No available mutation. No No available mutation. No No available mutation. No No No available mutation.						I .
27 5.02 Is the teacon likely to sequester food resources (including nutrities) to the definitient of native tasis in the RA area? No No enderse. Although It is competing food with comparison from the RA ender in this native area, no similar sequests is known from the RA and/or to reduce age-at-maturity in response is derivation reduce age-at-maturity in response to environmental conditions? No Reedum. No Reedum. Wery high angula (Lineaces, 1750; FAO That, Sympo, 80: 68,) Wery high angula (Lineaces, 1750; FAO That, Sympo, 80: 68,) Wery high angula (Lineaces, 1750; FAO That, Sympo, 80: 66,) Wery high angula (Lineaces, 1750; FAO That, Sympo, 80: 66,) Wery high angula (Lineaces, 1750; FAO That, Sympo, 80: 66,) Wery high angula (Lineaces, 1750; FAO That, Sympo, 80: 66,) Wery high angula (Lineaces, 1750; FAO That, Sympo, 80: 66,) Wery high angula (Lineaces, 1750; FAO That, Sympo, 80: 66,) Wery high angula (Lineaces, 1750; FAO That, Sympo, 80: 66,) Wery high angula (Lineaces, 1750; FAO That, Sympo, 80: 66,) Wery high angula (Lineaces, 1750; FAO That, Sympo, 80: 66,) Wery high angula (Lineaces, 1750; FAO That, Sympo, 80: 66,) Wery high angula (Lineaces, 1750; FAO That, Sympo, 80: 66,) Wery high angula (Lineaces, 1750; FAO That, Sympo, 80: 66,) Wery high angula (Lineaces, 1750; FAO That, Sympo, 80: 66,) Wery high angula (Lineaces, 1750; FAO That, Sympo, 80: 66,) Wery high angula (Lineaces, 1750; FAO That, Sympo, 80: 66,) Wery high angula (Lineaces, 1750; FAO That, Sympo, 80: 66,) Wery high angula (Lineaces, 1750; FAO That, Sympo, 80: 66,) 27 20 20 <td>26</td> <td></td> <td></td> <td>Yes</td> <td></td> <td>High</td>	26			Yes		High
resources (incluing nutrients) to the dama and	77			No		Madium
depriment of native taxa in the RA nee? No 28 6.0.1 St the taxon likely to exhibit parental care and for torcicca age = Mathemativity in response to biological data of the cel Anguilla Very high anguilla (Linneaue, 1759). FAO Fab. Synop., 80: 68. Very high anguilla (Linneaue, 1759). FAO Fab. Synop., 80: 68. 29 6.0.2 Is the taxon likely to poduce viable gametas in the RA nee?) No other taxas rolated to E is known from RA nee? Very high anstrop, P. (2003). The ell (.A.B.C. Ordord: Blackeell Science. 31 6.0.4 Is the taxon likely to be homanipholitic or to Vers Tesch, F. W., & Bartsch, P. (2003). The ell (.A.B.C. Ordord: Very high another taxon (or specific habitat features) is to complete its life cycle? Very high another taxon (or specific habitat features) is to taxon features or ordor or reach the age attern must be a pathway for eel to migrate to the atlantic Very high Blackwell Science. 32 6.0.6 Is the taxon feature active faulties or dispring Blackwell Science. No Tesch, F. W., & Bartsch, P. (2003). The eel (.P. 408). Oxford: Very high Blackwell Science. 33 6.0.6 Is the taxon feature active faulties or dispring Blackwell Science. No Tesch, F. W., & Bartsch, P. (2003). The eel (.P. 408). Oxford: Very high Blackwell Science. 37.0.1 Inte an special by a human an also it can reach the Caspian sea farmed system No In the areas where Eai could be	27			NO		Medium
6. Reproduction Part Number 1 Part N					conger in thes had ve area, no similar species is known nom the KA	
28 6.0.1 Is the taxon likely to produce value game thaturty in response to be environmental conditions? No Deedder, C. 1970. Synops, 80: 68. Very high 29 6.02 Is the taxon likely to produce value gameters No It needs to migrate to the attantic for the spawning Tesch, F. W., Very high Very high 20 6.02 Is the taxon likely to produce value gameters No No No other taxon categories (p. 408). Oxford: Very high 21 6.44 Is the taxon likely to produce a taxon (especific haturality on briefider naturality with No No No other taxon categories (p. 408). Oxford: Very high 22 6.05 Is the taxon likely to produce a taxon (especific habits fatures) No No other taxon categories (p. 408). Oxford: Very high 23 6.64 Is the taxon (especific habits fatures) No No Esch, F. W., & Bartsch, P. (2003). The eel (p. 408). Oxford: Very high 24 6.07 Hor may time units (dark, months, vers) P.0 Esch, F. W., & Bartsch, P. (2003). The eel (p. 408). Oxford: Very high 25 7.01 Very high units abort time span (e.g., e.s.) P.0 Esch, F. W., & Bartsch, P. (2003). The eel (p. 408). Oxford: Very high 26 7.02 Will may time units (dark, months, vers) P.0 Esch, F. W., & Bartsch, P. (2003). The eel (p. 408). Oxford: Very high	6. R					
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	<u>с. с</u>					
9. Climate change						

50	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?	No change	After climmatch modeling no significant change is expected	Medium
51	9.02	Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	No change	No significant change is expected in the establishment risk after climmatch scenario	Medium
52	9.03	Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change?	No change	Based on personal judgment, expected climate change should not affect the eel dispersal	High
53	9.04	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	No change	No change is expected	Medium
54	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	No change	No change is expected	Medium
55	9.06	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	No change	No climate related change is expected	Medium

Statistics

Scores	
BRA	12.0
BRA Outcome	-
BRA+CCA	12.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	12.0
1. Domestication/Cultivation	2.0
2. Climate, distribution and introduction risk	2.0
3. Invasive elsewhere	8.0
B. Biology/Ecology	0.0
4. Undesirable (or persistence) traits	2.0
5. Resource exploitation	5.0
6. Reproduction	-2.0
7. Dispersal mechanisms	-3.0
8. Tolerance attributes	-2.0
C. Climate change	0.0
9. Climate change	0.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	13 3 5 5 36
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	5
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	12 12 7 9
6. Reproduction	/
7. Dispersal mechanisms	9 6
8. Tolerance attributes	
C. Climate change	6 6
9. Climate change	6
Sectors affected	
Commercial	11
Environmental	9
Species or population nuisance traits	•

Thresholds	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.69
BRA	0.71
CCA	0.54
Date and Time	
04/05/2	022 12:02:06

Taxon and Assessor details	
Category	Fishes and Lampreys (freshwater)
Taxon name	Anguilla anguilla
Common name	European eel
Assessor	Giorgi Epitashvili
Risk screening context	
Reason and socio-economic benefits	Anguilla anguilla is a snake-like, catadromous fish. Eels have been important sources of food. At
Risk assessment area	South Caucasus
Taxonomy	Family - Anguillidae
Native range	Atlantic Ocean: Atlantic coast from Scandinavia to Morocco; Baltic, Black and Mediterranean Seas;
Introduced range	Continuous introductions to Asia and South and Central America
URL	https://www.fishbase.se/summary/Anguilla-anguilla.html

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
		ication/Cultivation	1		1
1	1.01	Has the taxon been the subject of	Yes	Currently, the top three producing countries of farmed European	High
		domestication (or cultivation) for at least 20		eels are the Netherlands, Italy, and Denmark. Spain, Greece,	
		generations?		Sweden and Germany are also centres of eel farming activity and	
				smaller quantities are produced in several other European and	
				North African countries (FAO 2021).	
2	1.02	Is the taxon harvested in the wild and likely	Yes	Production of eels is based on wild catches of glass eels (elvers)	High
		to be sold or used in its live form?		used for further ongrowing (FAO 2021).	
3	1.03	Does the taxon have invasive races,	No	There is no evidence of the invasiveness of this species.	High
_		varieties, sub-taxa or congeners?	-	· · · · · · · · · · · · · · · · · · ·	5
2. (limate.	, distribution and introduction risk			
	2.01	How similar are the climatic conditions of the	High	Anguilla anguilla is naturally distributed in the SC region and	Very high
		Risk Assessment (RA) area and the taxon's	5	enters in some rivers of Georgian Black Sea (Ninua et al. 2013;	- / 5
		native range?		Kuljanishvili et al. 2020). Therefore, climatic conditions are	
5	2.02	What is the quality of the climate matching	High	Anguilla anguilla is naturally distributed in the SC region and	Very high
5	2.02	data?	ingn	enters in some rivers of Georgian Black Sea (Ninua et al. 2013;	Very high
		uala			
<i>c</i>	2.02	To the target alwayds and anti-ide of	V	Kuljanishvili et al. 2020). Therefore, climatic conditions are	Mana hiah
6	2.03	Is the taxon already present outside of	Yes	Anguilla anguilla is naturally distributed in the SC region and	Very high
		captivity in the RA area?		enters in some rivers of Georgian Black Sea (Ninua et al. 2013;	
				Kuljanishvili et al. 2020).	
7	2.04	How many potential vectors could the taxon	>1	A. anguilla is naturally distributed in the SC region and enters in	Very high
		use to enter in the RA area?		some rivers of Georgian Black Sea (Ninua et al. 2013;	
				Kuljanishvili et al. 2020). This species can also be enter in the	
				region through aquaculture.	
8	2.05	Is the taxon currently found in close	Yes	A. anguilla is naturally distributed in the SC region and enters in	Very high
		proximity to, and likely to enter into, the RA		some rivers of Georgian Black Sea (Ninua et al. 2013;	, -
		area in the near future (e.g. unintentional		Kuljanishvili et al. 2020).	
		and intentional introductions)?			
3 1	nvacive	e elsewhere			
9	3.01	Has the taxon become naturalised	No	No such facts have been recorded	Medium
_	5.01	(established viable populations) outside its			riculum
10	3.02	In the taxon's introduced range, are there	No	No such facts have been recorded	Medium
10	5.02	known adverse impacts to wild stocks or	NO		neulum
		commercial taxa?			
1 1	3.03	In the taxon's introduced range, are there	No	No such facts have been recorded	Medium
11	3.03	- · ·	NO	No such facts have been recorded	Medium
12	2.04	known adverse impacts to aquaculture?			M
12	3.04	In the taxon's introduced range, are there	No	No such facts have been recorded	Medium
1.0		known adverse impacts to ecosystem			
13	3.05	In the taxon's introduced range, are there	No	No such facts have been recorded	Medium
		known adverse socio-economic impacts?			
		//Ecology			
		able (or persistence) traits	1		
14	4.01	Is it likely that the taxon will be poisonous or	No	This species does not pose a threat to humans	Medium
		pose other risks to human health?			
15	4.02	Is it likely that the taxon will smother one or	No	No such facts have been recorded	Medium
		more native taxa (that are not threatened or			
		protected)?			
16	4.03	Are there any threatened or protected taxa	Yes	No such facts have been recorded	Medium
-		that the non-native taxon would parasitise in			
		the RA area?			
17	4.04	Is the taxon adaptable in terms of climatic	Yes	This species is naturally distributed in the SC region and	Very high
1/	4.04		105	, , ,	very mgn
		and other environmental conditions, thus		climatic/environmental conditions are acceptable to it.	
		enhancing its potential persistence if it has			
	1.05	invaded or could invade the RA area?			
18	4.05	Is the taxon likely to disrupt food-web	No	A. anguilla is native to the SC region. At the same time this	High
		structure/function in aquatic ecosystems if it		species has very small population and such a fact is not expected.	
		has invaded or is likely to invade the RA			
19	4.06	Is the taxon likely to exert adverse impacts	No	A. anguilla is native to the SC region. At the same time this	High
		on ecosystem services in the RA area?		species has very small population and such a fact is not expected.	
20	4.07	Is it likely that the taxon will host, and/or	No	No such fact has been observed.	Medium
		act as a vector for, recognised pests and			
		infectious agents that are endemic in the RA			
		and agente that are chatment the tot		No such fact has been observed.	Medium
	4.08	Is it likely that the taxon will host and/or	INO		
	4.08	Is it likely that the taxon will host, and/or	No	NO SUCH TACL HAS DEEH ODSERVEU.	Medium
	4.08	act as a vector for, recognised pests and	No	No such fact has been observed.	Medium
	4.08		No	No such fact has been observed.	Medium

22	4.09	Is it likely that the taxon will achieve a body	Yes	Adult females can reach 133 cm in length with a total body weight	Very high
		size that will make it more likely to be		of about 6 kg (Dekker et al., 1998) whereas males only reach 50	, 5
		released from captivity?		cm in length with a maximum weight of 0.3 kg. Eels are also	
				extensively cultured in marine and brackish waters within a form	
				of aquaculture known as valliculture. In these Mediterranean	
				systems, mainly in Italy, in the north Adriatic, elvers of 15-35 g	
				are stocked at the rate of 4-15 kg/ha. The elvers are mainly	
23	4.10	Is the taxon capable of sustaining itself in a	Yes	imported from France but also from Denmark, the Netherlands Inhabits all types of benthic habitats from streams to shores of	Very high
25	4.10	range of water velocity conditions (e.g.	165	large rivers and lakes. Naturally found only in water bodies	very nigh
		versatile in habitat use)?		connected to the sea (Kottelat and Freyhof, 2007).	
24	4.11		No	No such fact has been observed.	Medium
2 '		(e.g. excretion of by-products) or behaviours			i iculuiii
		(e.g. feeding) will reduce habitat quality for			
		native taxa?			
25	4.12	Is the taxon likely to maintain a viable	No	No such fact has been observed.	Medium
		population even when present in low			
		densities (or persisting in adverse conditions			
		by way of a dormant form)?			
5. F	Resourd	ce exploitation			
26	5.01	Is the taxon likely to consume threatened or	No	No such fact has been observed since A. anguilla has very small	Medium
		protected native taxa in the RA area?		population in the SC region.	
27	5.02	Is the taxon likely to sequester food	No	No such fact has to be expected since A. anguilla has very small	Medium
		resources (including nutrients) to the		population in the SC region.	
		detriment of native taxa in the RA area?			
	Reprodu				
28	6.01	Is the taxon likely to exhibit parental care	No	No such fact has been observed.	Medium
		and/or to reduce age-at-maturity in response			
20	C 02	to environmental conditions?	Ne		
29	6.02	Is the taxon likely to produce viable gametes	INO	A. anguilla migrates to the depths of the Sargasso Sea to spawn	Very high
20	6.03	or propagules (in the RA area)?	No	(Deelder, 1984; Rochard and Elie, 1994)	High
30	6.03	Is the taxon likely to hybridise naturally with	INO	There is no data of hibridization of this species with native taxa.	High
21	6.04	native taxa? Is the taxon likely to be hermaphroditic or to	Yes	According to Wiberg (1983) the karyological investigation revealed	Very high
21	0.04		res	that in some of the specimens a heteromorphic chromosome pair	very nign
		display asexual reproduction?			
				was present. This heteromorphism appeared in both sexes of A. anguilla and in the hermaphrodite.	
32	6.05	Is the taxon dependent on the presence of	Yes	Young eels live in freshwater, where they stay for a period of 6-12	Very high
52	0.05	another taxon (or specific habitat features)	res	years for males and 9-18 years for females. As the eels become	very nign
		to complete its life cycle?		sexually mature they migrate to the sea, where they move to the	
		to complete its me cycle:		spawning grounds in the Sargasso Sea. During migration the eels	
				do not feed. Once in the Sargasso Sea the eels spawn in late	
				winter and spring. Adult eels do not leave the Sargasso Sea but	
				their progeny, the leaf-shaped larvae (leptocephali) are brought to	
				the continental shelf of Europe by the Gulf Stream, a journey that	
				takes 200-300 days (FAO 2021).	
33	6.06	Is the taxon known (or likely) to produce a	Yes	There is little information on their reproduction, but since	Very high
		large number of propagules or offspring		European eels are closely related to Japanese eels, Anguilla	, -
		within a short time span (e.g. < 1 year)?		japonica, similar breeding patterns might be assumed. Female A.	
				japonica can lay from 2,000,000 to 10,000,000 eggs, but die soon	
				after spawning (Deelder, 1970).	
34	6.07	How many time units (days, months, years)	7	The lifespan of European eels is dependent on maturation time	High
		does the taxon require to reach the age-at-		because once eels mature and spawn, they die. European eels can	
	<u> </u>	first-reproduction?		spawn as early as 7 years old (Dekker et al. 1998).	
		al mechanisms			I
35	7.01	How many potential internal	>1	This species is naturally occuring in the SC region with very small	Medium
		vectors/pathways could the taxon use to		population. Probably it can also spread by humans for aquaculture	
		disperse within the RA area (with suitable		purposes.	
36	7.02	Will any of these vectors/pathways bring the	Yes	There is a possibility of that. For instance in west Georgia there is	Medium
		taxon in close proximity to one or more		Kolkheti National Park which is located in the natural area of A.	
27	7 00	protected areas (e.g. MCZ, MPA, SSSI)?	No	anguilla.	Low
/ د	7.03	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship	No	No such fact has been observed.	Low
			1		1
		hulls, pilings, buoys) such that it enhances			
30	7.04	hulls, pilings, buoys) such that it enhances the likelihood of dispersal?	No	No such fact has been observed	Medium
38	7.04	hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to	No	No such fact has been observed.	Medium
38	7.04	hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules	No	No such fact has been observed.	Medium
		hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?			
	7.04	hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to	No	No such fact has been observed. No such fact has been observed.	Medium Medium
		hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as			
		hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA			
39	7.05	hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?	No	No such fact has been observed.	Medium
39		hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedings (for plants) in the RA area? Are older life stages of the taxon likely to		No such fact has been observed. No such fact has been observed. This species is spawning in the	
39 40	7.05	hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction?	No	No such fact has been observed. No such fact has been observed. This species is spawning in the Sargasso Sea.	Medium Very high
39 40	7.05	hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to	No	No such fact has been observed. No such fact has been observed. This species is spawning in the	Medium
39 40 41	7.05 7.06 7.07	hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No No	No such fact has been observed. No such fact has been observed. This species is spawning in the Sargasso Sea. No such fact has been observed.	Medium Very high High
39 40 41	7.05	hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the	No	No such fact has been observed. No such fact has been observed. This species is spawning in the Sargasso Sea.	Medium Very high
39 40 41	7.05 7.06 7.07	hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous	No No	No such fact has been observed. No such fact has been observed. This species is spawning in the Sargasso Sea. No such fact has been observed.	Medium Very high High
39 40 41	7.05 7.06 7.07	hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both	No No	No such fact has been observed. No such fact has been observed. This species is spawning in the Sargasso Sea. No such fact has been observed.	Medium Very high High
39 40 41 42	7.05 7.06 7.07	hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous	No No	No such fact has been observed. No such fact has been observed. This species is spawning in the Sargasso Sea. No such fact has been observed.	Medium Very high High

4.4	0.01	To the target able to with stand bais	No		L li ala
44	8.01	Is the taxon able to withstand being out of	No	No such fact has been observed.	High
		water for extended periods (e.g. minimum of			
Í		one or more hours) at some stage of its life			
		cycle?			
45	8.02	Is the taxon tolerant of a wide range of	No	Populations of the European eel (Anguilla anguilla) are declining	High
		water quality conditions relevant to that		rapidly and are now considered below safe biological limits. High	
		taxon? [In the Justification field, indicate the		pollution levels are one of the possible reasons for this decline	
		relevant water quality variable(s) being		(Guhl et al. 2014).	
46	8.03	Can the taxon be controlled or eradicated in	No	No data. We think there is no need for that since A. anguilla has	Medium
		the wild with chemical, biological, or other		very small endangered populations in the world.	
		agents/means?			
47	8.04	Is the taxon likely to tolerate or benefit from	No	Dam construction and other human activities has negative	High
		environmental/human disturbance?		impacts on this species (IUCN 2018).	
48	8.05	Is the taxon able to tolerate salinity levels	Yes	Inhabits all types of benthic habitats from streams to shores of	High
I		that are higher or lower than those found in		large rivers and lakes. Naturally found only in water bodies	
		its usual environment?		connected to the sea (Kottelat and Freyhof, 2007).	
49	8.06	Are there effective natural enemies	Yes	There are many potential predators in the SC region, e.g. birds,	High
I		(predators) of the taxon present in the RA		mammals, fish (Esox lucius, Silurus glanis etc). which can eat A.	
		area?		anguilla.	
С. (Climat	e change			
9. (Climate	change			
50	9.01	Under the predicted future climatic	Decrease	Own judgement	Medium
		conditions, are the risks of entry into the RA			
		area posed by the taxon likely to increase,			
		decrease or not change?			
51	9.02	Under the predicted future climatic	Decrease	Own judgement	Medium
		conditions, are the risks of establishment			
		posed by the taxon likely to increase,			
		decrease or not change?			
52	9.03	Under the predicted future climatic	Decrease	Own judgement	Medium
Ĩ		conditions, are the risks of dispersal within			
Í		the RA area posed by the taxon likely to			
Í		increase, decrease or not change?			
53	9.04	Under the predicted future climatic	No change	Own judgement	High
		conditions, what is the likely magnitude of			5
Ĩ		future potential impacts on biodiversity			
Ĩ		and/or ecological integrity/status?			
54	9.05	Under the predicted future climatic	No change	Own judgement	High
Ē.		conditions, what is the likely magnitude of		· · · · · · ·	5
Ĩ		future potential impacts on ecosystem			
Ĩ		structure and/or function?			
55	9.06	Under the predicted future climatic	No change	Own judgement	High
	1.00	conditions, what is the likely magnitude of			
		future potential impacts on ecosystem			
Ĩ		services/socio-economic factors?			
	1	ISELVICES/SUCIO-ECONUMIC IdCLOIS?	1		1

Statistics	
Scores	
BRA	1.0
BRA Outcome	-
BRA+CCA	-5.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	2.0
1. Domestication/Cultivation	2.0
2. Climate, distribution and introduction risk	2.0
3. Invasive elsewhere	-2.0
B. Biology/Ecology	-1.0
4. Undesirable (or persistence) traits	4.0
5. Resource exploitation	0.0
6. Reproduction	-1.0
7. Dispersal mechanisms	-3.0
8. Tolerance attributes	-1.0
C. Climate change	-6.0
9. Climate change	-6.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	<u>3</u>
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2 7 9
6. Reproduction	/
7. Dispersal mechanisms	9
8. Tolerance attributes	6
C. Climate change	6 6
	6
9. Climate change	
Sectors affected	6
Sectors affected Commercial	6
Sectors affected Commercial Environmental	1
Sectors affected Commercial	
Sectors affected Commercial Environmental	1

BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.69
BRA	0.69
CCA	0.63
Date and Time	
02/05/2	022 18:45:47

Taxon and Assessor details				
Category	Fishes and Lampreys (freshwater)			
Taxon name	Anguilla anguilla			
Common name	European eel			
Assessor	Tatia Kuljanishvili			
Risk screening context				
Reason and socio-economic benefits	Passing through the Volga-Baltic waterway, A. anguilla accidentally appeared in the Volga River,			
Risk assessment area	South Caucasus			
Taxonomy	Actinopteri (ray-finned fishes) > Anguilliformes (Eels and morays) > Anguillidae			
Native range	Atlantic Ocean			
Introduced range	The Caspian basin			
URL	https://www.fishbase.se/summary/Anguilla-anguilla.html			

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
		ication/Cultivation			
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20	Yes	Juveniles of the eel are being cough and transported to different places for farming.	High
		generations?			
2	1.02	Is the taxon harvested in the wild and likely	Yes	Juveniles of the eel are being cough and transported to different	Very high
3	1.03	to be sold or used in its live form? Does the taxon have invasive races,	Yes	places for farming. Asian swamp eel (Reinert et al 2006).	High
-		varieties, sub-taxa or congeners?			
2. (, distribution and introduction risk	1		
4	2.01	How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range?	High	Very similar	High
5	2.02	What is the quality of the climate matching data?	High	High	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	Since this species nesssessarily need to migrate to the atlantic basin for reproduction, the records of this species from RA are only accidental.	Low
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	Aquaculture	High
8	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)?	No	It is likely, but there is no chance that this species could survive. there is no documented evidence that this organism is established in neigbouring river or lake or whatsoever.	Medium
3. I	nvasive	e elsewhere			
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	No	The European eel has been recorded on the East coast and spreading south to Florida. Historical data stated the eel was found off the coast of California, but no populations were established due to an overall unfavorable habitat for the European eel. http://www.tsusinvasives.org/home/database/anguilla-	High
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	European eels present an ecological threat to the American eel (Anguilla rostrata), which is only found in North America. European eels have been recorded to carry a parasitic nematode, Anguillicola crassus, capable of causing severe damage to it's host. This parasite infects the swim bladder of the host resulting in acute inflammatory reactions such as fibrosis or fibrotic conglomerates, constriction of the intestine due to scar tissue, and complete rupture of the swim bladder in severe cases. This kind of damage can lead to unsuccessful migration, preventing spawning and death. With eel populations in decline, the spread of this nematode poses further risk to native American eel populations	High
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	from exnosure to infected European it is not known	Low
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	Yes	Can transmit diseases and parasites	Low
.3	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	it is not known	Low
B. I	Biology	//Ecology	1		
		able (or persistence) traits			
	4.01	Is it likely that the taxon will be poisonous or	No	Not poisonous See: https://fishbase.mnhn.fr/summary/Anguilla-	Very high
15	4.02	pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	anguilla.html are considered threat to the American eel in North America	High
6	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	Does not parasite. See https://fishbase.mnhn.fr/summary/Anguilla-anguilla.html	Very high
.7	4.04	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?	No	Not adaptable to climatic and environmental conditions	Very high
.8	4.05	Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA	No	it is not known	Medium
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	It is considered as harmless to humans https://fishbase.mnhn.fr/summary/Anguilla-anguilla.html	Very high

21 4 22 4 23 4 24 4 25 4 5. <i>Re</i> 26 5 27 5	4.09 4.10 4.11 4.12 <u>esourc</u>	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area? Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity? Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)? Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa? Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)? e exploitation Is the taxon likely to consume threatened or	Yes Yes Yes No	yes it is likely Although not studied it is likely Max length : 122 cm TL male/unsexed; 133.0 cm TL; common length : 35.0 cm TL male/unsexed; common length :50 cm TL (female); max. published weight: 6.6 kg https://fishbase.mnhn.fr/summary/Anguilla.anguilla.html It is catadromous species that migrates for reproduction for several thousands of kilometers and it is capable of sustaining itself in a range water velocity conditions Less likely Since this species is catadromous it can\t just maintain a negative powers to the	Medium High High High
222 4 23 4 24 4 25 4 5. Re 226 5 27 5	4.09 4.10 4.11 4.12 € <u>sourc</u>	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area? Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity? Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)? Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa? Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)? e exploitation Is the taxon likely to consume threatened or	Yes Yes No	Max length : 122 cm TL male/unsexed; 133.0 cm TL; common length : 35.0 cm TL male/unsexed; common length :50 cm TL (female); max. published weight: 6.6 kg https://fishbase.mnhn.fr/summary/Anguilla-anguilla.html It is catadromous species that migrates for reproduction for several thousands of kilometers and it is capable of sustaining itself in a range water velocity conditions Less likely Since this species is catadromous it can\t just maintain a	High
23 4 24 4 25 4 5. Re 26 5 27 5 6. Re	4.10 4.11 4.12 <u>esourc</u> 5.01	Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity? Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)? Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa? Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)? Is the taxon likely to consume threatened or	Yes	length : 35.0 cm TL male/unsexed; common length :50 cm TL (female); max. published weight: 6.6 kg https://fishbase.mnhn.fr/summary/Anguilla-anguilla.html It is catadromous species that migrates for reproduction for several thousands of kilometers and it is capable of sustaining itself in a range water velocity conditions Less likely Since this species is catadromous it can\t just maintain a	High
24 4 25 4 5. Re 26 5 27 5	4.11 4.12 <u>esourc</u> 5.01	range of water velocity conditions (e.g. versatile in habitat use)? Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa? Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)? <i>e exploitation</i> Is the taxon likely to consume threatened or	No	It is catadromous species that migrates for reproduction for several thousands of kilometers and it is capable of sustaining itself in a range water velocity conditions Less likely Since this species is catadromous it can\t just maintain a	-
25 4 5. Re 26 5 27 5 6. Re	4.12 esourc 5.01	Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa? Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)? <i>e exploitation</i> Is the taxon likely to consume threatened or		Less likely Since this species is catadromous it can\t just maintain a	High
<u>5. Re</u> 26 5 27 5 6. Re	e <u>sourc</u> 5.01	Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)? <i>e exploitation</i> Is the taxon likely to consume threatened or	No		
26 5 27 5 6. Re	5.01	e exploitation Is the taxon likely to consume threatened or		population anywhere. It all depends wheather it has access to the marine waters	High
27 5 6. Re					
6. Re	5.02	protected native taxa in the RA area?	Yes	Since this species eats almost all food it is possible that it will consume threatened or protected native taxa, however there is no	Low
		Is the taxon likely to sequester food resources (including nutrients) to the	No	information about it avalable Not documented	Very high
		detriment of native taxa in the RA area?			
28 6	eprodu	ction			
	5.01	Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?	Yes	"Eels resident in salt water grew on average in length 2.2 times faster than freshwater residents and increased in weight 5.3 times faster than freshwater residents. Previous findings of superior American eel growth rate in brackish water are thus extended to full-strength salt water. Freshwater residents took an estimated 2.4 times longer than saltwater residents to reach the silver eel stage." https://www.earth.sinica.edu.tw/content/people/EPMA/papers/Publ ished%20PDF%20files/Fisherv%202002-	Medium
29 6	5.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	No	This is a catadromous species that needs marine water for successful reproduction. Since there are no such conditions avalable in research area, this species can not produce viable	Very high
30 6		Is the taxon likely to hybridise naturally with native taxa?	No	No, it is not likley.	Very high
31 6 32 6		Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of	No	No. https://fishbase.mnhn.fr/summary/Anguilla-anguilla.html No https://fishbase.mnhn.fr/summary/Anguilla-anguilla.html	Very high Very high
52 0	5.05	another taxon (or specific habitat features) to complete its life cycle?	INO	No https://hshbase.minin.ir/summary/Anguma-anguma.ntmi	very nigh
33 6	5.06	Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)?	No	This species matures within 10-25years old and lays up to 5 million eggs, and after that it dies.	Medium
34 6	5.07	How many time units (days, months, years) does the taxon require to reach the age-at-	>10	10-25 years	Very high
		first-reproduction?			
7. Dis 35 7		al mechanisms How many potential internal	One	Aquaculture	Very bigb
,,,/	.01	vectors/pathways could the taxon use to disperse within the RA area (with suitable			Very high
36 7	7.02	Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)?	No	This vector is not that rapid that it will cause bringing it close to protected areas	High
37 7	7.03	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances	No	No https://fishbase.mnhn.fr/summary/Anguilla-anguilla.html	Very high
38 7	7.04	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?	No	No it is not possible.	High
39 7	7.05	Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?	No	No. due to its mating behaviour this is not possible	Very high
	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	No	No. not recorded.	Very high
41 7	.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No	Not possible.	Very high
42 7	7.08	Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both	No	No.it is not documented.	Very high
12	1.00	unintentional or intentional) likely to be			
43 7		Is dispersal of the taxon density dependent?	No	No.it is not documented.	High

4.4	0.01	To the tayon oble to withstand heir	No	No it is not desumented	Vorschigh
44	8.01	Is the taxon able to withstand being out of water for extended periods (e.g. minimum of	NU	No.it is not documented.	Very high
		1 1 3			
		one or more hours) at some stage of its life			
		cycle?			
45	8.02	Is the taxon tolerant of a wide range of	No	it is not tolerant	Medium
		water quality conditions relevant to that			
		taxon? [In the Justification field, indicate the			
		relevant water quality variable(s) being			
46	8.03	Can the taxon be controlled or eradicated in	Yes	it can be	High
		the wild with chemical, biological, or other			
		agents/means?			
47	8.04	Is the taxon likely to tolerate or benefit from	No	No.it is not documented.	Very high
		environmental/human disturbance?			
48	8.05	Is the taxon able to tolerate salinity levels	Yes	It can tolerate different salinity levels because, some live in	High
		that are higher or lower than those found in		freshwaters, and some in Brakish.	
		its usual environment?			
49	8.06	Are there effective natural enemies	No	No.it is not documented.	Very high
		(predators) of the taxon present in the RA			, ,
С. С		e change			
		change			
50	9.01	Under the predicted future climatic	Increase	It was hypotheses that climate change might alert the	High
		conditions, are the risks of entry into the RA		mechanisms of transportation and introduction of non-native	-
		area posed by the taxon likely to increase,		species. Commercial and recreational activities will increase, that	
		decrease or not change?		itself increases the propagule pressure levels of non-native	
51	9.02	Under the predicted future climatic	No change	No change	Very high
	-	conditions, are the risks of establishment		-	, ,
		posed by the taxon likely to increase,			
		decrease or not change?			
52	9.03	Under the predicted future climatic	No change	No change	Very high
1	2.05	conditions, are the risks of dispersal within			· · · · · · · · · · · ·
		the RA area posed by the taxon likely to			
]	increase, decrease or not change?			
53	9.04	Under the predicted future climatic	No change	No change	Very high
55	5.04	conditions, what is the likely magnitude of	no change		very mgn
		future potential impacts on biodiversity			
E 4	9.05	and/or ecological integrity/status? Under the predicted future climatic	No shang-	Ne abance	Vor high
54	9.05		No change	No change	Very high
]	conditions, what is the likely magnitude of			
		future potential impacts on ecosystem			
	0.00	structure and/or function?			N/ 1 · 1
55	9.06	Under the predicted future climatic	No change	No change	Very high
		conditions, what is the likely magnitude of			
		future potential impacts on ecosystem			
		services/socio-economic factors?			

Statistics	
Scores	
BRA	15.0
BRA Outcome	-
BRA+CCA	17.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	13.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	8.0
B. Biology/Ecology	2.0
4. Undesirable (or persistence) traits	4.0
5. Resource exploitation	5.0
6. Reproduction	-1.0
7. Dispersal mechanisms	-5.0
8. Tolerance attributes	-1.0
C. Climate change	2.0
9. Climate change	2.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3 5 5
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	
	5
B. Biology/Ecology	36
B. Biology/Ecology 4. Undesirable (or persistence) traits	36 12
B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation	36 12
B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction	36 12
B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms	36 12 2 7 9
B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes	36 12 2 7 9 6
B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change	36 12 2 7 9 6 6
B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change	36 12 2 7 9 6
B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected	36 12 2 7 9 6 6 6 6
B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change 9. Commercial	36 12 2 7 7 9 6 6 6 6 6 8
B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial Environmental	36 12 2 7 9 6 6 6 6
B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change 9. Commercial	36 12 2 7 7 9 6 6 6 6 6 8
B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change 9. Climate change Commercial Environmental Species or population nuisance traits	36 12 2 7 7 9 6 6 6 6 6 8
B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial Environmental	36 12 2 7 7 9 6 6 6 6 8

BRA+C	CA -
Confidence	
BRA+C	CA 0.79
В	RA 0.77
0	CA 0.96
Date and Time	
20/05	/2022 16:06:05

Faxon and Assessor details					
Category	Fishes and Lampreys (freshwater)				
Taxon name	Carassius gibelio				
Common name	gibel carp				
Assessor	Bella Japoshvili				
Risk screening context					
Reason and socio-economic benefits	This is the most widespread invasive species in the region having a signifcant although less				
Risk assessment area	South Caucasus				
Taxonomy	Actinopteri (ray-finned fishes) > Cypriniformes (Carps) > Cyprinidae (Minnows or carps)				
Native range	Northern Eurasia				
Introduced range	Throughout the world				
URL	https://www.fishbase.de/summary/Carassius-gibelio.html				

			Response	Justification (references and/or other information)	Confidence
Α.	Biogeo	graphy/Historical			
		ication/Cultivation			
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	Rylková, K., Kalous, L., Bohlen, J., Lamatsch, D. K., & Petrtýl, M. (2013). Phylogeny and biogeographic history of the cyprinid fish genus Carassius (Teleostei: Cyprinidae) with focus on natural and anthropogenic arrivals in Europe. Aguaculture. 380, 13-20.	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	Personal observation and numerous own unpublished data.	High
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	Other congeners	Very high
2. (Climate	, distribution and introduction risk	1		1
4	2.01	How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range?	Medium	Climmatch comparision	Low
5	2.02	What is the quality of the climate matching data?	Low	Due to absence of extensive climate data for the region	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	Kuljanishvili, T., Epitashvili, G., Freyhof, J., Japoshvili, B., Kalous, L., Levin, B., & Mumladze, L. (2020). Checklist of the freshwater fishes of Armenia, Azerbaijan and Georgia. Journal of Applied Ichthyology, 36(4), 501-514.	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	>1	Japoshvili, B., Mumladze, L., & Küçük, F. (2013). Invasive Carassius carp in Georgia: Current state of knowledge and future perspectives. Current Zoology, 59(6), 732-739.	Very high
8	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)?	Yes	Kuljanishvili, T., Epitashvili, G., Freyhof, J., Japoshvili, B., Kalous, L., Levin, B., & Mumladze, L. (2020). Checklist of the freshwater fishes of Armenia, Azerbaijan and Georgia. Journal of Applied Ichthyology, 36(4), 501-514.	Very high
3. 1	Invasiv	e elsewhere			
9		Has the taxon become naturalised (established viable populations) outside its native range?	Yes	Kuljanishvili, T., Epitashvili, G., Freyhof, J., Japoshvili, B., Kalous, L., Levin, B., & Mumladze, L. (2020). Checklist of the freshwater fishes of Armenia, Azerbaijan and Georgia. Journal of Applied Ichthyology, 36(4), 501-514.	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	e.g. Yalçın Özdilek, Ş., Partal, N., Jones, R.I., 2019. An invasive species, Carassius gibelio, alters the native fish community through trophic niche competition. Aquat. Sci. 81, 1–11. https://doi.org/10.1007/s00027-019-0623-6	Very high
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	Yes	No documented evidence	Low
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	Yes	It can modify the ecosystem heavily (https://www.cabi.org/isc/datasheet/90562)	Very high
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	No documented evidence	Medium
Β.	Biology	y/Ecology			
		able (or persistence) traits			
14	4.01	Is it likely that the taxon will be poisonous or pose other risks to human health?	No	Species is not harmful	Very high
15	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	Gaygusuz, Ö., Tarkan, A.S., Gaygusuz, Ç.G., 2007. Changes in the fish community of the Ömerli Reservoir (Turkey) following the introduction of non-native gibel carp Carassius gibelio (Bloch, 1782) and other human impacts. Aquat. Invasions 2, 117–120. https://doi.org/10.3391/ai.2007.2.2.6	Very high
	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	Yes	There are number of local endemic/threatened species caviar of which carassius carp can consume	Medium
17	4.04	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?	Yes	Nilsson, G.E., Renshaw, G.M.C., 2004. Hypoxic survival strategies in two fishes: extreme anoxia tolerance in the North European crucian carp and natural hypoxic preconditioning in a coral-reef shark. J. Exp. Biol. 207, 3131–3139. https://doi.org/10.1242/jeb.00979 De Boeck, G., Meeus, W., Coen, W. De, Blust, R., 2004. Tissue-specific Cu bioaccumulation patterns and differences in sensitivity to waterborne Cu in three freshwater fish: Rainbow trout (Oncorhynchus mykiss), common carp (Cyprinus carpio), and gibel carp (Carassius auratus gibelio). Aquat. Toxicol. 70, 179–188.	Very high

	1		1		
тg	4.05	Is the taxon likely to disrupt food-web	Yes	Savini D, Occhipinti-Ambrogi A, Marchini A, Tricarico E, Gherardi	Very high
		structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA		F, Olenin S, Gollasch S, 2010. The top 27 animal alien species introduced into Europe for aquaculture and related activities.	
		area?		Journal of Applied Ichthyology [Alien species in aquaculture and	
				fisheries. Proceedings of a conference Managing Alien Species for	
				Sustainable Development of Aquaculture and Fisheries (MALIAF),	
				University of Florence, Italy, 5-7 November 2008.], 26(s2):1-7.	
				http://www.blackwell-svnergy.com/loi/iai	
9	4.06	Is the taxon likely to exert adverse impacts	Yes	Through worthening water quality	High
		on ecosystem services in the RA area?		5 5 1 7	5
0	4.07	Is it likely that the taxon will host, and/or	No	No such a pests or enfectins are known	High
		act as a vector for, recognised pests and			
		infectious agents that are endemic in the RA			
1	4.08	Is it likely that the taxon will host, and/or	Yes	Japoshvili, B., Mumladze, L., & Murvanidze, L. (2017). The	Very high
		act as a vector for, recognised pests and		population of Carassius gibelio (Bloch, 1782) and its parasites in	
		infectious agents that are absent from (novel		Madatapa Lake (South Georgia). Iranian Journal of Fisheries	
		to) the RA area?		Sciences, 16(2), 793-799.	
:2	4.09	Is it likely that the taxon will achieve a body	No	Species is usually small to medium size (Kottelat, M., Freyhof, J.,	High
		size that will make it more likely to be		2007. Handbook of European freshwater fishes. Imprimeria du	
-	4.4.0	released from captivity?	24	Democrate SA, Dlemont. https://doi.org/10.1643/OT-08-098a.1)	
.3	4.10	Is the taxon capable of sustaining itself in a	Yes	Uses a number of different water habitats	High
		range of water velocity conditions (e.g.			
1	4.11	versatile in habitat use)? Is it likely that the taxon's mode of existence	Yes	Tarkan AS, Gaygusuz Ö, Gaygusuz ÇG, Saç G, Copp GH, 2012.	Very high
-	7.11	(e.g. excretion of by-products) or behaviours	103	Circumstantial evidence of gibel carp, Carassius gibelio,	very mgn
		(e.g. feeding) will reduce habitat quality for		reproductive competition exerted on native fish species in a	
		native taxa?		mesotrophic reservoir. Fisheries Management and Ecology,	
				19(2):167-177.	
25	4.12	Is the taxon likely to maintain a viable	Yes	It can survive and reproduce even when there is only a few	Very high
		population even when present in low		individuals because of reproductive strategy	
		densities (or persisting in adverse conditions		. 5,	
		by way of a dormant form)?			
		ce exploitation	1		1
6	5.01	Is the taxon likely to consume threatened or	Yes	It consumes the egges for instance of Atacus colchicus	High
_		protected native taxa in the RA area?			
/	5.02	Is the taxon likely to sequester food	Yes	Paulovits, G., Tatrai, I., Matyas, K., Korponai, J., Kovats, N., 1998.	Medium
		resources (including nutrients) to the		Role of Prussian Carp (Carassius-Auratus Gibelio Bloch) in the	
	Reprod	detriment of native taxa in the RA area?		Nutrient Cycle of the Kis-Balaton Reservoir. Int. Rev. Hydrobiol.	I
	6.01	Is the taxon likely to exhibit parental care	No	No documented evidence	High
	0.01	and/or to reduce age-at-maturity in response			
		to environmental conditions?			
29	6.02	Is the taxon likely to produce viable gametes	Yes	e.g. Kuljanishvili, T., Mumladze, L., Kalous, L., & Japoshvili, B.	Very high
		or propagules (in the RA area)?		(2018). Fish species composition, sex ratio and growth	
				parameters in Saghamo Lake (Southern Georgia). Biologia, 73(1),	
0	6.03	Is the taxon likely to hybridise naturally with	Yes	Freyhof J, Kottelat M, 2008. Carassius carassius. IUCN Red List of	High
		native taxa?		Threatened Species. http://www.iucnredlist.org	
31	6.04	Is the taxon likely to be hermaphroditic or to	Yes	Paulovits, G., Tatrai, I., Matyas, K., Korponai, J., Kovats, N., 1998.	Very high
		display asexual reproduction?		Role of Prussian Carp (Carassius-Auratus Gibelio Bloch) in the	
2	6.05	To the town dependent on the success of	NIE	Nutrient Cycle of the Kis-Balaton Reservoir. Int. Rev. Hydrobiol.) (auri biab
2	6.05	Is the taxon dependent on the presence of	No	Kottelat, M., Freyhof, J., 2007. Handbook of European freshwater	Very high
		another taxon (or specific habitat features)		fishes. Imprimeria du Democrate SA, Dlemont.	
2	6.06	to complete its life cycle? Is the taxon known (or likely) to produce a	No	https://doi.org/10.1643/OT-08-098a.1 Kottelat, M., Freyhof, J., 2007. Handbook of European freshwater	Very high
د	0.00	large number of propagules or offspring	110	fishes. Imprimeria du Democrate SA, Diemont.	very mgn
		within a short time span (e.g. < 1 year)?		https://doi.org/10.1643/OT-08-098a.1	
^	6.07	mann a snore anne span (e.g. < 1 year)?		phtps://doi.org/10.1043/01-06-0966.1	
4	0.07	How many time units (days months years)	2	vears	High
4	6.07	How many time units (days, months, years) does the taxon require to reach the age-at-	2	years	High
4	6.07	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	2	years	High
		does the taxon require to reach the age-at-	2	years	High
7.		does the taxon require to reach the age-at- first-reproduction? sal mechanisms How many potential internal	2	active dispersal, human mediated dispersal, also animal mediated	High Very high
	Dispers	does the taxon require to reach the age-at- first-reproduction? sal mechanisms How many potential internal vectors/pathways could the taxon use to			
<u>.</u> 5	<i>Dispers</i> 7.01	does the taxon require to reach the age-at- first-reproduction? sal mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable	>1	active dispersal, human mediated dispersal, also animal mediated dispersal is possible	Very high
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42	7.08	Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be	Yes	Usually large number of propagule or adults are released	Very high
43	7.09	Is dispersal of the taxon density dependent?	No	No documented evidence	High
8. 1		nce attributes			
44	8.01	Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle?	Yes	Species is very tolerant with drying or freezing water and can survive for month in such a conditions	Very high
45	8.02	Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being considered.]	Yes	e.g. Liasko, R., Koulish, A., Pogrebniak, A., Papiggioti, O., Taranenko, L., Leonardos, I., 2011. Influence of environmental parameters on growth pattern and population structure of Carassius auratus gibelio in Eastern Ukraine. Hydrobiologia 658, 317–328. https://doi.org/10.1007/s10750-010-0502-6	Very high
46	8.03	Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	No	No successful case exists	High
	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	No	No documented evidence	Low
48	8.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	No	No documented evidence	Low
49	8.06	Are there effective natural enemies (predators) of the taxon present in the RA	Yes	Birds, some predatory fishes that are not very effective	Medium
С. (Climat	e change			
		e change			
50	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?	No change	Not expected because the species is alreadu established in RA area	Very high
51	9.02	Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	Increase	Based on personal judgment establishment risks would increase	High
	9.03	Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change?	Increase	Based on personal judgment dispersal risks would increase	Medium
53	9.04	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	Higher	Based on personal judgment invirnmental impact would increase	Medium
			Higher	Based on personal judgment impact on ecosystems would increase	Medium
54	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	light		

2		11	CS

BRA 44.0 BRA Outcome		Statistics
BRA Outcome BRA+CCA BRA+CCA Outcome Score partition A. Biogeography/Historical 20.0 1. Domestication/Cultivation 4.0 2. Climate, distribution and introduction risk 2.0 3. Invasive elsewhere 14.0 B. Biology/Ecology 24.0 4. Undesirable (or persistence) traits 9.0 5. Resource exploitation 7.0 6. Reproduction 4.0 7. Dispersal mechanisms 4.0 8. Tolerance attributes 0.0 7. Dispersal mechanisms 4.0 8. Tolerance attributes 0.0 9. Climate change 10.0 9. Climate change 10.0 9. Climate change 10.0 1. Domestication/Cultivation 3 1. Domestication/Cultivation 3 2. Climate, distribution and introduction risk 5 3. Invasive elsewhere 5		Scores
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	12	4. Undesirable (or persistence) traits
5. Resource exploitation 2	2	5. Resource exploitation
6. Reproduction 7	7	6. Reproduction
7. Dispersal mechanisms 9	9	7. Dispersal mechanisms
8. Tolerance attributes 6	6	8. Tolerance attributes
C. Climate change 6	6	C. Climate change
9. Climate change 6	6	9. Climate change

Sectors affected	
Commercial	17
Environmental	17
Species or population nuisance traits	25
Thresholds	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.76
BRA	0.79
CCA	0.58
Date and Time	
04/05/20	022 12:14:38

Taxon and Assessor details			
Category	Fishes and Lampreys (freshwater)		
Taxon name	Carassius gibelio		
Common name	gibel carp		
Assessor	Giorgi Epitashvili		
Risk screening context			
Reason and socio-economic benefits	Carassius gibelio is one of the most widspread invasive species in many countries. This fish is also		
Risk assessment area	South Caucasus		
Taxonomy	Carassius gibelio (Bloch 1782)		
Native range	Europe and Asia: usually considered as native from central Europe to Siberia		
Introduced range	Introduced to European waters from eastern Asia. Clear and definite data on original distribution in		
URL	https://www.fishbase.se/summary/Carassius-gibelio.html		

			Response	Justification (references and/or other information)	Confidence
Α.	Biogeo	graphy/Historical			
1. l	Domest	ication/Cultivation			
1	1.01	Has the taxon been the subject of	Yes	C. gibelio have been introduced intentionally for the purposes of	Very high
		domestication (or cultivation) for at least 20 generations?		food production (U.S. Fish & Wildlife Service, 2012)	
2	1.02	Is the taxon harvested in the wild and likely	Yes	Farmed crucian carp is entirely sold live or fresh. Drying and	Very high
		to be sold or used in its live form?		salting is only used for crucian carp caught from natural water	
				bodies (rivers and lakes) by some traditional inland fishers (FAO	
3	1.03	Does the taxon have invasive races,	Yes	A major biological trait responsible for invasiveness in C. gibelio is	Very high
		varieties, sub-taxa or congeners?		its mode of reproduction. Invading populations are often triploid	
				and composed of almost exclusively females that exhibit	
				apomictic (gynogenetic) reproduction, using the sperm of other	
				species to activate (but not fertilize) their own eggs (CABI 2019).	
				This species has been reported as invasive in Alberta, Canada (Elgin et al., 2014; Ruppert et al., 2017) and in many countries of	
2. (Climate	, distribution and introduction risk		TEIGIN et al., 2014; Rubbert et al., 2017) and in many countries of	
4		How similar are the climatic conditions of the	High	C. gibelio has a wide range and therefore the SC region is	Medium
	2.01	Risk Assessment (RA) area and the taxon's native range?		somewhat in a suitable climatic zone.	
5	2.02	What is the quality of the climate matching	Medium	C. gibelio has a wide range and therefore the SC region is	Medium
		data?		somewhat in a suitable climatic zone.	
6	2.03	Is the taxon already present outside of	Yes	Carassius gibelio is widespread throughout South Caucasus Region	Very high
1		captivity in the RA area?		and present in the ponds, lakes, rivers and reservoirs of the	
7	2.64		. 1	region (Japoshvili et al. 2013; Ninua et al. 2013; Kuljanishvili et	LL: -l-
1	2.04	How many potential vectors could the taxon	>1	This fish is spread by both intentional by humans and unintentional by animals (birds, mammals, etc.)	High
8	2.05	use to enter in the RA area? Is the taxon currently found in close	Yes	This species is widely distributed in the Caucasus region and	Very high
°	2.05	proximity to, and likely to enter into, the RA	105	surrounding.	very mgn
1		area in the near future (e.g. unintentional		Surrounding.	
1		and intentional introductions)?			
<u>3.</u> 1	nvasive	e elsewhere			
9	3.01	Has the taxon become naturalised	Yes	This species has been successfully established in many countries	Very high
		(established viable populations) outside its native range?		around the world (Japoshvili et al. 2013; Japoshvili et al. 2017; Yerli et al. 2014; Kuljanishvili et al. 2020; FAO 2021).	
10	3.02	In the taxon's introduced range, are there	Yes	The species has negative impact on the local populations (Tarkan	High
		known adverse impacts to wild stocks or commercial taxa?		et al. 2012; Ruppert et al. 2017).	
11	3.03	In the taxon's introduced range, are there	Yes	In aquaculture systems, C. gibelio is an unwelcome competitor	Very high
1		known adverse impacts to aquaculture?		with cultures of the major reared species. The occurrence of	
1				numerous populations of C. gibelio in fishponds causes	
1				considerable economic loss in the Czech Republic as there is no	
1				market for the species. Even when it can be sold, it reaches a	
12	2.04	In the taxon's introduced range, are them.	Vac	considerably lower price (Lusková et al., 2010).	Von hich
12	3.04	In the taxon's introduced range, are there	Yes	This species affect nutrient recycling and then primary	Very high
13	3.05	known adverse impacts to ecosystem In the taxon's introduced range, are there	Yes	productivity in aquatic ecosystems, either directly or indirectly In Europe economic impact (on agriculture, animal production,	Very high
1.7	5.05	known adverse socio-economic impacts?	103	forestry, human infrastructure, human health and human social	very mgn
1		anothe develoc boold economic impacts:		life) caused by C. gibelio has been assessed and scored the	
L				highest impact points (Veer & Nentwig 2014).	
B.	Biology	//Ecology			
		able (or persistence) traits			
		Is it likely that the taxon will be poisonous or pose other risks to human health?		No such fact has been revealed.	High
15	4.02	Is it likely that the taxon will smother one or	Yes	Declines of toppredators/piscivorous fish such as native trout	High
1		more native taxa (that are not threatened or		speciesand European catfish (S. glanis) and reduced compe-tition	
1		protected)?		for food by the rest of the species may further favored the	
1.0	4.02			explosion of C. gibelio populations in Greece (Perdikaris et al.	Marris Inia I
10	4.03	Are there any threatened or protected taxa	Yes	In the SC region there are many protected and thretend species	Very high
1		that the non-native taxon would parasitise in		who are under pressure from this species, e.g. Luciobarbus capito,	
17	4.04	the RA area? Is the taxon adaptable in terms of climatic	Yes	L. mursa, Acipencer spp, etc. (Ninua et al. 2013; Kuljanishvili et This species has been successfully established in the region and	Very high
- ′	4.04	and other environmental conditions, thus	105	consequently it has overcome all barriers.	very mgn
		enhancing its potential persistence if it has			
1		invaded or could invade the RA area?			
18	4.05	Is the taxon likely to disrupt food-web	Yes	C. gibelio has potential to cause economic and environmental	High
		structure/function in aquatic ecosystems if it		damage by causing quantitative changes in community structure	
1		has invaded or is likely to invade the RA		in becoming the dominant species and shifts in food chains, and	
		area?		by altering the physical and chemical properties of habitats	

4.0	4.07				
19		Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes	A similar fact is likely to occur as this species interferes with the reproduction of local fish populations.	Medium
20	4.07	Is it likely that the taxon will host, and/or	Not applicable	No such data available.	Low
		act as a vector for, recognised pests and			
21		infectious agents that are endemic in the RA Is it likely that the taxon will host, and/or	Not annlicable	No such data available.	Low
		act as a vector for, recognised pests and	applicable		
		infectious agents that are absent from (novel			
<u>.</u>		to) the RA area?	Voc	C albelia is a modium sized suprisid, and are suprish us to 2	High
22		Is it likely that the taxon will achieve a body size that will make it more likely to be	Yes	C. gibelio is a medium-sized cyprinid, and can growth up to 3 kilograms and a length of 45 centimetres. Therefore, it can	High
		released from captivity?		released from captivity in the nature for angling.	
23	4.10	Is the taxon capable of sustaining itself in a	Yes	Inhabits a wide variety of still water bodies and lowland rivers,	High
		range of water velocity conditions (e.g.		usually associated with submerged vegetation or regular flooding.	
1	4.11	versatile in habitat use)? Is it likely that the taxon's mode of existence	Yes	The presence of C. gibelio in some habitats increased the biomass	High
4	4.11	(e.g. excretion of by-products) or behaviours	Tes	of planktonic algae, total and inorganic suspended solids, leading	riigii
		(e.g. feeding) will reduce habitat quality for		to decreased light intensity in the water and a lower biomass of	
_		native taxa?		benthic algae (Razlutskij et al. 2021).	
5		Is the taxon likely to maintain a viable	Yes	Successful adaptation and proliferation of Carassius gibelio is	High
		population even when present in low densities (or persisting in adverse conditions		mainly attributed to its dual reproductive mode (allogynogenetic and gonochoristic), the opportunistic-omnivorous feeding habits	
		by way of a dormant form)?		and the ability to withstand and flourish in adverse ecological	
				conditions. Accordingly, it exerts competitive, as well as	
				destructive effects upon the indigenous fish species (sperm	
				parasitism, antagonism for food, spawning grounds and spawning substrates) and therefore, efforts are needed to sustain a relative	
_				substrates) and therefore, efforts are needed to sustain a relative balance of the populations (Perdikaris et al. 2011).	
		e exploitation			
6	5.01	Is the taxon likely to consume threatened or	Yes	Such a fact has not been documented though it is to be expected	Medium
7	5.02	protected native taxa in the RA area? Is the taxon likely to sequester food	Yes	Such a fact has not been documented though it is to be expected	Medium
		resources (including nutrients) to the			
		detriment of native taxa in the RA area?			
	eprodu 6.01	Is the taxon likely to exhibit parental care	Yes	Relative density, duration of spawning, reproductive effort and	High
5		and/or to reduce age-at-maturity in response		gonado-somatic index of C. gibelio increased with some water	
		to environmental conditions?		quality variables and coincided with decreasing trends for natives	
0	6.02	Is the taxon likely to produce viable gametes	Yes	(Tarkan et al. 2012). This species is successfully breeding in the SC region (Japoshvili	Very high
J		or propagules (in the RA area)?	103	et al. 2013; Kuljanishvili et al. 2020).	very mgn
0	6.03	Is the taxon likely to hybridise naturally with	Yes	C. gibelio are very similar to other members of the Carassius	Very high
1		native taxa? Is the taxon likely to be hermaphroditic or to	Yes	genus, Cyprinus carpio and hybrids of these species. This species is characterized by asexual reproduction (Japoshvili	Very high
-		display asexual reproduction?	103	et al. 2013; Yadrenkina 2020).	very night
2	6.05	Is the taxon dependent on the presence of	No	Such a fact is not known	Medium
		another taxon (or specific habitat features)			
3		to complete its life cycle? Is the taxon known (or likely) to produce a	Yes	Fecundity of this species is about 300 000 eggs (Ninua et al.	High
-		large number of propagules or offspring		2013).	
		within a short time span (e.g. < 1 year)?			
4		How many time units (days, months, years)	4	Sexually maturate at the age of 4 (Ninua et al. 2013).	High
		does the taxon require to reach the age-at- first-reproduction?			
	Dispersa	al mechanisms			·
5		How many potential internal	>1	Carassius gibelio is widspread species in the throughout Caucasus	Very high
		vectors/pathways could the taxon use to disperse within the RA area (with suitable		region. This species is spreading both intentionally and accidentally by humans, birds, other animals and etc.	
6		Will any of these vectors/pathways bring the	Yes	This species is occurring in the protected areas of the SC region	High
		taxon in close proximity to one or more		for example in the Kolkheti National Park, west Georgia.	-
7		protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively	No	Such a fact is not known	Low
/		Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship	No	Such a fact is not known	Low
		hulls, pilings, buoys) such that it enhances			
_		the likelihood of dispersal?			
3		Is natural dispersal of the taxon likely to	Yes	This species can spread by birds and other organisms.	High
		occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?			
Э	7.05	Is natural dispersal of the taxon likely to	Not applicable	Such a fact is not known	Low
		occur as larvae/juveniles (for animals) or as			
		fragments/seedlings (for plants) in the RA			
)		area? Are older life stages of the taxon likely to	No	This species is not characterized by migration.	Medium
		migrate in the RA area for reproduction?	-	· · · ·	
1		Are propagules or eggs of the taxon likely to	Yes	This species can spread by birds and other organisms in the SC	Very high
2		be dispersed in the RA area by other animals?	Vec	region. A similar fact is likely to bappen	Medium
2		Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous	Yes	A similar fact is likely to happen.	Medium
		seven questions (35–41; i.e. both			
		unintentional or intentional) likely to be			
			1.4	C gibalia by its high reproduction approxity by mappe of	Medium
3	7.09	Is dispersal of the taxon density dependent?	Yes	C. gibelio by its high reproduction capacity by means of	neulum
3	7.09	Is dispersal of the taxon density dependent?	Yes	gynogenesis and tolerance to environmental changes, considered	neulum
3	7.09	Is dispersal of the taxon density dependent?	Yes		healam

44	8.01	Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life	Yes	C. gibelio has ability to withstand without water for several hours.	High
		cycle?			
45	8.02	Is the taxon tolerant of a wide range of	Yes	Inhabits a wide variety of still water bodies and lowland rivers,	High
		water quality conditions relevant to that		usually associated with submerged vegetation or regular flooding.	
		taxon? [In the Justification field, indicate the		Can strongly tolerate low oxygen concentrations and pollution	
		relevant water quality variable(s) being		(Kottelat and Freyhof, 2007).	-
46	8.03	Can the taxon be controlled or eradicated in	No	Data on this are not available.	Low
		the wild with chemical, biological, or other			
47	0.04	agents/means?		Climate behitet and burger disturburger wave deschungleted to	Madium
47	8.04	Is the taxon likely to tolerate or benefit from	Yes	Climate, habitat and human disturbance were closely related to	Medium
		environmental/human disturbance?		the life history, suggesting that C. gibelio will expand their	
10	8.05	Is the taxon able to tolerate salinity levels	No	distribution in response to future global environmental changes This species is able to persist in low-salinity environments (<10	High
40	0.05	that are higher or lower than those found in	NO	ppt) for long periods of time and at higher salinities for short time	riigii
		its usual environment?		periods. When acutely shifted from fresh water to low-salinity	
		its usual environment:		conditions (5-15 ppt) the species is capable of survival for at least	
				72 h. However, acute transfer to salinities of 20-25 ppt lead to	
				100% mortality (Schofield et al. 2006)	
49	8.06	Are there effective natural enemies	Yes	Esox lucius, Silurus glanis, Salmo labrax, etc. (Kuljanishvili et al.	Very high
	0.00	(predators) of the taxon present in the RA	100	2020).	ter, ingi
С. (Climat	e change			
		change			
50	9.01	Under the predicted future climatic	Increase	Own judgement	High
		conditions, are the risks of entry into the RA			-
		area posed by the taxon likely to increase,			
		decrease or not change?			
51	9.02	Under the predicted future climatic	Increase	Own judgement	High
		conditions, are the risks of establishment			
		posed by the taxon likely to increase,			
		decrease or not change?			
52	9.03	Under the predicted future climatic	Increase	Own judgement	High
		conditions, are the risks of dispersal within			
		the RA area posed by the taxon likely to			
52	0.04	the RA area posed by the taxon likely to increase, decrease or not change?	Highor	Own judgement	Modium
53	9.04	the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic	Higher	Own judgement	Medium
53	9.04	the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of	Higher	Own judgement	Medium
53	9.04	the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity	Higher	Own judgement	Medium
		the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?			
	9.04	the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic	Higher Higher	Own judgement Own judgement	Medium
		the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of			
		the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem			
54	9.05	the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Higher	Own judgement	Medium
54		the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? Under the predicted future climatic			
54	9.05	the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Higher	Own judgement	Medium

Statistics	
Scores	
BRA	52.0
BRA Outcome	-
BRA+CCA	64.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	24.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	2.0
3. Invasive elsewhere	18.0
B. Biology/Ecology	28.0
4. Undesirable (or persistence) traits	9.0
5. Resource exploitation	7.0
6. Reproduction	5.0
7. Dispersal mechanisms	3.0
8. Tolerance attributes	4.0
C. Climate change	12.0
9. Climate change	12.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	5
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	3 5 36 12 2 7 9 9 6 6
5. Resource exploitation	2
6. Reproduction	7
7. Dispersal mechanisms	9
8. Tolerance attributes	6
C. Climate change	
9. Climate change	6
Sectors affected	
Commercial	21
Environmental	17

Species or population nuisance traits	31		
Thresholds			
BRA	-		
BRA+CCA	-		
Confidence			
BRA+CCA	0.72		
BRA	0.73		
CCA	0.58		
Date and Time			
03/05/2022 13:41:54			

Taxon and Assessor details					
Category	Fishes and Lampreys (freshwater)				
Taxon name	Carassius gibelio				
Common name	gibel carp				
Assessor	Tatia Kuljanishvili				
Risk screening context					
Reason and socio-economic benefits	Prussian carp, Carassius gibelio (Bloch, 1782), has spread outside it's native range and has				
Risk assessment area	South Caucasus				
Taxonomy	Actinopterygii (ray-finned fishes) Cypriniformes (Carps) Cyprinidae (Minnows or carps) Cyprininae				
Native range	Europe and Asia: usually considered as native from central Europe to Siberia or introduced to				
Introduced range	At present, widely distributed and commonly stocked together with Cyprinus carpio which is				
URL	https://www.fishbase.de/summary/Carassius-gibelio.html				

			Response	Justification (references and/or other information)	Confidence
		ography/Historical			
1. L		ication/Cultivation	[···		
	1.01	Has the taxon been the subject of	Yes	Carassius gibelio is considered as C. auratus complex, which	Very high
		domestication (or cultivation) for at least 20		means that species of C. auratus complex are very difficult to	
		generations?		distinguish from each other in the wild. This group includes the	
				most popular aquarium fish - goldfish (Rylkova et al 2013).	
				Carassius gibelio itself is considered as a weed fish and it does not	
				have economic benefits. Therefore it is not deliberately grown in	
				fish farms or is subjected to substantial human selection.	
				-	
	1.02	To the terror because at in the cuild and liter.	NI-	However, fish farming is mostly the case how this species is	L B ala
	1.02	Is the taxon harvested in the wild and likely	No	The species was being introduced to some countries as a bait fish	High
		to be sold or used in its live form?		for other aquaculture fish (Lever 1996) however, this species is	
				not harvested, sold or consumed nowadays.	
	1.03	Does the taxon have invasive races,	Yes	Carassius auratus very closely related invasive species.	Very high
		varieties, sub-taxa or congeners?			
(Climate	, distribution and introduction risk			
	2.01	How similar are the climatic conditions of the	High	If we count that the native area of Carassius gibelio is Siberia/Asia	Medium
		Risk Assessment (RA) area and the taxon's		then climatic conditions are different to those to S. Caucasian	
		native range?		area, however, since we do not know what is exact native range	
		native range:			
_	2.02		1	of this species, confidence of this answer remains medium.	11:
	2.02	What is the quality of the climate matching	Low	The quality of the climate data is low since we do not know the	High
		data?		exact native range of this species. This can affect the accuracy of	
_				the climate analysis.	
	2.03	Is the taxon already present outside of	Yes	Following citations are the published records of this species	Very high
		captivity in the RA area?		apparance in RA area: Daraselia 1985; Japoshvili et al 2013;	
				Japoshvili et al 2017; Kuljanishvili et a; 2018; Kuljanishvili et al	
	2.04	How many potential vectors could the taxon	>1	Japoshvili et al 2017, Ruganshvill et al, 2016, Ruganshvill et al Japoshvili et al 2013 proposed two vectors: unintentional	High
	2.04		~1		ingn
		use to enter in the RA area?		introduction with Cyprinus carpio or spread by the birds,	
				ornamental trade and natural dispersal are also the possible	
	2.05	Is the taxon currently found in close	Yes	This species is established in almost every water body where it	Very high
		proximity to, and likely to enter into, the RA		occurs (Japoshvili et al 2013; Japoshvili et al 2017; Kuljanishvili	
		area in the near future (e.g. unintentional		et al 2020)	
		and intentional introductions)?		,	
1	nvasiv	e elsewhere			
1		e <i>elsewhere</i> Has the taxon become naturalised	Yes	It is known that this species have been naturalised in Europe	Very high
1	<i>nvasivo</i> 3.01	Has the taxon become naturalised	Yes	It is known that this species have been naturalised in Europe since 19th century (See: Bylkova et al 2013)	Very high
	3.01	Has the taxon become naturalised (established viable populations) outside its		since 19th century (See: Rylkova et al 2013).	, ,
		Has the taxon become naturalised (established viable populations) outside its In the taxon's introduced range, are there	Yes Yes	since 19th century (See: Rylkova et al 2013). Carassius gibelio is recognized as one of the most successful	Very high Very high
	3.01	Has the taxon become naturalised (established viable populations) outside its In the taxon's introduced range, are there known adverse impacts to wild stocks or		since 19th century (See: Rylkova et al 2013). Carassius gibelio is recognized as one of the most successful invasive fish worldwide (Copp et al 2005; Gozlan et al 2010). It	, ,
	3.01	Has the taxon become naturalised (established viable populations) outside its In the taxon's introduced range, are there		since 19th century (See: Rylkova et al 2013). Carassius gibelio is recognized as one of the most successful	, ,
	3.01	Has the taxon become naturalised (established viable populations) outside its In the taxon's introduced range, are there known adverse impacts to wild stocks or		since 19th century (See: Rylkova et al 2013). Carassius gibelio is recognized as one of the most successful invasive fish worldwide (Copp et al 2005; Gozlan et al 2010). It	, 5
	3.01	Has the taxon become naturalised (established viable populations) outside its In the taxon's introduced range, are there known adverse impacts to wild stocks or		since 19th century (See: Rylkova et al 2013). Carassius gibelio is recognized as one of the most successful invasive fish worldwide (Copp et al 2005; Gozlan et al 2010). It has negative impact on environment, in which it is introduced due to foraging behaviour and usual high abundances (Vetemaa et al	, 5
	3.01	Has the taxon become naturalised (established viable populations) outside its In the taxon's introduced range, are there known adverse impacts to wild stocks or		since 19th century (See: Rylkova et al 2013). Carassius gibelio is recognized as one of the most successful invasive fish worldwide (Copp et al 2005; Gozlan et al 2010). It has negative impact on environment, in which it is introduced due to foraging behaviour and usual high abundances (Vetemaa et al 2005; Lusková et al 2010). Presence of Prussian carp populations	, ,
	3.01	Has the taxon become naturalised (established viable populations) outside its In the taxon's introduced range, are there known adverse impacts to wild stocks or		since 19th century (See: Rylkova et al 2013). Carassius gibelio is recognized as one of the most successful invasive fish worldwide (Copp et al 2005; Gozlan et al 2010). It has negative impact on environment, in which it is introduced due to foraging behaviour and usual high abundances (Vetemaa et al 2005; Lusková et al 2010). Presence of Prussian carp populations increases turbidity (Crivelli, 1995) and leads to a change in the	, ,
	3.01	Has the taxon become naturalised (established viable populations) outside its In the taxon's introduced range, are there known adverse impacts to wild stocks or		since 19th century (See: Rylkova et al 2013). Carassius gibelio is recognized as one of the most successful invasive fish worldwide (Copp et al 2005; Gozlan et al 2010). It has negative impact on environment, in which it is introduced due to foraging behaviour and usual high abundances (Vetemaa et al 2005; Lusková et al 2010). Presence of Prussian carp populations increases turbidity (Crivelli, 1995) and leads to a change in the nutrient cycle (Paulovits et al., 1998). Additionally, Prussian carp	, ,
	3.01	Has the taxon become naturalised (established viable populations) outside its In the taxon's introduced range, are there known adverse impacts to wild stocks or		since 19th century (See: Rylkova et al 2013). Carassius gibelio is recognized as one of the most successful invasive fish worldwide (Copp et al 2005; Gozlan et al 2010). It has negative impact on environment, in which it is introduced due to foraging behaviour and usual high abundances (Vetemaa et al 2005; Lusková et al 2010). Presence of Prussian carp populations increases turbidity (Crivelli, 1995) and leads to a change in the nutrient cycle (Paulovits et al., 1998). Additionally, Prussian carp affects native species including plants and animals in terms of	, ,
	3.01	Has the taxon become naturalised (established viable populations) outside its In the taxon's introduced range, are there known adverse impacts to wild stocks or		since 19th century (See: Rylkova et al 2013). Carassius gibelio is recognized as one of the most successful invasive fish worldwide (Copp et al 2005; Gozlan et al 2010). It has negative impact on environment, in which it is introduced due to foraging behaviour and usual high abundances (Vetemaa et al 2005; Lusková et al 2010). Presence of Prussian carp populations increases turbidity (Crivelli, 1995) and leads to a change in the nutrient cycle (Paulovits et al., 1998). Additionally, Prussian carp	, ,
	3.01	Has the taxon become naturalised (established viable populations) outside its In the taxon's introduced range, are there known adverse impacts to wild stocks or		since 19th century (See: Rylkova et al 2013). Carassius gibelio is recognized as one of the most successful invasive fish worldwide (Copp et al 2005; Gozlan et al 2010). It has negative impact on environment, in which it is introduced due to foraging behaviour and usual high abundances (Vetemaa et al 2005; Lusková et al 2010). Presence of Prussian carp populations increases turbidity (Crivelli, 1995) and leads to a change in the nutrient cycle (Paulovits et al., 1998). Additionally, Prussian carp affects native species including plants and animals in terms of	, ,
	3.01	Has the taxon become naturalised (established viable populations) outside its In the taxon's introduced range, are there known adverse impacts to wild stocks or		since 19th century (See: Rylkova et al 2013). Carassius gibelio is recognized as one of the most successful invasive fish worldwide (Copp et al 2005; Gozlan et al 2010). It has negative impact on environment, in which it is introduced due to foraging behaviour and usual high abundances (Vetemaa et al 2005; Lusková et al 2010). Presence of Prussian carp populations increases turbidity (Crivelli, 1995) and leads to a change in the nutrient cycle (Paulovits et al., 1998). Additionally, Prussian carp affects native species including plants and animals in terms of grazing pressure and impacts on other fish by direct competition (Gaygusuz et al., 2007; Ribeiro and Leunda, 2012; Tarkan et al.	, ,
	3.01	Has the taxon become naturalised (established viable populations) outside its In the taxon's introduced range, are there known adverse impacts to wild stocks or		since 19th century (See: Rylkova et al 2013). Carassius gibelio is recognized as one of the most successful invasive fish worldwide (Copp et al 2005; Gozlan et al 2010). It has negative impact on environment, in which it is introduced due to foraging behaviour and usual high abundances (Vetemaa et al 2005; Lusková et al 2010). Presence of Prussian carp populations increases turbidity (Crivelli, 1995) and leads to a change in the nutrient cycle (Paulovits et al., 1998). Additionally, Prussian carp affects native species including plants and animals in terms of grazing pressure and impacts on other fish by direct competition (Gaygusuz et al., 2007; Ribeiro and Leunda, 2012; Tarkan et al. 2012; Ruppert et al. 2017). As with other non-native species,	, ,
	3.01	Has the taxon become naturalised (established viable populations) outside its In the taxon's introduced range, are there known adverse impacts to wild stocks or		since 19th century (See: Rylkova et al 2013). Carassius gibelio is recognized as one of the most successful invasive fish worldwide (Copp et al 2005; Gozlan et al 2010). It has negative impact on environment, in which it is introduced due to foraging behaviour and usual high abundances (Vetemaa et al 2005; Lusková et al 2010). Presence of Prussian carp populations increases turbidity (Crivelli, 1995) and leads to a change in the nutrient cycle (Paulovits et al., 1998). Additionally, Prussian carp affects native species including plants and animals in terms of grazing pressure and impacts on other fish by direct competition (Gaygusuz et al., 2017; Ribeiro and Leunda, 2012; Tarkan et al. 2012; Ruppert et al. 2017). As with other non-native species, Prussian carp may cause the introduction of uncommon parasites	, ,
	3.01	Has the taxon become naturalised (established viable populations) outside its In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	since 19th century (See: Rylkova et al 2013). Carassius gibelio is recognized as one of the most successful invasive fish worldwide (Copp et al 2005; Gozlan et al 2010). It has negative impact on environment, in which it is introduced due to foraging behaviour and usual high abundances (Vetemaa et al 2005; Lusková et al 2010). Presence of Prussian carp populations increases turbidity (Crivelli, 1995) and leads to a change in the nutrient cycle (Paulovits et al., 1998). Additionally, Prussian carp affects native species including plants and animals in terms of grazing pressure and impacts on other fish by direct competition (Gaygusuz et al., 2007; Ribeiro and Leunda, 2012; Tarkan et al. 2012; Ruppert et al. 2017). As with other non-native species, Prussian carp may cause the introduction of uncommon parasites and diseases in newly invaded areas (Žitňan. 1974: Mahmoud et	Very high
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	3.01	Has the taxon become naturalised (established viable populations) outside its In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	since 19th century (See: Rylkova et al 2013). Carassius gibelio is recognized as one of the most successful invasive fish worldwide (Copp et al 2005; Gozlan et al 2010). It has negative impact on environment, in which it is introduced due to foraging behaviour and usual high abundances (Vetemaa et al 2005; Lusková et al 2010). Presence of Prussian carp populations increases turbidity (Crivelli, 1995) and leads to a change in the nutrient cycle (Paulovits et al., 1998). Additionally, Prussian carp affects native species including plants and animals in terms of grazing pressure and impacts on other fish by direct competition (Gaygusuz et al., 2007; Ribeiro and Leunda, 2012; Tarkan et al. 2012; Ruppert et al. 2017). As with other non-native species, Prussian carp may cause the introduction of uncommon parasites and diseases in newlv invaded areas (Žitňan_1974: Mahmoud et There are no studies or assessments done in RA area regarding C. gibelo adverse impacts to aquaculture. However, based on other	Very high
	3.01	Has the taxon become naturalised (established viable populations) outside its In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	since 19th century (See: Rylkova et al 2013). Carassius gibelio is recognized as one of the most successful invasive fish worldwide (Copp et al 2005; Gozlan et al 2010). It has negative impact on environment, in which it is introduced due to foraging behaviour and usual high abundances (Vetemaa et al 2005; Lusková et al 2010). Presence of Prussian carp populations increases turbidity (Crivelli, 1995) and leads to a change in the nutrient cycle (Paulovits et al., 1998). Additionally, Prussian carp affects native species including plants and animals in terms of grazing pressure and impacts on other fish by direct competition (Gaygusuz et al., 2007; Ribeiro and Leunda, 2012; Tarkan et al. 2012; Ruppert et al. 2017). As with other non-native species, Prussian carp may cause the introduction of uncommon parasites and diseases in newly invaded areas (Žitňan_1924: Mahmoud et There are no studies or assessments done in RA area regarding C. gibelo adverse impacts to aquaculture. However, based on other area assessments we can say thay it can negatively affect the	Very high
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	3.01 3.02 3.03 3.03 3.04 3.05 Biolog	Has the taxon become naturalised (established viable populations) outside its In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? In the taxon's introduced range, are there known adverse impacts to aquaculture? In the taxon's introduced range, are there known adverse impacts to ecosystem services? In the taxon's introduced range, are there known adverse socio-economic impacts? y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or	Yes No No	since 19th century (See: Rylkova et al 2013). Carassius gibelio is recognized as one of the most successful invasive fish worldwide (Copp et al 2005; Gozlan et al 2010). It has negative impact on environment, in which it is introduced due to foraging behaviour and usual high abundances (Vetemaa et al 2005; Lusková et al 2010). Presence of Prussian carp populations increases turbidity (Crivelli, 1995) and leads to a change in the nutrient cycle (Paulovits et al., 1998). Additionally, Prussian carp affects native species including plants and animals in terms of grazing pressure and impacts on other fish by direct competition (Gaygusuz et al., 2007; Ribeiro and Leunda, 2012; Tarkan et al. 2012; Ruppert et al. 2017). As with other non-native species, Prussian carp may cause the introduction of uncommon parasites and diseases in newlv invaded areas (Žitňan_1974: Mahmoud et There are no studies or assessments done in RA area regarding C. gibelo adverse impacts to aquaculture. However, based on other area assessments we can say thay it can negatively affect the productivity in the pond aquaculture, since its ability to change nutrient cycle, grazing pressure and competition. Impacts all tyes of ecosystem services (in water). 1) Affects water quality (Crivelli, 1995; Richardson et al 1995); 2) can be transmitting diseases (Žitňan, 1974; Mahmoud et al 2009); 3)distrupts nutrient cycles in water (Paulovits et al 1998); 4) is not used in recreational fisheries. Does not have any known consequences on commercial or	Very high Medium Very high
	3.01 3.02 3.03 3.03 3.04 3.05 Biology Jndesir 4.01	Has the taxon become naturalised (established viable populations) outside its In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? In the taxon's introduced range, are there known adverse impacts to aquaculture? In the taxon's introduced range, are there known adverse impacts to ecosystem services? In the taxon's introduced range, are there known adverse impacts to ecosystem services? In the taxon's introduced range, are there known adverse socio-economic impacts? y/Ecology <i>able (or persistence) traits</i> Is it likely that the taxon will be poisonous or pose other risks to human health?	Yes No No No	since 19th century (See: Rylkova et al 2013). Carassius gibelio is recognized as one of the most successful invasive fish worldwide (Copp et al 2005; Gozlan et al 2010). It has negative impact on environment, in which it is introduced due to foraging behaviour and usual high abundances (Vetemaa et al 2005; Lusková et al 2010). Presence of Prussian carp populations increases turbidity (Crivelli, 1995) and leads to a change in the nutrient cycle (Paulovits et al., 1998). Additionally, Prussian carp affects native species including plants and animals in terms of grazing pressure and impacts on other fish by direct competition (Gaygusuz et al., 2007; Ribeiro and Leunda, 2012; Tarkan et al. 2012; Ruppert et al. 2017). As with other non-native species, Prussian carp may cause the introduction of uncommon parasites and diseases in newlv invaded areas (Žitňan 1974: Mahmoud et There are no studies or assessments done in RA area regarding C. gibelo adverse impacts to aquaculture. However, based on other area assessments we can say thay it can negatively affect the productivity in the pond aquaculture, since its ability to change nutrient cycle, grazing pressure and competition. Impacts all tyes of ecosystem services (in water). 1) Affects water quality (Crivelli, 1995; Richardson et al 1995); 2) can be transmitting diseases (Žitňan, 1974; Mahmoud et al 2009); 3)distrupts nutrient cycles in water (Paulovits et al 1998); 4) is not used in recreational fisheries. Does not have any known consequences on commercial or recreational fisheries or aquaculture.	Very high Medium Very high Medium
	3.01 3.02 3.03 3.03 3.04 3.05 Biolog	Has the taxon become naturalised (established viable populations) outside its In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? In the taxon's introduced range, are there known adverse impacts to aquaculture? In the taxon's introduced range, are there known adverse impacts to ecosystem services? In the taxon's introduced range, are there known adverse impacts to ecosystem services? In the taxon's introduced range, are there known adverse socio-economic impacts? y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or	Yes No No	since 19th century (See: Rylkova et al 2013). Carassius gibelio is recognized as one of the most successful invasive fish worldwide (Copp et al 2005; Gozlan et al 2010). It has negative impact on environment, in which it is introduced due to foraging behaviour and usual high abundances (Vetemaa et al 2005; Lusková et al 2010). Presence of Prussian carp populations increases turbidity (Crivelli, 1995) and leads to a change in the nutrient cycle (Paulovits et al., 1998). Additionally, Prussian carp affects native species including plants and animals in terms of grazing pressure and impacts on other fish by direct competition (Gaygusuz et al., 2007; Ribeiro and Leunda, 2012; Tarkan et al. 2012; Ruppert et al. 2017). As with other non-native species, Prussian carp may cause the introduction of uncommon parasites and diseases in newlv invaded areas (Žitňan. 1974: Mahmoud et There are no studies or assessments done in RA area regarding C. gibelo adverse impacts to aquaculture. However, based on other area assessments we can say thay it can negatively affect the productivity in the pond aquaculture, since its ability to change nutrient cycle, grazing pressure and competition. Impacts all tyes of ecosystem services (in water). 1) Affects water quality (Crivelli, 1995; Richardson et al 1995); 2) can be transmitting diseases (Žitňan, 1974; Mahmoud et al 2009); 3)distrupts nutrient cycles in water (Paulovits et al 1998); 4) is not used in recreational fisheries. Does not have any known consequences on commercial or recreational fisheries or aquaculture.	Very high Medium Very high Medium
	3.01 3.02 3.03 3.03 3.04 3.05 Biology Jndesir 4.01	Has the taxon become naturalised (established viable populations) outside its In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? In the taxon's introduced range, are there known adverse impacts to aquaculture? In the taxon's introduced range, are there known adverse impacts to ecosystem services? In the taxon's introduced range, are there known adverse impacts to ecosystem services? In the taxon's introduced range, are there known adverse socio-economic impacts? y/Ecology <i>able (or persistence) traits</i> Is it likely that the taxon will be poisonous or pose other risks to human health?	Yes No No No	since 19th century (See: Rylkova et al 2013). Carassius gibelio is recognized as one of the most successful invasive fish worldwide (Copp et al 2005; Gozlan et al 2010). It has negative impact on environment, in which it is introduced due to foraging behaviour and usual high abundances (Vetemaa et al 2005; Lusková et al 2010). Presence of Prussian carp populations increases turbidity (Crivelli, 1995) and leads to a change in the nutrient cycle (Paulovits et al., 1998). Additionally, Prussian carp affects native species including plants and animals in terms of grazing pressure and impacts on other fish by direct competition (Gaygusuz et al., 2007; Ribeiro and Leunda, 2012; Tarkan et al. 2012; Ruppert et al. 2017). As with other non-native species, Prussian carp may cause the introduction of uncommon parasites and diseases in newlv invaded areas (Žitňan 1974: Mahmoud et There are no studies or assessments done in RA area regarding C. gibelo adverse impacts to aquaculture. However, based on other area assessments we can say thay it can negatively affect the productivity in the pond aquaculture, since its ability to change nutrient cycle, grazing pressure and competition. Impacts all tyes of ecosystem services (in water). 1) Affects water quality (Crivelli, 1995; Richardson et al 1995); 2) can be transmitting diseases (Žitňan, 1974; Mahmoud et al 2009); 3)distrupts nutrient cycles in water (Paulovits et al 1998); 4) is not used in recreational fisheries. Does not have any known consequences on commercial or recreational fisheries or aquaculture.	Very high Medium Very high Medium

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16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	This species is omnivorous. Is not characterised with parasitism and is not being a predator.	High
17	4.04	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has	Yes	The species ability to tolerate degraded conditions in different environment makes this species invasive (Morgan 2007).	High
18	4.05	invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA	Yes	It can disrupt food-web structure via eating-out zooplankton (See Paulovits et al 1998)	High
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes	Can affect water quality, can be transmitting desases, disrupts nutrient cycles in water, and recreational fisheries are being	High
20	4.07	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA	Yes	impacted as this species is not local anglers favourite. There is no information about endemic pests and infectious agents in the region	Low
21	4.08	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area?	Yes	Carassius gibelio might bring of uncommon parasites and diseases in newly invaded areas (Žitňan, 1974; Mahmoud et al 2009).	Medium
22	4.09	Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity?	Yes	The fish grows up to 30cm (at least what is recorded) in the RA area (Japoshvili et al 2017). If held in captivity, it is more likely to be released into nature due to it's achieved size.	High
23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)?	Yes	Recently this fish has been found in flowing waters as well.	High
24	4.11	Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for	Yes	Several studies document it's foraging behaviour, leading the decrease of habitat quality and decline of native species	High
25	4.12	native taxa? Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)?	Yes	This species is known that can be reproducing by Parthenogenesis (Gui and Zhou, 2010) Meaning that it can quickly reproduce even in low densities.	Very high
		e exploitation			
26	5.01	Is the taxon likely to consume threatened or protected native taxa in the RA area?	No	There is expectation that it can consume some threatened benthic invertebrates. However, local IUCN lists are not updated and it is difficult to say which local organisms it can affect. Secondly, C. gibelio is not a predatory fish, that means that it can not consume threatened fishes. Thus, answer will be NO, but with Medium confidence	Medium
27	5.02	Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?	Yes	It is known that the C. gibelio or its closely related taxa (C. carassius; C. auratus) impact the nutrient cycle and food resources availability for native organisms (Paulovits et al 1998;	Medium
c r	Reprodu	untion .		He et al 2017; He et al 2019; Jia et al 2019).	
		Is the taxon likely to exhibit parental care	No	It is not known.	High
29	6.02	and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes	Yes	It has produced viable propagules.	Very high
30	6.03	or propagules (in the RA area)? Is the taxon likely to hybridise naturally with	Yes	It might hybridize with Cyprinus carpio (Simkova et al 2015)	Medium
31	6.04	native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction?	Yes	Yes it has ability to reproduce asexually as well, that has been documented using several studies.	Very high
32	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	No	C gibelio sometimes uses the sperm of other species of the same genus to trigger its clonal reproduction (Sperm dependent parthenogenesis). However, if there is not avalability of heterospecific sperm, they produce recombinant offspring of both sexes. Which indicates that they are not dependent on another taxon to complete its life cycle.	High
33	6.06	Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)?	No	Not recorded	High
	6.07	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	2	Age at maturity is 3-4 years in central and eastern europe; 1-2 years in southern Europe (Kotellat & Freyhof, 2007).	Medium
		al mechanisms			
	7.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable	>1	Unintentional releases with other fish species fry (e.g. C. carpio), accidental escapes from fish farms, intentional releases (by hobbysts).	High
	7.02	Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)?	Yes	Like written above, C. gibelio appeares in flowing waters, making this species highly mobile for further dispersal. It has reached protected areas as well.	Very high
	7.03	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal?	No	C. gibelio produces "sticky eggs that are attached to water plants or, submerged objects" (kottelat and Freyhof 2007). However, can it be transported by ships, hulls pilings, buoys? less likely.	High
	7.04	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?	Yes	Japoshvili et al. 2013 reported that the eggs of Carassius gibelio was believed to be introduced through birds in Georgia. However, it is less likely.	Low
39	7.05	Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA	No	There is no documentation of natural dispersal of this species larvae or juveniles	High

40	7.06	Are older life stages of the taxon likely to	Not applicable	Does not migrate for reproduction	High
		migrate in the RA area for reproduction?			
	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	Yes	This species occurs in natural lakes, which serve as an important areas for water birds (e.i Javakheti upland lakes). Its eggs could be transported by birds, but less likely.	Medium
42	7.08	Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be	Yes	In some urban ponds, accidentally introduced C. gibelio reproduces and disperses very rapidly (one calendar year)	High
	7.09	Is dispersal of the taxon density dependent?	No	Not documented	High
		ce attributes	Ne	No. and with stand being out of water for some there are been	List
		Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle?	No	No. can not withstand being out of water for more than one hour	High
45	8.02	Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being	Yes	Tolerates low oxygen and eutrophic environments	High
46	8.03	Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	No	There was documented case when C. auratus has been eradicated from the certain areas of the Vasse River via electrofishing and Gill nets (https://researchrepository.murdoch.edu.au/id/eprint/5948/1/Feral Goldfish.pdf). However, it is not known if it has been eridicated	High
47	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	Yes	Several studies have revealed that C gibelio is very tolerant to environmental/human disturbance.	Very high
48	8.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	No	Carassius gibelio belongs to Stenohaline fishes, that can not tolerate wide variety of salinity. Study done for C. auratus showed that salinities higher than 8-10‰ affects its growth and food	High
49	8.06	Are there effective natural enemies	No	intake, results in muscle dehydratation and increase of cortisol There is no such study done in RA area. Therefore, the answer has	Low
<u> </u>	Climat	(predators) of the taxon present in the RA e change		medium confidence.	
		e change			
	9.01	Under the predicted future climatic	Increase	It was hypothised that climate change might alert the	High
		conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?		mechanisms of transportation and introduction of non-native species. Commercial and recreational activities will increase, that itself increases the propagule pressure levels of non-native	5
51	9.02	Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	Increase	Increased temperatures will cause this species establish in higher altitudes	High
52	9.03				
		Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to	Increase	It might favour by environmental changes (caused by climate change) that will increase resource availability, resulting their widespread.	High
53	9.04	Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity	Increase Higher	change) that will increase resource availability, resulting their	High High
54	9.04	Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of		change) that will increase resource availability, resulting their widespread. Population densities will increase making them on one hand impossible to eradicate and on the other hand, affecting native organisms due to competition, that does not leave much resources	-

Statistics	
Scores	
BRA	36.0
BRA Outcome	-
BRA+CCA	48.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	14.0
1. Domestication/Cultivation	2.0
2. Climate, distribution and introduction risk	2.0
3. Invasive elsewhere	10.0
B. Biology/Ecology	22.0
4. Undesirable (or persistence) traits	10.0
5. Resource exploitation	2.0
6. Reproduction	4.0
7. Dispersal mechanisms	2.0

1.0	
-	8. Tolerance attributes
	C. Climate change
12.0	9. Climate change
	Answered Questions
55	Total
13	A. Biogeography/Historical
3	1. Domestication/Cultivation
5	2. Climate, distribution and introduction risk
5	3. Invasive elsewhere
36	B. Biology/Ecology
12	4. Undesirable (or persistence) traits
2	5. Resource exploitation
7	6. Reproduction
9	7. Dispersal mechanisms
6	8. Tolerance attributes
. (C. Climate change
6	9. Climate change
	Sectors affected
11	Commercial
12	Environmental
30	Species or population nuisance traits

Thresholds	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.75
BRA	0.74
CCA	0.83
Date and Time	

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Faxon and Assessor details					
Category	Fishes and Lampreys (freshwater)				
Taxon name	Chelon auratus				
Common name	golden grey mullet				
Assessor	Bella Japoshvili				
Risk screening context					
Reason and socio-economic benefits	The species have been translocated to the Caspian Sea and have important economic value				
Risk assessment area	South Caucasus				
Taxonomy	https://www.fishbase.de/summary/Chelon-auratus.html				
Native range	Mediterranean Sea				
Introduced range	Caspian Sea				
URL	https://www.fishbase.de/summary/Chelon-auratus.html				

			Response	Justification (references and/or other information)	Confidence
A. I	Biogeo	graphy/Historical	-		
1. L		ication/Cultivation			
1	1.01	Has the taxon been the subject of	Yes	Crosetti, D. & Cataudella, S. (1995). The Mullets (pp. 253-268),	Very high
		domestication (or cultivation) for at least 20		In: C.E. Nash, A.J. Novotny (Eds.). World Anim. SciProduction of	
		generations?		Aquatic Animals (fishes-C8). Elsevier Science, Amsterdam,	
2	1.00	· · · · · · · · · · · · · · · · · · ·		Netherlands, 529 pp.;	
2	1.02	Is the taxon harvested in the wild and likely	Yes	Ninua, N., Japoshvili, B., Bochorishvili, V., 2013. Fishes of	Very high
3	1.03	to be sold or used in its live form? Does the taxon have invasive races,	Yes	Georgia. Tsignieri, Tbilisi. Other congeners. CABI, 2022. Invasive Species Compendium.	Very high
5	1.05	varieties, sub-taxa or congeners?	165	Wallingford, UK: CAB International. www.cabi.org/isc.	very nigh
2. (Climate	, distribution and introduction risk		Wallingfold, OK. CAD International. www.cabl.org/ise.	
4	2.01	How similar are the climatic conditions of the	High	Results of climatch algorithm	High
		Risk Assessment (RA) area and the taxon's			
		native range?			
5	2.02	What is the quality of the climate matching	Low	Due to low accuracy of local climate data	High
		data?			
6	2.03	Is the taxon already present outside of	Yes	Kuljanishvili, T., Mumladze, L., Japoshvili, B., Mustafayev, N.,	Very high
		captivity in the RA area?		Ibrahimov, S., Patoka, J., & Kalous, L. (2021). The first unified	
				inventory of non-native fishes of the South Caucasian countries,	
				Armenia, Azerbaijan, and Georgia. Knowledge & Management of	
	0.6.			Aquatic Ecosystems, (422), 32.	
7	2.04	How many potential vectors could the taxon	None	Human mediated translocation	High
	2.05	use to enter in the RA area?		Maddensteller T. Managlander, J. To., J. W. D. M. & G) (augus la ilad
8	2.05	Is the taxon currently found in close	Yes	Kuljanishvili, T., Mumladze, L., Japoshvili, B., Mustafayev, N.,	Very high
		proximity to, and likely to enter into, the RA		Ibrahimov, S., Patoka, J., & Kalous, L. (2021). The first unified	
		area in the near future (e.g. unintentional		inventory of non-native fishes of the South Caucasian countries,	
		and intentional introductions)?		Armenia, Azerbaijan, and Georgia. Knowledge & Management of	
3 1	nyaciya	e elsewhere		Aquatic Ecosystems, (422), 32.	
9. I	3.01	Has the taxon become naturalised	Yes	Kuljanishvili, T., Mumladze, L., Japoshvili, B., Mustafayev, N.,	Very high
Ĩ	5.01	(established viable populations) outside its	105	Ibrahimov, S., Patoka, J., & Kalous, L. (2021). The first unified	very night
		native range?		inventory of non-native fishes of the South Caucasian countries,	
		native range.		Armenia, Azerbaijan, and Georgia. Knowledge & Management of	
				Aquatic Ecosystems, (422), 32.	
10	3.02	In the taxon's introduced range, are there	No	No documented evidence	Low
		known adverse impacts to wild stocks or			
		commercial taxa?			
11	3.03	In the taxon's introduced range, are there	No	No documented evidence	Low
		known adverse impacts to aquaculture?			
12	3.04	In the taxon's introduced range, are there	No	No documented evidence	Low
		known adverse impacts to ecosystem			
13	3.05	In the taxon's introduced range, are there	No	No documented evidence	Low
D I	Pielegy	known adverse socio-economic impacts?			
		able (or persistence) traits			
		Is it likely that the taxon will be poisonous or	No	Species is harmless	Very high
		pose other risks to human health?			,
15	4.02	Is it likely that the taxon will smother one or	No	No documented evidence	Low
		more native taxa (that are not threatened or			
1		protected)?			
16	4.03	Are there any threatened or protected taxa	No	Species is not parasite	High
1		that the non-native taxon would parasitise in			
		the RA area?			
17	4.04	Is the taxon adaptable in terms of climatic	Yes	Guessed based on its ability to tolerate with varing level of salinity	Low
1		and other environmental conditions, thus			
1		enhancing its potential persistence if it has			
1		invaded or could invade the RA area?			
18	4.05	Is the taxon likely to disrupt food-web	No	No documented evidence	Low
1		structure/function in aquatic ecosystems if it			
-	4.05	has invaded or is likely to invade the RA			
19	4.06	Is the taxon likely to exert adverse impacts	No	No documented evidence	Low
20	4.07	on ecosystem services in the RA area? Is it likely that the taxon will host, and/or	No	No documented evidence	Low
20	4.07		No	No documented evidence	Low
1		act as a vector for, recognised pests and infectious agents that are endemic in the RA			
21	4.08	Infectious agents that are endemic in the RA Is it likely that the taxon will host, and/or	Yes	No documented evidence	Low
~ 1	1.00	act as a vector for, recognised pests and	103		L
1		infectious agents that are absent from (novel			
1		to) the RA area?			
	1	to, ale fortalea.	1		1

22	4 00				
22	4.09	Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity?	Yes	Species reared in mariculture for future release	High
23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)?	Yes	No documented evidence	Low
24	4.11	(e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for	No	No documented evidence	Low
25	4.12	native taxa? Is the taxon likely to maintain a viable population even when present in low	No	No documented evidence	Low
		densities (or persisting in adverse conditions by way of a dormant form)?			
5. R	Resourc	e exploitation			
	5.01	Is the taxon likely to consume threatened or	No	No documented evidence	Low
		protected native taxa in the RA area?			
27	5.02	Is the taxon likely to sequester food	Yes	No documented evidence	Low
		resources (including nutrients) to the detriment of native taxa in the RA area?			
6. R	Reprodu				
	6.01	Is the taxon likely to exhibit parental care	No	Kottelat, M., Freyhof, J., 2007. Handbook of European freshwater	Very high
		and/or to reduce age-at-maturity in response		fishes. Imprimeria du Democrate SA, Dlemont.	
20	6.00	to environmental conditions?		https://doi.org/10.1643/OT-08-098a.1	
29	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	Species is established and reproducing in RA area	Very high
30	6.03	Is the taxon likely to hybridise naturally with	No	Not a documentied evidence exists	High
		native taxa?			
31	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	No	Species is sexualy reproducing (Kottelat, M., Freyhof, J., 2007. Handbook of European freshwater fishes. Imprimeria du Democrate SA, Dlemont. https://doi.org/10.1643/OT-08-098a.1)	Very high
32	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	No	It has independent life cycle	Very high
33	6.06	Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)?	Yes	Thausands of egges are produced by a single individual	Very high
34	6.07	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	3	Kesiktaş, M., Yemişken, E., Yildiz, T., & Eryilmaz, L. (2020). Age, growth and reproduction of the golden grey mullet, Chelon auratus (Risso, 1810) in the Golden Horn Estuary, Istanbul. Journal of the Marine Biological Association of the United	Very high
7 5	lianara	al machanisma		Kingdom, 100(6), 989-995.	
		al mechanisms How many potential internal	>1	Active dispersal, Human mediated translocation	High
		vectors/pathways could the taxon use to disperse within the RA area (with suitable			
	7.02	Will any of these vectors/pathways bring the taxon in close proximity to one or more	No	No such areas in the Caspian Sea	High
37		protected areas (e.g. MCZ, MPA, SSSI)?			
	7.03	protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal?	No	Not such fact is known. Furthermore, species morpholgy does not allow such behavior	Very high
38	7.03	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules	No Yes	allow such behavior Eggs are pelagic moving freely with water currents (Breder, C.M. and D.E. Rosen, 1966. Modes of reproduction in fishes. T.F.H.	Very high High
		Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA		allow such behavior Eggs are pelagic moving freely with water currents (Breder, C.M.	, ,
39	7.04	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as	Yes	allow such behavior Eggs are pelagic moving freely with water currents (Breder, C.M. and D.E. Rosen, 1966. Modes of reproduction in fishes. T.F.H. Publications, Neptune City, New Jersey. 941 p.) Juveniles are actively sweeming (Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications	High
39 40	7.04	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to	Yes Yes	allow such behavior Eggs are pelagic moving freely with water currents (Breder, C.M. and D.E. Rosen, 1966. Modes of reproduction in fishes. T.F.H. Publications, Neptune City, New Jersey. 941 p.) Juveniles are actively sweeming (Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin. 646 pp.)	High
39 40 41	7.04 7.05 7.06	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both	Yes Yes No	allow such behavior Eggs are pelagic moving freely with water currents (Breder, C.M. and D.E. Rosen, 1966. Modes of reproduction in fishes. T.F.H. Publications, Neptune City, New Jersey. 941 p.) Juveniles are actively sweeming (Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin. 646 pp.) Not such an evidence is known	High High High
39 40 41 42	7.04 7.05 7.06 7.07 7.08	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be	Yes Yes No Yes	allow such behavior Eggs are pelagic moving freely with water currents (Breder, C.M. and D.E. Rosen, 1966. Modes of reproduction in fishes. T.F.H. Publications, Neptune City, New Jersey. 941 p.) Juveniles are actively sweeming (Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin. 646 pp.) Not such an evidence is known Not such an evidence exists Eggs or juveniles that reach large number can disperse independently	High High High Very high Very high
39 40 41 42 43	7.04 7.05 7.06 7.07 7.08 7.09	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both	Yes Yes No No	allow such behavior Eggs are pelagic moving freely with water currents (Breder, C.M. and D.E. Rosen, 1966. Modes of reproduction in fishes. T.F.H. Publications, Neptune City, New Jersey. 941 p.) Juveniles are actively sweeming (Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin. 646 pp.) Not such an evidence is known Not such an evidence exists Eggs or juveniles that reach large number can disperse	High High High Very high
39 40 41 42 <u>43</u> 8.7	7.04 7.05 7.06 7.07 7.08 7.09	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life	Yes Yes No Yes	allow such behavior Eggs are pelagic moving freely with water currents (Breder, C.M. and D.E. Rosen, 1966. Modes of reproduction in fishes. T.F.H. Publications, Neptune City, New Jersey. 941 p.) Juveniles are actively sweeming (Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin. 646 pp.) Not such an evidence is known Not such an evidence exists Eggs or juveniles that reach large number can disperse independently	High High High Very high Very high
39 40 41 42 43 8.7 44	7.04 7.05 7.06 7.07 7.08 7.09	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that	Yes No No Yes	allow such behavior Eggs are pelagic moving freely with water currents (Breder, C.M. and D.E. Rosen, 1966. Modes of reproduction in fishes. T.F.H. Publications, Neptune City, New Jersey. 941 p.) Juveniles are actively sweeming (Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin. 646 pp.) Not such an evidence is known Not such an evidence exists Eggs or juveniles that reach large number can disperse independently No documented evidence	High High Very high Very high
39 40 41 42 43 8.7 44	7.04 7.05 7.06 7.07 7.08 7.09 <i>Folerano</i> 8.01	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of	Yes No No Yes No	allow such behavior Eggs are pelagic moving freely with water currents (Breder, C.M. and D.E. Rosen, 1966. Modes of reproduction in fishes. T.F.H. Publications, Neptune City, New Jersey. 941 p.) Juveniles are actively sweeming (Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin. 646 pp.) Not such an evidence is known Not such an evidence exists Eggs or juveniles that reach large number can disperse independently No documented evidence Not such evidence exists	High High Very high Very high Medium

48	8.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	No	The species is living in marin and brackish waters and even occuring in lower reaches of rivers. Thus already tolerate large variety of salinity in its natural environment	Very high
49	8.06	Are there effective natural enemies (predators) of the taxon present in the RA	No	In spite of some potential predators (Esox lucius, Sander lucioperca, Silurus glanis) no one is ever shown as an effective	Low
С. (Climat	e change			
9. (change			
50	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?	No change	Based on professional judgement	Low
51	9.02	Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	No change	Based on professional judgement	Low
52	9.03	Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase. decrease or not change?	No change	Based on professional judgement	Low
53	9.04	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	Higher	Based on professional judgement	Low
54	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Higher	Based on professional judgement	Low
55	9.06	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	Higher	Based on professional judgement	Low

Statistics	
Scores	
BRA	14.0
BRA Outcome	-
BRA+CCA	20.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	6.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	0.0
3. Invasive elsewhere	2.0
B. Biology/Ecology	8.0
4. Undesirable (or persistence) traits	4.0
5. Resource exploitation	2.0
6. Reproduction	1.0
7. Dispersal mechanisms	1.0
8. Tolerance attributes	0.0
C. Climate change	6.0
9. Climate change	6.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3 5 5 36
2. Climate, distribution and introduction risk	5
<i>3. Invasive elsewhere</i>	5
B. Biology/Ecology	
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2
6. Reproduction	
7. Dispersal mechanisms	9
8. Tolerance attributes	
C. Climate change	6
9. Climate change	6
Sectors affected	_
Commercial	7
Environmental	4
Species or population nuisance traits	11
Thresholds	
BRA	

Thresholds	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.62
BRA	0.67
CCA	0.25
Date and Time	
04/05/2	022 13:04:41
	022 13:04:41

Taxon and Assessor details	
Category	Fishes and Lampreys (freshwater)
Taxon name	Chelon auratus
Common name	golden grey mullet
Assessor	Giorgi Epitashvili
Risk screening context	
Reason and socio-economic benefits	In some estuaries it is main target of both commercial fishery and recreational fishermen.
Risk assessment area	South Caucasus
Taxonomy	Chelon auratus (Risso, 1810)
Native range	Eastern Atlantic: Scotland to Cape Verde; in the Mediterranean and Black Sea. Also in coastal
Introduced range	It has been introduced into the Caspian Sea.
URL	https://www.fishbase.se/summary/1735

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
1. l		ication/Cultivation			1
1	1.01	Has the taxon been the subject of	Yes	The species' potential for aquaculture is enhanced by its	High
		domestication (or cultivation) for at least 20		eurihalyne and eurithermal adaptability, allowing it to grow in a	
		generations?		variety of ecosystems (Crosetti & Cataudella, 1995). Moreover, fry	
				production is high in certain seasons, and their capture almost	
				entirely supports seed supply for mullet aquaculture (Crosetti &	
				Cataudella, 1995). Golden grey mullets are consumers of the low	
				trophic layers and can therefore be used in most economic and	
				efficient way by culturing them extensively (Crosetti & Cataudella,	
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	The fish has a trade importance (Ninua et al. 2013).	Very high
3	1.03	Does the taxon have invasive races,	Yes	Data deficient	Medium
		varieties, sub-taxa or congeners?			
		, distribution and introduction risk			
4	2.01	How similar are the climatic conditions of the	High	This species is naturally distributed in the SC region.	Very high
		Risk Assessment (RA) area and the taxon's			
-	2.02	native range?	11:	This section is not well, distributed in the CC version	Mara hiah
5	2.02	What is the quality of the climate matching data?	High	This species is naturally distributed in the SC region.	Very high
6	2.03	Is the taxon already present outside of	Yes	This species is naturally distributed in the SC region and	Very high
		captivity in the RA area?		translocated in the Caspian Basin (Azerbaijan, Iran) (Kuljanishvili	
7	2.04	How many potential vectors could the taxon	>1	This species is naturally distributed in the SC region. Also it was	Very high
	1	use to enter in the RA area?		entered in the Caspian Sea basin via human, intentionally.	
8	2.05	Is the taxon currently found in close	Yes	Chelon auratus is a common species and major commercial	Very high
		proximity to, and likely to enter into, the RA		resource of Turkish waters (Kesiktas et al. 2020).	- , 5
		area in the near future (e.g. unintentional			
	1	and intentional introductions)?			
3. 1	Invasiv	e elsewhere			
9	3.01	Has the taxon become naturalised	Yes	C. auratus was introduced from the Black Sea to the Caspian Sea	Very high
	1	(established viable populations) outside its		in Azerbaijan, Kazakhstan and Turkmenistan. It is established in	- , 5
	1	native range?		all three countries.	
10	3.02	In the taxon's introduced range, are there	No	C. auratus has been introduced into the Caspian Sea where it has	Very high
	0.02	known adverse impacts to wild stocks or		established populations but no negative impacts have been	ter, mgn
		commercial taxa?		reported from this introduction. It has also been introduced in the	
				Jordan River and Lake Kinneret but no adverse impacts have been	
				recorded from these introductions.	
11	3.03	In the taxon's introduced range, are there	No	Nu such fact has been reported	High
11	5.05	known adverse impacts to aquaculture?	NO	Nu such fact has been reported	nign
17	3.04	In the taxon's introduced range, are there	No	Nu such fact has been reported	High
	5.54	known adverse impacts to ecosystem			
17	3.05	In the taxon's introduced range, are there	No	Nu such fact has been reported	High
13	3.05		NU		ingn
P	Piolog	known adverse socio-economic impacts?			1
		able (or persistence) traits			
		Is it likely that the taxon will be poisonous or	No	This species does not pose a threat to humans.	Very high
14	7.01	pose other risks to human health?			very mgn
15	4.02	Is it likely that the taxon will smother one or	No	Nu such fact has been reported	High
10	4.02		NO		i iigii
	1	more native taxa (that are not threatened or			
10	4.02	protected)?	No	A similar and is not expected because this section is not all	High
10	4.03	Are there any threatened or protected taxa	No	A similar case is not expected because this species is naturally	High
	1	that the non-native taxon would parasitise in		occurring in the SC region.	
	1.0.1	the RA area?	N N		
17	4.04	Is the taxon adaptable in terms of climatic	Yes	This species is naturally distributed in the SC region and	Very high
	1	and other environmental conditions, thus		environmental conditions are acceptable for it.	
	1	enhancing its potential persistence if it has			
		invaded or could invade the RA area?			
18	4.05	Is the taxon likely to disrupt food-web	No	This species is naturally distributed in the SC region and	Very high
	1	structure/function in aquatic ecosystems if it		therefore, such fact is not expected.	1
		has invaded or is likely to invade the RA			
19	4.06	Is the taxon likely to exert adverse impacts	No	This species is naturally distributed in the SC region and	Very high
		on ecosystem services in the RA area?		therefore, such fact is not expected.	, , ,
20	4.07	Is it likely that the taxon will host, and/or	Not applicable	Data deficient	Low
		act as a vector for, recognised pests and			
	1	infectious agents that are endemic in the RA			
	1	micedous agents that are chuchlic in the KA	1	1	1

	4.00	To it likely that the target will be the	Vee	Develte found of the colder	High
21	4.08	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and	Yes	Parasite fauna of the golden grey mullet Liza aurata (Risso, 1810) collected from Lower Kızılırmak Delta in Samsun, Turkey were	High
		infectious agents that are absent from (novel		investigated in the present study. A total of 10 parasite species	
		to) the RA area?		were identified and they are; Trichodina puytoraci, Trichodina	
		.,		lepsii, Ligophorus mediterraneus, Ligophorus cephali, Microcotyle	
				mugilis, Ascocotyle (Phagicola) longa, Haplosplanchnus	
				pachysomus, Tylodelphys clavata, Neoechinorhyncus agilis and	
_				Ergasilus lizae. Overall infection prevalence was 100 %.	
2	4.09	Is it likely that the taxon will achieve a body	Yes	Its maximum length is around 60 centimetres and weight around	Very high
		size that will make it more likely to be		1.5 kilograms, but commonly it is much smaller fish with average	
R	4.10	released from captivity? Is the taxon capable of sustaining itself in a	No	specimen having 30 centimetres in length. Adults are neritic usually in schools, entering lagoons and lower	High
5	4.10	range of water velocity conditions (e.g.	NO	estuaries; rarely entering freshwater.	ingn
		versatile in habitat use)?			
4	4.11		No	No such fact has been described	High
		(e.g. excretion of by-products) or behaviours			5
		(e.g. feeding) will reduce habitat quality for			
		native taxa?			
5	4.12	Is the taxon likely to maintain a viable	Not applicable	Data deficient	Low
		population even when present in low			
		densities (or persisting in adverse conditions			
1	Resourc	by way of a dormant form)?			
	5.01		No	No such fact has been detected	High
		protected native taxa in the RA area?			5
7	5.02	Is the taxon likely to sequester food	No	No such fact has been described	Medium
		resources (including nutrients) to the			
	0	detriment of native taxa in the RA area?			L
	Reprodu		No	Data deficient	Medium
د	0.01	Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response	NU		rieululli
		to environmental conditions?			
9	6.02	Is the taxon likely to produce viable gametes	Yes	This species is naturally reproduces in the SC region.	Very high
		or propagules (in the RA area)?		, , , , , , , , , , , , , , , , , , , ,	, 3
0	6.03	Is the taxon likely to hybridise naturally with	No	No such fact has been described from the introduced range of the	Medium
		native taxa?		C. auratus.	
1	6.04	Is the taxon likely to be hermaphroditic or to	Yes	The present study documents the occurrence of an intersex	High
		display asexual reproduction?		condition in a natural population of mullet Mugil cephalus	
2	6.05	Is the taxon dependent on the presence of	No	(Dhanasekar et al. 2018). This species does not have such requirements.	High
2	0.05	another taxon (or specific habitat features)	NO	This species does not have such requirements.	підп
		to complete its life cycle?			
3	6.06	Is the taxon known (or likely) to produce a	Yes	Fecundity of C. auratus is 142 000 to 4 440 000 eggs (Ninua et al.	High
		large number of propagules or offspring		2013).	5
		within a short time span (e.g. < 1 year)?			
4	6.07	How many time units (days, months, years)	3	The fish reaches sexual maturity at the age of 3-4 (Ninua et al.	Very high
		does the taxon require to reach the age-at-		2013).	
	Diamana	first-reproduction?			
	7.01	al mechanisms How many potential internal	>1	This species is disperse or dispersed within the SC region naturally	High
5	7.01	vectors/pathways could the taxon use to	~1	and intentionally by humans.	ingn
		disperse within the RA area (with suitable			
5	7.02	Will any of these vectors/pathways bring the	Yes	Such a fact is to be expected. This species is already distributed	Very high
		taxon in close proximity to one or more		within the protected areas of SC region, for instance in the	, -
				Kolkheti National Park, west Georgia.	1
	7.03	protected areas (e.g. MCZ, MPA, SSSI)?		Ronalet Hational Failty Hebt beergia	
7	7.05	Does the taxon have a means of actively	No	This species does not have such means.	Very high
7	7.03	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship	No		Very high
7	7.03	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances	No		Very high
		Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal?		This species does not have such means.	
	7.03	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to	No Yes		Very high Very high
		Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules		This species does not have such means.	
3		Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to		This species does not have such means.	
3	7.04	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?	Yes	This species does not have such means. This fish is naturally reproduces and dispersed in the SC region.	Very high
3	7.04	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA	Yes	This species does not have such means. This fish is naturally reproduces and dispersed in the SC region.	Very high
3	7.04	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?	Yes Yes	This species does not have such means. This fish is naturally reproduces and dispersed in the SC region. This fish is naturally reproduces and dispersed in the SC region.	Very high Very high
3	7.04	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to	Yes	This species does not have such means. This fish is naturally reproduces and dispersed in the SC region.	Very high
3	7.04 7.05 7.06	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction?	Yes Yes	This species does not have such means. This fish is naturally reproduces and dispersed in the SC region. This fish is naturally reproduces and dispersed in the SC region. This fish is naturally reproduces in the SC region.	Very high Very high Very high
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3	7.04 7.05 7.06	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction?	Yes Yes	This species does not have such means. This fish is naturally reproduces and dispersed in the SC region. This fish is naturally reproduces and dispersed in the SC region. This fish is naturally reproduces in the SC region.	Very high Very high Very high
3 9 1	7.04 7.05 7.06 7.07	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	Yes Yes Yes Yes	This species does not have such means. This fish is naturally reproduces and dispersed in the SC region. This fish is naturally reproduces and dispersed in the SC region. This fish is naturally reproduces in the SC region. Such a fact is not described though it is not ruled out.	Very high Very high Very high Medium
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3)	7.04 7.05 7.06 7.07 7.08	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be	Yes Yes Yes Yes	This species does not have such means. This fish is naturally reproduces and dispersed in the SC region. This fish is naturally reproduces and dispersed in the SC region. This fish is naturally reproduces in the SC region. Such a fact is not described though it is not ruled out. Own judgement	Very high Very high Very high Medium Medium
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3) 1 3	7.04 7.05 7.06 7.07 7.08 7.09 7.09	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i>	Yes Yes Yes Yes Not applicable	This species does not have such means. This fish is naturally reproduces and dispersed in the SC region. This fish is naturally reproduces and dispersed in the SC region. This fish is naturally reproduces in the SC region. Such a fact is not described though it is not ruled out. Own judgement Data deficient	Very high Very high Very high Medium Medium
3 3 1 2 3	7.04 7.05 7.06 7.07 7.08 7.09	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of	Yes Yes Yes Yes	This species does not have such means. This fish is naturally reproduces and dispersed in the SC region. This fish is naturally reproduces and dispersed in the SC region. This fish is naturally reproduces in the SC region. Such a fact is not described though it is not ruled out. Own judgement	Very high Very high Very high Medium Medium
8 9 0 1 2	7.04 7.05 7.06 7.07 7.08 7.09 7.09	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of	Yes Yes Yes Yes Not applicable	This species does not have such means. This fish is naturally reproduces and dispersed in the SC region. This fish is naturally reproduces and dispersed in the SC region. This fish is naturally reproduces in the SC region. Such a fact is not described though it is not ruled out. Own judgement Data deficient	Very high Very high Very high Medium Medium
3 3 1 2 3	7.04 7.05 7.06 7.07 7.08 7.09 7.09	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life	Yes Yes Yes Yes Not applicable	This species does not have such means. This fish is naturally reproduces and dispersed in the SC region. This fish is naturally reproduces and dispersed in the SC region. This fish is naturally reproduces in the SC region. Such a fact is not described though it is not ruled out. Own judgement Data deficient	Very high Very high Very high Medium Medium
8 9 0 1 2 3	7.04 7.05 7.06 7.07 7.08 7.09 7.09	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle?	Yes Yes Yes Yes Not applicable	This species does not have such means. This fish is naturally reproduces and dispersed in the SC region. This fish is naturally reproduces and dispersed in the SC region. This fish is naturally reproduces in the SC region. Such a fact is not described though it is not ruled out. Own judgement Data deficient Such a fact is not known.	Very high Very high Very high Medium Medium
8 9 0 1 2 3 	7.04 7.05 7.06 7.07 7.08 7.09 7.09 7.09	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life	Yes Yes Yes Yes Not applicable	This species does not have such means. This fish is naturally reproduces and dispersed in the SC region. This fish is naturally reproduces and dispersed in the SC region. This fish is naturally reproduces in the SC region. Such a fact is not described though it is not ruled out. Own judgement Data deficient	Very high Very high Very high Medium Medium Low Very high
8 9 0 1 2 3 	7.04 7.05 7.06 7.07 7.08 7.09 7.09 7.09	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cvcle? Is the taxon tolerant of a wide range of	Yes Yes Yes Yes Not applicable	This species does not have such means. This fish is naturally reproduces and dispersed in the SC region. This fish is naturally reproduces and dispersed in the SC region. This fish is naturally reproduces in the SC region. Such a fact is not described though it is not ruled out. Own judgement Data deficient Such a fact is not known. It is tolerant of low oxygen levels and can ventilate water in	Very high Very high Very high Medium Medium Low Very high

46	8.03	Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	Not applicable	Data deficient	Low
47	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	Yes	In some countries/regions this species has spread by humans	High
48		Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	Yes	Golden grey mullet is a neritic species, usually inshore, entering lagoons, ports and estuaries, but rarely moves into freshwater. Spawns in the Sea.	Very high
49	8.06	Are there effective natural enemies (predators) of the taxon present in the RA area?	Yes	There are several predators in the SC region which can controll the C. auratus: Esox lucius, Sander lucioperca, Silurus glanis, Salmo labrax, etc.	Very high
		e change			
		change			
50	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?	No change	Own judgement	Medium
51	9.02	Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	No change	Own judgement	Medium
52	9.03	Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change?	No change	Own judgement	Medium
53	9.04	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	Lower	Own judgement	Medium
54	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Lower	Own judgement	Medium
55	9.06	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	Lower	Own judgement	Medium

Statistics	
Statistics	
BRA	25.0
BRA Outcome	-
BRA+CCA	19.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	8.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	2.0
3. Invasive elsewhere	2.0
B. Biology/Ecology	17.0
4. Undesirable (or persistence) traits	3.0
5. Resource exploitation	0.0
6. Reproduction	3.0
7. Dispersal mechanisms	6.0
8. Tolerance attributes	5.0
C. Climate change	-6.0
9. Climate change Answered Questions	-6.0
Answered Questions	
Total	55
Total A. Biogeography/Historical	<u>55</u> 13
A. Biogeography/Historical	13
A. Biogeography/Historical 1. Domestication/Cultivation	13
A. Biogeography/Historical	13
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk	13 3 5 5
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere	13 3 5 5 36
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology	13 3 5 5 36 12
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits	13 3 5 5 36 12 2 7
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation	13 3 5 5 36 12 2 7 7 9
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction	13 3 5 5 36 12 2 7
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms	13 3 5 36 12 2 7 9 9 6 6
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change	13 3 5 5 36 12 2 7 9 9 6
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected	13 3 5 5 36 12 2 7 7 9 6 6 6 6
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial	13 3 5 36 12 2 7 9 9 6 6
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial Environmental	13 3 5 5 36 12 2 7 7 9 6 6 6 6
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial	13 3 5 5 36 12 2 7 7 9 6 6 6 6
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change 9. Climate change Sectors affected Commercial Environmental Species or population nuisance traits	13 3 5 5 36 12 2 7 7 9 6 6 6 6
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial Environmental	13 3 5 5 36 12 2 7 7 9 6 6 6 6

Thresholds	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.76
BRA	0.80
CCA	0.50

Date and Time

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05/07/2021 17:23:09

axon and Assessor details						
Category	Fishes and Lampreys (freshwater)					
Taxon name	Chelon auratus					
Common name	golden grey mullet					
Assessor	Tatia Kuljanishvili					
Risk screening context						
Reason and socio-economic benefits	Chelon auratus and C. saliens are native to the Black Sea basin, and both species were					
Risk assessment area	South Caucasus					
Taxonomy	Actinopteri (ray-finned fishes) > Mugiliformes (Mullets) > Mugilidae					
Native range	The Black Sea basin					
Introduced range	The Caspian Sea basin					
URL	https://fishbase.mnhn.fr/summary/Chelon-auratus.html					

			Response	Justification (references and/or other information)	Confidence
Α. Ι	Biogeo	graphy/Historical	•		
1. L	Domesti	ication/Cultivation			
1	1.01	Has the taxon been the subject of	Yes	This taxon has not been subject of substantial human selection,	High
		domestication (or cultivation) for at least 20		however it has comercial value and is being fisheries important.	
		generations?			
2	1.02	Is the taxon harvested in the wild and likely	Yes	Yes. this species is very popular for market.	Very high
		to be sold or used in its live form?			
3	1.03	Does the taxon have invasive races,	Yes	Chelon labrosus (Yankova 2016) or Chelon saliens (Medium risk)	Medium
2 (varieties, sub-taxa or congeners?		(Moghaddas et al 2021)	
2. (<i>, distribution and introduction risk</i> How similar are the climatic conditions of the	Link	Comolo an similar	Madium
4	2.01		High	Somehow similar	Medium
		Risk Assessment (RA) area and the taxon's native range?			
5	2.02	What is the quality of the climate matching	High	There are no climatic stations in climatch to make this analysis.	Medium
5	2.02	data?	ingn	However, according to Koppen-Geiger map the climate is	neulum
				somehow similar.	
6	2.03	Is the taxon already present outside of	Yes	are distributed over the entire Caspian sea basin (Bogutskaya et	Very high
Ŭ	2.00	captivity in the RA area?		al. 2013; Yusifov et al. 2017). are also found in the brackish and	e, y mgn
				fresh waters of the Caspian Sea coast (Kuljannishvili et al 2021)	
7	2.04	How many potential vectors could the taxon	One	Aquaculture	Very high
1		use to enter in the RA area?			, ,
8	2.05	Is the taxon currently found in close	Yes	are distributed over the entire Caspian sea basin (Bogutskaya et	Very high
1		proximity to, and likely to enter into, the RA		al. 2013; Yusifov et al. 2017). are also found in the brackish and	
		area in the near future (e.g. unintentional		fresh waters of the Caspian Sea coast (Kuljannishvili et al 2021)	
		and intentional introductions)?			
3. I	nvasive	e elsewhere			
9	3.01	Has the taxon become naturalised	Yes	species formed self-sustaining populations (Ibrahimov and	Very high
		(established viable populations) outside its		Mustafayev 2015)	
10	3.02	In the taxon's introduced range, are there	No	No adverse impacts to the wild comercial taxa ar known.	Medium
		known adverse impacts to wild stocks or			
		commercial taxa?			
11	3.03	In the taxon's introduced range, are there	No	No adverse impacts to aquaculture iare known.	Medium
		known adverse impacts to aquaculture?			
12	3.04	In the taxon's introduced range, are there	No	No adverse impacts to ecosystem are known, however, can be	Low
12	2.05	known adverse impacts to ecosystem	No	transmitting of parasites and deseases	L li ala
13	3.05	In the taxon's introduced range, are there	NO	No adverse socio-economic impacts are known	High
D I	Zielegy	known adverse socio-economic impacts?			
		able (or persistence) traits			
			No	Not poisonous https://fishbase.mnhn.fr/summary/Chelon-	Very high
		pose other risks to human health?	-	auratus.html	., 5
15	4.02	Is it likely that the taxon will smother one or	No	It is not known	Low
		more native taxa (that are not threatened or			
		protected)?			
16	4.03	Are there any threatened or protected taxa	No	Does not parasite	Very high
1		that the non-native taxon would parasitise in			
		the RA area?			
17	4.04	Is the taxon adaptable in terms of climatic	Yes	This species can tolerate wide range of salinities and temeratures	Very high
1		and other environmental conditions, thus		(Nita & Nenciu 2020)	
1		enhancing its potential persistence if it has			
I		invaded or could invade the RA area?			
18	4.05	Is the taxon likely to disrupt food-web	No	The impact of G. aculeatus in Azerbaijan has not been documented	Low
1		structure/function in aquatic ecosystems if it			
10	4.00	has invaded or is likely to invade the RA	N		1
19	4.06	Is the taxon likely to exert adverse impacts	No	No adverse impacts on ecosystem services in the RA area is	Low
20	4.07	on ecosystem services in the RA area? Is it likely that the taxon will host, and/or	No	known. No information avalable	Low
20	+.07	act as a vector for, recognised pests and	110		Low
1		infectious agents that are endemic in the RA			
21	4.08	Is it likely that the taxon will host, and/or	Yes	It is possible.	Low
~ 1	1.00	act as a vector for, recognised pests and	103		2000
1		infectious agents that are absent from (novel			
1		to) the RA area?			
22	4.09	Is it likely that the taxon will achieve a body	Yes	This taxon is usually reared and then released in open waters	Very high
1		size that will make it more likely to be		(Maricultures)	, mgn
1		released from captivity?			
23	4.10	Is the taxon capable of sustaining itself in a	Yes	Yes. this specie is marine, which sometimes enters freshwaters	High
Ē		range of water velocity conditions (e.g.			5
1		versatile in habitat use)?			
-		· · ·			

24	4.11	Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa?	No	Not documented	High
25	4.12	Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)?	No	Less likely. since the first attempt of introducing this species in caspian sea basin failed.	Low
5. R	lesourc	e exploitation			
26	5.01	Is the taxon likely to consume threatened or	No	This species feed on small benthic organisms, detritus, and	Very high
. 7	F 02	protected native taxa in the RA area?	No	occasionally on insects and plankton	M a dissa
./	5.02	Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?	No	Less likely	Medium
i. R	leprodu				
	6.01	Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response	No	Not documented	High
9	6.02	to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	Yes. It has been considered as established species since 1930ies	Very high
	6.03	Is the taxon likely to hybridise naturally with native taxa?	No	Not documented	High
1	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	No	No https://fishbase.mnhn.fr/summary/Chelon-auratus.html	Very high
2	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	No	No. This tacon is not dependent on the presence of another taxon.	Very high
3	6.06	Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)?	Yes	Individual absolute ranges from 113 386 to 1.47 million eggs (Fazli et al 2008)	High
4	6.07	How many time units (days, months, years) does the taxon require to reach the age-at-	3	"Fifty percent of sexual maturity was at FL 26.0 cm. Mature gonads were present in 20% of fish at age 3, 63% at age 4, 88%	High
)isperer	first-reproduction? al mechanisms	l	at age 5, and 97% at age 6. " (Fazli et al 2008)	
	-	How many potential internal	>1	Aquaculture; recreational Fisheries;	High
-		vectors/pathways could the taxon use to disperse within the RA area (with suitable			
6	7.02	Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)?	No	It is possible however based on the spceies biological characters it will not establish in the protected areas. So the answer is no.	Medium
7	7.03	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal?	No	No, The morohological traits of the species does not allow it to attach to the surfaces.	Very high
8	7.04			No. This sort of dispersal is higly unlikely.	Very high
9	7.05	Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?	Yes	Yes it is possible, juveniles can spread independently	High
0	7.06	Are older life stages of the taxon likely to	No	No. it is reproducing in the sea	High
1	7.07	migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No	No. This is in my opinion not an option for dispersal.	Very high
2	7.08	Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both	Yes	There is no information regarding how rapid is the stocking of this species in the RA area	Low
2	7.09	unintentional or intentional) likely to be Is dispersal of the taxon density dependent?	No	Not documented	High
		ce attributes			nign
_		Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life	No	Not known. Not likely.	High
5	8.02	cvcle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the	Yes	it can tolerate wide range of temperatures and salinities	Low
6	8.03	relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	No	Can not be eradicated. and it will not be, because it has fisheries value	High
7	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	No	No. Not documented.	High
8	8.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	Yes	golden grey mullet fries can indeed tolerate a wide range of salinities (5‰-70‰),	Very high
9	8.06	Are there effective natural enemies (predators) of the taxon present in the RA	No	no effective natural enemies exist in RA area	High
		e change			
0		<i>change</i> Under the predicted future climatic	-		Let 1
		upgor the producted tuture climatic	Increase	It was hypotheses that climate change might alert the	High

51	9.02	Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	No change	Since this species are very much tolerant to wide range of temperatures their establishment wiill not decrease, it will stay the same	High
52	9.03	Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change?	No change	No change	High
53	9.04	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	No change	No change	Medium
54	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	No change	No change	Medium
55	9.06	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	No change	No change	Medium

Statistics

Scores	
BRA	14.0
BRA Outcome	-
BRA+CCA	16.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	7.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	2.0
B. Biology/Ecology	7.0
4. Undesirable (or persistence) traits	4.0
5. Resource exploitation	0.0
6. Reproduction	1.0
7. Dispersal mechanisms	-1.0
8. Tolerance attributes	3.0
C. Climate change	2.0
9. Climate change	2.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3 5 5
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2
6. Reproduction	
7. Dispersal mechanisms	9
8. Tolerance attributes	6
C. Climate change	6
9. Climate change	6
Sectors affected	-
Commercial	6
Environmental	0
Species or population nuisance traits	13
Thresholds	
BRA	-

	BRA	-
	BRA+CCA	-
Confidence		
	BRA+CCA	0.70
	BRA	0.71
	CCA	0.63
Date and Time		
	20/05/20	022 16:11:28

Taxon and Assessor details	
Category	Fishes and Lampreys (freshwater)
Taxon name	Chelon saliens
Common name	leaping mullet
Assessor	Bella Japoshvili
Risk screening context	
Reason and socio-economic benefits	The species have been translocated to the Caspian Sea and have important economic value
Risk assessment area	South Caucasus
Taxonomy	Actinopteri (ray-finned fishes) > Mugiliformes (Mullets) > Mugilidae (Mullets)
Native range	Mediterranean Sea, Atlantic coast
Introduced range	Caspian Sea, USA
URL	https://www.fishbase.de/summary/Chelon-saliens.html

			Response	Justification (references and/or other information)	Confidence
A. I	Biogeo	graphy/Historical			
		ication/Cultivation			
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	Thomson, J.M., 1986. Mugilidae. p. 344-349. In J. Daget, JP. Gosse and D.F.E. Thys van den Audenaerde (eds.) Check-list of the freshwater fishes of Africa (CLOFFA). ISNB, Brussels, MRAC; Tervuren; and ORSTOM, Paris. Vol. 2.	High
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	Thomson, J.M., 1986. Mugilidae. p. 344-349. In J. Daget, JP. Gosse and D.F.E. Thys van den Audenaerde (eds.) Check-list of the freshwater fishes of Africa (CLOFFA). ISNB, Brussels, MRAC; Tervuren; and ORSTOM, Paris. Vol. 2.	High
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	Congenerics (CABI, 2022. Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc.)	High
2. (Climate	, distribution and introduction risk			
4	2.01	How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range?	High	Result of climatch algorithm	Medium
5	2.02	What is the quality of the climate matching data?	Low	Due to low accuracy of local climate data	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	Kuljanishvili, T., Mumladze, L., Japoshvili, B., Mustafayev, N., Ibrahimov, S., Patoka, J., & Kalous, L. (2021). The first unified inventory of non-native fishes of the South Caucasian countries, Armenia, Azerbaijan, and Georgia. Knowledge & Management of Aquatic Ecosystems, (422), 32; Esmaeili, H. R., Teimori, A., Owfi, F., Abbasi, K., & Coad, B. W. (2014). Alien and invasive freshwater fish species in Iran: Diversity, environmental impacts and management. Iranian Journal of Ichthyology, 1(2), 62-72.	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	None	Human mediated translocation	Very high
8	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)?	Yes	Kuljanishvili, T., Mumladze, L., Japoshvili, B., Mustafayev, N., Ibrahimov, S., Patoka, J., & Kalous, L. (2021). The first unified inventory of non-native fishes of the South Caucasian countries, Armenia, Azerbaijan, and Georgia. Knowledge & Management of Aquatic Ecosystems, (422), 32; Esmaeili, H. R., Teimori, A., Owfi, F., Abbasi, K., & Coad, B. W. (2014). Alien and invasive freshwater fish species in Iran: Diversity, environmental impacts and management. Iranian Journal of Ichthyology. 1(2), 62-72.	Very high
3. 1	Invasiv	e elsewhere			
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	Esmaeili, H. R., Teimori, A., Owfi, F., Abbasi, K., & Coad, B. W. (2014). Alien and invasive freshwater fish species in Iran: Diversity, environmental impacts and management. Iranian Journal of Ichthyology, 1(2), 62-72.	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	No	No documented evidence	Low
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	No documented evidence	Low
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	No	No documented evidence	Low
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	No documented evidence	Low
в. І	Biology	v/Ecology			
		able (or persistence) traits			
		Is it likely that the taxon will be poisonous or pose other risks to human health?	No	Not harmful species	Very high
	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	No documented evidence	Low
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	Species is not parasite	Very high

17	4.04	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?	Yes	The species is adaptable to a range of water salinity, oxygen level and turbidity. Minos G, Katselis G, Kaspiris P, Ondris I. 1994. The differential increase of morphometrical characters during the growth of grey mullet, Liza ramada (Risso) and Liza saliens (Risso), in the Messolonghi – Etoliko lagoon. Bios (Macedonia, Greece), 2:149-154. https://www.researchgate.net/publication/236343487 The differential increase of the morphometrical characters during the growth of the grey mullets Liza ramada Risso and Liza saliens Risso in Messolongi-Etoliko lagoon; Minos, G. Kalselis, G. Kaspiris, D. Ordrig, 1005. Comparison of the character sumbalogiant,	High
18	4.05	Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it	No	P. Ondris, I. 1995. Comparison of the change in morphological pattern during the growth in length of the grey mullets Liza ramada and Liza saliens from western Greece. Fisheries Research No documented evidence	Low
19	4.06	has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts	No	No documented evidence	Low
20	4.07	on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and	No	No documented evidence	Low
21	4.08	infectious agents that are endemic in the RA Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area?	No	e.g. Zorriehzahra, M. E. J., M. Ghasemi, M. Ghiasi, S.Haghighi Karsidani, G. Bovo, A. Nazari, M. Adel, V. Arizza, and K. Dhama. 2016. Isolation and confirmation of viral nervous necrosis (VNN) disease in golden grey mullet (Liza aurata) and leaping mullet (Liza saliens) in the Iranian waters of the Caspian Sea. Veterinary	High
22	4.09	Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity?	Yes	No documented evidence.	Medium
23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)?	Yes	No documented evidence	Low
24	4.11		No	No such an evidence exist and not expected	Low
25	4.12	Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)?	No	No such an evidence exist	Low
5. F	Resourc	ce exploitation			
26	5.01		No	Species is plankton/detritus feeder and no threatened species	Low
27	5.02	protected native taxa in the RA area? Is the taxon likely to sequester food resources (including nutrients) to the detriment of active taxa in the RA area?	Yes	within these organisms are known in the RA area No documented evidence; Professional judgement	Low
6. F	Reprodu	detriment of native taxa in the RA area?			
28	6.01	Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?	No	No such an evidence is known	High
29	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	Species is already established and reproducing in RA area	Very high
30	6.03	Is the taxon likely to hybridise naturally with native taxa?	No	Not such an evidence is known	Low
31	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	No	Species is sexually reproducing (Kottelat, M., Freyhof, J., 2007. Handbook of European freshwater fishes. Imprimeria du Democrate SA, Dlemont. https://doi.org/10.1643/OT-08-098a.1)	High
	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	No	No such an evidnece is known	High
	6.06	Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)?	Yes	Tousands of eggs are generated by a single individual per year	Very high
34	6.07	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	2	years	High
		al mechanisms			
		How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable	>1	Active dispersal, human mediated translocation	Medium
	7.02	taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)?	No	Species is found in Kolkheti National Park, Georgia. No other such PA is in RA area	High
	7.03	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal?	No	No such an evidence is known. Species morphology and anataomy does not support such behavoir	Very high
38	7.04	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?	Yes	Egges are pelagic and juveniles are sweeming freely (Breder, C.M. and D.E. Rosen, 1966. Modes of reproduction in fishes. T.F.H. Publications, Neptune City, New Jersey. 941 p.)	High
39	7.05	Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?	Yes	Due to active swiming capabilities of juveniles	High

10 7. 11 7. 12 7.	.06	Are older life stages of the taxon likely to	No	No such an evidence is known	High
	.06	migrate in the RA area for reproduction?	NO		nigii
	07	Are propagules or eggs of the taxon likely to	No	No such an evidence are known	High
12 7.		be dispersed in the RA area by other animals?	NO		ingn
		Is dispersal of the taxon along any of the	Yes	Speices are producing large number of pelagic eggs and juveniles	High
		vectors/pathways mentioned in the previous		re swiming with large collonies	
		seven questions (35–41; i.e. both			
		unintentional or intentional) likely to be			
13 7.	.09	Is dispersal of the taxon density dependent?	No	No documented evidence; Professional judgement	Low
3. Tole	lerand	ce attributes			
14 8.	.01	Is the taxon able to withstand being out of	No	No such an evidence is known	Low
		water for extended periods (e.g. minimum of			
		one or more hours) at some stage of its life			
		cycle?			
15 8.	.02	Is the taxon tolerant of a wide range of	Yes	Oxygen level, salinity, turbidity; Bekova, R., Prodanov, B, &	Medium
		water quality conditions relevant to that		Lambev, T (2019). Mullets and the impact of the environmental	
		taxon? [In the Justification field, indicate the		status of Burgas Bay on their populations. In International	
	0.2	relevant water quality variable(s) being	NI-	Scientific Conference "Kliment's Days (Vol. 104, pp. 62-69).	1
16 8.		Can the taxon be controlled or eradicated in	No	No documented evidence; Professional judgement	Low
		the wild with chemical, biological, or other			
17 8.		agents/means?	No	No such an evidence is knwon.	Low
+/ 0.		Is the taxon likely to tolerate or benefit from environmental/human disturbance?	NO		Low
18 8.		Is the taxon able to tolerate salinity levels	No	Species is using variable salinity environment in its natural	High
10 0.		that are higher or lower than those found in	NO	habitats.	ingn
		its usual environment?			
19 8.	06	Are there effective natural enemies	No	In spite of a number of predators in RA area, no any of them are	Low
		(predators) of the taxon present in the RA		shown to be effective	2011
C. Clir	imate	e change			
ə. Clin	mate	change			
50 9.	.01	Under the predicted future climatic	No change	Based on professional judgement	Low
		conditions, are the risks of entry into the RA			
		area posed by the taxon likely to increase,			
		decrease or not change?			
51 9.	.02	Under the predicted future climatic	No change	Based on professional judgement	Low
		conditions, are the risks of establishment			
		posed by the taxon likely to increase,			
		decrease or not change?			
52 9.	.03	Under the predicted future climatic	No change	Based on professional judgement	Low
		conditions, are the risks of dispersal within			
		the RA area posed by the taxon likely to			
	04	increase, decrease or not change? Under the predicted future climatic	Highor	Pased on professional judgement	Low
2 0		conditions, what is the likely magnitude of	Higher	Based on professional judgement	Low
53 9.		, , , ,			
53 9.					1
53 9.		future potential impacts on biodiversity			
		and/or ecological integrity/status?	Higher	Based on professional judgement	Low
53 9. 54 9.		and/or ecological integrity/status? Under the predicted future climatic	Higher	Based on professional judgement	Low
	.05	and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of	Higher	Based on professional judgement	Low
	.05	and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem	Higher	Based on professional judgement	Low
54 9.	.05	and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	-		
	.05	and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? Under the predicted future climatic	Higher Higher	Based on professional judgement based on professional judgement	Low
54 9.	0.05	and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	-		

Statistics	
Scores	
BRA	14.0
BRA Outcome	-
BRA+CCA	20.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	6.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	0.0
3. Invasive elsewhere	2.0
B. Biology/Ecology	8.0
4. Undesirable (or persistence) traits	4.0
5. Resource exploitation	2.0
6. Reproduction	1.0
7. Dispersal mechanisms	1.0
8. Tolerance attributes	0.0
C. Climate change	6.0
9. Climate change	6.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3 5 5
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	5
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2
6. Reproduction	12 2 7 9
7. Dispersal mechanisms	9

8. Tolerance attributes	6
C. Climate change	6
9. Climate change	6
Sectors affected	
Commercial	7
Environmental	4
Species or population nuisance traits	11
Thresholds	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.55
BRA	0.58
CCA	0.25
Date and Time	
04/05/2	022 13:30:23

Taxon and Assessor details	
Category	Fishes and Lampreys (freshwater)
Taxon name	Chelon saliens
Common name	leaping mullet
Assessor	Giorgi Epitashvili
Risk screening context	
Reason and socio-economic benefits	The fish has a trade importance.
Risk assessment area	South Caucasus
Taxonomy	Chelon saliens (Risso, 1810)
Native range	Eastern Atlantic: Mediterranean Sea, the Black Sea, Sea of Azov and Atlantic coasts from Morocco
Introduced range	Introduced to Iran and is now naturally occurring in the Caspian Sea basin.
URL	https://www.fishbase.se/summary/Chelon-saliens

_			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
L. L		ication/Cultivation	1.4		
L	1.01	Has the taxon been the subject of	Yes	Grey mullets are are important food fishes. The euryhalinity,	Medium
		domestication (or cultivation) for at least 20		eurythermality and their simpler diet, as well as the rapid growth	
		generations?		of some species, have made them the object of aquaculture in	
				many parts of the world, including the Mediterranean (Oren, 1981)	
2	1.02	Is the taxon harvested in the wild and likely	Yes	Data deficient	Medium
		to be sold or used in its live form?			
3	1.03	Does the taxon have invasive races,	No	Data deficient	Medium
		varieties, sub-taxa or congeners?			
2 (limato	, distribution and introduction risk			1
2. U 1	1	How similar are the climatic conditions of the	High	This appaies is naturally distributed in the CC region	Vorubiah
ł	2.01		підп	This species is naturally distributed in the SC region.	Very high
		Risk Assessment (RA) area and the taxon's			
		native range?			
5	2.02	What is the quality of the climate matching	High	This species is naturally distributed in the SC region (Ninua et al.	Very high
		data?		2013; Kuljanishvili et al. 2020).	
5	2.03	Is the taxon already present outside of	Yes	This species is naturally distributed in the SC region (Ninua et al.	Very high
		captivity in the RA area?		2013; Kuljanishvili et al. 2020).	
7	2.04	How many potential vectors could the taxon	>1	This species is naturally distributed in the SC region, also it has	Very high
		use to enter in the RA area?		been translocated in the Caspian Sea intentionally for aquacultural	
				purposes.	
3	2.05	Is the taxon currently found in close	Yes	This species is naturally distributed in the Caucasus region. C.	Very high
,	2.05		105		very mgn
		proximity to, and likely to enter into, the RA		saliens is also distributed in Turkey and introduced in Iran.	
		area in the near future (e.g. unintentional			
		and intentional introductions)?			
?. I	nvasive	e elsewhere			
)	3.01	Has the taxon become naturalised	Yes	C. saliens has been introduced into Israel, Iran, Azerbaijan,	Very high
		(established viable populations) outside its		Kazakhstan, and Turkmenistan, where it has established	
		native range?		populations. Now this fish naturally occurring in the Caspian Sea	
0	3.02	In the taxon's introduced range, are there	No	C. saliens has been introduced into Israel, Iran, Azerbaijan,	High
	0.02	known adverse impacts to wild stocks or		Kazakhstan, and Turkmenistan, where it has established	
		commercial taxa?			
		commercial taxa?		populations. The introduction to Israel was for aquaculture. No	
-	2.02		N	negative impacts have been reported from these introductions.	112.1
. 1	3.03	In the taxon's introduced range, are there	No	C. saliens has been introduced into Israel, Iran, Azerbaijan,	High
		known adverse impacts to aquaculture?		Kazakhstan, and Turkmenistan, where it has established	
				populations. The introduction to Israel was for aquaculture. No	
				negative impacts have been reported from these introductions.	
.2	3.04	In the taxon's introduced range, are there	No	C. saliens has been introduced into Israel, Iran, Azerbaijan,	High
		known adverse impacts to ecosystem		Kazakhstan, and Turkmenistan, where it has established	5
		services?		populations. The introduction to Israel was for aquaculture. No	
				negative impacts have been reported from these introductions.	
2	3.05	In the taxon's introduced range, are there	No	C. saliens has been introduced into Israel, Iran, Azerbaijan,	High
. ၁	3.05		NO		High
		known adverse socio-economic impacts?		Kazakhstan, and Turkmenistan, where it has established	
				populations. The introduction to Israel was for aquaculture. No	
				negative impacts have been reported from these introductions.	
		y/Ecology			
ι. ι		able (or persistence) traits			
4	4.01	Is it likely that the taxon will be poisonous or	No	This species does not pose a threat to humans.	Very high
		pose other risks to human health?			
5	4.02	Is it likely that the taxon will smother one or	No	No such fact has been detected.	Medium
2	1.52	more native taxa (that are not threatened or			
~	4.00	protected)?	N		M = diss
6	4.03	Are there any threatened or protected taxa	Yes	There are several threathened and protected species in the SC	Medium
		that the non-native taxon would parasitise in		region which may be affected by C. saliens (competition, eggs	
		the RA area?		consumption, etc).	
7	4.04	Is the taxon adaptable in terms of climatic	Yes	This species is naturally distributed in the Caucasus region and	Very high
		and other environmental conditions, thus		climatic conditions are acceptable for it.	
		enhancing its potential persistence if it has			
		invaded or could invade the RA area?			
	4.05	Is the taxon likely to disrupt food-web	No	This species is naturally distributed in the Caucasus region and	Very high
8			110		very myn
8	4.05		1	such a case is not expected.	
8	4.05	structure/function in aquatic ecosystems if it			1
		has invaded or is likely to invade the RA			
	4.05	has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts	No	This species is naturally distributed in the Caucasus region and	Very high
		has invaded or is likely to invade the RA	No	This species is naturally distributed in the Caucasus region and such a case is not expected.	Very high
9		has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts			Very high Low
9	4.06	has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?		such a case is not expected.	

21					
	4.08	Is it likely that the taxon will host, and/or	No	Such a case is not expected.	Medium
		act as a vector for, recognised pests and infectious agents that are absent from (novel			
		to) the RA area?			
22	4.09	Is it likely that the taxon will achieve a body	Yes	Max length of C. saliens is 40.0 cm SL male/unsexed; common	Very high
		size that will make it more likely to be		length: 30 cm, therefore this fish is good object for aquaculture.	
12	4.10	released from captivity? Is the taxon capable of sustaining itself in a	No	Adults usually in schools inhabit coastal waters, sometimes in	High
23	4.10	range of water velocity conditions (e.g.	NO	lagoons and estuaries.	High
		versatile in habitat use)?			
24	4.11		No	No such fact has been described.	High
		(e.g. excretion of by-products) or behaviours			
		(e.g. feeding) will reduce habitat quality for			
5	4.12	native taxa? Is the taxon likely to maintain a viable	Not applicable	Data deficient	Low
.5	7.12	population even when present in low			LOW
		densities (or persisting in adverse conditions			
_		by way of a dormant form)?			
		e exploitation Is the taxon likely to consume threatened or	No	No such fact has been described.	Medium
0	5.01	protected native taxa in the RA area?	NO	No such fact has been described.	Medium
27	5.02	Is the taxon likely to sequester food	Yes	The adults feed on worms, on snails, on crustaceans. The fray	High
		resources (including nutrients) to the		feed on detritus and on plankton (Ninua et al. 2013).	
- ,	<i>,</i>	detriment of native taxa in the RA area?			
	R <i>eprodu</i> 6.01	Is the taxon likely to exhibit parental care	Not applicable	Data deficient	Low
5	0.01	and/or to reduce age-at-maturity in response	applicable		
		to environmental conditions?			
29	6.02	Is the taxon likely to produce viable gametes	Yes	This species is naturally reproduces in the SC region.	Very high
0	6.03	or propagules (in the RA area)? Is the taxon likely to hybridise naturally with	No	No such fact has been described.	High
U	0.05	native taxa?			ingn
31	6.04	Is the taxon likely to be hermaphroditic or to	Yes	Tancioni et al. (2015) affirmed that the prevalence of natural	Medium
		display asexual reproduction?		hermaphroditism in mullets is non-existent or very low, some	
				cases were previously reported for M. cephalus (Franks et al.	
				1998) and L. ramada (Bayhan & Acarli 2006). Thus, it is also	
				possible that there is a general lack of information on this specific	
				topic for migratory fish such as mullets, conversely to other more studied species (Bahamonde et al. 2013).	
32	6.05	Is the taxon dependent on the presence of	No	This species does not have such requirements.	High
		another taxon (or specific habitat features)			
2	6.00	to complete its life cycle?	Vac	Forundity of C options in 500,000 to 2,400,000 (All states	Vom (bisb
53	6.06	Is the taxon known (or likely) to produce a large number of propagules or offspring	Yes	Fecundity of C. saliens is 500 000 to 2 100 000 eggs (Ninua et al. 2013).	Very high
		within a short time span (e.g. < 1 year)?		2013).	
34	6.07	How many time units (days, months, years)	3	It becomes sexually mature at the age of 3 (Ninua et al. 2013).	Very high
		does the taxon require to reach the age-at-		, , , , ,	, 3
_		first-reproduction?			
		al mechanisms How many potential internal	>1	This fish is distributed in the region naturally and possibly by	High
5	7.01	vectors/pathways could the taxon use to	~1	humans.	nign
		disperse within the RA area (with suitable	<u> </u>		
6	7.02	Will any of these vectors/pathways bring the	Yes	C. saliens are found in protected areas of the SC region, such as	Very high
		taxon in close proximity to one or more		Lake Paliastomi, in Kolkheti National Park, Georgia.	
7	7.03	protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively	No	This fish does not have such means.	Very high
1	,.05	attaching itself to hard substrata (e.g. ship			very night
		hulls, pilings, buoys) such that it enhances			
		the likelihood of dispersal?			
20	7.04	Is natural dispersal of the taxon likely to	Yes	This species is naturally reproduces in the SC region (Ninua et al.	Very high
,0					
0		occur as eggs (for animals) or as propagules		2013; Kuljanishvili et al. 2020).	
	7.05	(for plants: seeds, spores) in the RA area?	Yes		Very high
	7.05		Yes	2013; Kuljanishvili et al. 2020). This species is naturally reproduces in the SC region (Ninua et al. 2013; Kuljanishvili et al. 2020).	Very high
	7.05	(for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to	Yes	This species is naturally reproduces in the SC region (Ninua et al.	Very high
9		(for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?		This species is naturally reproduces in the SC region (Ninua et al. 2013; Kuljanishvili et al. 2020).	
39	7.05	(for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to	Yes	This species is naturally reproduces in the SC region (Ninua et al. 2013; Kuljanishvili et al. 2020). This species is naturally reproduces in the SC region (Ninua et al.	Very high Very high
9	7.06	(for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction?	Yes	This species is naturally reproduces in the SC region (Ninua et al. 2013; Kuljanishvili et al. 2020). This species is naturally reproduces in the SC region (Ninua et al. 2013; Kuljanishvili et al. 2020).	Very high
9 9		(for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to		This species is naturally reproduces in the SC region (Ninua et al. 2013; Kuljanishvili et al. 2020). This species is naturally reproduces in the SC region (Ninua et al.	
39 10	7.06	(for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction?	Yes	This species is naturally reproduces in the SC region (Ninua et al. 2013; Kuljanishvili et al. 2020). This species is naturally reproduces in the SC region (Ninua et al. 2013; Kuljanishvili et al. 2020).	Very high
39 10	7.06	(for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous	Yes Yes	This species is naturally reproduces in the SC region (Ninua et al. 2013; Kuljanishvili et al. 2020). This species is naturally reproduces in the SC region (Ninua et al. 2013; Kuljanishvili et al. 2020). There is no evidence of this, though it is possible.	Very high Medium
39 10	7.06	(for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both	Yes Yes	This species is naturally reproduces in the SC region (Ninua et al. 2013; Kuljanishvili et al. 2020). This species is naturally reproduces in the SC region (Ninua et al. 2013; Kuljanishvili et al. 2020). There is no evidence of this, though it is possible.	Very high Medium
89 10 11	7.06 7.07 7.08	(for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be	Yes Yes Yes	This species is naturally reproduces in the SC region (Ninua et al. 2013; Kuljanishvili et al. 2020). This species is naturally reproduces in the SC region (Ninua et al. 2013; Kuljanishvili et al. 2020). There is no evidence of this, though it is possible. Own judgement	Very high Medium Medium
89 10 12	7.06 7.07 7.08 7.09	(for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent?	Yes Yes	This species is naturally reproduces in the SC region (Ninua et al. 2013; Kuljanishvili et al. 2020). This species is naturally reproduces in the SC region (Ninua et al. 2013; Kuljanishvili et al. 2020). There is no evidence of this, though it is possible. Own judgement	Very high Medium
9 0 1 2 3	7.06 7.07 7.08 7.09	(for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be	Yes Yes Yes	This species is naturally reproduces in the SC region (Ninua et al. 2013; Kuljanishvili et al. 2020). This species is naturally reproduces in the SC region (Ninua et al. 2013; Kuljanishvili et al. 2020). There is no evidence of this, though it is possible. Own judgement	Very high Medium Medium
39 10 11 12 13 3. 7	7.06 7.07 7.08 7.09	(for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? ce attributes	Yes Yes Yes Not applicable	This species is naturally reproduces in the SC region (Ninua et al. 2013; Kuljanishvili et al. 2020). This species is naturally reproduces in the SC region (Ninua et al. 2013; Kuljanishvili et al. 2020). There is no evidence of this, though it is possible. Own judgement Data deficient	Very high Medium Medium Low
39 10 11 12 13 3. 7	7.06 7.07 7.08 7.09	(for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? ce attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life	Yes Yes Yes Not applicable	This species is naturally reproduces in the SC region (Ninua et al. 2013; Kuljanishvili et al. 2020). This species is naturally reproduces in the SC region (Ninua et al. 2013; Kuljanishvili et al. 2020). There is no evidence of this, though it is possible. Own judgement Data deficient	Very high Medium Medium Low
39 10 11 12 13 14	7.06 7.07 7.08 7.09 7.09 7.09 8.01	(for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle?	Yes Yes Not applicable	This species is naturally reproduces in the SC region (Ninua et al. 2013; Kuljanishvili et al. 2020). This species is naturally reproduces in the SC region (Ninua et al. 2013; Kuljanishvili et al. 2020). There is no evidence of this, though it is possible. Own judgement Data deficient No such fact has been revealed.	Very high Medium Medium Low Very high
39 10 11 12 13 13 14	7.06 7.07 7.08 7.09	(for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? ce attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of	Yes Yes Yes Not applicable	This species is naturally reproduces in the SC region (Ninua et al. 2013; Kuljanishvili et al. 2020). This species is naturally reproduces in the SC region (Ninua et al. 2013; Kuljanishvili et al. 2020). There is no evidence of this, though it is possible. Own judgement Data deficient	Very high Medium Medium
39 10 11 12 13 <u>7</u> 14	7.06 7.07 7.08 7.09 7.09 7.09 8.01	(for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle?	Yes Yes Not applicable	This species is naturally reproduces in the SC region (Ninua et al. 2013; Kuljanishvili et al. 2020). This species is naturally reproduces in the SC region (Ninua et al. 2013; Kuljanishvili et al. 2020). There is no evidence of this, though it is possible. Own judgement Data deficient No such fact has been revealed.	Very high Medium Medium Low Very high

46	8.03	Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	Yes	Own judgement	Medium
47	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	Yes	This species has expanded its range with the help of humans.	High
48	8.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	Yes	C. saliens is shoal sea fish, it's easily adapted to fresh and brackish waters (Ninua et al. 2013).	Very high
49	8.06	Are there effective natural enemies (predators) of the taxon present in the RA area?	Yes	There are several potential predators in the SC region which can controll the C. saliens populations: Esox lucius, Silurus glanis, Sander lucioperca, Salmo labrax, etc.	Very high
		e change			
		change			
50	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?	No change	Own judgement	Medium
51	9.02	Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	No change	Own judgement	Medium
52	9.03	Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase. decrease or not change?	No change	Own judgement	Medium
53	9.04	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	Lower	Own judgement	Medium
54	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Lower	Own judgement	Medium
55	9.06	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	Lower	Own judgement	Medium

Statistics	
Statistics	
BRA	23.0
BRA Outcome	
BRA+CCA	17.0
BRA+CCA Outcome	_
Score partition	
A. Biogeography/Historical	6.0
1. Domestication/Cultivation	2.0
2. Climate, distribution and introduction risk	2.0
3. Invasive elsewhere	2.0
B. Biology/Ecology	17.0
4. Undesirable (or persistence) traits	3.0
5. Resource exploitation	2.0
6. Reproduction	3.0
7. Dispersal mechanisms	6.0
8. Tolerance attributes	3.0
C. Climate change	-6.0
9. Climate change	-6.0
Answered Questions	
Total	
	55
A. Biogeography/Historical	13
A. Biogeography/Historical 1. Domestication/Cultivation	13
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk	13
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere	13
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology	13 3 5 5 36
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits	13 3 5 5 36 12
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation	13 3 5 5 36 12
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction	13 3 5 5 36 12 2 7
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms	13 3 5 5 36 12 2 7 7 9
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes	13 3 5 5 36 12 2 7 7 9 6
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms	13 3 5 5 36 12 2 7 7 9
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change	13 3 5 36 12 2 7 9 9 6 6
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change	13 3 5 36 12 2 7 9 9 6 6
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected	13 3 5 5 36 12 2 7 7 9 6 6 6 6
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial	13 3 5 5 36 12 2 7 9 6 6 6 6 6 5
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial Environmental	13 3 5 5 36 12 2 7 9 6 6 6 6 6 5 -3
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial Environmental	13 3 5 5 36 12 2 7 9 6 6 6 6 6 5 -3

Thresholds	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.73
BRA	0.76
CCA	0.50
CCA	0.5

Date and Time

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03/05/2022 14:17:07

Faxon and Assessor details					
Category	Fishes and Lampreys (freshwater)				
Taxon name	Chelon saliens				
Common name	leaping mullet				
Assessor	Tatia Kuljanishvili				
Risk screening context					
Reason and socio-economic benefits	Chelon auratus and C. saliens are native to the Black Sea basin, and both species were				
Risk assessment area	South Caucasus				
Taxonomy	Actinopteri (ray-finned fishes) > Mugiliformes (Mullets) > Mugilidae (Mullets)				
Native range	The Black Sea basin				
Introduced range	The Caspian Sea basin				
URL	https://fishbase.mnhn.fr/summary/Chelon-saliens.html				

			Response	Justification (references and/or other information)	Confidence
Α. Ι	Biogeo	ography/Historical			
		tication/Cultivation			
1	1.01	Has the taxon been the subject of	Yes	This taxon has not been subject of substantial human selection,	High
		domestication (or cultivation) for at least 20		however it has comercial value and is being fisheries important.	-
		generations?			
2	1.02	Is the taxon harvested in the wild and likely	Yes	Yes, it is harvested in the wild and is likely to be sold in its live	Very high
		to be sold or used in its live form?		form.	
3	1.03	Does the taxon have invasive races,	Yes	Chelon labrosus (Yankova 2016)	Medium
		varieties, sub-taxa or congeners?			
2. (Climate	, distribution and introduction risk			
4	2.01	How similar are the climatic conditions of the	High	Somehow similar	Medium
		Risk Assessment (RA) area and the taxon's	-		
		native range?			
5	2.02	What is the quality of the climate matching	Low	There are no climatic stations in climatch to make this analysis.	Medium
		data?		However, according to Koppen-Geiger map the climate is	
				somehow similar.	
6	2.03	Is the taxon already present outside of	Yes	Yes it is distributed alover Caspian Sea basin	Very high
		captivity in the RA area?		·····	-, 5
7	2.04	How many potential vectors could the taxon	One	Aquaculture	High
	1	use to enter in the RA area?	-		
8	2.05	Is the taxon currently found in close	Yes	Are distributed over the entire Caspian sea basin (Bogutskaya et	Very high
1		proximity to, and likely to enter into, the RA		al. 2013; Yusifov et al. 2017). are also found in the brackish and	
		area in the near future (e.g. unintentional		fresh waters of the Caspian Sea coast (Kuljannishvili et al 2021)	
		and intentional introductions)?			
3.1	Invasiv	e elsewhere			
9		Has the taxon become naturalised	Yes	Species formed self-sustaining populations (Ibrahimov and	Very high
<u> </u>	5.01	(established viable populations) outside its	105	Mustafayev 2015)	very mgn
10	3.02	In the taxon's introduced range, are there	No	No adverse impacts to the wild commercial taxa are known.	Medium
10	5.02	known adverse impacts to wild stocks or	NO		riculum
		commercial taxa?			
11	3.03	In the taxon's introduced range, are there	No	No adverse impacts to aquaculture are known.	Medium
11	5.05	known adverse impacts to aquaculture?	NO	No adverse impacts to aquaculture are known.	Medium
12	3.04	In the taxon's introduced range, are there	No	No adverse impacts to ecosystem are known. Possible can be	Medium
12	5.04	known adverse impacts to ecosystem	NO	transmitting parasites or deseases	Medium
12	3.05	In the taxon's introduced range, are there	No	No adverse socio-economic impacts are known	Medium
13	5.05	known adverse socio-economic impacts?	NO	No adverse socio-economic impacts are known	Medium
B I	Biology	y/Ecology			
4 1					
	Undesir	rable (or persistence) traits	No	Not poisonous, https://fishbase.mphp.fr/summary/Chelon-	Very high
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0 6.0 1 6.0 2 6.0 3 6.0 4 6.0 5 7.0	02 Will any of these vec	ctors/pathways bring the	No	None of these.	High
0 6.0 1 6.0 2 6.0 3 6.0 4 6.0 5 7.0			No	None of these	Link
0 6.0 1 6.0 2 6.0 3 6.0 4 6.0 . Disp		KA area (with suitable	1		1
0 6.0 1 6.0 2 6.0 3 6.0 4 6.0 . Disp	vectors/pathways co	ould the taxon use to			
0 6.0 1 6.0 2 6.0 3 6.0 4 6.0	, ,		>1	Aquaculture; recreational Fisheries;	Medium
0 6.0 1 6.0 2 6.0 3 6.0	ersal mechanisms				
0 6.0 1 6.0 2 6.0 3 6.0	first-reproduction?				
0 6.0 1 6.0 2 6.0 3 6.0	does the taxon requi	ire to reach the age-at-			
0 6.0 1 6.0 2 6.0		ts (days, months, years)	2	males 2 yo. females 3 y.o	Medium
0 6.0 1 6.0 2 6.0		span (e.g. < 1 year)?			
0 6.0 1 6.0 2 6.0	large number of prop				i iculuili
30 6.0 31 6.0	to complete its life c	cycle? (or likely) to produce a	No	They mature at the age of 2 or 3 yo.	Medium
0 6.0		pecific habitat features)		to complete its life cycle	
30 6.0 31 6.0		ent on the presence of	No	No. this taxon is not dependent on the presence of another taxon	Very high
30 6.0	display asexual repro		Na		Man. 1
	,	o be hermaphroditic or to	No	No https://fishbase.mnhn.fr/summary/Chelon-saliens.html	Very high
	native taxa?	· · ·			
9 6.0		b hybridise naturally with	No	No. Not documented	Very high
O Fr	or propagules (in the		103		very mgn
	to environmental cor	nditions? o produce viable gametes	Yes	Yes. It has been considered as established species since 1930ies	Very high
		e-at-maturity in response			
8 6.0	1 Is the taxon likely to		No	No. Not documented	Very high
	roduction				1
		taxa in the RA area?			
., 5.0	resources (including				nculuiti
7 5.0	protected native taxa 12 Is the taxon likely to		No	juveniles feed on zooplankton and then on bentic Less likely	Medium
6 5.0		o consume threatened or	No	Adults are herbivorous feeding on algae and vegetal detritus while	Medium
	ource exploitation		Ne		Madium
	by way of a dormant	t form)?			
		ing in adverse conditions			
	population even whe			caspian sea basin failed.	i iculuii
5 4.1		o maintain a viable	No	Less likely. since the first attempt of introducing this species in	Medium
	native taxa?	succe habitat quality for			
	(o a fooding) will re	-products) or behaviours educe habitat quality for			
4.1		(products) or boboyiours	No		-

51	9.02	Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	No change	Since this species are very much tolerant to wide range of temperatures their establishment will not decrease, it will stay the same	Medium
52	9.03	Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change?	No change	No change	Medium
53	9.04	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	No change	No change	Medium
54	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	No change	No change	Medium
55	9.06	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	No change	No change	Medium

Statistics

Scores	
BRA	13.0
BRA Outcome	-
BRA+CCA	15.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	7.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	2.0
B. Biology/Ecology	6.0
4. Undesirable (or persistence) traits	4.0
5. Resource exploitation	0.0
6. Reproduction	0.0
7. Dispersal mechanisms	-1.0
8. Tolerance attributes	3.0
C. Climate change	2.0
9. Climate change	2.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3 5 5
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	5
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2
6. Reproduction	7
7. Dispersal mechanisms	9
8. Tolerance attributes	6
C. Climate change	6
9. Climate change	6
Sectors affected	
Commercial	6
Environmental	0
Species or population nuisance traits	12
Thresholds	
BRA	-

	BRA	-
	BRA+CCA	-
Confidence		
	BRA+CCA	0.69
	BRA	0.71
	CCA	0.50
Date and Time		
	20/05/20	022 16:14:54

Taxon and Assessor details					
Category	Fishes and Lampreys (freshwater)				
Taxon name	Clarias gariepinus				
Common name	North African catfish				
Assessor	Bella Japoshvili				
Risk screening context					
Reason and socio-economic benefits	Species is absent from the RA Area howver can be found in neighbour country and is also a subject				
Risk assessment area	South Caucasus				
Taxonomy	Actinopteri (ray-finned fishes) > Siluriformes (Catfishes) > Clariidae (Airbreathing catfishes)				
Native range	Africa, part of Asia Minor				
Introduced range	Part of Europe, Asia and south America				
URL	https://www.fishbase.de/summary/Clarias-gariepinus.html				

			Response	Justification (references and/or other information)	Confidence
A.	Biogeo	graphy/Historical			
1. [ication/Cultivation			
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	Romanova, E. M., Lyubomirova, V. N., Romanov, V. V., Mukhitova, M. E., Shlenkina, T. M., Shadyeva, L. A., & Galushko, I. S. (2018). Biology of reproduction of catfish (CLARIAS GARIEPINUS, BURCHELL, 1822) in high-tech industrial aquaculture. Journal of	Very high
2	1.02	Is the taxon harvested in the wild and likely	Yes	fundamental and applied sciences, 10(5S), 1116-1129. Okonkwo, C. O., Onyenweaku, E., & Uwujibha, J. O. Comparative	High
		to be sold or used in its live form?		Assessment of Nutrient Composition of Aquacultured and Wild Catfish (Clarias gariepinus) in Cross Rivers State Nigeria.	
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	Congeners	Very high
2. (Climate	, distribution and introduction risk			
4	2.01	How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range?	Low	Results of climatch algorithm	Medium
5	2.02	What is the quality of the climate matching data?	Low	Due to low accuracy of local climate data	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	No	CABI, 2021. Clarias gariepinus (North African catfish). https://www.cabi.org/isc/datasheet/88683 (accessed October	Very high
7	2.04	How many potential vectors could the taxon	>1	Aquacultural and recreatinal purpose. It can also reach the South	High
1		use to enter in the RA area?		Caucasus naturally via transboundary rivers	
8	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional	Yes	It is known from neighbour country (Turkey) and can easily be imported in Georgia	Medium
2 1	·	and intentional introductions)?	l		
<i>3.1</i> 9	<i>nvasiv</i> 3.01	e elsewhere Has the taxon become naturalised	Yes	CABI, 2021. Clarias gariepinus (North African catfish).	Very high
_	5.01	(established viable populations) outside its	105	https://www.cabi.org/isc/datasheet/88683 (accessed October	very nigh
10	3.02	In the taxon's introduced range, are there	Yes	Radhakrishnan, K. V., Lan, Z. J., Zhao, J., Qing, N., & Huang, X. L.	Medium
		known adverse impacts to wild stocks or		(2011). Invasion of the African sharp-tooth catfish Clarias	
		commercial taxa?		gariepinus (Burchell, 1822) in South China. Biological Invasions,	
				13(8), 1723-1727; Weyl, O. L. F., Daga, V. S., Ellender, B. R., & Vitule, J. R. S. (2016). A review of Clarias gariepinus invasions in	
1				Brazil and South Africa. Journal of fish biology, 89(1), 386-402.	
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	No documented evidence	Low
12	3.04	In the taxon's introduced range, are there	Yes	Radhakrishnan, K. V., Lan, Z. J., Zhao, J., Qing, N., & Huang, X. L.	Medium
		known adverse impacts to ecosystem services?		(2011). Invasion of the African sharp-tooth catfish Clarias gariepinus (Burchell, 1822) in South China. Biological Invasions, 13(8), 1723-1727. though Not well documented	
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	Not well documented	Low
B. I	Biology	y/Ecology			
		able (or persistence) traits	1		
		Is it likely that the taxon will be poisonous or pose other risks to human health?		Not a harmful species	Medium
15	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or	Yes	Not well documented though	Low
I		protected)?			
16	4.03	Are there any threatened or protected taxa	Yes	Since the catfish are predator, it can consume a variety of	Medium
1		that the non-native taxon would parasitise in the RA area?		freshwater fish and inverterbates in the RA area	
17	4.04	Is the taxon adaptable in terms of climatic	Yes	CABI, 2021. Clarias gariepinus (North African catfish).	Low
1		and other environmental conditions, thus		https://www.cabi.org/isc/datasheet/88683 (accessed October	
1		enhancing its potential persistence if it has		2021)	
10	4.05	invaded or could invade the RA area?	Voc	Expected professional judgement	Low
18	4.05	Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it	Yes	Expected, professional judgement	Low
1		has invaded or is likely to invade the RA			
19	4.06	Is the taxon likely to exert adverse impacts	Yes	Possible through reducing the economically important fish	Medium
1		on ecosystem services in the RA area?		diversity and also through affecting the ecosystem structure (e.g.	
1				Radhakrishnan, K. V., Lan, Z. J., Zhao, J., Qing, N., & Huang, X. L. (2011). Invasion of the African sharp-tooth catfish Clarias	
1				gariepinus (Burchell, 1822) in South China. Biological Invasions,	
				13(8), 1723-1727.)	
20	4.07	Is it likely that the taxon will host, and/or	No	Not expected based on professional judgement	Medium
1		act as a vector for, recognised pests and			
1	I	infectious agents that are endemic in the RA			

21					
1	4.08	Is it likely that the taxon will host, and/or	Yes	e.g Akinsanya, B., & Otubanjo, O. A. (2006). Helminth Parasites of	Very high
		act as a vector for, recognised pests and		Clarias gariepinus (Clariidae) in Lekki Lagoon, Lagos, Nigeria.	
		infectious agents that are absent from (novel		Revista de biología tropical, 54(1), 93-99; Oniye, S. J., Adebote,	
		to) the RA area?		D. A., & Ayanda, O. I. (2004). Helminth parasites of Clarias	
12	4.00	To the literation where where we could be addressed as the day.	¥	gariepinus (Teugels) in Zaria, Nigeria. Journal of Aquatic Sciences,	Marris biab
22	4.09	Is it likely that the taxon will achieve a body size that will make it more likely to be	Yes	https://www.fishbase.de/summary/Clarias-gariepinus.html	Very high
		released from captivity?			
23	4.10	Is the taxon capable of sustaining itself in a	No	https://www.fishbase.de/summary/Clarias-gariepinus.html	Medium
25	4.10	range of water velocity conditions (e.g.	NO	https://www.hshbdsc.dc/summary/clands/ganepinds.html	neurum
		versatile in habitat use)?			
24	4.11	Is it likely that the taxon's mode of existence	Yes	Expected but not well documented	Low
		(e.g. excretion of by-products) or behaviours	105		2011
		(e.g. feeding) will reduce habitat quality for			
		native taxa?			
25	4.12	Is the taxon likely to maintain a viable	No	Not such an information	Low
		population even when present in low			
		densities (or persisting in adverse conditions			
		by way of a dormant form)?			
5. R	esourd	ce exploitation			
26	5.01	Is the taxon likely to consume threatened or	Yes	Polyphagous predator - https://www.fishbase.de/summary/Clarias-	Very high
		protected native taxa in the RA area?		gariepinus.html	
27	5.02	Is the taxon likely to sequester food	Yes	This includes native cat fish, however no RIP value have been	Low
		resources (including nutrients) to the		calculated.	
-		detriment of native taxa in the RA area?			
	eprodu		N-		Mardi.
28	6.01	Is the taxon likely to exhibit parental care	No	Haylor, G. S. (1989). The case for the African catfish, Clarias	Medium
		and/or to reduce age-at-maturity in response		gariepinus Burchell, 1822, Clariidae: a comparison of the relative	
		to environmental conditions?		merits of Tilapiine fishes, especially Oreochromis niloticus (L.) and	
				C. gariepinus Burchell, for African aquaculture. Aquaculture	
20	6.02	Is the taxon likely to produce vishin compta-	No	Research, 20(3), 279-285.	Low
29	0.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	NO	Not cultured or released in the RA area untill yet	Low
30	6.03	Is the taxon likely to hybridise naturally with	Yes	Maneechot, N., Yano, C. F., Bertollo, L. A. C., Getlekha, N., Molina,	Very high
50	0.05	native taxa?	165	W. F., Ditcharoen, S., & de Bello Cioffi, M. (2016). Genomic	very nigh
				organization of repetitive DNAs highlights chromosomal evolution	
				in the genus Clarias (Clariidae, Siluriformes). Molecular	
				cytogenetics, 9(1), 1-10.	
31	6.04	Is the taxon likely to be hermaphroditic or to	No	No such an evidence. Species is sexual	High
51	0.04	display asexual reproduction?	140		ingn
32	6.05	Is the taxon dependent on the presence of	No	Not such an evidence is known. Species is polyphagous and no	Very high
-		another taxon (or specific habitat features)		other particular species is needed for any stage of life cycle	,g
		to complete its life cycle?		······································	
33	6.06	Is the taxon known (or likely) to produce a	Yes	Haylor, G. S. (1989). The case for the African catfish, Clarias	High
		large number of propagules or offspring		gariepinus Burchell, 1822, Clariidae: a comparison of the relative	-
		within a short time span (e.g. < 1 year)?		merits of Tilapiine fishes, especially Oreochromis niloticus (L.) and	
				C. gariepinus Burchell, for African aquaculture. Aquaculture	
1		······································			
				Research, 20(3), 279-285.	
34	6.07	How many time units (days, months, years)	1		High
34	6.07		1	Research, 20(3), 279-285.	High
34	6.07	How many time units (days, months, years)	1	Research, 20(3), 279-285. Legendre, M., Teugels, G. G., Cauty, C., & Jalabert, B. (1992). A	High
34	6.07	How many time units (days, months, years) does the taxon require to reach the age-at-	1	Research, 20(3), 279-285. Legendre, M., Teugels, G. G., Cauty, C., & Jalabert, B. (1992). A comparative study on morphology, growth rate and reproduction	High
34	6.07	How many time units (days, months, years) does the taxon require to reach the age-at-	1	Research, 20(3), 279-285. Legendre, M., Teugels, G. G., Cauty, C., & Jalabert, B. (1992). A comparative study on morphology, growth rate and reproduction of Clarias gariepinus (Burchell, 1822), Heterobranchus longifilis Valenciennes, 1840, and their reciprocal hybrids (Pisces, Clariidae). Journal of Fish Biology, 40(1), 59-79; YALÇIN, Ş. Ö.,	High
34	6.07	How many time units (days, months, years) does the taxon require to reach the age-at-	1	Research, 20(3), 279-285. Legendre, M., Teugels, G. G., Cauty, C., & Jalabert, B. (1992). A comparative study on morphology, growth rate and reproduction of Clarias gariepinus (Burchell, 1822), Heterobranchus longifilis Valenciennes, 1840, and their reciprocal hybrids (Pisces, Clariidae). Journal of Fish Biology, 40(1), 59-79; YALÇIN, Ş. Ö., Solak, K., & Akyurt, İ. (2001). Certain reproductive characteristics	High
34	6.07	How many time units (days, months, years) does the taxon require to reach the age-at-	1	Research, 20(3), 279-285. Legendre, M., Teugels, G. G., Cauty, C., & Jalabert, B. (1992). A comparative study on morphology, growth rate and reproduction of Clarias gariepinus (Burchell, 1822), Heterobranchus longifilis Valenciennes, 1840, and their reciprocal hybrids (Pisces, Clariidae). Journal of Fish Biology, 40(1), 59-79; YALÇIN, Ş. Ö., Solak, K., & Akyurt, İ. (2001). Certain reproductive characteristics of the catfish (Clarias gariepinus Burchell, 1822) living in the	High
		How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	1	Research, 20(3), 279-285. Legendre, M., Teugels, G. G., Cauty, C., & Jalabert, B. (1992). A comparative study on morphology, growth rate and reproduction of Clarias gariepinus (Burchell, 1822), Heterobranchus longifilis Valenciennes, 1840, and their reciprocal hybrids (Pisces, Clariidae). Journal of Fish Biology, 40(1), 59-79; YALÇIN, Ş. Ö., Solak, K., & Akyurt, İ. (2001). Certain reproductive characteristics	High
7. C	Dispers	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms		Research, 20(3), 279-285. Legendre, M., Teugels, G. G., Cauty, C., & Jalabert, B. (1992). A comparative study on morphology, growth rate and reproduction of Clarias gariepinus (Burchell, 1822), Heterobranchus longifilis Valenciennes, 1840, and their reciprocal hybrids (Pisces, Clariidae). Journal of Fish Biology, 40(1), 59-79; YALÇIN, Ş. Ö., Solak, K., & Akyurt, İ. (2001). Certain reproductive characteristics of the catfish (Clarias gariepinus Burchell, 1822) living in the River Asi. Turkey. Turkish Journal of Zoology. 25(4), 453-460.	
7. E		How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal	1	Research, 20(3), 279-285. Legendre, M., Teugels, G. G., Cauty, C., & Jalabert, B. (1992). A comparative study on morphology, growth rate and reproduction of Clarias gariepinus (Burchell, 1822), Heterobranchus longifilis Valenciennes, 1840, and their reciprocal hybrids (Pisces, Clariidae). Journal of Fish Biology, 40(1), 59-79; YALÇIN, Ş. Ö., Solak, K., & Akyurt, İ. (2001). Certain reproductive characteristics of the catfish (Clarias gariepinus Burchell, 1822) living in the River Asi. Turkev. Turkish Journal of Zoology. 25(4), 453-460. Species is introduced intentionally for a aquacultural purpose as	High
7. E	Dispers	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to		Research, 20(3), 279-285. Legendre, M., Teugels, G. G., Cauty, C., & Jalabert, B. (1992). A comparative study on morphology, growth rate and reproduction of Clarias gariepinus (Burchell, 1822), Heterobranchus longifilis Valenciennes, 1840, and their reciprocal hybrids (Pisces, Clariidae). Journal of Fish Biology, 40(1), 59-79; YALÇIN, Ş. Ö., Solak, K., & Akyurt, İ. (2001). Certain reproductive characteristics of the catfish (Clarias gariepinus Burchell, 1822) living in the River Asi. Turkev. Turkish Journal of Zooloav. 25(4), 453-460. Species is introduced intentionally for a aquacultural purpose as well as it can also spread by its own. Not a documented evidence	
<i>7. E</i> 35	<i>Dispers</i> 7.01	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable	>1	Research, 20(3), 279-285. Legendre, M., Teugels, G. G., Cauty, C., & Jalabert, B. (1992). A comparative study on morphology, growth rate and reproduction of Clarias gariepinus (Burchell, 1822), Heterobranchus longifilis Valenciennes, 1840, and their reciprocal hybrids (Pisces, Clariidae). Journal of Fish Biology, 40(1), 59-79; YALÇIN, Ş. Ö., Solak, K., & Akyurt, İ. (2001). Certain reproductive characteristics of the catfish (Clarias gariepinus Burchell, 1822) living in the River Asi. Turkev. Turkish Journal of Zooloav. 25(4), 453-460. Species is introduced intentionally for a aquacultural purpose as well as it can also spread by its own. Not a documented evidence for the RA area	Medium
<i>7. E</i> 35	Dispers	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the		Research, 20(3), 279-285. Legendre, M., Teugels, G. G., Cauty, C., & Jalabert, B. (1992). A comparative study on morphology, growth rate and reproduction of Clarias gariepinus (Burchell, 1822), Heterobranchus longifilis Valenciennes, 1840, and their reciprocal hybrids (Pisces, Clariidae). Journal of Fish Biology, 40(1), 59-79; YALÇIN, Ş. Ö., Solak, K., & Akyurt, İ. (2001). Certain reproductive characteristics of the catfish (Clarias gariepinus Burchell, 1822) living in the River Asi. Turkev. Turkish Journal of Zooloav. 25(4), 453-460. Species is introduced intentionally for a aquacultural purpose as well as it can also spread by its own. Not a documented evidence	
<i>7. E</i> 35	<i>Dispers</i> 7.01	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? Al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more	>1	Research, 20(3), 279-285. Legendre, M., Teugels, G. G., Cauty, C., & Jalabert, B. (1992). A comparative study on morphology, growth rate and reproduction of Clarias gariepinus (Burchell, 1822), Heterobranchus longifilis Valenciennes, 1840, and their reciprocal hybrids (Pisces, Clariidae). Journal of Fish Biology, 40(1), 59-79; YALÇIN, Ş. Ö., Solak, K., & Akyurt, İ. (2001). Certain reproductive characteristics of the catfish (Clarias gariepinus Burchell, 1822) living in the River Asi. Turkev. Turkish Journal of Zooloav. 25(4), 453-460. Species is introduced intentionally for a aquacultural purpose as well as it can also spread by its own. Not a documented evidence for the RA area	Medium
<u>7. []</u> 35 36	0 <i>ispers</i> 7.01 7.02	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)?	>1 Yes	Research, 20(3), 279-285. Legendre, M., Teugels, G. G., Cauty, C., & Jalabert, B. (1992). A comparative study on morphology, growth rate and reproduction of Clarias gariepinus (Burchell, 1822), Heterobranchus longifilis Valenciennes, 1840, and their reciprocal hybrids (Pisces, Clariidae). Journal of Fish Biology, 40(1), 59-79; YALÇIN, Ş. Ö., Solak, K., & Akyurt, İ. (2001). Certain reproductive characteristics of the catfish (Clarias gariepinus Burchell, 1822) living in the River Asi. Turkev. Turkish Journal of Zoologv. 25(4), 453-460. Species is introduced intentionally for a aquacultural purpose as well as it can also spread by its own. Not a documented evidence for the RA area Professional judgement, not a documented evidence	Medium
7. <u>C</u> 35 36	<i>Dispers</i> 7.01	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively	>1	Research, 20(3), 279-285. Legendre, M., Teugels, G. G., Cauty, C., & Jalabert, B. (1992). A comparative study on morphology, growth rate and reproduction of Clarias gariepinus (Burchell, 1822), Heterobranchus longifilis Valenciennes, 1840, and their reciprocal hybrids (Pisces, Clariidae). Journal of Fish Biology, 40(1), 59-79; YALÇIN, Ş. Ö., Solak, K., & Akyurt, İ. (2001). Certain reproductive characteristics of the catfish (Clarias gariepinus Burchell, 1822) living in the River Asi. Turkev. Turkish Journal of Zooloav. 25(4), 453-460. Species is introduced intentionally for a aquacultural purpose as well as it can also spread by its own. Not a documented evidence for the RA area	Medium
7. <u>C</u> 35 36	0 <i>ispers</i> 7.01 7.02	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship	>1 Yes	Research, 20(3), 279-285. Legendre, M., Teugels, G. G., Cauty, C., & Jalabert, B. (1992). A comparative study on morphology, growth rate and reproduction of Clarias gariepinus (Burchell, 1822), Heterobranchus longifilis Valenciennes, 1840, and their reciprocal hybrids (Pisces, Clariidae). Journal of Fish Biology, 40(1), 59-79; YALÇIN, Ş. Ö., Solak, K., & Akyurt, İ. (2001). Certain reproductive characteristics of the catfish (Clarias gariepinus Burchell, 1822) living in the River Asi. Turkev. Turkish Journal of Zoologv. 25(4), 453-460. Species is introduced intentionally for a aquacultural purpose as well as it can also spread by its own. Not a documented evidence for the RA area Professional judgement, not a documented evidence	Medium
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44	8.01	Is the taxon able to withstand being out of	Yes	https://www.fishbase.de/summary/Clarias-gariepinus.html	High
44		water for extended periods (e.g. minimum of	Tes	https://www.hshbase.ue/summary/clanas-ganepinus.htm	ingn
		one or more hours) at some stage of its life			
		, 3			
45	8.02	cycle? Is the taxon tolerant of a wide range of	Yes	Oxygen, temperature, turbidity	Very high
45	0.02	water quality conditions relevant to that	ies	Oxygen, temperature, turbidity	very nigh
		taxon? [In the Justification field, indicate the			
		-			
16	8.03	relevant water quality variable(s) being Can the taxon be controlled or eradicated in	No	Not known such cases	High
40		the wild with chemical, biological, or other	NO	NOT KHOWH SUCH Cases	ingn
		agents/means?			
47	8.04	Is the taxon likely to tolerate or benefit from	No	Not such an evidence is known	Medium
47	0.04	environmental/human disturbance?	NO		Medium
18	8.05	Is the taxon able to tolerate salinity levels	Yes	Britz, P. J., & Hecht, T. (1989). Effects of salinity on growth and	High
40		that are higher or lower than those found in	103	survival of African sharptooth catfish (Clarias gariepinus) larvae.	ingii
		its usual environment?		Journal of applied ichthyology, 5(4), 194-202.	
49		Are there effective natural enemies	No	No effective natural enemies from the RA area is known	High
75		(predators) of the taxon present in the RA	NO		ingn
		change			
		change			
		Under the predicted future climatic	No change	No enough information, professional judgement	Low
		conditions, are the risks of entry into the RA	···· ·································		
		area posed by the taxon likely to increase,			
		decrease or not change?			
51	9.02	Under the predicted future climatic	Increase	No enough information, professional judgement	Medium
		conditions, are the risks of establishment			
		posed by the taxon likely to increase,			
		decrease or not change?			
52		Under the predicted future climatic	Increase	No enough information, professional judgement	Medium
		conditions, are the risks of dispersal within			
		the RA area posed by the taxon likely to			
		increase, decrease or not change?			
53	9.04	Under the predicted future climatic	Higher	No enough information, professional judgement	Low
		conditions, what is the likely magnitude of			
		future potential impacts on biodiversity			
		and/or ecological integrity/status?			
54	9.05	Under the predicted future climatic	Higher	No enough information, professional judgement	Medium
		conditions, what is the likely magnitude of			
		future potential impacts on ecosystem			
		structure and/or function?			
55	9.06	Under the predicted future climatic	Higher	No enough information, professional judgement	Low
		conditions, what is the likely magnitude of			
		future potential impacts on ecosystem			
		services/socio-economic factors?			

Statistics	
Scores	
BRA	38.0
BRA Outcome	-
BRA+CCA	48.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	15.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	10.0
B. Biology/Ecology	23.0
4. Undesirable (or persistence) traits	8.0
5. Resource exploitation	7.0
6. Reproduction	3.0
7. Dispersal mechanisms	0.0
8. Tolerance attributes	5.0
C. Climate change	10.0
9. Climate change	10.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3 5 5
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	5
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2
6. Reproduction	
7. Dispersal mechanisms	9
8. Tolerance attributes	
C. Climate change	6
9. Climate change	6
Sectors affected	
Commercial	12
Environmental	17
Species or population nuisance traits	23
Thresholds	
BRA	-

BRA+CCA	-
Confidence	
BRA+CCA	0.60
BRA	0.62
CCA	0.38
Date and Time	
04/05/202	2 13:46:56

Taxon and Assessor details				
Category	Fishes and Lampreys (freshwater)			
Taxon name	Clarias gariepinus			
Common name	North African catfish			
Assessor	Giorgi Epitashvili			
Risk screening context				
Reason and socio-economic benefits	The African sharptooth catfish was introduced all over the world in the early 1980s for aquaculture			
Risk assessment area	South Caucasus			
Taxonomy	Clarias gariepinus (Burchell, 1822)			
Native range	Africa: almost Pan-Africa, absent from Maghreb, the Upper and (most of the) Lower Guinea and the			
Introduced range	Widely introduced to other parts of Africa, Europe and Asia.			
URL	https://www.fishbase.se/summary/1934			

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
1.1		ication/Cultivation			
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	C. garepinus was introduced all over the world in the early 1980s for aquaculture purposes.	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	The price of catfish fingerlings remains high (USD 0.15-0.25 each in Cameroon) and most farmers prefer to collect wild seed when available.	Very high
3 2. (1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	C. gariepinus has all the qualities of an aggressive and successful invasive species. Its high fecundity, flexible phenotype, rapid growth, wide habitat preferences, tolerance to extreme water conditions and the ability to subsist on a wide variety of prey can devastate indigenous fish and aquatic invertebrate populations	Very high
Z. (1	, distribution and introduction risk How similar are the climatic conditions of the	Low	World Map of the Köppen-Geiger climate classification	Medium
4	2.01	Risk Assessment (RA) area and the taxon's native range?	Low	word map of the koppen-deiger climate classification	Mediam
5	2.02	What is the quality of the climate matching data?	Low	World Map of the Köppen-Geiger climate classification	Medium
6	2.03	Is the taxon already present outside of captivity in the RA area?	No	Currently this species does not occurring in the SC region.	Very high
/ 8	2.04	How many potential vectors could the taxon use to enter in the RA area? Is the taxon currently found in close	One Yes	This species can enter in the region only for aquacultural purposes. This species is distributed in the southern part of Turkey (Turan,	Medium Very high
0	2.05	proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)?	Tes	2016).	very high
3. 1	Invasive	e elsewhere			
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	This review of introductions, establishment, spread and impact of C. gariepinus in Brazil and outside of its native range in South Africa provides evidence that the species has been able to overcome all barriers to invasion in both countries (Weyl et al.	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	Clarias gariepinus has all the qualities of an aggressive and successful invasive species. Its high fecundity, flexible phenotype, rapid growth, wide habitat preferences, tolerance to extreme water conditions and the ability to subsist on a wide variety of prey can devastate indigenous fish and aquatic invertebrate populations (Bruton, 1986). It is because of these characteristics that countries such as India have imposed a ban on the introduction and culture of C. gariepinus (Dhawan and Kaur, 2001). Nevertheless, the effects of the illegal and indiscriminate introduction of this fish into India, as in other countries, have brought about potential ecological problems such as the loss of	Very high
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	Yes	C. gariepinus is one of the most suitable species for aquaculture in the world. (Hecht et al., 1995). It is a fast-growing species and probably has adverse impacts on aquaculture.	Low
	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem services?	Yes	The most decisive economic parameter is the low selling price of C. gariepinus (2.20 EUR/kg whole fish), which affects the returns by \pm 70,463 EUR/year for every ten percent (0.22 EUR) price change. Among the variable costs, feed has by far the largest impact with a share of 61.4% (42.1% of total costs) (Pasch and	Medium
	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	Yes	Data deficient	Low
		//Ecology			
		able (or persistence) traits Is it likely that the taxon will be poisonous or	No	This fish does not pose a threat to humans	High
	4.02	pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	Clarias gariepinus has all the qualities of an aggressive and successful invasive species. Its high fecundity, flexible phenotype, rapid growth, wide habitat preferences, tolerance to extreme water conditions and the ability to subsist on a wide variety of prev can devastate indigenous fish and aquatic invertebrate	Medium
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	Yes	There are several protected and threathened species in the SC region who may have been harmed by these fish: Acipenser spp, Salmo spp, Luciobarbus capito, etc.	Very high
17	4.04	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?	Yes	The probability of this is high	High

8 4.05 9 4.06 0 4.07 1 4.08 2 4.09 3 4.10 5 4.12	 structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area? Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity? Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)? Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa? 	Yes	The probability of this is high The probability of this is high There is a possibility of that There is a possibility of that Max length is 170 cm TL male/unsexed; common length : 90.0 cm NG male/unsexed; max. published weight: 60.0 kg. This species is actively used in aquaculture. Adults occur mainly in quiet waters, lakes and pools and prefer rather shallow and swampy areas with a soft muddy substrate and calmer water. They may also occur in fast flowing rivers and in Data deficient	Very high High Low Low Very high
0 4.07 1 4.08 2 4.09 3 4.10 4 4.11 5 4.12 . Resout	 Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area? Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity? Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)? Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa? Is the taxon likely to maintain a viable population even when present in low 	Yes Not applicable Yes Yes	There is a possibility of that There is a possibility of that Max length is 170 cm TL male/unsexed; common length : 90.0 cm NG male/unsexed; max. published weight: 60.0 kg. This species is actively used in aquaculture. Adults occur mainly in quiet waters, lakes and pools and prefer rather shallow and swampy areas with a soft muddy substrate and calmer water. They may also occur in fast flowing rivers and in	Low Low Very high
1 4.08 2 4.09 3 4.10 4 4.11 5 4.12 . Resour	 Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area? Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity? Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)? Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa? Is the taxon likely to maintain a viable population even when present in low 	Not applicable Yes Yes Yes	There is a possibility of that Max length is 170 cm TL male/unsexed; common length : 90.0 cm NG male/unsexed; max. published weight: 60.0 kg. This species is actively used in aquaculture. Adults occur mainly in quiet waters, lakes and pools and prefer rather shallow and swampy areas with a soft muddy substrate and calmer water. They may also occur in fast flowing rivers and in	Low Very high
2 4.09 3 4.10 4 4.11 5 4.12 . Resou	 B Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area? D Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity? D Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)? Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa? Is the taxon likely to maintain a viable population even when present in low 	Yes	Max length is 170 cm TL male/unsexed; common length : 90.0 cm NG male/unsexed; max. published weight: 60.0 kg. This species is actively used in aquaculture. Adults occur mainly in quiet waters, lakes and pools and prefer rather shallow and swampy areas with a soft muddy substrate and calmer water. They may also occur in fast flowing rivers and in	Very high
3 4.10 4 4.11 5 4.12 . Resou	 infectious agents that are absent from (novel to) the RA area? D Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity? D Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)? Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa? Is the taxon likely to maintain a viable population even when present in low 	Yes	NG male/unsexed; max. published weight: 60.0 kg. This species is actively used in aquaculture. Adults occur mainly in quiet waters, lakes and pools and prefer rather shallow and swampy areas with a soft muddy substrate and calmer water. They may also occur in fast flowing rivers and in	, -
3 4.10 4 4.11 5 4.12 . Resou	 size that will make it more likely to be released from captivity? Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)? Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa? Is the taxon likely to maintain a viable population even when present in low 	Yes	NG male/unsexed; max. published weight: 60.0 kg. This species is actively used in aquaculture. Adults occur mainly in quiet waters, lakes and pools and prefer rather shallow and swampy areas with a soft muddy substrate and calmer water. They may also occur in fast flowing rivers and in	, -
4 4.11 5 4.12 . Resou	 Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)? Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa? Is the taxon likely to maintain a viable population even when present in low 	Yes	Adults occur mainly in quiet waters, lakes and pools and prefer rather shallow and swampy areas with a soft muddy substrate and calmer water. They may also occur in fast flowing rivers and in	Very high
5 4.12 . Resou	 Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa? Is the taxon likely to maintain a viable population even when present in low 			
. Resou	Is the taxon likely to maintain a viable population even when present in low			Medium
	by way of a dormant form)?	Yes	Data deficient	Low
	Irce exploitation			
_	Is the taxon likely to consume threatened or protected native taxa in the RA area?	Yes	The probability of this is high because C. garepinus is a predator fish.	Very high
7 5.02	Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?	Yes	The probability of this is high because C. garepinus is a predator fish.	Very high
. Repro	duction	·		
8 6.01		Yes	The male guards the nest from predators, such as the clown loach (Chromobotia macracanthus) and yoyo loach (Botia lohachata), immediately following spawning. The female will return once the eggs have hatched and the male and female take part in protecting the fry until they are independent. The parental investment only extends to 24 hours following the hatching. By the third day. the fry are capable of swimming strongly and they	High
9 6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	No	This species does not reproduces in the SC region	Very high
0 6.03	Is the taxon likely to hybridise naturally with native taxa?	Yes	Genetic introgression of native wild clariid catfish by escapees of hybrid catfish (C. gariepinus x C. macrocephalus) from fish farms have been reported in Thailand (Senanan et al. 2004).	Very high
1 6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	Yes	This is the first histological evidence of intersex in a fish species inhabiting a South African water source (C. garepinus) (Barnhoorn et al. 2004).	High
2 6.05	5 Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	No	No such data has been known	Medium
3 6.06	5 Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)?	Yes	A modal size female produces about 50,000 eggs, but large females may produce over 150,000 eggs (Bruton 1979).	High
4 6.07	7 How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	Not applicable	Data deficient	Low
	rsal mechanisms			
5 7.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable	One	This species may be spread by humans for aquacultural purposes.	Medium
6 7.02		Yes	The probability of this is high	High
7 7.03	B Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances	No	No such means has been detected	Medium
8 7.04	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?	No	This species is not distributed in the SC region.	Very high
9 7.05		No	This species is not distributed in the SC region.	Very high
0 7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	No	This species is not distributed in the SC region.	Very high
1 7.07	be dispersed in the RA area by other animals?	No	This species is not distributed in the SC region.	Very high
2 7.08	Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be	Not applicable	Data deficient	Low
3 7.09		Not applicable	Data deficient	Low

44			1		
	8.01	Is the taxon able to withstand being out of	Yes	Clarias gariepinus, possesses a pair of suprabranchial chambers	Very high
		water for extended periods (e.g. minimum of		located in the dorsal-posterior part of the branchial cavity having	
		one or more hours) at some stage of its life		extensions from the upper parts of the second and fourth gill	
		cycle?		arches, forming the arborescent organs. This structure is an air-	
				breathing organ (ABO) and allows aerial breathing (AB).	
45	8.02	Is the taxon tolerant of a wide range of	Yes	The nature and structure of the respiratory organs of fish have a	Very high
		water quality conditions relevant to that		significant consequence on its ability to tolerate poor water	
		taxon? [In the Justification field, indicate the		condition. The gill of C. gariepinus is equipped with an air-	
		relevant water quality variable(s) being		breathing organ known as suprabranchial organ (Vandewalle and	
		considered.]		Chardon, 1991, Ahmed et al., 2008) while those of P.	
				hypophthalmus do not have this organ but possesses a	
				vascularized swim bladder (Browman and Kramer, 1985, Okomoda	
				et al., 2017c). The efficiency of the air-breathing organ of the	
				latter makes it more tolerant to anoxic water than the former	
46	8.03	Can the taxon be controlled or eradicated in	Yes	Data deficient	Low
		the wild with chemical, biological, or other			
		agents/means?			
47	8.04	Is the taxon likely to tolerate or benefit from	Yes	This species has spread by humans in many regions of the world.	Very high
		environmental/human disturbance?			
48	8.05	Is the taxon able to tolerate salinity levels	Yes	Growth and survival of replicate batches of African catfish larvae	High
		that are higher or lower than those found in		were monitored in 0, 2.5, 5.0, 7.5 and 10 ppt salinity. No	
		its usual environment?		significant differences in mortality or growth rate were evident	
				between 0 and 5 ppt salinity. It was concluded that 0-2.5 ppt is	
				the optimal sclinity range for larval rearing and that short-term	
				exposure to higher salinities (2.5-7.5 ppt) could be effective in	
				the treatment of ectoparasitic diseases (Britz and Hecht 2007).	
49	8.06	Are there effective natural enemies	Yes	There are several potential predators distributed in the SC region	Very high
		(predators) of the taxon present in the RA		who can controll the C. garepinus populations: Esox lucius, Sander	
		area?		lucioperca, Silurus glanis, Salmo spp. etc.	
		e change			
		change			
50	9.01		-		
		Under the predicted future climatic	Increase	Own judgement	Medium
		conditions, are the risks of entry into the RA	Increase	Own judgement	Medium
		conditions, are the risks of entry into the RA area posed by the taxon likely to increase,	Increase	Own judgement	Medium
		conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?			
51	9.02	conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic	Increase Increase	Own judgement Own judgement	Medium Medium
51	9.02	conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment			
51	9.02	conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase,			
		conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	Increase	Own judgement	Medium
	9.02	conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic			
		conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within	Increase	Own judgement	Medium
		conditions, are the risks of entry into the RA area posed by the taxon likely to increase, <u>decrease or not change?</u> Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, <u>decrease or not change?</u> Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to	Increase	Own judgement	Medium
52	9.03	conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change?	Increase Increase	Own judgement Own judgement	Medium Medium
52		conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic	Increase	Own judgement	Medium
52	9.03	conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of	Increase Increase	Own judgement Own judgement	Medium Medium
52	9.03	conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity	Increase Increase	Own judgement Own judgement	Medium Medium
52	9.03	conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological intearity/status?	Increase Increase Higher	Own judgement Own judgement Own judgement	Medium Medium Medium
52	9.03	conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic	Increase Increase	Own judgement Own judgement	Medium Medium
52	9.03	conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological intearity/status? Under the predicted future climatic conditions, what is the likely magnitude of	Increase Increase Higher	Own judgement Own judgement Own judgement	Medium Medium Medium
52	9.03	conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem	Increase Increase Higher	Own judgement Own judgement Own judgement	Medium Medium Medium
52 53 54	9.03 9.04 9.05	conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Increase Increase Higher Higher	Own judgement Own judgement Own judgement Own judgement	Medium Medium Medium
52 53 54	9.03	conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magitude of future potential impacts on biodiversity and/or ecological intearity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? Under the predicted future climatic	Increase Increase Higher	Own judgement Own judgement Own judgement	Medium Medium Medium
52 53 54	9.03 9.04 9.05	conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? Under the predicted future climatic conditions, what is the likely magnitude of	Increase Increase Higher Higher	Own judgement Own judgement Own judgement Own judgement	Medium Medium Medium
52 53 54	9.03 9.04 9.05	conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magitude of future potential impacts on biodiversity and/or ecological intearity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? Under the predicted future climatic	Increase Increase Higher Higher	Own judgement Own judgement Own judgement Own judgement	Medium Medium Medium

Statistics

Statistics	
Scores	
BRA	45.0
BRA Outcome	-
BRA+CCA	55.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	22.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	0.0
3. Invasive elsewhere	18.0
B. Biology/Ecology	23.0
4. Undesirable (or persistence) traits	10.0
5. Resource exploitation	7.0
6. Reproduction	5.0
7. Dispersal mechanisms	-4.0
8. Tolerance attributes	5.0
C. Climate change	10.0
9. Climate change	10.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3
2. Climate, distribution and introduction risk	3 5 5
3. Invasive elsewhere	5
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	12 2 7
6. Reproduction	7

7. Dispersal mechanisms	9			
8. Tolerance attributes	6			
C. Climate change	6			
9. Climate change	6			
Sectors affected				
Commercial	15			
Environmental	17			
Species or population nuisance traits	24			
Thresholds				
BRA	-			
BRA+CCA	-			
Confidence				
BRA+CCA	0.70			
BRA	0.73			
CCA	0.50			
00/1				
Date and Time				
Date and Time)22 14:44:09			

Faxon and Assessor details					
Category	Fishes and Lampreys (freshwater)				
Taxon name	Clarias gariepinus				
Common name	ame North African catfish				
Assessor	Tatia Kuljanishvili				
Risk screening context					
Reason and socio-economic benefits	Has been introduced as fisheries value fish in worldwide and has become invasive in many				
Risk assessment area	South Caucasus				
Taxonomy	Actinopteri (ray-finned fishes) > Siluriformes (Catfishes) > Clariidae				
Native range	Africa: almost Pan-Africa, absent from Maghreb, the Upper and (most of the) Lower Guinea and the				
Introduced range	Widely introduced to other parts of Africa, Europe and Asia				
URL	https://www.fishbase.se/summary/1934				

			Response	Justification (references and/or other information)	Confidence
Α. Ι	Biogeo	graphy/Historical			
		ication/Cultivation			
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	Widely used for aquaculture	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	Yes. has a comertial value and is being sold in its live form	Very high
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	Clarias batrachus for example	Very high
2 (limate	, distribution and introduction risk			
2. C 4		How similar are the climatic conditions of the	High	out of 18 stations 8 are similar (at the threshold of 9 and 8)	Medium
	2.01	Risk Assessment (RA) area and the taxon's native range?		similar spots are alongside the kura river drainage and in abkhazian region	, loaiann
5	2.02	What is the quality of the climate matching data?	Medium	Quality of climate matching data is medium	Medium
6	2.03	Is the taxon already present outside of captivity in the RA area?	No	No. not present.	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	>1	Aquaculture, recriational fisheries	Very high
8	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional	Yes	This species occurs in Turkey and is considered invasive (Tarkan et al 2014)	High
		and intentional introductions)?			
3. I	nvasiv	e elsewhere			
9	3.01	Has the taxon become naturalised (established viable populations) outside its	Yes	Yes. There are several countries where it has become invasive see: https://www.cabi.org/isc/datasheet/88683	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	The high level of niche overlap (92%) and strong competition for similar resources was exhibited by C. gariepinus. The adverse effects of African catfish on all fish and crustaceans in the reservoir were revealed by mixed troohic impact." (Khan et al	High
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	No. no data	Medium
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	Yes	transmission of deseases	Low
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	No. no data	Low
B. I	Biology	y/Ecology			
4. L	Indesir	able (or persistence) traits			
		Is it likely that the taxon will be poisonous or pose other risks to human health?	No	Not poisonous https://fishbase.mnhn.fr/summary/Clarias- gariepinus.html	Very high
15	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	It is possible	High
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	No. does not parasite.	Very high
17	4.04	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?	Yes	it can tolerate to wide range of environmental conditions however it can not tolerate cold waters	Medium
18	4.05	Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA	Yes	the ability to subsist on a wide variety of prey can devastate indigenous fish and aquatic invertebrate populations (Bruton, 1986). https://www.cabi.org/isc/datasheet/88683	Very high
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	No info	Low
20	4.07	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA	Yes	It is likely	Very high
	4.08	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area?	No	No info	Low
22	4.09	Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity?	Yes	It is likely. even though not documented I can assume it can be a host or vector for pests and infectious agents, that could be endemic in RA	High

23					
	4.10	Is the taxon capable of sustaining itself in a	Yes	very versatile to havitate use: they prefer quite waters but can	High
		range of water velocity conditions (e.g.		occur in rapid rivers as well. "Can leave the water at night using	
		versatile in habitat use)?		its strong pectoral fins and spines in search of land-based food or	
				can move into the breeding areas through very shallow pathways	
				"https://www.fishbase.se/summary/1934	
24	4.11	Is it likely that the taxon's mode of existence	No	NO info	Low
		(e.g. excretion of by-products) or behaviours			2011
		(e.g. feeding) will reduce habitat quality for			
		native taxa?			
25	4.12	Is the taxon likely to maintain a viable	Yes	Yes, if the conditions are good.	Medium
25	4.12		165	res, il the conditions are good.	Medium
		population even when present in low			
		densities (or persisting in adverse conditions			
_		by way of a dormant form)?			
		ce exploitation	[-
26	5.01	Is the taxon likely to consume threatened or	Yes	it is lilkely, however, no info	Low
		protected native taxa in the RA area?			
27	5.02	Is the taxon likely to sequester food	Yes	it is likely but has not been evaluated	Low
		resources (including nutrients) to the			
		detriment of native taxa in the RA area?			
	Reprod				
28	6.01	Is the taxon likely to exhibit parental care	Yes	yes https://fishbase.mnhn.fr/summary/Clarias-gariepinus.html	High
		and/or to reduce age-at-maturity in response			
		to environmental conditions?			
29	6.02	Is the taxon likely to produce viable gametes	No	To survive, the average temp. of coolest month should be $> 18^{\circ}$ C.	Medium
-		or propagules (in the RA area)?	-	The region experiences guite cold winters, due to this reason it is	
	1	, pregente (in the rectarda).		less likely that it could produce viable propagules	
30	6.03	Is the taxon likely to hybridise naturally with	Yes	It is but in the region there are no native clarias species.	High
20	0.05	native taxa?			
31	6.04	Is the taxon likely to be hermaphroditic or to	No	No. Does not display asexual reproduction	Very high
10	0.04		INU	no. Does not uispiay asexual reproduction	very mgn
27	6 05	display asexual reproduction?	No	No it is not dependent on the presence of another target	Von/ hish
52	6.05	Is the taxon dependent on the presence of	No	No. it is not dependent on the presence of another taxon.	Very high
	1	another taxon (or specific habitat features)			
		to complete its life cycle?			
33	6.06	Is the taxon known (or likely) to produce a	Yes	they spawn several times during the year	Very high
		large number of propagules or offspring			
		within a short time span (e.g. < 1 year)?			
34	6.07	How many time units (days, months, years)	1	less than 1 years	Very high
		does the taxon require to reach the age-at-			
		first-reproduction?			
7. I	Dispers	al mechanisms			
35	7.01	How many potential internal	One	Aquaculture	High
		vectors/pathways could the taxon use to			5
		disperse within the RA area (with suitable			
36	7.02	Will any of these vectors/pathways bring the	Yes	it is likely	Medium
	/.02	taxon in close proximity to one or more			. ieuluii
		protected areas (e.g. MCZ, MPA, SSSI)?			
37	7.03	Does the taxon have a means of actively	No	No. does not have morphological caracters that will allow it to	Very high
57	7.05	attaching itself to hard substrata (e.g. ship	NO	attach	very nigh
		hulls, pilings, buoys) such that it enhances			
20					
20	7.04	the likelihood of dispersal?	No	No. Only invenile	High
	7.04	the likelihood of dispersal? Is natural dispersal of the taxon likely to	No	No. Only juvenile.	High
	7.04	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules	No	No. Only juvenile.	High
20		the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?			
39	7.04	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to	No Yes	No. Only juvenile. it is possible but less likely	High
39		the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as			
39		the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA			
	7.05	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?	Yes	it is possible but less likely	Low
		the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to			
40	7.05	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction?	Yes	it is possible but less likely they might	Low
40	7.05	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to	Yes	it is possible but less likely they might no. I strongly believe that this is not the way their eggs can be	Low
40 41	7.05 7.06 7.07	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	Yes Yes No	it is possible but less likely they might no. I strongly believe that this is not the way their eggs can be distributed. And it was alos never documented.	Low
40 41	7.05	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to	Yes Yes No	it is possible but less likely they might no. I strongly believe that this is not the way their eggs can be	Low
40 41	7.05 7.06 7.07	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	Yes Yes No	it is possible but less likely they might no. I strongly believe that this is not the way their eggs can be distributed. And it was alos never documented.	Low Medium Very high
40 41	7.05 7.06 7.07	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the	Yes Yes No	it is possible but less likely they might no. I strongly believe that this is not the way their eggs can be distributed. And it was alos never documented.	Low Medium Very high
40 41	7.05 7.06 7.07	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both	Yes Yes No	it is possible but less likely they might no. I strongly believe that this is not the way their eggs can be distributed. And it was alos never documented.	Low Medium Very high
40 41 42	7.05 7.06 7.07 7.08	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or intentional) likely to be	Yes Yes No Not applicable	it is possible but less likely they might no. I strongly believe that this is not the way their eggs can be distributed. And it was alos never documented. it has not been introduced yet	Low Medium Very high Low
40 41 42 43	7.05 7.06 7.07 7.08 7.09	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent?	Yes Yes No	it is possible but less likely they might no. I strongly believe that this is not the way their eggs can be distributed. And it was alos never documented.	Low Medium Very high
40 41 42 43 8. 1	7.05 7.06 7.07 7.08 7.09	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent?	Yes Yes No Not applicable Yes	it is possible but less likely they might no. I strongly believe that this is not the way their eggs can be distributed. And it was alos never documented. it has not been introduced yet it is possible	Low Medium Very high Low
40 41 42 43 8. 1	7.05 7.06 7.07 7.08 7.09	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of	Yes Yes No Not applicable	it is possible but less likely they might no. I strongly believe that this is not the way their eggs can be distributed. And it was alos never documented. it has not been introduced yet it is possible Yes. it can be out of water for long periods thanks to its ability to	Low Medium Very high Low
40 41 42 43 8. 1	7.05 7.06 7.07 7.08 7.09	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? Es the taxon able to withstand being out of water for extended periods (e.g. minimum of	Yes Yes No Not applicable Yes	it is possible but less likely they might no. I strongly believe that this is not the way their eggs can be distributed. And it was alos never documented. it has not been introduced yet it is possible	Low Medium Very high Low
40 41 42 43 8. 1	7.05 7.06 7.07 7.08 7.09	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>Ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life	Yes Yes No Not applicable Yes	it is possible but less likely they might no. I strongly believe that this is not the way their eggs can be distributed. And it was alos never documented. it has not been introduced yet it is possible Yes. it can be out of water for long periods thanks to its ability to	Low Medium Very high Low
40 41 42 43 8. 2 44	7.05 7.06 7.07 7.08 7.09 7.09	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cvcle?	Yes No Not applicable Yes	it is possible but less likely they might no. I strongly believe that this is not the way their eggs can be distributed. And it was alos never documented. it has not been introduced yet it is possible Yes. it can be out of water for long periods thanks to its ability to breath from air	Low Medium Very high Low Very high
40 41 42 43 8. 2 44	7.05 7.06 7.07 7.08 7.09	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? mee attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of	Yes Yes No Not applicable Yes	it is possible but less likely they might no. I strongly believe that this is not the way their eggs can be distributed. And it was alos never documented. it has not been introduced yet it is possible Yes. it can be out of water for long periods thanks to its ability to breath from air quite tolerant to wide water conditions and low oxigen	Low Medium Very high Low
40 41 42 43 8. 2 44	7.05 7.06 7.07 7.08 7.09 7.09	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>cree attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that	Yes No Not applicable Yes	it is possible but less likely they might no. I strongly believe that this is not the way their eggs can be distributed. And it was alos never documented. it has not been introduced yet it is possible Yes. it can be out of water for long periods thanks to its ability to breath from air	Low Medium Very high Low Very high
40 41 42 <u>43</u> 8. 1 44	7.05 7.06 7.07 7.08 7.09 7.09	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the	Yes No Not applicable Yes	it is possible but less likely they might no. I strongly believe that this is not the way their eggs can be distributed. And it was alos never documented. it has not been introduced yet it is possible Yes. it can be out of water for long periods thanks to its ability to breath from air quite tolerant to wide water conditions and low oxigen	Low Medium Very high Low Very high
40 41 42 43 8.7 44	7.05 7.06 7.07 7.08 7.09 7.09 7.09 7.09 8.01 8.01	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? the attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being	Yes No Not applicable Yes Yes	it is possible but less likely they might no. I strongly believe that this is not the way their eggs can be distributed. And it was alos never documented. it has not been introduced yet it is possible Yes. it can be out of water for long periods thanks to its ability to breath from air quite tolerant to wide water conditions and low oxigen concentrations	Low Very high Low Very high High
40 41 42 43 8.7 44	7.05 7.06 7.07 7.08 7.09 7.09	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life (cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon bole controlled or eradicated in	Yes No Not applicable Yes	it is possible but less likely they might no. I strongly believe that this is not the way their eggs can be distributed. And it was alos never documented. it has not been introduced yet it is possible Yes. it can be out of water for long periods thanks to its ability to breath from air quite tolerant to wide water conditions and low oxigen	Low Medium Very high Low Very high
40 41 42 43 3. 1 44	7.05 7.06 7.07 7.08 7.09 7.09 7.09 7.09 8.01 8.01	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>mee attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other	Yes No Not applicable Yes Yes	it is possible but less likely they might no. I strongly believe that this is not the way their eggs can be distributed. And it was alos never documented. it has not been introduced yet it is possible Yes. it can be out of water for long periods thanks to its ability to breath from air quite tolerant to wide water conditions and low oxigen concentrations	Low Very high Low Very high High
40 41 42 43 8.2 44 45 45	7.05 7.06 7.07 7.08 7.09 7.09 7.09 8.01 8.01 8.02 8.03	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? The taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	Yes No Not applicable Yes Yes	it is possible but less likely they might no. I strongly believe that this is not the way their eggs can be distributed. And it was alos never documented. it has not been introduced yet it is possible Yes. it can be out of water for long periods thanks to its ability to breath from air quite tolerant to wide water conditions and low oxigen concentrations	Low Very high Low Very high High
40 41 42 43 8.2 44 45 45	7.05 7.06 7.07 7.08 7.09 7.09 7.09 7.09 8.01 8.01	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>mee attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other	Yes No Not applicable Yes Yes	it is possible but less likely they might no. I strongly believe that this is not the way their eggs can be distributed. And it was alos never documented. it has not been introduced yet it is possible Yes. it can be out of water for long periods thanks to its ability to breath from air quite tolerant to wide water conditions and low oxigen concentrations	Low Very high Low Very high High
40 41 42 43 8.7 44 45 46	7.05 7.06 7.07 7.08 7.09 7.09 7.09 8.01 8.01 8.02 8.03	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? The taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	Yes No Not applicable Yes Yes Yes	it is possible but less likely they might no. I strongly believe that this is not the way their eggs can be distributed. And it was alos never documented. it has not been introduced yet it is possible Yes. it can be out of water for long periods thanks to its ability to breath from air quite tolerant to wide water conditions and low oxigen concentrations Yes, however it is very costy and sometimes innefective	Low Very high Low Very high High Low
40 41 42 43 44 45 46 46	7.05 7.06 7.07 7.08 7.09 7.09 7.09 8.01 8.01 8.02 8.03	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>The attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Is the taxon likely to tolerate or benefit from	Yes No Not applicable Yes Yes Yes	it is possible but less likely they might no. I strongly believe that this is not the way their eggs can be distributed. And it was alos never documented. it has not been introduced yet it is possible Yes. it can be out of water for long periods thanks to its ability to breath from air quite tolerant to wide water conditions and low oxigen concentrations Yes, however it is very costy and sometimes innefective	Low Very high Low Very high High Low
40 41 42 43 44 45 46 46	7.05 7.06 7.07 7.08 7.09 7.09 7.09 8.01 8.01 8.02 8.03	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>mee attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life relevant water quality variable(s) being Can the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon bile to tolerate or benefit from environmental/human disturbance? Is the taxon able to tolerate salinity levels	Yes No Not applicable Yes Yes Yes	it is possible but less likely they might no. I strongly believe that this is not the way their eggs can be distributed. And it was alos never documented. it has not been introduced yet It is possible Yes. it can be out of water for long periods thanks to its ability to breath from air quite tolerant to wide water conditions and low oxigen concentrations Yes, however it is very costy and sometimes innefective It is possible No. can not tolerate salinity fluctuations	Low Very high Low Very high High Low Medium
40 41 42 43 8. 44 45 45 46 47	7.05 7.06 7.07 7.08 7.09 7.09 7.09 8.01 8.01 8.02 8.03	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>cre attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Is the taxon able to tolerate or benefit from environmental/human disturbance? Is the taxon able to tolerate salinity levels that are higher or lower than those found in	Yes No Not applicable Yes Yes Yes	it is possible but less likely they might no. I strongly believe that this is not the way their eggs can be distributed. And it was alos never documented. it has not been introduced yet it is possible Yes. it can be out of water for long periods thanks to its ability to breath from air quite tolerant to wide water conditions and low oxigen concentrations Yes, however it is very costy and sometimes innefective It is possible	Low Very high Low Very high High Low Medium
40 41 42 43 44 45 45 46 47 48	7.05 7.06 7.07 7.08 7.09 7.09 7.09 8.01 8.01 8.02 8.03	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>mee attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life relevant water quality variable(s) being Can the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon bile to tolerate or benefit from environmental/human disturbance? Is the taxon able to tolerate salinity levels	Yes No Not applicable Yes Yes Yes	it is possible but less likely they might no. I strongly believe that this is not the way their eggs can be distributed. And it was alos never documented. it has not been introduced yet It is possible Yes. it can be out of water for long periods thanks to its ability to breath from air quite tolerant to wide water conditions and low oxigen concentrations Yes, however it is very costy and sometimes innefective It is possible No. can not tolerate salinity fluctuations	Low Very high Low Very high High Low Medium

C .	C. Climate change				
9. (Climate	change			
50	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?	Increase	Introduction risks increase	Very high
51		Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	Increase	If temperatures will rise, it increases their establishment	High
52	9.03	Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change?	Increase	more favorable habitats will be available for this species as well as recources	High
53	9.04	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	Higher	Higher	High
54	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	No change	No change	Medium
55		Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	No change	No change	Low

Statistics	
Scores	
BRA	38.0
BRA Outcome	-
BRA+CCA	46.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	15.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	10.0
B. Biology/Ecology	23.0
4. Undesirable (or persistence) traits	7.0
5. Resource exploitation	7.0
6. Reproduction	4.0
7. Dispersal mechanisms	1.0
8. Tolerance attributes	4.0
C. Climate change	8.0
9. Climate change	8.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	5
B. Biology/Ecology	J
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	36 12
	36 12 2
4. Undesirable (or persistence) traits	36 12 2 7
<i>4. Undesirable (or persistence) traits</i> <i>5. Resource exploitation</i>	36 12 2 7 9
4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction	36 12 2 7 9 6
4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms	3 5 36 12 2 7 9 6 6
4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes	36 12 2 7 9 6 6 6
4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change	12 2 7 9 6 6
4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change	12 2 7 9 6 6
4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected	12 2 7 9 6 6 6
4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change 9. Climate change Commercial	12 2 7 9 6 6 6 6 8
4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial Environmental	12 2 7 9 6 6 6 6 8
4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial Environmental	12 2 7 9 6 6 6 6 8
4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change 9. Climate change Commercial Environmental Species or population nuisance traits	12 2 7 9 6 6 6 6 8

BR	- A
BRA+CC	- A
Confidence	
BRA+CC	A 0.68
BR	A 0.68
CC	A 0.67
Date and Time	
20/05/	2022 16:27:15

Taxon and Assessor details	axon and Assessor details						
Category	Fishes and Lampreys (freshwater)						
Taxon name	Coregonus albula						
Common name	vendace						
Assessor	Bella Japoshvili						
Risk screening context							
Reason and socio-economic benefits	The species was subject of repeated introduction and had an important economic values						
Risk assessment area	South Caucasus						
Taxonomy	Actinopteri (ray-finned fishes) > Salmoniformes (Salmons) > Salmonidae (Salmonids)						
Native range	North-west Eurasia						
Introduced range	NUmber of European Countries						
URL	https://www.fishbase.de/summary/Coregonus-albula.html						

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
1. l		ication/Cultivation			
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20	Yes	Japoshvili, B. (2012). Long-term assessment of a vendace (Coregonus albula L.) stock in Lake Paravani, South Georgia.	Very high
2	1.02	generations? Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	Advances in Limnology, 63, 363-369. Frys are imported for introduction purpose	High
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	There are other congeners also introduced in many areas	High
2. (Climate	, distribution and introduction risk			
4		How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range?	Low	Climatch algorithm shows a low similarity to its native range	Medium
5	2.02	What is the quality of the climate matching data?	Low	Due to absence of extensive climate data for the RA	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	Kuljanishvili, T., Mumladze, L., Japoshvili, B., Mustafayev, N., Ibrahimov, S., Patoka, J., & Kalous, L. (2021). The first unified inventory of non-native fishes of the South Caucasian countries, Armenia, Azerbaijan, and Georgia. Knowledge & Management of Aquatic Ecosystems, (422), 32.	High
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	Only human mediated dispersal is possible for the RA area	High
8	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)?	Yes	It is already in RA area	Very high
		e elsewhere			T
9		Has the taxon become naturalised (established viable populations) outside its	Yes	https://www.cabi.org/isc/datasheet/88207#toriskOfIntroduction	High
	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	No	No such an evidence	Medium
	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	No such an evidence	Medium
	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	No	No such an evidence	Low
	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	No such an evidence	Medium
		y/Ecology			
		able (or persistence) traits	1		1
		Is it likely that the taxon will be poisonous or pose other risks to human health?	No	The species is not harmful	High
	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	The species is zooplanktivorous and can have strong effect on plankton taxa Bøhn T; Amundsen PA, 1998. Effects of invading vendace (Coregonus albula L.) on species composition and body size in two zooplankton communities of the Pasvik River System, northern Norway. Journal of Plankton Research, 20(2):243-256.	High
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	Vendace is not a parasite	High
17	4.04	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?	No	No such an evidence. Usually requires very similar conditions to its native habitats	Medium
		Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA area?	Yes	By affecting the local community Bøhn T; Amundsen PA, 1998. Effects of invading vendace (Coregonus albula L.) on species composition and body size in two zooplankton communities of the Pasvik River System, northern Norway. Journal of Plankton Research, 20(2):243-256. Amundsen PA; Siwertsson A; Primicerio R; Bøhn T, 2009. Long-term responses of zooplankton to invasion by a planktivorous fish in a subarctic watercourse. Freshwater Biology. 54(1):24-34. http://www.blackwell-svnergy.com/loi/fwb	High
	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	No such an evidence	Medium
20	4.07	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA	No	No such endemic pest or infectious agents are known for the RA area	Medium

10		the wild with chemical, biological, or other agents/means?			
46	8.03	Can the taxon be controlled or eradicated in	No	No such an evidence exists	High
		water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being	-		
45	8.02	water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of	No	No such an evidence exists	High
44	8.01	Is the taxon able to withstand being out of water for extended periods (e.g. minimum of	No	No such ana evidence exists	High
8. 7	oleran	<u>ce attributes</u>			
43	7.09	Is dispersal of the taxon density dependent?	No	No such an evidence exists	Medium
		seven questions (35-41; i.e. both unintentional or intentional) likely to be		Lake Paravani, South Georgia. Advances in Limnology, 63, 363- 369.	
		vectors/pathways mentioned in the previous		Long-term assessment of a vendace (Coregonus albula L.) stock in	
12	7.08	Is dispersal of the taxon along any of the	Yes	Usually a large number of frys are released Japoshvili, B. (2012).	Very high
11	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No	No such an evidence is known	Very high
40	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	No	No such evidence exists	Very high
53	7.05	occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?		NO SUCH EVIDENCE EXISTS FOR VEHILDLE	High
20	7.05	occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to	No	No such evidence exists for vendace	High
38	7.04	hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to	No	No such an evidence	High
37	7.03	protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship	No	No such an evidence	Very high
86	7.02	disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more	Yes	Yes, the species is released within the Javakheti protected areas	High
85	7.01	How many potential internal vectors/pathways could the taxon use to	One	Only human dependant translocation	High
		al mechanisms			
		does the taxon require to reach the age-at- first-reproduction?			
4	6.07	within a short time span (e.g. < 1 year)? How many time units (days, months, years)	2	Species Compendium. Wallingford, UK: CAB International.	High
3	6.06	Is the taxon known (or likely) to produce a large number of propagules or offspring	Yes	Species is usually producing large amount of eggs after reaching the adult size (CABI, 2022. Coregounus albula. In: Invasive Encice Comparium Wallingford, UK: CAB International	High
	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	No	Vendace does not require any other species for completion of life cycle	High
		display asexual reproduction?			-
	6.04	native taxa? Is the taxon likely to be hermaphroditic or to	No	No such an evidence exists	High
30	6.03	or propagules (in the RA area)? Is the taxon likely to hybridise naturally with	No	Fish species composition, sex ratio and growth parameters in Saghamo Lake (Southern Georgia). Biologia, 73(1), 93-100. No such an evidence	High
29	6.02	to environmental conditions? Is the taxon likely to produce viable gametes	Yes	Kuljanishvili, T., Mumladze, L., Kalous, L., & Japoshvili, B. (2018).	Medium
ŭ	6.01	Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response	No	No such an evidence exists	High
	Reprodu	iction	No	No such an avidance aviste	High
		resources (including nutrients) to the detriment of native taxa in the RA area?		dorect competition for food with native salmon and other cyprinids	
27	5.02	protected native taxa in the RA area? Is the taxon likely to sequester food	Yes	known from RA area Not the RIP values have been calculated, however, venadace is in	High
26	5.01	Is the taxon likely to consume threatened or	No	The fish is plancton feeder and no threatend plancton species are	High
5. F	Resourc	by way of a dormant form)?			
		population even when present in low densities (or persisting in adverse conditions			
25	4.12	native taxa? Is the taxon likely to maintain a viable	No	No such an evidence	High
		(e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for			
4	4.11	versatile in habitat use)? Is it likely that the taxon's mode of existence	Yes	Through the reduction of available food	Medium
3	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g.	Yes	The species is anadromous though no exact data is available on its ability to adapt different velocity levels	Medium
		size that will make it more likely to be released from captivity?			
2	4.09	infectious agents that are absent from (novel to) the RA area? Is it likely that the taxon will achieve a body	No	vendace's native area It is only kept in natural water bodies	High

48	8.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in	No	No such an evidence	Medium
		its usual environment?			
49	8.06	Are there effective natural enemies	No	No effective natural enemies have been observed in RA area	Medium
		(predators) of the taxon present in the RA			
С. (Climate	e change			
		change			
50	9.01	Under the predicted future climatic	No change	Based on professional judgment	High
		conditions, are the risks of entry into the RA			
		area posed by the taxon likely to increase,			
		decrease or not change?			
51	9.02	Under the predicted future climatic	Decrease	Increase of temperature most probably decrease the risk of	Low
		conditions, are the risks of establishment		establishment	
		posed by the taxon likely to increase,			
		decrease or not change?			
52	9.03	Under the predicted future climatic	Decrease	Increase of temperature most probably decrease the risk of	Low
		conditions, are the risks of dispersal within		dispersal	
		the RA area posed by the taxon likely to			
		increase, decrease or not change?			
53	9.04	Under the predicted future climatic	Lower	Based on personal guess	Low
		conditions, what is the likely magnitude of			
		future potential impacts on biodiversity			
		and/or ecological integrity/status?			
54	9.05	Under the predicted future climatic	Lower	Based on personal guess	Low
		conditions, what is the likely magnitude of			
		future potential impacts on ecosystem			
		structure and/or function?			
55	9.06	Under the predicted future climatic	Lower	Based on personal guess	Low
		conditions, what is the likely magnitude of			
		future potential impacts on ecosystem			
		services/socio-economic factors?			

Statistics	
Scores	
BRA	9.0
BRA Outcome	-
BRA+CCA	-1.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	7.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	1.0
<i>3. Invasive elsewhere</i>	2.0
B. Biology/Ecology	2.0
4. Undesirable (or persistence) traits	4.0
5. Resource exploitation	2.0
6. Reproduction	1.0
7. Dispersal mechanisms	-3.0
8. Tolerance attributes	-2.0
C. Climate change	-10.0
9. Climate change	-10.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3 5 5 36
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	5
B. Biology/Ecology	
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2
6. Reproduction	2 7 9
7. Dispersal mechanisms	9
8. Tolerance attributes	6
C. Climate change	6
9. Climate change	6
Sectors affected	
Commercial	3
Environmental	-1
	0
Species or population nuisance traits	
Species or population nuisance traits	
Species or population nuisance traits	

BRA BRA+CCA Confidence
Confidence
Conndence
BRA+CCA 0.0
BRA 0.3
CCA 0.3
Date and Time
14/05/2022 12:41:4

Taxon and Assessor details	
Category	Fishes and Lampreys (freshwater)
Taxon name	Coregonus albula
Common name	vendace
Assessor	Giorgi Epitashvili
Risk screening context	
Reason and socio-economic benefits	The species has a trade importance. It is included in Appendix III of the Bern Convention
Risk assessment area	South Caucasus
Taxonomy	Coregonus albula (Linnaeus 1758)
Native range	Europe: Baltic basin, lakes of upper Volga drainage (Seliger, Vseluga, Perejaslavskoe), some lakes
Introduced range	This fish frequently stocked in lakes and reservoirs in Germany and Poland. It has been introduced
URL	https://www.fishbase.in/summary/Coregonus-albula.html

			Response	Justification (references and/or other information)	Confidence
A. I	Biogeo	graphy/Historical			
		ication/Cultivation			
1		Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	This fish has a trade importance and frequently stocked in lakes and reservoirs in Germany and in Poland (Ninua et al. 2013).	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	The local populations of Coregonus lavaretus are commercially valuable in Georgia though the abundance is decreasing due to the unavailability of local hatcheries (Kuljanishvili et al. 2020).	Very high
		Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	In the Pasvik River System, northern Norway invasion and establishment of a dense vendace population in the upper locality had increased the predation pressure in the pelagic, resulting in a reduction of body size and a shift towards smaller species in the zooplankton community (Bohn & Amundsen 1998).	High
2. 0		distribution and introduction risk	Maralis una	Annualis based on Kännen. Onigen elimete men	Madium
4	2.01	How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range?	Medium	Answer is based on Köppen-Geiger climate map.	Medium
5		What is the quality of the climate matching data?	Medium	Answer is based on Köppen-Geiger climate map.	Medium
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	This species has been introduced in Georgia since 1930, in the Lakes Tabatskuri and Paravani. Two species were introduced to Lake Sevan in the 1920s: Coregonus ludoga from Lake Ladoga and Coregonus maraenoides from Lake Chudskoe (both in Northern European Russia). These two species naturalised and hybridised in the lake and an intermediate phenotype was subsequently described as a Coregonus lavaretus sevanicus by Dadikvan (1986) (Mailvan. 1957: Ninua et al. 2013: Kulianishvili	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	This species intentionally spread within the south Caucasus region for aquacultural purposes (Kuljanishvili et al. 2020)	High
8		Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)?	Yes	Coregenus albula was first seen in the shared Aktas/Kartsakhi lake between Turkey and Georgia as an alien species (Yerli 2019)	Very high
3 I	nvasive	e elsewhere			
		Has the taxon become naturalised (established viable populations) outside its native range?	Yes	This species has been established in many parts of the world, also in the SC region (Japoshvili et al. 2012; Ninua et al. 2013; Kuljanishvili et al. 2020).	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	In the Pasvik River System, northern Norway invasion and establishment of a dense vendace population in the upper locality had increased the predation pressure in the pelagic, resulting in a reduction of body size and a shift towards smaller species in the zooplankton community (Bohn & Amundsen 1998).	High
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	Such data is not available	Medium
		In the taxon's introduced range, are there known adverse impacts to ecosystem	No	Such data is not available	Medium
		In the taxon's introduced range, are there known adverse socio-economic impacts?	No	Such data is not available	Medium
		r/Ecology able (or persistence) traits			
14	4.01	Is it likely that the taxon will be poisonous or pose other risks to human health?	No	This species does not pose a threat to humans	Very high
		Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	In the Pasvik River System, northern Norway invasion and establishment of a dense vendace population in the upper locality had increased the predation pressure in the pelagic, resulting in a reduction of body size and a shift towards smaller species in the zooplankton community (Bohn & Amundsen 1998).	High
		Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	Yes	C. albula is a predator fish and can eat protected or threatend native species in the Caucasus region such as Salmo caspius, Salmo ischchan, Cyprinus carpio etc.	High
	4.04	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?	Yes	This species is occurring in the South Caucasus region since 1920s and it seems that climatic and environmental conditions of the region is suitable for it.	High
		Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA	Yes	On the example of Norway (Bohn & Amundsen 1998) we can assume that if its population increases this will lead to significant changes in the food web structure.	High
19		Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	Own judgement	Medium

20					
	4.07	Is it likely that the taxon will host, and/or	No	Such data is not available	Medium
		act as a vector for, recognised pests and infectious agents that are endemic in the RA			
1	4.08	Is it likely that the taxon will host, and/or	No	Such data is not available	Medium
1	4.00	act as a vector for, recognised pests and	NO		Medium
		infectious agents that are absent from (novel			
		to) the RA area?			
2	4.09	Is it likely that the taxon will achieve a body	Yes	Max length of C. albula is 48.0 cm, max. published weight: 1.0 kg	High
		size that will make it more likely to be		(Muus and Dahlström 1968), therefore this species can released in	
		released from captivity?		nature from captivity.	
3	4.10	Is the taxon capable of sustaining itself in a	No	C. albula is a lacustrine and marine species. At sea, forages close	Medium
		range of water velocity conditions (e.g.		to coast (Kottelat and Freyhof 2007).	
		versatile in habitat use)?			
4	4.11	Is it likely that the taxon's mode of existence	No	Such data is not available	Medium
		(e.g. excretion of by-products) or behaviours			
		(e.g. feeding) will reduce habitat quality for			
		native taxa?			
5	4.12	Is the taxon likely to maintain a viable	Yes	A recovery of C. albula from overfishing is possible because the	High
		population even when present in low		biological features of this fish make it a highly resilient species	
		densities (or persisting in adverse conditions		(Sarvala et al. 2020).	
		by way of a dormant form)?			
		ce exploitation	r		1
5	5.01	Is the taxon likely to consume threatened or	Yes	C. albula is a predator fish and can eat protected or threatend	High
		protected native taxa in the RA area?		native species in the Caucasus region such as Salmo caspius,	
_	+			Salmo ischchan, Cyprinus carpio etc.	
1	5.02	Is the taxon likely to sequester food	No	No such fact has been observed	Low
		resources (including nutrients) to the			
	0	detriment of native taxa in the RA area?	l		1
	Reprod		Not and it	Cuch data is not available	Low
5	6.01	Is the taxon likely to exhibit parental care	NOT applicable	Such data is not available	Low
		and/or to reduce age-at-maturity in response			
n	6.02	to environmental conditions?	Yes	This species reproduces paturally in the South Courses a size	High
9	6.02	Is the taxon likely to produce viable gametes	res	This species reproduces naturally in the South Caucasus region	High
0	6.03	or propagules (in the RA area)?	V	(Kuljanishvili et al. 2020).	L l'arte
J	6.03	Is the taxon likely to hybridise naturally with	Yes	Hybridization between native Coregonus lavaretus and introduced	High
1	6.04	native taxa? Is the taxon likely to be hermaphroditic or to	Yes	C. albula were detected in Finland (Kahilainen et al. 2011). The investigation of gonad development in the early life history	High
T	0.04		res		підп
		display asexual reproduction?		stages of the whitefish Coregonus lavaretus baeri (Kessler) under	
				experimental conditions revealed the phenomenon of mass	
				hermaphroditism as response to high temperature influence	
2	6.05	Is the taxon dependent on the presence of	No	(Bogdanova, 2004). No such fact has been described	High
Z	0.05		NO	No such fact flas been described	nign
		another taxon (or specific habitat features) to complete its life cycle?			
2	6.06	Is the taxon known (or likely) to produce a	No	No such fact has been described	Medium
5	0.00	large number of propagules or offspring	NO	No such fact flas been described	Medium
1	6.07	within a short time span (e.g. < 1 year)? How many time units (days, months, years)	3	The species become sexually mature at the age of 3-4 (Ninua et	High
+	0.07		3	al. 2013).	nign
				al. 2015).	
		does the taxon require to reach the age-at-			
1	Disners	first-reproduction?			
		first-reproduction?	One	This species can disperse within the SC region intentionally by	High
		first-reproduction? sal mechanisms How many potential internal	One	This species can disperse within the SC region intentionally by	High
		first-reproduction? sal mechanisms How many potential internal vectors/pathways could the taxon use to	One	This species can disperse within the SC region intentionally by humans for aquacultural purposes.	High
5	7.01	first-reproduction? sal mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable		humans for aquacultural purposes.	-
5		first-reproduction? sal mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the		humans for aquacultural purposes. This species was found in the Aktaş/Kartsakhi Lake which is	High
5	7.01	first-reproduction? sal mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more		humans for aquacultural purposes. This species was found in the Aktaş/Kartsakhi Lake which is located on the border of Georgia-Turkey and Georgian side of the	-
5	7.01	first-reproduction? sal mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)?	Yes	humans for aquacultural purposes. This species was found in the Aktaş/Kartsakhi Lake which is located on the border of Georgia-Turkey and Georgian side of the lake is part of the Javakheti Protected Areas.	High
5	7.01	first-reproduction? sal mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively		humans for aquacultural purposes. This species was found in the Aktaş/Kartsakhi Lake which is located on the border of Georgia-Turkey and Georgian side of the	-
5	7.01	first-reproduction? sal mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship	Yes	humans for aquacultural purposes. This species was found in the Aktaş/Kartsakhi Lake which is located on the border of Georgia-Turkey and Georgian side of the lake is part of the Javakheti Protected Areas.	High
5	7.01	first-reproduction? sal mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances	Yes	humans for aquacultural purposes. This species was found in the Aktaş/Kartsakhi Lake which is located on the border of Georgia-Turkey and Georgian side of the lake is part of the Javakheti Protected Areas.	High
5	7.01 7.02 7.03	first-reproduction? sal mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal?	Yes	humans for aquacultural purposes. This species was found in the Aktaş/Kartsakhi Lake which is located on the border of Georgia-Turkey and Georgian side of the lake is part of the Javakheti Protected Areas. This species has not such means	High
5	7.01	first-reproduction? sal mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to	Yes	humans for aquacultural purposes. This species was found in the Aktaş/Kartsakhi Lake which is located on the border of Georgia-Turkey and Georgian side of the lake is part of the Javakheti Protected Areas.	High
5	7.01 7.02 7.03	first-reproduction? sal mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules	Yes	humans for aquacultural purposes. This species was found in the Aktaş/Kartsakhi Lake which is located on the border of Georgia-Turkey and Georgian side of the lake is part of the Javakheti Protected Areas. This species has not such means	High
5	7.01 7.02 7.03 7.04	first-reproduction? sal mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?	Yes No	humans for aquacultural purposes. This species was found in the Aktas/Kartsakhi Lake which is located on the border of Georgia-Turkey and Georgian side of the lake is part of the Javakheti Protected Areas. This species has not such means No such fact has been detected in the Caucasus region	High High High
5	7.01 7.02 7.03	first-reproduction? sal mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to	Yes	humans for aquacultural purposes. This species was found in the Aktaş/Kartsakhi Lake which is located on the border of Georgia-Turkey and Georgian side of the lake is part of the Javakheti Protected Areas. This species has not such means	High
5	7.01 7.02 7.03 7.04	first-reproduction? sal mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?	Yes No	humans for aquacultural purposes. This species was found in the Aktas/Kartsakhi Lake which is located on the border of Georgia-Turkey and Georgian side of the lake is part of the Javakheti Protected Areas. This species has not such means No such fact has been detected in the Caucasus region	High High High
5	7.01 7.02 7.03 7.04	first-reproduction? sal mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to	Yes No	humans for aquacultural purposes. This species was found in the Aktas/Kartsakhi Lake which is located on the border of Georgia-Turkey and Georgian side of the lake is part of the Javakheti Protected Areas. This species has not such means No such fact has been detected in the Caucasus region	High High High
5	7.01 7.02 7.03 7.04	first-reproduction? sal mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA	Yes No	humans for aquacultural purposes. This species was found in the Aktas/Kartsakhi Lake which is located on the border of Georgia-Turkey and Georgian side of the lake is part of the Javakheti Protected Areas. This species has not such means No such fact has been detected in the Caucasus region	High High High
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5 5 7 3 9	7.01 7.02 7.03 7.04 7.05	first-reproduction? sal mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to	Yes No No	humans for aquacultural purposes. This species was found in the Aktas/Kartsakhi Lake which is located on the border of Georgia-Turkey and Georgian side of the lake is part of the Javakheti Protected Areas. This species has not such means No such fact has been detected in the Caucasus region No such fact has been detected in the Caucasus region This species has landlocked populations within the South Caucasus region and occuring in the several lakes such as:	High High High High
5 5 7 7	7.01 7.02 7.03 7.04 7.05	first-reproduction? sal mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to	Yes No No	humans for aquacultural purposes. This species was found in the Aktas/Kartsakhi Lake which is located on the border of Georgia-Turkey and Georgian side of the lake is part of the Javakheti Protected Areas. This species has not such means No such fact has been detected in the Caucasus region No such fact has been detected in the Caucasus region This species has landlocked populations within the South	High High High High
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5 5 7 7 9	7.01 7.02 7.03 7.04 7.05 7.06 7.07	first-reproduction? sal mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	Yes No No No	humans for aquacultural purposes. This species was found in the Aktas/Kartsakhi Lake which is located on the border of Georgia-Turkey and Georgian side of the lake is part of the Javakheti Protected Areas. This species has not such means No such fact has been detected in the Caucasus region No such fact has been detected in the Caucasus region This species has landlocked populations within the South Caucasus region and occuring in the several lakes such as: Paravani, Tabatskuri, Sevan and Kartsakhi. Therefore it is not No such fact has been detected	High High High High Very high
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	8.02	Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being considered.]	No	Low pH (pH 4.75 and 5.00) associated with 1.0-l.1 mg 1-1 Mn and 0.1 mg I -~ Fe did not reduce Imtching success and survival during the embryonic and early larval development in Coregonus albula population when the A1 concentration was low (0.1-0.2 mg 1 -~). However, when the A1 content was increased to 2.4 and 2.1 mg I -1 at pH 4.75 and 5.00, respectively, mortality prior to hatch was high, no (pH 4.75) or very few embryos (pH 5.00) hatched, and no fish survived to the end of the experiment (DUIS	Medium
46	8.03	Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	Not applicable	Such data is not available	Low
47	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	No	Such data is not available	Medium
	8.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	Yes	C. albula and C. lavaretus are species which, as adults, migrate into brackish water with salinities of 10 to 18 "/oo or higher (Nellen, 1965)	High
	8.06	Are there effective natural enemies (predators) of the taxon present in the RA area?	Yes	In the Caucasus region there are distributed several species which should be considered as potential predators for C. albula. These species are S. ischchan, S. labrax, S. caspius, etc. according to Kuljanishvili et al. (2020)	High
C. (Climate	e change			
9. (Climate	change			
50	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?	Decrease	C. albula has limited distribution range in the Caucasus region and future climatic conditions will lead to a deterioration of its living environment which represents the alpine lakes in the region. Water temperatures are expected to rise in these lakes, which will lead to a deterioration in the living conditions for these fish.	High
51	9.02	Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	Decrease	C. albula has limited distribution range in the Caucasus region and future climatic conditions will lead to a deterioration of its living environment which represents the alpine lakes in the region. Water temperatures are expected to rise in these lakes, which will lead to a deterioration in the living conditions for these fish.	High
52	9.03	Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change?	Decrease	C. albula has limited distribution range in the Caucasus region and future climatic conditions will lead to a deterioration of its living environment which represents the alpine lakes in the region. Water temperatures are expected to rise in these lakes, which will lead to a deterioration in the living conditions for these fish.	High
53	9.04	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	Lower	Own judgement	High
	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Lower	Own judgement	High
55	9.06	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	Lower	Own judgement	High

Statistics	
Scores	
BRA	19.5
BRA Outcome	-
BRA+CCA	7.5
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	9.5
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	4.5
B. Biology/Ecology	10.0
4. Undesirable (or persistence) traits	6.0
5. Resource exploitation	5.0
6. Reproduction	4.0
7. Dispersal mechanisms	-4.0
8. Tolerance attributes	-1.0
C. Climate change	-12.0
9. Climate change	-12.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3 5 5
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	5
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2
6. Reproduction	2 7 9
7. Dispersal mechanisms	
8. Tolerance attributes	6
C. Climate change	6
9. Climate change	6
Sectors affected	
Commercial	5

Environmental	3
Species or population nuisance traits	2
Thresholds	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.68
BRA	0.67
CCA	0.75
Date and Time	
03/05/20	22 16:08:20

Taxon and Assessor details	
Category	Fishes and Lampreys (freshwater)
Taxon name	Coregonus albula
Common name	vendace
Assessor	Tatia Kuljanishvili
Risk screening context	
Reason and socio-economic benefits	It was introduced from the Volkhov hatchery at Lake Ladoga (Russia) to southern Georgia, in Lakes
Risk assessment area	South Caucasus
Taxonomy	Actinopteri (ray-finned fishes) > Salmoniformes (Salmons) > Salmonidae (Salmonids) >
Native range	the Baltic Sea basin, lakes of the upper Volga River drainage, and also in some lakes of the White
Introduced range	Lakes of Javakheti Upland
URL	https://www.fishbase.se/summary/Coregonus-albula.html

			Response	Justification (references and/or other information)	Confidence
Α.	Biogeo	graphy/Historical			
1. l		ication/Cultivation	1		
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	Has been a subject for stocking. This species were reproduced and transported from Russia to Georgia. and in Georgia, this species has been bred and stocked regularly during past century	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	(Japoshvili et al 2012; Kuljanishvili et al 2018). Since the species is the commercially valuable, it is being harvested from the wild, and it can also be sold in its live form, for commercial purposes.	Very high
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	No	Congeners of C. alba are not known to be serious pests	High
2. (Climate,	, distribution and introduction risk			
4	2.01	How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range?	High	it is similar in high altitude areas. But in lowlands it is not.	Medium
5	2.02	What is the quality of the climate matching data?	High	out of 10 stations, 5 stations in mountainos areas have matched	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	It occurs in the lake Saghamo at least confirmed by catch (Kuljanishvili et al 2018).	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	Only quaculture	High
8	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)?	Yes	Young individuals of the fish are being found in Saghamo lake. Documented by Kuljanishvili et al 2018	High
3. i		elsewhere			
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	In the beginning, of C. albula introduction, local hatcheries were involved in artificial reproduction of C. albula and release of young fry into the lake (Japoshvili 2012). However, as of 2005, these hatcheries ceased operation and it was expected that C. albula populations would become extinct over time. However, twelve years later young individuals were found in Saghamo Lake, which is connected to Paravani Lake by the Paravani River. This meant that they had become naturalized in the area, although the population density was extremely low (Kulianishvili et al. 2018).	High
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	No	There no adverse impacts documented in Georgia. However, one might assume that it could be altering the native food web via selective praying on zooplanktonic organisms (Savini et al 2010).	Medium
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	No adverse impacts on aquaculture is known in Georgia.	Very high
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	No	No adverse impacts on ecosystem is known in Georgia. Possible can be transmitting parasites or deseases	Medium
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	No adverse socio-economic impacts is known in Georgia.	High
B.	Biology	//Ecology			
		able (or persistence) traits	1		
		pose other risks to human health?	No	Is not poisonous or pose other risks to human health	Very high
15	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	No	Impact of introduced C. albula on native taxa can only be alteration of native food webs (Savini et al 2010).	High
	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	No.	Very high
		Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?	No	Coregonids are Coldwater fishes and they require cold environment. they can not adapt variable climatic environments.	High
	4.05	Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA	Yes	May alter the food webs by selective praying on zooplankton	High
	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	No. No data. less likely	Very high
20	4.07	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA	Not applicable	No information avalable	Medium

21	4.08	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel	Yes	It is possible.	Medium
22	4.09	to) the RA area? Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity?	Yes	it is usually released in the wild sine small fry.	Very high
23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)?	Yes	This species is anadromous, marine, or can form landlocked populations as well (Kottelat & Freyhof 2007).	High
24	4.11	Is it likely that the taxon's mode of existence	No	No. less likely, no documentation.	High
		(e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for			
		native taxa?			
25	4.12	Is the taxon likely to maintain a viable population even when present in low	Yes	It usually spawns for the first time at the age of 2-5 years old. in case of overfishing it might not be able to have viable population	Medium
		densities (or persisting in adverse conditions		in low densities.	
5 6	Pesouro	by way of a dormant form)?			
		Is the taxon likely to consume threatened or	No	Not a predator, eats plankton only.	High
77	5.02	protected native taxa in the RA area? Is the taxon likely to sequester food	No	It is quite unlikely.	Medium
_ /	5.02	resources (including nutrients) to the	NO		neulum
c I	lanradi	detriment of native taxa in the RA area?			
	eprodu 6.01	Is the taxon likely to exhibit parental care	No	No.No info.	Very high
		and/or to reduce age-at-maturity in response			-
29	6.02	to environmental conditions? Is the taxon likely to produce viable gametes	Yes	The conditions for maturation are available in the RA area	High
30	6.03	or propagules (in the RA area)? Is the taxon likely to hybridise naturally with	No	There are no native coregonids in RA area.	High
	6.04	native taxa? Is the taxon likely to be hermaphroditic or to	No	No does not display asexual reproduction.	Very high
		display asexual reproduction?			
32	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	No	Not dependent on another taxon to complete its life cycle	Very high
33	6.06	Is the taxon known (or likely) to produce a large number of propagules or offspring	No	Not known	Very high
		within a short time span (e.g. < 1 year)?			
34	6.07	How many time units (days, months, years)	3	From 2 to 5 years	High
		does the taxon require to reach the age-at-			-
		does the taxon require to reach the age-at- first-reproduction?			
		first-reproduction? al mechanisms	One	Aquaculture	High
		first-reproduction?	One	Aquaculture	High
35		first-reproduction? al mechanisms How many potential internal	One		-
35	7.01	first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more		Aquaculture Stocking is not allowed in protected areas	High
35 36	7.01	first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the			
35 36	7.01	first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship	No	Stocking is not allowed in protected areas	High
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35 36 37 38	7.01 7.02 7.03 7.04	first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as	No	Stocking is not allowed in protected areas No. does not attach to any surface. Less likely.	High Very high High
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35 36 37 38 39 40 41 42 43 3. 7	7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09	first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i>	No No No No No No	Stocking is not allowed in protected areas No. does not attach to any surface. Less likely. less likely. No. does not migrate. No. not possible. As far as we know, no. It is not known	High Very high High High Very high Very high High Medium
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35 36 37 38 39 40 41 42 43 8.7	7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09	first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? ce attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life	No No No No No No	Stocking is not allowed in protected areas No. does not attach to any surface. Less likely. less likely. No. does not migrate. No. not possible. As far as we know, no. It is not known	High Very high High High Very high Very high High Medium
35 36 37 38 39 40 41 42 43 3.7 44	7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09	first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? ce attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of	No No No No No No	Stocking is not allowed in protected areas No. does not attach to any surface. Less likely. less likely. No. does not migrate. No. not possible. As far as we know, no. It is not known No.can not withstand being out of water for long This species requires specific conditions and are not tolerant to	High Very high High High Very high Very high High Medium
35 36 37 38 39 40 41 42 43 3.7 44	7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 0leran 8.01	first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that	No No No No No No No	Stocking is not allowed in protected areas No. does not attach to any surface. Less likely. less likely. No. does not migrate. No. not possible. As far as we know, no. It is not known No.can not withstand being out of water for long	High Very high High High Very high Very high High Medium
35 36 37 38 39 40 41 42 43 3.7 44	7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 0leran 8.01	first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? ce attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of	No No No No No No No	Stocking is not allowed in protected areas No. does not attach to any surface. Less likely. less likely. No. does not migrate. No. not possible. As far as we know, no. It is not known No.can not withstand being out of water for long This species requires specific conditions and are not tolerant to	High Very high High High Very high Very high High Medium
35 36 37 38 39 40 41 42 42 43 74 44	7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 0leran 8.01	first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon becontrolled or eradicated in the wild with chemical, biological, or other	No No No No No No No	Stocking is not allowed in protected areas No. does not attach to any surface. Less likely. less likely. No. does not migrate. No. not possible. As far as we know, no. It is not known No.can not withstand being out of water for long This species requires specific conditions and are not tolerant to	High Very high High High Very high Very high High Medium
35 36 37 38 39 40 41 42 43 8.7 44 45 46	7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 0leran 8.01 8.02	first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	No No No No No No No No No No No No No N	Stocking is not allowed in protected areas No. does not attach to any surface. Less likely. less likely. No. does not migrate. No. not possible. As far as we know, no. It is not known No.can not withstand being out of water for long This species requires specific conditions and are not tolerant to wide range of water quality conditions	High Very high High Very high Very high High Very high High

48	8.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	Yes	I guess it can tolerate sainity levels since it can be anadromous, freshwater or marine fish.	Low
49	8.06	Are there effective natural enemies (predators) of the taxon present in the RA	No	No. Not documented	High
С. (Climate	e change			
9. (Climate	change			
50	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?	Increase	It was hypotheses that climate change might alert the mechanisms of transportation and introduction of non-native species. Commercial and recreational activities will increase, that itself increases the propagule pressure levels of non-native	Very high
51	9.02	Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	Decrease	In terms of increased temperatures this species will be having troubles to survive in the wild	High
52	9.03	Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase. decrease or not change?	Decrease	Increased temperatures will cause stress in their populations making their populations weaker, therefore it won't be available to disperse	High
53	9.04	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	Lower	The environment for them will be unbearable and this species populations will decrease, making the impact lower.	High
54	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Lower	If there is any, in future it will be lower.	High
55	9.06	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	Lower	The magnitude of future potential impact is low.	High

Statistics Scores	
BRA	5.0
BRA Outcome	-
BRA+CCA	-3.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	5.0
1. Domestication/Cultivation	2.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	2.0
B. Biology/Ecology	0.0
4. Undesirable (or persistence) traits	4.0
5. Resource exploitation	0.0
6. Reproduction	0.0
7. Dispersal mechanisms	-5.0
8. Tolerance attributes	1.0
C. Climate change	-8.0
9. Climate change	-8.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3 5 5 36
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	5
B. Biology/Ecology	36
4. Undesirable (or persistence) traits 5. Resource exploitation	12 2 7 9 6
	2
6. Reproduction 7. Dispersal mechanisms	/
8. Tolerance attributes	9
	0
C. Climate change	6 6
9. Climate change Sectors affected	0
Commercial	2
Environmental	-3
Species or population nuisance traits	-3
opecies of population nuisalice traits	-1
Thresholds	

Intestolds		
	BRA	-
	BRA+CCA	-
Confidence		
	BRA+CCA	0.78
	BRA	0.78
	CCA	0.79
Date and Time		
	20/05/20	022 16:35:23

Taxon and Assessor details	
Category	Fishes and Lampreys (freshwater)
Taxon name	Coregonus sp.
Common name	-
Assessor	Bella Japoshvili
Risk screening context	
Reason and socio-economic benefits	This taxa was introduced in sevan with probably other congeners. It is still there having important
Risk assessment area	South Caucasus
Taxonomy	Actinopteri (ray-finned fishes) > Salmoniformes (Salmons) > Salmonidae (Salmonids)
Native range	North Russia
Introduced range	South Caucasus
LIRI	

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			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
ι. L 1		<i>ication/Cultivation</i> Has the taxon been the subject of	Yes	Dadikyan MG. 1964. Towards the Results of Intriduction of	Very high
L	1.01	domestication (or cultivation) for at least 20	165	Coregonids (Coregonus lavaretus maraenoides Poljakow, C.	very nigh
		generations?		lavaretus ludoga Poljakow) in the Lake Sevan. Proc Acad Sci	
		generations:		Armenian SSR (in Russian) 17: 41–48	
2	1.02	Is the taxon harvested in the wild and likely	Yes	Personal observation - harvested and imported in RA area as well	High
-	1.02	to be sold or used in its live form?		as harvested and sold Within RA area	
}	1.03	Does the taxon have invasive races,	Yes	Other coregonus species	High
		varieties, sub-taxa or congeners?			5
2. (Climate	, distribution and introduction risk			
ŀ		How similar are the climatic conditions of the	Low	Climatch shows no high similarity	Medium
		Risk Assessment (RA) area and the taxon's			
		native range?			
5	2.02	What is the quality of the climate matching	Low	Due to absence of extensive local climate data in RA area	High
		data?			
5	2.03	Is the taxon already present outside of	Yes	Kuljanishvili, T., Mumladze, L., Kalous, L., & Japoshvili, B. (2018).	Very high
		captivity in the RA area?		Fish species composition, sex ratio and growth parameters in	
				Saghamo Lake (Southern Georgia). Biologia, 73(1), 93-100.	
7	2.04	How many potential vectors could the taxon	None	Human mediated translocation	High
	2.05	use to enter in the RA area?			
3	2.05	Is the taxon currently found in close	Yes	It is already in RA area Kuljanishvili, T., Mumladze, L., Kalous, L.,	Very high
		proximity to, and likely to enter into, the RA		& Japoshvili, B. (2018). Fish species composition, sex ratio and	
		area in the near future (e.g. unintentional		growth parameters in Saghamo Lake (Southern Georgia). Biologia,	
) <i>т</i>		and intentional introductions)?		73(1), 93-100.	
. 1		e elsewhere Has the taxon become naturalised	Yes	The taxon is already in Sevan lake for a long. But due to repeated	Low
	5.01	(established viable populations) outside its	res		LOW
		,		releasing frys in the lake it is not known if it creates viable	
		native range?		population in the lake. On the other hand The species was also	
				released intho the Georgian lakes once and the did not survived	
				Elanidze R. 1983. Ichthyofauna of the rivers and lakes of Georgia, Metsniereba (in Russian) Tbilisi, p. 320.	
0	3.02	In the taxon's introduced range, are there	No	No such an evidence exits	Medium
.0	5.02	known adverse impacts to wild stocks or	140		inculum
		commercial taxa?			
1	3.03	In the taxon's introduced range, are there	No	No documented evidence exits	Medium
-		known adverse impacts to aquaculture?			
.2	3.04	In the taxon's introduced range, are there	No	No documented evidence exits	Medium
		known adverse impacts to ecosystem			
13	3.05	In the taxon's introduced range, are there	No	No documented evidence exits	Medium
		known adverse socio-economic impacts?			
3. I	Biology	y/Ecology			
		able (or persistence) traits			
4	4.01	Is it likely that the taxon will be poisonous or	No	Is not harmful species	High
		pose other risks to human health?			<u> </u>
.5	4.02	Is it likely that the taxon will smother one or	Yes	No documented evidence exits	Low
		more native taxa (that are not threatened or			1
_		protected)?			
6	4.03	Are there any threatened or protected taxa	No	Species is not parasite exits	Very high
		that the non-native taxon would parasitise in			
7	4.0.4	the RA area?	N		Mandia.
/	4.04	Is the taxon adaptable in terms of climatic	No	No documented evidence exits	Medium
		and other environmental conditions, thus			
		enhancing its potential persistence if it has			
		invaded or could invade the RA area?	Yes	No documented evidence exits	Low
8	4 05			No documented evidence exits	2000
8	4.05	Is the taxon likely to disrupt food-web			
8	4.05	structure/function in aquatic ecosystems if it			
		structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA		Not expected based on personal judgment	High
	4.05 4.06	structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts	No	Not expected based on personal judgment	High
9	4.06	structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	, , , , , , , , , , , , , , , , , , , ,	-
9		structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or		Not expected based on personal judgment No documented evidence exits	High Low
9	4.06	structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and	No	, , , , , , , , , , , , , , , , , , , ,	-
9	4.06 4.07	structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA	No	No documented evidence exits	Low
9	4.06	structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA Is it likely that the taxon will host, and/or	No	, , , , , , , , , , , , , , , , , , , ,	-
.9	4.06 4.07	structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA	No	No documented evidence exits	Low

22 A.O. Is in Bit wheth that the tance will achieve a bady into the tank of the tance in the local value bady is be into the tank of the tank of the tank of the tank of the tank of the tank of the tank of the tank of the tank of the tank of the tank of the tank of the tank of the tank of the tank of the tank of ta						
23 ALD State taken capable of sustaining teel main and water velocity control of subtractions (e.g., freeding) will reduce habitat quality for (e.g., freeding) will reduce habitat quality for (e.g., freeding) will reduce habitat quality for (e.g., freeding) will reduce habitat quality for (e.g., freeding) will reduce habitat quality for (e.g., freeding) will reduce habitat quality for (e.g., freeding) will reduce habitat quality for (e.g., freeding) will reduce habitat quality for (e.g., freeding) will reduce habitat quality for (e.g., freeding) will reduce habitat quality for (e.g., freeding) will reduce habitat quality for (e.g., freeding) will reduce habitat quality for (e.g., freeding) will reduce habitat quality for (e.g., freeding) will reduce habitat quality for (e.g., freeding) will reduce habitat quality for (e.g., freeding) will reduce habitat quality for (e.g., freeding) will reduce habitat quality for (e.g., freeding) will reduce habitat quality for (e.g., freeding) will reduce habitat quality for (e.g., freeding) will reduce the form (freedong) will reduce habitat quality for (e.g., freeding) will reduce the form (freedong) will reduce habitat quality for (e.g., freeding) will reduce the freedong will be (freedong)	22	4.09		No	It is usually released into the natiral waterbodies	High
24 4.1 1.1 Is it likely that the taxon's mode of esistance (e.g., exception) and induce habitat quality for (e.g., exception) and induce habitat quality for densities (e.g., exception) and induce habitat for densities (e.g., exception) and induce habitat for densities (e.g., exception) and induce habitat for densities (e.g., exception) and induce habitat for densities (e.g., exception) and induce habitat for densities (e.g., exception) and induce habitat for densities (e.g., exception) and induce habitat for densities (e.g., exception) and induce habitat for densities (e.g., exception) and induce habitat for densities (e.g., exception) and induce habitat for densities (e.g., exception) and induce habitat for densities (e.g., exception) and induce habitat for densities (e.g., exception) and induce habitat for densities (e.g., exception) and induce habitat fo	23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g.	No	Not a migratory species and no evidence of such a capabilities	Medium
25 AL2 Bit be taxed likely to maintain a value position even when present in low destributes (or pressing) in adverse conditions No No documented evidence exits Low 26 Solar Extension I is adverse conditions Since the species is planton feeder, there is no such taxa protected or threatment in RA area? High protected or threatment in RA area? High protected or threatment in RA area? High protected or threatment in RA area? High protected or threatment in RA area? High protected or threatment in RA area? High protected or threatment in RA area? Heedum 6.8000000000000000000000000000000000000	24	4.11	Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for	No	No documented evidence exits	Low
Specification event when present in low develop configuration was of a domain form? Specification event when a second form? Science (c) presisting in a develop construct form? Specification event when a second form? Figure 1 Science (c) presisting in a develop construct form? Yes Extension (law) to construct thread a second form (source construct for a document of the planktonic measure (including numerics) to the science of the document of the planktonic measure (including numerics) to the science of the document of the planktonic measure (including numerics) to the science of the document of the planktonic measure (including numerics) to the science of the document of the planktonic measure (including numerics) to the science of the document of the planktonic measure (including numerics) to the science of the document of the planktonic measure (including numerics) to the science of the document of the planktonic measure (including numerics) to the science of the document of the planktonic measure (including numerics) to the science of the science of the document of the planktonic measure (including numerics) to the science of	25	4.12		No	No documented evidence exits	Low
Image: Constraint of the spectral information of the spectral i						2011
S. Resource exploation Time Tim						
25 50.1 Is the taxon likely to consume threatened or anottect during that and the same and the same and producted or transtened in RA area? No						
Imported analyse tasis in the RA area? protected or threatened in RA area protected or threatened in RA area 25:02 5:03 Site transmittery to sequester food resources (including nutrinets) to the RA area? Yes Con reach to high density and consume most of the planktonic resource to the planktonic resource including nutrinets) to the RA area? Yes Con reach to high density and consume most of the planktonic resource to the planktonic resource including nutrinets) to the RA area? Yes Con reach to high density and consume most of the planktonic resource to the origination of the planktonic resource including nutrinets) to the resource including nutrinets in the A area? Yes Con reach to high density and consume most of the planktonic resource including nutrinets in the A area? Yes <t< td=""><td></td><td></td><td></td><td>[</td><td></td><td>1</td></t<>				[1
27 5.12 is the taxon likely to sequester food determine to determine to the presence of the environmental condition present and and/or to reduce age-at-maturity in response to environmental conditions? No No such an evidence exits Very high 28 6.00 Environmental conditions? No No No such an evidence exits Uow 29 6.01 5.01 Is the taxon likely to be hornise in the presence of the environmental conditions? No No such an evidence exits Uow 29 6.02 15.01 Is the taxon likely to be hornise neurally with display asexual regroduction? No No such evidence exits Uow 20 6.05 Is the taxon likely to behornise neurally with display asexual regroduction? No No such evidence exits Uow 21 6.04 Is the taxon likely to behornise neurally with display asexual regroduction? No No such evidence exits Uow 22 6.05 Is the taxon likely to protopaulis or difforing within a short time spin (the protopaulis or difforing within a short time spin (the protopaulis or difforing within a short time spin (the protopaulis or difforing within a short time spin (the protopaulis or difforing within a short time spin (the protopaulis or difforing within a short time spin (the protopaulis or difforing within a short time spin (the protopaulis or difforing within a short time spin (the protopaulis or difforing within a short time spin (the protopaulis or difforing within a short time spin (the protopaulis time taxon regin (the	26	5.01		No		High
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Identifiest of native taxa in the RA area? Image: constraint of native taxa in the RA area? 28 6.0.1 15 the taxon likely to exhibit perental care individual constraints of native taxon likely to exhibit perental care individual constraints of native taxon likely to exhibit perental care individual constraints of native taxon likely to exhibit perental native taxon likely to be thermaphysic of the taxon likely to be thermaphysic of the taxon likely to be thermaphysic of the taxon likely to be thermaphysic of the taxon likely to be thermaphysic of the taxon likely to be thermaphysic of the taxon likely to be thermaphysic of the taxon likely to taxon (or specific habits frashures) No No such envidence exits Very high individual constraints of taxon (or specific habits frashures) No 28 6.01 6.01 6.01 6.01 No No such envidence exits Very high individual constraints of taxon (or specific habits frashures) No 29 6.02 6.07 6.07 6.07 No No No depends to any other taxon to complete its life cycle. Very high individual constraints. 20 6.02 6.07 No	27	5.02		165		Medium
Construction Very high 8 6.01 Is the taxon likely to exhibit parental care and/or to reduce age-at-maturky in response No such an evidence exists Usery high 9 0.02 extramage age-at-maturky in response Expected but not a documented evidence exists Low 9 0.03 Is the axon likely to buffide naturally with No No such an evidence exists Very high 21 6.04 Is the cason likely to buffide naturally with No No such an evidence exists Very high 21 6.04 Is the cason likely to buffide naturally with No No No depends to any other taxon to complete its life cycle Very high 22 6.06 Is the context non (respect to any likely to produce a vest non (respect to any likely to produce a vest non (respect to any likely to produce a vest non (respect to any likely to produce a vest non (respect to any likely non-propagales or offspring west non-propagales or offspring west non-production respect to any potential internal vest non propagales or offspring west non-produce to any potential internal vest non-produce to any potential internal vest non-produce to any potential internal vest non-produce to any potential internal vest non-produce to any potential internal vest non-produce to any potential internal vest non-produce to any potential internal vest non-produce to any potential internal vest non-produce to any potential internal vest non produce to any potential internal vest non produce to any pot						
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29 50.0 Is the taxon likely to produce value gameters Yes Expected but not a documented evidence exists Low 30 6.0.3 Is the taxon likely to hybridise naturally with No No such evidence exists Very high 31 6.0.4 Is the taxon likely to bybridise naturally with No No No such evidence exists Very high 32 6.0.5 Is the taxon likely to bybridise naturally with No No The species is sexually reproducing Very high 32 6.0.6 Is the taxon likely to produce a lass many other taxon to complete its life cycle? Very high 33 6.0.6 Is the taxon known (or likely) to produce a lass many time units (days, months, years) 3 Kottelat M, Freyhof J. 2007. Handbook of European Freshwater Fishes. Kottelat, Cornol and Freyhof. Berlin, p. 646. Internal does the taxon require to reach the age-attraction? No No such an evidence exists Very high definition? 7 7.01 Veroparthwys could the taxon use to dispersed with an active transloation by a human High definition? 7 7.02 Work of the axon likely to one or more protected areas (as (Las 2, MPA, SSS1)? No No such an evidence exists Very high definit ans. by as propagues for a nimaly or as propagues for a nimaly						
or procequies (in the RA area)? on such evidence exists Length 6.03 Is the taxon likely to be hermaphroditic arto No No such evidence exists Very high 22 6.04 Is the taxon likely to be hermaphroditic arto No No such evidence exists Very high 23 6.04 Is the taxon likely to be hermaphroditic arto No No such evidence exists Very high 24 6.05 Is the taxon flow to be hermaphroditic arto No No such evidence exists Very high 25 6.05 Is the taxon flow to be hermaphroditic arto No No such evidence exists Very high 26 6.06 Is the taxon flow (or likely) to produce a large number of eggs once reaching adult size were in the species of the taxon flow (or likely) to produce a large number of engs once reaching adult size Very high 27 700 Now many totential internal were reach the species of the taxon flow (or likely) to produce a large number of engs once reaching adult size were reaching adult size were reaching adult size were reaching adult size were reaching adult size were reaching adult size were reaching adult size were reaching adult size were reaching adult size were reaching adult size were reaching adult size were reaching adult size were reaching adult size were reaching adult size were reaching adult size were reaching adult size were reaching adult size were reaching adult size were reaching adult size were						-
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Instruct taxa Instruct	30	6 02		No	No such evidence exists	Very high
31 6.46 Is the taxon likely to be hermaphrolitic or to No The species is sexually reproducing Very high 32 6.50 Is the taxon dependent on the presence of another taxon (or specific habitst features) No Not depends to any other taxon to complete its life cycle Very high 32 6.06 Is the taxon independent on the presence of propagules or offspring within the taxon independent (e.g. <1 year)?	50	5.05		140		very nigh
display securit reproduction? No Not depends to any other taxon to complete its life cycle Very high 32 6.05 Is the taxon dependent on the presence of another taxon on (or specific habitst features) ho complete its life cycle? Very high Very high 33 6.06 Is the taxon dependent on the presence of another taxon on (or specific habitst features) ho complete its life cycle? Very high 34 6.07 design on the presence of the taxon lengendent of the age-at- first-reproduction? Xet taxon dependent on the presence of the taxon lengendent of the taxon lengendent of the age-at- first-reproduction? Xet taxon dependent on the presence of the age-at- first-reproduction? Xet taxon dependent on the presence of the age-at- first-reproduction? Xet taxon dependent on the presence of the age-at- first-reproduction? Xet taxon dependent on the age-at- first-reproduction? Xet taxon dependent on the age-at- first-reproduction? Xet taxon dependent on the age-at- first-reproduction? Xet taxon dependent on the age-at- first-reproduction? Xet taxon dependent on the age-at- first-reproduction? Xet taxon dependent on the age-at- first-reproduction? Xet taxon dependent on the age-at- first-reproduction? Xet taxon dependent on taxon first-reproduction? Xet taxon dependent on taxon first-reproduction? Xet taxon dependent on taxon first-reproduction? Xet taxon first-reproduction? Xet taxon first-reproduction? 7	31	6.04		No	The species is sexually reproducing	Very high
another taxon (or specific habitat features) Ves Usually producing large number of eggs once reaching adult size Very high 33 6.06 Is the taxon known (or likely) to produce a large number of eggs once reaching adult size within a short time span (e.g. < 1 vear)?			display asexual reproduction?			
bx complete isile for cycle? complete isile for cycle? 36 6.06 Is texans hown (or likely) to produce a large number of eggs once reaching adult size Very high 37 6.07 How many time units (days, months, years) and short time spans (e.g. < 1 year)?	32	6.05		No	Not depends to any other taxon to complete its life cycle	Very high
33 6.06 Is the taxon known (or likely) to produce a large number of progueds or dispinal within a short time span (e.g. < 1 year)?						
large number of propagules or offspring within a short time span (e.g1) year)? Kottelat M, Freyhof J. 2007. Handbook of European Freshwater first-reproduction? How many time units (days, months, years) A 35 2.01 How many time units (days, months, years) B Kottelat C, Corrol and Freyhof. Berlin, p. 646. High 36 7.02 Will may of these vectors/pathways could the taxon use to disperse within the RA area (with suitable vectors/pathways course/pathways cours/pathways may and cours/pathways cours/pathways cours/pathways cours/pathways may and cours/pathways cours/pathways may and cours/pathways cours/pathways cours/pathways cours/pathways cours/pathways cours/pathways cours/pathways may and cours/pathways cours/pathways may cours/pathways may and cours/pathways may cours/pathways may cours/pathways may cours/pathways may cours/pathways method in the Aarea? Mos course may cours/pathways may cours/pathways may cours/pathways method in the pathway Massisticate at a course pathways course c	22	6.06		Vac	Levely produceing large number of ease and reaching - toth -i	Vony high
within a short time signal (.e., c. 1, year)?	55	0.00		185	osuany producenty large number of eggs once reaching adult size	very nigh
34 6.07 How many time units (days, months, years) 3 Kottelat N, Freyhof J. 2007. Handbook of European Freshwater Fishes. Kottelat, Cornol and Freyhof J. Berlin, p. 646. High 7.0.5.05.05.05.05.05.05.05.05.05.05.05.05						
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С.	. Climate change					
9.	Climate	change				
50	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?	No change	Not expected based on personal experience	High	
51	9.02	Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	Decrease	Based on professional judgment	Low	
52	9.03	Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change?	No change	Based on professional judgment	High	
53	9.04	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	Lower	Based on professional judgment	Medium	
54	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Lower	Based on professional judgment	Low	
55	9.06	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	Lower	Based on professional judgment	Low	

Statistics	
Scores	
BRA	8.0
BRA Outcome	-
BRA+CCA	0.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	6.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	0.0
3. Invasive elsewhere	2.0
B. Biology/Ecology	2.0
4. Undesirable (or persistence) traits	2.0
5. Resource exploitation	2.0
6. Reproduction	1.0
7. Dispersal mechanisms	-1.0
8. Tolerance attributes	-2.0
C. Climate change	-8.0
9. Climate change	-8.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	
	3
2. Climate, distribution and introduction risk	3
2. Climate, distribution and introduction risk 3. Invasive elsewhere	3 5 5
,	36
3. Invasive elsewhere	36
3. Invasive elsewhere B. Biology/Ecology	36
3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits	36
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3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial	36 12 2 7 9 6 6 6 6
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BRA	-
BRA+CCA	-
BRA+CCA	0.63
BRA	0.65
CCA	0.46
14/05/20)22 12:51:24
	BRA+CCA BRA+CCA BRA CCA

Taxon and Assessor details	axon and Assessor details					
Category	Fishes and Lampreys (freshwater)					
Taxon name	Coregonus sp.					
Common name	-					
Assessor	Giorgi Epitashvili					
Risk screening context						
Reason and socio-economic benefits	C. lavaretus is important fish for trade. It has been stocked in waters of Europe, where it isn't					
Risk assessment area	South Caucasus					
Taxonomy	Coregonus lavaretus (Linnaeus 1758)					
Native range	Europe: Native to Lake Bourget (France) and Geneva (Switzerland, France). Population of Lake					
Introduced range	Has been stocked into many other places in Europe outside its native range. Introduced to Iran,					
URL	https://www.fishbase.se/summary/Coregonus-lavaretus.html					

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
		cation/Cultivation			
		Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	This species has been stocked into many places in Europe outside its native range for aquacultural purposes.	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	In recent years in Lake Sevan, Armenia, the declining of whitefish is caused by high value of fishing pressure.	Very high
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	Population biology changes in native dimorphic whitefish Coregonus lavaretus were studied over a decade in the subarctic Pasvik watercourse, where large biotric changes occurred due to an invasion by vendace C. albula. Although initially recorded in the upstream part of the watercourse, where it is now the dominant pelagic species, the vendace subsequently also colonised the downstream area (Bohn & Amundsen 2004).	High
		distribution and introduction risk			
4	2.01	How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range?	High	Koppen - Geiger climate classification	Medium
	2.02	What is the quality of the climate matching data?	Medium	Koppen - Geiger climate classification	Medium
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	This species is distributed in the SC region since 1920ies (Ninua et al. 2013; Kuljanishvili et al. 2020).	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	This species already inhabits the region. It was introduced by human for aquacultural purposes	High
	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)?	Yes	C. lavaretus was introduced in Iran (Coad, 1998).	Very high
		e elsewhere	Yes	Naturalised populations of C. lavaretus is occuring in the lakes of	Vorschigh
9	3.01	Has the taxon become naturalised (established viable populations) outside its	105	Armenia and Georgia (Ninua et al. 2013; Kuljanishvili et al. 2020)	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	No	No such fact has been revealed	High
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	No such fact has been revealed	High
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	No	No such fact has been revealed	High
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	No such fact has been revealed	High
B. E	Biology	//Ecology			
		able (or persistence) traits	1		
		Is it likely that the taxon will be poisonous or pose other risks to human health?		This species does not pose a threat to humans.	Very high
15	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	This fish is a predator but no such fact has been revealed in the Caucasus region	Low
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	Yes	This fish is a predator but no such fact has been revealed in the Caucasus region	Low
17	4.04	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?	Yes	This species has inhabites the region for about 100 years	Very high
		Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA	No	Such a fact is not expected because the population is small	High
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	This species will not affect ecosystem service in the SC region	Very high
20	4.07	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA	Not applicable	Such data is not available	Low
		Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area?	No	Such data is not available	Low
22	4.09	Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity?	Yes	This species is common subject for fishery and aquaculture. Max length: 73.0 cm; max. published weight: 10.0 kg	Very high

24. 4.10 In the trace capabilities of substring factific rates No This species has locations forms and andoremous estuarine High 24. 4.11 IS II bit work that between on capability in the species has location forms, and regimes in the analysis of the specie						
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47 8.04 Is the taxon likely to tolerate or benefit from environmental/human disturbance? Yes This species was spread by humans in regions where it was not inhabited. Medium 48 8.05 Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment? Yes C. lavaretus has lacustrine and anadromous estuarine forms, rarely in full saltwater forms. High 49 8.06 Are there effective natural enemies (predators) of the taxon present in the RA Yes There are several predators in the Caucasus region which can controll the C. lavaretus population: Salmo spp, Squalius spp, High						
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that are higher or lower than those found in its usual environment? rarely in full saltwater forms. 49 8.06 Are there effective natural enemies (predators) of the taxon present in the RA Yes There are several predators in the Caucasus region which can controll the C. lavaretus population: Salmo spp, Squalius spp, High						
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49 8.06 Are there effective natural enemies Yes There are several predators in the Caucasus region which can (predators) of the taxon present in the RA High					rarely in full saltwater forms.	
(predators) of the taxon present in the RA controll the C. lavaretus population: Salmo spp, Squalius spp,						
	49	8.06		Yes		High
C. Climate change					controll the C. lavaretus population: Salmo spp, Squalius spp,	
		This and the	change			

9.	Climate	change			
50	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?	Decrease	Such risks are likely to be reduced as climate change adversely affects the alpine lakes (Sevan, Paravani, Tabatskuri, etc) in the region where the species currently inhabits.	Medium
51	9.02	Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	Decrease	Such risks are likely to be reduced as climate change adversely affects the alpine lakes (Sevan, Paravani, Tabatskuri, etc) in the region where the species currently inhabits.	Medium
52	9.03	Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase. decrease or not change?	Decrease	Such risks are likely to be reduced as climate change adversely affects the alpine lakes (Sevan, Paravani, Tabatskuri, etc) in the region where the species currently inhabits.	Medium
53	9.04	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	Lower	Own judgement	High
54	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Lower	Own judgement	High
55	9.06	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	Lower	Own judgement	High

Statistics	
Scores	
BRA	18.0
BRA Outcome	-
BRA+CCA	6.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	7.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	2.0
B. Biology/Ecology	11.0
4. Undesirable (or persistence) traits	4.0
5. Resource exploitation	7.0
6. Reproduction	3.0
7. Dispersal mechanisms	-4.0
8. Tolerance attributes	1.0
C. Climate change	-12.0
9. Climate change	-12.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3 5 5 36
2. Climate, distribution and introduction risk 3. Invasive elsewhere	5
	5
B. Biology/Ecology	
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2 7
	9
6. Reproduction	9
7. Dispersal mechanisms	6
7. Dispersal mechanisms 8. Tolerance attributes	6
7. Dispersal mechanisms 8. Tolerance attributes C. Climate change	6 6
7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change	6
7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected	6 6 6
7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial	6 6 6 2
7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial Environmental	6 6 6
7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial	6 6 6 2

Thresholds	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.68
BRA	0.68
CCA	0.63
Date and Time	

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axon and Assessor details					
Category	Fishes and Lampreys (freshwater)				
Taxon name	Coregonus sp.				
Common name	-				
Assessor	Tatia Kuljanishvili				
Risk screening context					
Reason and socio-economic benefits	Following the recommendations of Prof. Derzhavin, commercially valuable species such as				
Risk assessment area	South Caucasus				
Taxonomy	Actinopteri (ray-finned fishes) > Salmoniformes (Salmons) > Salmonidae (Salmonids) >				
Native range	Russian Lakes				
Introduced range	South Caucasian Lakes				
URL					

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
1.1		ication/Cultivation	1		
1	1.01	Has the taxon been the subject of	Yes	Following the recommendations of Prof. Derzhavin, commercially	Very high
		domestication (or cultivation) for at least 20		valuable species such as Coregonus sp. and C. ludoga from	
		generations?		Ladoga Lake, and C. maraenoides from Chudskoe Lake were	
				introduced to Sevan Lake in Armenia from 1924-1927, to support	
				fish production (Barach, 1940; Dadikyan, 1964). During these	
				three years, these coregonids were transported in the form of	
				fertilized eggs from the Volkhov Hatchery in Russia, and already	
				in 1927, fish farms around the lake could reproduce whitefishes	
				and release them in the lake (Dadikyan, 1964). According to	
				Elanidze (1983) in 1930, C. ludoga was introduced from the	
				Volkhov hatchery at Ladoga Lake to Tabatskuri Lake in Georgia.	
_				For some reason, however, the species was not recorded for the	
2	1.02	Is the taxon harvested in the wild and likely	Yes	Since the species is the commercially valuable, it is being	Very high
		to be sold or used in its live form?		harvested from the wild, and it can also be sold in its live form,	
				for commercial purposes.	
3	1.03	Does the taxon have invasive races,	Yes	Not known	High
		varieties, sub-taxa or congeners?			
2. (, distribution and introduction risk		T	
4	2.01	How similar are the climatic conditions of the	Medium	it is similar in high altitude areas. But in lowlands it is not.	Very high
	1	Risk Assessment (RA) area and the taxon's			
_		native range?			
5	2.02	What is the quality of the climate matching	High	out of 10 stations, 5 stations in mountainos areas have matched	Very high
<i>c</i>	2.02	data?	No.	Occurs in Lake Course (Kuliseriakuili et al 2020)) (ave a biala
6	2.03	Is the taxon already present outside of	Yes	Occurs in Lake Sevan (Kuljanishvili et al 2020)	Very high
7	2.04	captivity in the RA area?	0.7.0	Aquaculture	Vorschigh
′	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	Aquaculture	Very high
8	2.05	Is the taxon currently found in close	Yes	Occurs in Lake Sevan (Kuljanishvili et al 2020)	High
0	2.05	proximity to, and likely to enter into, the RA	165	Occurs in Lake Sevan (Ruljanishvin et al 2020)	riigii
		area in the near future (e.g. unintentional			
		and intentional introductions)?			
_					
3	Invasiv				
3. i 9		e elsewhere	Yes	Following the recommendations of Prof. Derzhavin, commercially	High
3. 1 9		e elsewhere Has the taxon become naturalised	Yes	Following the recommendations of Prof. Derzhavin, commercially valuable species such as Coregonus sp. and C. Judoga from	High
<u>3.</u> 9		e elsewhere Has the taxon become naturalised (established viable populations) outside its	Yes	valuable species such as Coregonus sp. and C. ludoga from	High
<u>3. 1</u> 9		e elsewhere Has the taxon become naturalised	Yes	valuable species such as Coregonus sp. and C. ludoga from Ladoga Lake, and C. maraenoides from Chudskoe Lake were	High
<u>3. 1</u> 9		e elsewhere Has the taxon become naturalised (established viable populations) outside its	Yes	valuable species such as Coregonus sp. and C. ludoga from Ladoga Lake, and C. maraenoides from Chudskoe Lake were introduced to Sevan Lake in Armenia from 1924-1927, to support	High
<u>3. 1</u> 9		e elsewhere Has the taxon become naturalised (established viable populations) outside its	Yes	valuable species such as Coregonus sp. and C. ludoga from Ladoga Lake, and C. maraenoides from Chudskoe Lake were introduced to Sevan Lake in Armenia from 1924-1927, to support fish production (Barach, 1940; Dadikyan, 1964). During these	High
<u>3.</u> 9		e elsewhere Has the taxon become naturalised (established viable populations) outside its	Yes	valuable species such as Coregonus sp. and C. ludoga from Ladoga Lake, and C. maraenoides from Chudskoe Lake were introduced to Sevan Lake in Armenia from 1924-1927, to support fish production (Barach, 1940; Dadikyan, 1964). During these three years, these coregonids were transported in the form of	High
<u>3.</u> 9		e elsewhere Has the taxon become naturalised (established viable populations) outside its	Yes	valuable species such as Coregonus sp. and C. ludoga from Ladoga Lake, and C. maraenoides from Chudskoe Lake were introduced to Sevan Lake in Armenia from 1924-1927, to support fish production (Barach, 1940; Dadikyan, 1964). During these three years, these coregonids were transported in the form of fertilized eggs from the Volkhov Hatchery in Russia, and already	High
<u>3.</u> 9		e elsewhere Has the taxon become naturalised (established viable populations) outside its	Yes	valuable species such as Coregonus sp. and C. ludoga from Ladoga Lake, and C. maraenoides from Chudskoe Lake were introduced to Sevan Lake in Armenia from 1924-1927, to support fish production (Barach, 1940; Dadikyan, 1964). During these three years, these coregonids were transported in the form of fertilized eggs from the Volkhov Hatchery in Russia, and already in 1927, fish farms around the lake could reproduce whitefishes	High
<u>3.</u> 9		e elsewhere Has the taxon become naturalised (established viable populations) outside its	Yes	valuable species such as Coregonus sp. and C. ludoga from Ladoga Lake, and C. maraenoides from Chudskoe Lake were introduced to Sevan Lake in Armenia from 1924-1927, to support fish production (Barach, 1940; Dadikyan, 1964). During these three years, these coregonids were transported in the form of fertilized eggs from the Volkhov Hatchery in Russia, and already in 1927, fish farms around the lake could reproduce whitefishes and release them in the lake (Dadikyan, 1964). Later on these	High
<u>3. 1</u> 9		e elsewhere Has the taxon become naturalised (established viable populations) outside its	Yes	valuable species such as Coregonus sp. and C. ludoga from Ladoga Lake, and C. maraenoides from Chudskoe Lake were introduced to Sevan Lake in Armenia from 1924-1927, to support fish production (Barach, 1940; Dadikyan, 1964). During these three years, these coregonids were transported in the form of fertilized eggs from the Volkhov Hatchery in Russia, and already in 1927, fish farms around the lake could reproduce whitefishes and release them in the lake (Dadikyan, 1964). Later on these species were interbred (Mailyan, 1957) and a hybrid form arose as	High
9		e elsewhere Has the taxon become naturalised (established viable populations) outside its	Yes	valuable species such as Coregonus sp. and C. ludoga from Ladoga Lake, and C. maraenoides from Chudskoe Lake were introduced to Sevan Lake in Armenia from 1924-1927, to support fish production (Barach, 1940; Dadikyan, 1964). During these three years, these coregonids were transported in the form of fertilized eggs from the Volkhov Hatchery in Russia, and already in 1927, fish farms around the lake could reproduce whitefishes and release them in the lake (Dadikyan, 1964). Later on these	High Very high
9	3.01	e elsewhere Has the taxon become naturalised (established viable populations) outside its native range?		valuable species such as Coregonus sp. and C. ludoga from Ladoga Lake, and C. maraenoides from Chudskoe Lake were introduced to Sevan Lake in Armenia from 1924-1927, to support fish production (Barach, 1940; Dadikyan, 1964). During these three years, these coregonids were transported in the form of fertilized eggs from the Volkhov Hatchery in Russia, and already in 1927, fish farms around the lake could reproduce whitefishes and release them in the lake (Dadikyan, 1964). Later on these species were interbred (Mailyan, 1957) and a hybrid form arose as a new subspecies C. lavaretus sevanicus (Dadikvan. 1986).	
9	3.01	e elsewhere Has the taxon become naturalised (established viable populations) outside its native range? In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?		valuable species such as Coregonus sp. and C. ludoga from Ladoga Lake, and C. maraenoides from Chudskoe Lake were introduced to Sevan Lake in Armenia from 1924-1927, to support fish production (Barach, 1940; Dadikyan, 1964). During these three years, these coregonids were transported in the form of fertilized eggs from the Volkhov Hatchery in Russia, and already in 1927, fish farms around the lake could reproduce whitefishes and release them in the lake (Dadikyan, 1964). Later on these species were interbred (Mailyan, 1957) and a hybrid form arose as a new subspecies C. lavaretus sevanicus (Dadikvan. 1986).	
9	3.01	e elsewhere Has the taxon become naturalised (established viable populations) outside its native range? In the taxon's introduced range, are there known adverse impacts to wild stocks or		valuable species such as Coregonus sp. and C. ludoga from Ladoga Lake, and C. maraenoides from Chudskoe Lake were introduced to Sevan Lake in Armenia from 1924-1927, to support fish production (Barach, 1940; Dadikyan, 1964). During these three years, these coregonids were transported in the form of fertilized eggs from the Volkhov Hatchery in Russia, and already in 1927, fish farms around the lake could reproduce whitefishes and release them in the lake (Dadikyan, 1964). Later on these species were interbred (Mailyan, 1957) and a hybrid form arose as a new subspecies C. lavaretus sevanicus (Dadikvan. 1986).	
9	3.01	e elsewhere Has the taxon become naturalised (established viable populations) outside its native range? In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	No	valuable species such as Coregonus sp. and C. ludoga from Ladoga Lake, and C. maraenoides from Chudskoe Lake were introduced to Sevan Lake in Armenia from 1924-1927, to support fish production (Barach, 1940; Dadikyan, 1964). During these three years, these coregonids were transported in the form of fertilized eggs from the Volkhov Hatchery in Russia, and already in 1927, fish farms around the lake could reproduce whitefishes and release them in the lake (Dadikyan, 1964). Later on these species were interbred (Mailyan, 1957) and a hybrid form arose as a new subspecies C. lavaretus sevanicus (Dadikvan. 1986). Not known	Very high
9 10 11	3.01	e elsewhere Has the taxon become naturalised (established viable populations) outside its native range? In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? In the taxon's introduced range, are there	No	valuable species such as Coregonus sp. and C. ludoga from Ladoga Lake, and C. maraenoides from Chudskoe Lake were introduced to Sevan Lake in Armenia from 1924-1927, to support fish production (Barach, 1940; Dadikyan, 1964). During these three years, these coregonids were transported in the form of fertilized eggs from the Volkhov Hatchery in Russia, and already in 1927, fish farms around the lake could reproduce whitefishes and release them in the lake (Dadikyan, 1964). Later on these species were interbred (Mailyan, 1957) and a hybrid form arose as a new subspecies C. lavaretus sevanicus (Dadikvan. 1986). Not known	Very high
9 10 11	3.01 3.02 3.03	e elsewhere Has the taxon become naturalised (established viable populations) outside its native range? In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	valuable species such as Coregonus sp. and C. ludoga from Ladoga Lake, and C. maraenoides from Chudskoe Lake were introduced to Sevan Lake in Armenia from 1924-1927, to support fish production (Barach, 1940; Dadikyan, 1964). During these three years, these coregonids were transported in the form of fertilized eggs from the Volkhov Hatchery in Russia, and already in 1927, fish farms around the lake could reproduce whitefishes and release them in the lake (Dadikyan, 1964). Later on these species were interbred (Mailyan, 1957) and a hybrid form arose as a new subspecies C. lavaretus sevanicus (Dadikvan. 1986). Not known	Very high High
9 10 11 12	3.01 3.02 3.03	e elsewhere Has the taxon become naturalised (established viable populations) outside its native range? In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? In the taxon's introduced range, are there known adverse impacts to aquaculture? In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	valuable species such as Coregonus sp. and C. ludoga from Ladoga Lake, and C. maraenoides from Chudskoe Lake were introduced to Sevan Lake in Armenia from 1924-1927, to support fish production (Barach, 1940; Dadikyan, 1964). During these three years, these coregonids were transported in the form of fertilized eggs from the Volkhov Hatchery in Russia, and already in 1927, fish farms around the lake could reproduce whitefishes and release them in the lake (Dadikyan, 1964). Later on these species were interbred (Mailyan, 1957) and a hybrid form arose as a new subspecies C. lavaretus sevanicus (Dadikvan. 1986). Not known No advarse impact on aquaculture NO adverse impacts on ecosystem services, however can be	Very high High
9 10 11 12	3.01 3.02 3.03 3.04	e elsewhere Has the taxon become naturalised (established viable populations) outside its native range? In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? In the taxon's introduced range, are there known adverse impacts to aquaculture? In the taxon's introduced range, are there known adverse impacts to ecosystem	No No No	valuable species such as Coregonus sp. and C. ludoga from Ladoga Lake, and C. maraenoides from Chudskoe Lake were introduced to Sevan Lake in Armenia from 1924-1927, to support fish production (Barach, 1940; Dadikyan, 1964). During these three years, these coregonids were transported in the form of fertilized eggs from the Volkhov Hatchery in Russia, and already in 1927, fish farms around the lake could reproduce whitefishes and release them in the lake (Dadikyan, 1964). Later on these species were interbred (Mailyan, 1957) and a hybrid form arose as a new subspecies C. lavaretus sevanicus (Dadikvan. 1986). Not known No advarse impact on aquaculture NO adverse impacts on ecosystem services, however can be transmitting deseases and parasites	Very high High Low
9 10 11 13 B.	3.01 3.02 3.03 3.04 3.05 Biolog	e elsewhere Has the taxon become naturalised (established viable populations) outside its native range? In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? In the taxon's introduced range, are there known adverse impacts to aquaculture? In the taxon's introduced range, are there known adverse impacts to ecosystem In the taxon's introduced range, are there known adverse impacts to ecosystem In the taxon's introduced range, are there known adverse is introduced range, are there known adverse is introduced range, are there known adverse socio-economic impacts? y/Ecology	No No No	valuable species such as Coregonus sp. and C. ludoga from Ladoga Lake, and C. maraenoides from Chudskoe Lake were introduced to Sevan Lake in Armenia from 1924-1927, to support fish production (Barach, 1940; Dadikyan, 1964). During these three years, these coregonids were transported in the form of fertilized eggs from the Volkhov Hatchery in Russia, and already in 1927, fish farms around the lake could reproduce whitefishes and release them in the lake (Dadikyan, 1964). Later on these species were interbred (Mailyan, 1957) and a hybrid form arose as a new subspecies C. lavaretus sevanicus (Dadikvan. 1986). Not known No advarse impact on aquaculture NO adverse impacts on ecosystem services, however can be transmitting deseases and parasites	Very high High Low
9 10 11 13 B. 4.	3.01 3.02 3.03 3.04 3.05 Biolog	e elsewhere Has the taxon become naturalised (established viable populations) outside its native range? In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? In the taxon's introduced range, are there known adverse impacts to aquaculture? In the taxon's introduced range, are there known adverse impacts to ecosystem In the taxon's introduced range, are there known adverse impacts to ecosystem In the taxon's introduced range, are there known adverse impacts to ecosystem In the taxon's introduced range, are there known adverse socio-economic impacts? y/Ecology	No No No No	valuable species such as Coregonus sp. and C. ludoga from Ladoga Lake, and C. maraenoides from Chudskoe Lake were introduced to Sevan Lake in Armenia from 1924-1927, to support fish production (Barach, 1940; Dadikyan, 1964). During these three years, these coregonids were transported in the form of fertilized eggs from the Volkhov Hatchery in Russia, and already in 1927, fish farms around the lake could reproduce whitefishes and release them in the lake (Dadikyan, 1964). Later on these species were interbred (Mailyan, 1957) and a hybrid form arose as a new subspecies C. lavaretus sevanicus (Dadikvan. 1986). Not known No advarse impact on aquaculture NO adverse impacts on ecosystem services, however can be transmitting deseases and parasites No socio-economic impacts	Very high High Low High
9 10 11 13 B. 4.	3.01 3.02 3.03 3.04 3.05 Biolog	e elsewhere Has the taxon become naturalised (established viable populations) outside its native range? In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? In the taxon's introduced range, are there known adverse impacts to aquaculture? In the taxon's introduced range, are there known adverse impacts to aquaculture? In the taxon's introduced range, are there known adverse impacts to ecosystem In the taxon's introduced range, are there known adverse socio-economic impacts? y/Ecology Is it likely that the taxon will be poisonous or	No No No No	valuable species such as Coregonus sp. and C. ludoga from Ladoga Lake, and C. maraenoides from Chudskoe Lake were introduced to Sevan Lake in Armenia from 1924-1927, to support fish production (Barach, 1940; Dadikyan, 1964). During these three years, these coregonids were transported in the form of fertilized eggs from the Volkhov Hatchery in Russia, and already in 1927, fish farms around the lake could reproduce whitefishes and release them in the lake (Dadikyan, 1964). Later on these species were interbred (Mailyan, 1957) and a hybrid form arose as a new subspecies C. lavaretus sevanicus (Dadikvan. 1986). Not known No advarse impact on aquaculture NO adverse impacts on ecosystem services, however can be transmitting deseases and parasites	Very high High Low
9 10 11 13 B. 14	3.01 3.02 3.03 3.04 3.05 Biolog Undesir 4.01	e elsewhere Has the taxon become naturalised (established viable populations) outside its native range? In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? In the taxon's introduced range, are there known adverse impacts to aquaculture? In the taxon's introduced range, are there known adverse impacts to aquaculture? In the taxon's introduced range, are there known adverse impacts to ecosystem In the taxon's introduced range, are there known adverse socio-economic impacts? y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health?	No No No No	valuable species such as Coregonus sp. and C. ludoga from Ladoga Lake, and C. maraenoides from Chudskoe Lake were introduced to Sevan Lake in Armenia from 1924-1927, to support fish production (Barach, 1940; Dadikyan, 1964). During these three years, these coregonids were transported in the form of fertilized eggs from the Volkhov Hatchery in Russia, and already in 1927, fish farms around the lake could reproduce whitefishes and release them in the lake (Dadikyan, 1964). Later on these species were interbred (Mailyan, 1957) and a hybrid form arose as a new subspecies C. lavaretus sevanicus (Dadikvan. 1986). Not known No advarse impact on aquaculture NO adverse impacts on ecosystem services, however can be transmitting deseases and parasites No socio-economic impacts	Very high High Low High
9 10 11 13 B. 14	3.01 3.02 3.03 3.04 3.05 Biolog	e elsewhere Has the taxon become naturalised (established viable populations) outside its native range? In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? In the taxon's introduced range, are there known adverse impacts to aquaculture? In the taxon's introduced range, are there known adverse impacts to acouster In the taxon's introduced range, are there known adverse impacts to ecosystem In the taxon's introduced range, are there known adverse socio-economic impacts? y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or	No No No No	valuable species such as Coregonus sp. and C. ludoga from Ladoga Lake, and C. maraenoides from Chudskoe Lake were introduced to Sevan Lake in Armenia from 1924-1927, to support fish production (Barach, 1940; Dadikyan, 1964). During these three years, these coregonids were transported in the form of fertilized eggs from the Volkhov Hatchery in Russia, and already in 1927, fish farms around the lake could reproduce whitefishes and release them in the lake (Dadikyan, 1964). Later on these species were interbred (Mailyan, 1957) and a hybrid form arose as a new subspecies C. lavaretus sevanicus (Dadikvan. 1986). Not known No advarse impact on aquaculture NO adverse impacts on ecosystem services, however can be transmitting deseases and parasites No socio-economic impacts Harmless.	Very high High Low High
9 10 11 12 13 B. 14	3.01 3.02 3.03 3.04 3.05 Biolog Undesir 4.01	e elsewhere Has the taxon become naturalised (established viable populations) outside its native range? In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? In the taxon's introduced range, are there known adverse impacts to aquaculture? In the taxon's introduced range, are there known adverse impacts to acquaculture? In the taxon's introduced range, are there known adverse impacts to ecosystem In the taxon's introduced range, are there known adverse socio-economic impacts? y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or	No No No No	valuable species such as Coregonus sp. and C. ludoga from Ladoga Lake, and C. maraenoides from Chudskoe Lake were introduced to Sevan Lake in Armenia from 1924-1927, to support fish production (Barach, 1940; Dadikyan, 1964). During these three years, these coregonids were transported in the form of fertilized eggs from the Volkhov Hatchery in Russia, and already in 1927, fish farms around the lake could reproduce whitefishes and release them in the lake (Dadikyan, 1964). Later on these species were interbred (Mailyan, 1957) and a hybrid form arose as a new subspecies C. lavaretus sevanicus (Dadikvan. 1986). Not known No advarse impact on aquaculture NO adverse impacts on ecosystem services, however can be transmitting deseases and parasites No socio-economic impacts	Very high High Low High
9 10 11 13 B. 14 15	3.01 3.02 3.03 3.04 3.05 Biolog Undesir 4.01 4.02	e elsewhere Has the taxon become naturalised (established viable populations) outside its native range? In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? In the taxon's introduced range, are there known adverse impacts to aquaculture? In the taxon's introduced range, are there known adverse impacts to aquaculture? In the taxon's introduced range, are there known adverse impacts to ecosystem In the taxon's introduced range, are there known adverse socio-economic impacts? y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	No No No No Yes	valuable species such as Coregonus sp. and C. ludoga from Ladoga Lake, and C. maraenoides from Chudskoe Lake were introduced to Sevan Lake in Armenia from 1924-1927, to support fish production (Barach, 1940; Dadikyan, 1964). During these three years, these coregonids were transported in the form of fertilized eggs from the Volkhov Hatchery in Russia, and already in 1927, fish farms around the lake could reproduce whitefishes and release them in the lake (Dadikyan, 1964). Later on these species were interbred (Mailyan, 1957) and a hybrid form arose as a new subspecies C. lavaretus sevanicus (Dadikvan, 1986). Not known No advarse impact on aquaculture NO adverse impacts on ecosystem services, however can be transmitting deseases and parasites No socio-economic impacts Harmless. Impact of introduced witefish on native taxa can only be alteration of native food webs (Savini et al 2010).	Very high High Low High Very high Low
9 10 11 12 13 B. 14 15	3.01 3.02 3.03 3.04 3.05 Biolog Undesir 4.01	e elsewhere Has the taxon become naturalised (established viable populations) outside its native range? In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? In the taxon's introduced range, are there known adverse impacts to aquaculture? In the taxon's introduced range, are there known adverse impacts to acquaculture? In the taxon's introduced range, are there known adverse impacts to acquaculture? In the taxon's introduced range, are there known adverse impacts to ecosystem In the taxon's introduced range, are there known adverse socio-economic impacts? //Ecology Jose other risks to human health? Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa	No No No No	valuable species such as Coregonus sp. and C. ludoga from Ladoga Lake, and C. maraenoides from Chudskoe Lake were introduced to Sevan Lake in Armenia from 1924-1927, to support fish production (Barach, 1940; Dadikyan, 1964). During these three years, these coregonids were transported in the form of fertilized eggs from the Volkhov Hatchery in Russia, and already in 1927, fish farms around the lake could reproduce whitefishes and release them in the lake (Dadikyan, 1964). Later on these species were interbred (Mailyan, 1957) and a hybrid form arose as a new subspecies C. lavaretus sevanicus (Dadikvan. 1986). Not known No advarse impact on aquaculture NO adverse impacts on ecosystem services, however can be transmitting deseases and parasites No socio-economic impacts Harmless.	Very high High Low High
9 10 11 12 13 B. 14 15	3.01 3.02 3.03 3.04 3.05 Biolog Undesir 4.01 4.02	e elsewhere Has the taxon become naturalised (established viable populations) outside its native range? In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? In the taxon's introduced range, are there known adverse impacts to aquaculture? In the taxon's introduced range, are there known adverse impacts to accusted known adverse impacts to ecosystem In the taxon's introduced range, are there known adverse impacts to ecosystem In the taxon's introduced range, are there known adverse socio-economic impacts? y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in	No No No No Yes	valuable species such as Coregonus sp. and C. ludoga from Ladoga Lake, and C. maraenoides from Chudskoe Lake were introduced to Sevan Lake in Armenia from 1924-1927, to support fish production (Barach, 1940; Dadikyan, 1964). During these three years, these coregonids were transported in the form of fertilized eggs from the Volkhov Hatchery in Russia, and already in 1927, fish farms around the lake could reproduce whitefishes and release them in the lake (Dadikyan, 1964). Later on these species were interbred (Mailyan, 1957) and a hybrid form arose as a new subspecies C. lavaretus sevanicus (Dadikvan, 1986). Not known No advarse impact on aquaculture NO adverse impacts on ecosystem services, however can be transmitting deseases and parasites No socio-economic impacts Harmless. Impact of introduced witefish on native taxa can only be alteration of native food webs (Savini et al 2010).	Very high High Low High Low
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9 10 11 12 13 B. 14 15 16	3.01 3.02 3.03 3.04 3.05 Biolog Undesir 4.01 4.02	e elsewhere Has the taxon become naturalised (established viable populations) outside its native range? In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? In the taxon's introduced range, are there known adverse impacts to aquaculture? In the taxon's introduced range, are there known adverse impacts to ecosystem In the taxon's introduced range, are there known adverse impacts to ecosystem In the taxon's introduced range, are there known adverse impacts to ecosystem In the taxon's introduced range, are there known adverse socio-economic impacts? y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will be poisonous or portected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic	No No No No Yes	valuable species such as Coregonus sp. and C. ludoga from Ladoga Lake, and C. maraenoides from Chudskoe Lake were introduced to Sevan Lake in Armenia from 1924-1927, to support fish production (Barach, 1940; Dadikyan, 1964). During these three years, these coregonids were transported in the form of fertilized eggs from the Volkhov Hatchery in Russia, and already in 1927, fish farms around the lake could reproduce whitefishes and release them in the lake (Dadikyan, 1964). Later on these species were interbred (Mailyan, 1957) and a hybrid form arose as a new subspecies C. lavaretus sevanicus (Dadikvan. 1986). Not known No advarse impact on aquaculture NO adverse impacts on ecosystem services, however can be transmitting deseases and parasites No socio-economic impacts Harmless. Impact of introduced witefish on native taxa can only be alteration of native food webs (Savini et al 2010). No. does not parasite	Very high High Low High Very high Low
9 10 11 12 13 B. 4. 14 15 16	3.01 3.02 3.03 3.04 3.05 Biolog <i>Undesir</i> 4.01 4.02 4.03	e elsewhere Has the taxon become naturalised (established viable populations) outside its native range? In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? In the taxon's introduced range, are there known adverse impacts to aquaculture? In the taxon's introduced range, are there known adverse impacts to ecosystem In the taxon's introduced range, are there known adverse impacts to ecosystem In the taxon's introduced range, are there known adverse impacts to ecosystem In the taxon's introduced range, are there known adverse socio-economic impacts? y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus	No No No No Yes No	valuable species such as Coregonus sp. and C. ludoga from Ladoga Lake, and C. maraenoides from Chudskoe Lake were introduced to Sevan Lake in Armenia from 1924-1927, to support fish production (Barach, 1940; Dadikyan, 1964). During these three years, these coregonids were transported in the form of fertilized eggs from the Volkhov Hatchery in Russia, and already in 1927, fish farms around the lake could reproduce whitefishes and release them in the lake (Dadikyan, 1964). Later on these species were interbred (Mailyan, 1957) and a hybrid form arose as a new subspecies C. lavaretus sevanicus (Dadikvan. 1986). Not known No advarse impact on aquaculture NO adverse impacts on ecosystem services, however can be transmitting deseases and parasites No socio-economic impacts Harmless. Impact of introduced witefish on native taxa can only be alteration of native food webs (Savini et al 2010). No. does not parasite	Very high High Low High Low Very high
9 10 11 13 B. 14 14 15 16	3.01 3.02 3.03 3.04 3.05 Biolog <i>Undesir</i> 4.01 4.02 4.03	e elsewhere Has the taxon become naturalised (established viable populations) outside its native range? In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? In the taxon's introduced range, are there known adverse impacts to aquaculture? In the taxon's introduced range, are there known adverse impacts to ecosystem In the taxon's introduced range, are there known adverse impacts to ecosystem In the taxon's introduced range, are there known adverse impacts to ecosystem In the taxon's introduced range, are there known adverse socio-economic impacts? y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will be poisonous or portected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic	No No No No Yes No	valuable species such as Coregonus sp. and C. ludoga from Ladoga Lake, and C. maraenoides from Chudskoe Lake were introduced to Sevan Lake in Armenia from 1924-1927, to support fish production (Barach, 1940; Dadikyan, 1964). During these three years, these coregonids were transported in the form of fertilized eggs from the Volkhov Hatchery in Russia, and already in 1927, fish farms around the lake could reproduce whitefishes and release them in the lake (Dadikyan, 1964). Later on these species were interbred (Mailyan, 1957) and a hybrid form arose as a new subspecies C. lavaretus sevanicus (Dadikvan. 1986). Not known No advarse impact on aquaculture NO adverse impacts on ecosystem services, however can be transmitting deseases and parasites No socio-economic impacts Harmless. Impact of introduced witefish on native taxa can only be alteration of native food webs (Savini et al 2010). No. does not parasite	Very high High Low High Low Very high

1	one or more hours) at some stage of its life cycle?			1
4 8.01	Is the taxon able to withstand being out of water for extended periods (e.g. minimum of	No	No. It is not documented	High
	nce attributes	No	No. Not likely	High
	vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or intentional) likely to be		N N M	
2 7.08	be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the	No	As far as we know, no.	High
1 7.07	Are propagules or eggs of the taxon likely to	No	No, it is not possible.	Very high
7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	No	No does not migrate	Very high
, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?			i ligit
9 7.05	occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to	No	No. no data.	High
3 7.04	the likelihood of dispersal? Is natural dispersal of the taxon likely to	No	No. less likely.	High
.03	attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances		traits that will allow them to attach. Thanks	very myn
7 7.03	taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively	No	No. Can not attach to anything. does not have that morphological	Very high
5 7.02	disperse within the RA area (with suitable Will any of these vectors/pathways bring the	No	Stocking is not allowed in protected areas	Very high
5 7.01	How many potential internal vectors/pathways could the taxon use to	One	Aquaculture	Very high
	sal mechanisms	0		
	does the taxon require to reach the age-at- first-reproduction?			
4 6.07	within a short time span (e.g. < 1 year)? How many time units (days, months, years)	4	From 3-5 (Kottelat & Freyhof, 2007)	High
3 6.06	Is the taxon known (or likely) to produce a large number of propagules or offspring	No	Not known	Very high
6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	No	No. it is not dependent on the presesence of another taxon to complet its life cycle.	Very high
6.04	display asexual reproduction?	No	No does not display asexual reproduction.	Very high
6.03	native taxa?	No	There are no native coregonids in RA area.	Very high
6.02	or propagules (in the RA area)?	Yes	The conditions for maturation are available in the RA area	Very high
	and/or to reduce age-at-maturity in response to environmental conditions?			-
Reprod 6.01	Is the taxon likely to exhibit parental care	No	No.No info.	High
	resources (including nutrients) to the detriment of native taxa in the RA area?			
7 5.02	protected native taxa in the RA area? Is the taxon likely to sequester food	No	It is unlikely	High
	Is the taxon likely to consume threatened or	No	Not a predator, eats plankton only.	High
Recour	by way of a dormant form)?			
	population even when present in low densities (or persisting in adverse conditions		case of overfishing it might not be able to have viable population in low densities.	
5 4.12	native taxa? Is the taxon likely to maintain a viable	No	It usually spawns for the first time at the age of 3-6 years old. in	Medium
	(e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for			
4 4.11	range of water velocity conditions (e.g. versatile in habitat use)? Is it likely that the taxon's mode of existence	No	No. Not documented	High
3 4.10	released from captivity? Is the taxon capable of sustaining itself in a	No	This is a lacustrine species.	High
4.09	Is it likely that the taxon will achieve a body size that will make it more likely to be	Yes	Iit is usually released in the wild since small fry.	Medium
	act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area?			
1 4.08	Is it likely that the taxon will host, and/or	Yes	It is possible.	Low
	act as a vector for, recognised pests and infectious agents that are endemic in the RA	-		
0 4.07	on ecosystem services in the RA area? Is it likely that the taxon will host, and/or	No	No information available	Low
4.06	has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts	No	No information available	High
	structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA	Yes	May alter the food webs by selective praying on zooplankton	Low

45	8.02	Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being	No	This species requires specific conditions and are not tolerant to wide range of water quality conditions	Very high
46	8.03	Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	No	No, it can not be.	Very high
47		Is the taxon likely to tolerate or benefit from environmental/human disturbance?	No	No, not documented	Very high
48	8.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	No	No. Cann not tolerate.	High
49	8.06	Are there effective natural enemies (predators) of the taxon present in the RA	No	No. there are not.	High
С. (Climate	e change			
		change			
50	9.01	Under the predicted future climatic	Increase	It was hypotheses that climate change might alert the	High
		conditions, are the risks of entry into the RA		mechanisms of transportation and introduction of non-native	
		area posed by the taxon likely to increase,		species. Commercial and recreational activities will increase, that	
		decrease or not change?		itself increases the propagule pressure levels of non-native	
51	9.02	Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase,	Decrease	In terms of increased temperatures this species will be having troubles to survive in the wild	High
52	9.03	decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase. decrease or not change?	Decrease	Increased temperatures will cause stress in their populations making their populations weaker, therefore it won't be available to disperse	High
53	9.04	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	Lower	The environment for them will be unbearable and this species populations will decrease, making the impact lower.	High
54	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Lower	If there is any, in future it will be lower.	High
55	9.06	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	Lower	the magnitude of future potential impact is low.	High

Statistics

Scores	
BRA	1.0
BRA Outcome	-
BRA+CCA	-7.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	6.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	1.0
<i>3. Invasive elsewhere</i>	1.0
B. Biology/Ecology	-5.0
4. Undesirable (or persistence) traits	3.0
5. Resource exploitation	0.0
6. Reproduction	-1.0
7. Dispersal mechanisms	-5.0
8. Tolerance attributes	-2.0
C. Climate change	-8.0
9. Climate change	-8.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	5
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2
6. Reproduction	
7. Dispersal mechanisms	9
8. Tolerance attributes	6
C. Climate change	6
9. Climate change	6
Sectors affected	
Sectors affected Commercial	6 2
Sectors affected Commercial Environmental	
Sectors affected Commercial	
Sectors affected Commercial Environmental Species or population nuisance traits	
Sectors affected Commercial Environmental	

BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.80
BRA	0.81

	CCA	0.75
Date and Time		
	20/05/2022	2 16:40:04

Taxon and Assessor details	
Category	Fishes and Lampreys (freshwater)
Taxon name	Ctenopharyngodon idella
Common name	grass carp
Assessor	Bella Japoshvili
Risk screening context	
Reason and socio-economic benefits	Continuous introduction into South Caucasus region. Not yet estableshed population form the RA
Risk assessment area	South Caucasus
Taxonomy	Actinopteri (ray-finned fishes) > Cypriniformes (Carps) > Xenocyprididae (East Asian minnows)
Native range	China
Introduced range	Worldwide
URL	https://www.fishbase.de/summary/Ctenopharyngodon-idella.html

Response Justification (references and/or other information)

Confidence

	Diogen	aranhy / Historical	Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
1. L	-		Vac	Chiroman IV/ Smith CD 1082 Synamole of historical data an the	Von hich
	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	Shireman JV; Smith CR, 1983. Synopsis of biological data on the grass carp, Ctenopharyngodon idella (Cuvier and Valenciennes, 1844). FAO Fisheries Synopsis, No. 135:iv + 86pp.; [distribution restricted.].	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	Cudmore, B. M. N. E., & Mandrak, N. E. (2004). Biological synopsis of grass carp (Ctenopharyngodon idella). Canadian manuscript report of fisheries and Aquatic Sciences, 2705(7), 1-44.	Very high
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	No	No other taxa within the genus is known as invasive	Medium
2. (Climate	, distribution and introduction risk			
4	2.01	How similar are the climatic conditions of the	Low	Results of climatch algorithm	Medium
		Risk Assessment (RA) area and the taxon's native range?			
5	2.02	What is the quality of the climate matching data?	Low	Due to low accuracy of local climate data	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	No	Kuljanishvili, T., Mumladze, L., Japoshvili, B., Mustafayev, N., Ibrahimov, S., Patoka, J., & Kalous, L. (2021). The first unified inventory of non-native fishes of the South Caucasian countries, Armenia, Azerbaijan, and Georgia. Knowledge & Management of Aquatic Ecosystems, (422), 32.	High
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	Acuacultural purpose	High
8	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)?	No	No well presented distribution of established populations	Low
3.1	Invasive	e elsewhere			
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	Shireman JV; Smith CR, 1983. Synopsis of biological data on the grass carp, Ctenopharyngodon idella (Cuvier and Valenciennes, 1844). FAO Fisheries Synopsis, No. 135:iv + 86pp.; [distribution restricted.].	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	Petr T, 2000. Interactions between fish and aquatic macrophytes in inland waters a review. FAO Fisheries Technical Paper, No. 396:185 pp. Shireman JV; Smith CR, 1983. Synopsis of biological data on the grass carp, Ctenopharyngodon idella (Cuvier and Valenciennes, 1844). FAO Fisheries Synopsis, No. 135:iv + 86pp.; [distribution restricted.].	Medium
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	CABI, 2021. Ctenopharyngodon idella (grass carp). https://www.cabi.org/isc/datasheet/16772 (accessed November	Medium
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	No	CABI, 2021. Ctenopharyngodon idella (grass carp). https://www.cabi.org/isc/datasheet/16772 (accessed November	Medium
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	CABI, 2021. Ctenopharyngodon idella (grass carp). https://www.cabi.org/isc/datasheet/16772 (accessed November	Medium
в. І	Biology	y/Ecology		https://www.cubilorg/isc/dddancer/10772 (decessed November	
		able (or persistence) traits			
14	4.01	Is it likely that the taxon will be poisonous or pose other risks to human health?	No	Not a harmful species	Very high
15	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	Petr T, 2000. Interactions between fish and aquatic macrophytes in inland waters a review. FAO Fisheries Technical Paper, No. 396:185 pp. Shireman JV; Smith CR, 1983. Synopsis of biological data on the grass carp, Ctenopharyngodon idella (Cuvier and Valenciennes, 1844). FAO Fisheries Synopsis, No. 135:iv + 86pp.; [distribution restricted.].	Low
		Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	Not a parasite species	Very high
	4.04	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?	Yes	Shireman JV; Smith CR, 1983. Synopsis of biological data on the grass carp, Ctenopharyngodon idella (Cuvier and Valenciennes, 1844). FAO Fisheries Synopsis, No. 135:iv + 86pp.; [distribution restricted.].	Medium
18	4.05	Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA area?	Yes	Shireman JV; Smith CR, 1983. Synopsis of biological data on the grass carp, Ctenopharyngodon idella (Cuvier and Valenciennes, 1844). FAO Fisheries Synopsis, No. 135:iv + 86pp.; [distribution restricted.].	Medium

			I		1 .
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	Usually positive effects are reported on ecosystems and ecosystem services (CABI, 2021. Ctenopharyngodon idella (grass carp). https://www.cabi.org/isc/datasheet/16772 (accessed November 2021))	Medium
20		Is it likely that the taxon will host, and/or act as a vector for, recognised pests and	No	Based on professional judgement	Medium
21	4.08	infectious agents that are endemic in the RA Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel	Yes	Based on professional judgement	Medium
22		to) the RA area? Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity?	Yes	Kottelat, M., & Freyhof, J. (2007). Handbook of European freshwater fishes. Publications Kottelat.	High
23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g.	No	Cudmore, B. M. N. E., & Mandrak, N. E. (2004). Biological synopsis of grass carp (Ctenopharyngodon idella). Canadian	Low
24	4.11	versatile in habitat use)? Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for	No	manuscript report of fisheries and Aquatic Sciences, 2705(7), 1-44. CABI, 2021. Ctenopharyngodon idella (grass carp). https://www.cabi.org/isc/datasheet/16772 (accessed November 2021)	Medium
25		native taxa? Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)?	No	No documented evidence exist	Medium
5. R		e exploitation	1		1
		protected native taxa in the RA area?	No	Based on professional judgement	High
27	5.02	Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?	Yes	Based on professional judgement	High
	Reprodu	iction			
28		Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?	No	Shireman, J.V. and C.R. Smith, 1983. Synopsis of biological data on the grass carp, Ctenopharyngodon idella (Cuvier and Valenciennes, 1884). FAO Fish. Synop. No.135, 86 p	High
29	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	No	Kuljanishvili, T., Mumladze, L., Japoshvili, B., Mustafayev, N., Ibrahimov, S., Patoka, J., & Kalous, L. (2021). The first unified inventory of non-native fishes of the South Caucasian countries, Armenia, Azerbaijan, and Georgia. Knowledge & Management of Aquatic Ecosystems, (422), 32.	High
30	6.03	Is the taxon likely to hybridise naturally with native taxa?	No	No such fact is known and not expected in RA area based professional experience	Medium
31	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	No	Shireman, J.V. and C.R. Smith, 1983. Synopsis of biological data on the grass carp, Ctenopharyngodon idella (Cuvier and Valenciennes, 1884). FAO Fish. Synop. No.135, 86 p	Medium
32	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	No	Not such a dependancy is ever observed	Very high
33	6.06	Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)?	Yes	More than milion eggs a year (Cudmore, B. M. N. E., & Mandrak, N. E. (2004). Biological synopsis of grass carp (Ctenopharyngodon idella). Canadian manuscript report of fisheries and Aquatic Sciences, 2705(7), 1-44.)	Very high
34	6.07	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	5	years	High
		al mechanisms			T
55	7.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable	One	This species is and can only spread via aquacultural purpose in RA area. This is supposed based on own experience	High
36	7.02	Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)?	Yes	This includes Colkheti national park and surroundings	High
37		Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal?	No	No such fact is ever observed	Very high
38	7.04	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules	Yes	Pelagic egges are drifting along the river	Very high
39	7.05	(for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?	Yes	CABI, 2021. Ctenopharyngodon idella (grass carp). https://www.cabi.org/isc/datasheet/16772 (accessed November 2021)	Very high
		Are older life stages of the taxon likely to migrate in the RA area for reproduction?	No	Not migrant species (Cudmore, B. M. N. E., & Mandrak, N. E. (2004). Biological synopsis of grass carp (Ctenopharyngodon idella). Canadian manuscript report of fisheries and Aquatic Sciences, 2705(7), 1-44.)	Very high
41	7.07	Are propagules or eggs of the taxon likely to	No	No, Such fact is not known	Very high
42		be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentical or interational) likely to be	Yes	The inroduction usually happans with lare amount of juveniles	High
43	7.09	unintentional or intentional) likely to be Is dispersal of the taxon density dependent?	No	No documented evidence exist	Low
		ce attributes			

44	8.01	Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life	No	No documented evidence exist	High
		cvcle?			
45	8.02	Is the taxon tolerant of a wide range of	Yes	CABI, 2021. Ctenopharyngodon idella (grass carp).	High
		water quality conditions relevant to that		https://www.cabi.org/isc/datasheet/16772 (accessed November	5
		taxon? [In the Justification field, indicate the		2021)	
		relevant water quality variable(s) being		,	
46	8.03	Can the taxon be controlled or eradicated in	No	No documented evidence exist	Low
		the wild with chemical, biological, or other			
		agents/means?			
47	8.04	Is the taxon likely to tolerate or benefit from	No	No documented evidence exist	Medium
		environmental/human disturbance?			
48	8.05	Is the taxon able to tolerate salinity levels	Yes	Frimodt, C., 1995. Multilingual illustrated guide to the world's	Medium
1		that are higher or lower than those found in		commercial warmwater fish. Fishing News Books, Osney Mead,	
1		its usual environment?		Oxford, England. 215 p.	
49	8.06	Are there effective natural enemies	No	Not an effective enemies have been observed in RA area	High
		(predators) of the taxon present in the RA			-
С. (Climate	e change			
9. (Climate	change			
50	9.01	Under the predicted future climatic	No change	Solely based on professinal experience	Low
		conditions, are the risks of entry into the RA			
		area posed by the taxon likely to increase,			
		decrease or not change?			
51	9.02	Under the predicted future climatic	Increase	Based on professional judgement	Low
		conditions, are the risks of establishment			
		posed by the taxon likely to increase,			
		decrease or not change?			
52	9.03	Under the predicted future climatic	Increase	Based on professional judgement	Low
		conditions, are the risks of dispersal within			
		the RA area posed by the taxon likely to			
		increase, decrease or not change?			
53	9.04	Under the predicted future climatic	Higher	Based on professional judgement	Low
		conditions, what is the likely magnitude of			
		future potential impacts on biodiversity			
		and/or ecological integrity/status?			
54	9.05	Under the predicted future climatic	Higher	Based on professional judgement	Low
1		conditions, what is the likely magnitude of			
		future potential impacts on ecosystem			
		structure and/or function?			
55	9.06	Under the predicted future climatic	Higher	Based on professional judgement	Low
1		conditions, what is the likely magnitude of			
		future potential impacts on ecosystem			
		services/socio-economic factors?			

Statistics	
Scores	
BRA	18.0
BRA Outcome	-
BRA+CCA	28.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	8.0
1. Domestication/Cultivation	2.0
2. Climate, distribution and introduction risk	0.0
3. Invasive elsewhere	6.0
B. Biology/Ecology	10.0
4. Undesirable (or persistence) traits	5.0
5. Resource exploitation	2.0
6. Reproduction	-1.0
7. Dispersal mechanisms	1.0
8. Tolerance attributes	3.0
C. Climate change	10.0
9. Climate change	10.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3 5 5
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	5
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2
6. Reproduction	
7. Dispersal mechanisms	9
8. Tolerance attributes	6
C. Climate change	6
9. Climate change	6
Sectors affected	
Commercial	10
Environmental	6
Species or population nuisance traits	14
Thresholds	
BRA	-

-
0.63
0.67
0.25
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Taxon and Assessor details	
Category	Fishes and Lampreys (freshwater)
Taxon name	Ctenopharyngodon idella
Common name	grass carp
Assessor	Giorgi Epitashvili
Risk screening context	
Reason and socio-economic benefits	Grass carp is cultivated in China for food, but was introduced in Europe and the United States for
Risk assessment area	South Caucasus
Taxonomy	Ctenopharyngodon idella (Valenciennes, 1844)
Native range	Asia: Eastern China and Russia in eastern Siberia, Amur River system.
Introduced range	Widely transported around the world. Introduced in Europe and the United States for aquatic weed
URL	https://www.fishbase.se/summary/Ctenopharyngodon-idella.html

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
	1	ication/Cultivation	1		1
1	1.01	Has the taxon been the subject of	Yes	It is cultivated in China for food, but was introduced in Europe and	Very high
		domestication (or cultivation) for at least 20		the United States for aquatic weed control, becoming the species	
		generations?		of fish with the largest reported production in aquaculture	
				globally, over five million tonnes per year.	
2	1.02	Is the taxon harvested in the wild and likely	Yes	At present artificial propagation is the major supply of seed for the	Very high
		to be sold or used in its live form?		culture of grass carp, although natural seeds are still available in	, ,
				some rivers of China. Seed collected from the wild is mainly used	
				for maintaining the genetic quality of the broodstock.	
3	1.03	Does the taxon have invasive races,	Yes	Grass Carp has been globally introduced to waterways for	Very high
-		varieties, sub-taxa or congeners?		purposes of controlling invasive macrophytes, but is also	· • · / · · · 5··
		varieties, sub-taxa or congeners.		perceived as an invasive species when populations cause	
				unwanted impacts to native macrophytes (Wittmann et al. 2014).	
2. C	Climate,	, distribution and introduction risk	1		
4	2.01	How similar are the climatic conditions of the	Medium	World Map of the Köppen-Geiger climate classification	Medium
		Risk Assessment (RA) area and the taxon's			
		native range?			
5	2.02	What is the quality of the climate matching	Medium	World Map of the Köppen-Geiger climate classification.	Medium
-		data?		·····	
6	2.03	Is the taxon already present outside of	Yes	This species is inhabits in Jandari, Lisi, Kumisi lakes and other	Very high
-		captivity in the RA area?		lakes and reservoirs in Georgia as well as in the SC region (Ninua	.,
				et al. 2013; Own unpublished data).	1
7	2.04	How many potential vectors could the taxon	One	This species is enter in the SC region by humans for aquacultural	High
·	2.04	use to enter in the RA area?	SIIC	purposes.	i iigii
8	2.05	Is the taxon currently found in close	Yes	The grass carp was first introduced outside its native area for	Very high
0	2.05	proximity to, and likely to enter into, the RA	165	aquaculture and aquatic management purposes after 1945 and in	very mgn
		area in the near future (e.g. unintentional		Turkey after 1972 (Kırkağaç 2011). This species is also distributed	
2 1	nunciu	and intentional introductions)?		in the natural and artificial lakes and reservoirs in the SC region.	
5. I. 0	3.01	e elsewhere	Yes	As a result of intensive introduction and assidental releases, the	Vorschigh
9	5.01	Has the taxon become naturalised	res	As a result of intensive introduction and accidental releases, the	Very high
		(established viable populations) outside its		European and central Asian areas of the USSR now have naturally	
		native range?		reproducing grass carp populations in the Amudar'ya, Syrdar'ya,	
				Terek, Volga and Kuban Rivers and in the Karakum Canal	
				(Nikol'sky and Ahiev, 1974).	
10	3.02	In the taxon's introduced range, are there	Yes	The exotic grass carp has been used for almost a half a century in	Very high
		known adverse impacts to wild stocks or		the United States as a bi- ological agent to control and manage	
		commercial taxa?		aquatic plants. This long-lived generalist herbivore consumes	
				large amounts of vegetation and can considerably alter habitat	
				and impact aquatic communities (Dibble & Kovalenko 2009).	
11	3.03	In the taxon's introduced range, are there	No	Data deficient	Medium
		known adverse impacts to aquaculture?			
12	3.04	In the taxon's introduced range, are there	No	Data deficient	Medium
		known adverse impacts to ecosystem			
13	3.05	In the taxon's introduced range, are there	Yes	The socio-economic study concludes that, in addition to the	High
		known adverse socio-economic impacts?		significant ecological threat that is posed by the presence of grass	
				carp in the Great Lakes, there would also be economic, social and	1
				cultural ripple effects (Hayder 2019).	
		y/Ecology			
		able (or persistence) traits			[···· ·
14	4.01	Is it likely that the taxon will be poisonous or	No	This species does not pose threat to humans	High
		pose other risks to human health?			
15	4.02	Is it likely that the taxon will smother one or	Yes	In Tashkent C. idella, resulted in declines in local species through	High
		more native taxa (that are not threatened or		superior growth and fecundity (Rosenthal, 1976).	
		protected)?			
16	4.03	Are there any threatened or protected taxa	Yes	There are several protected and threatened species which would	Very high
		that the non-native taxon would parasitise in		be impacted by C. idella, e.g. Luciobarbus capito, L. mursa,	-
				Cyprinus carpio, etc.	
		the RA area?			Medium
17	4.04	the RA area? Is the taxon adaptable in terms of climatic	Yes	This species has inhabited in the SC region for several decades	
17	4.04		Yes		
17	4.04	Is the taxon adaptable in terms of climatic and other environmental conditions, thus	Yes	This species has inhabited in the SC region for several decades however, it cannot reproduce naturally.	
17	4.04	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has	Yes		
		Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?		however, it cannot reproduce naturally.	
	4.04 4.05	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web	Yes Yes	however, it cannot reproduce naturally. C. idella has significantly altered the food web and trophic	High
		Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it		however, it cannot reproduce naturally. C. idella has significantly altered the food web and trophic structure of aquatic systems in USA by inducing changes in plant,	
		Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA		however, it cannot reproduce naturally. C. idella has significantly altered the food web and trophic structure of aquatic systems in USA by inducing changes in plant, invertebrate, and fish communities (NAS Database). No such fact	
18	4.05	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA area?	Yes	however, it cannot reproduce naturally. C. idella has significantly altered the food web and trophic structure of aquatic systems in USA by inducing changes in plant, invertebrate, and fish communities (NAS Database). No such fact has been observed in the Caucasus region yet.	High
18		Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA		however, it cannot reproduce naturally. C. idella has significantly altered the food web and trophic structure of aquatic systems in USA by inducing changes in plant, invertebrate, and fish communities (NAS Database). No such fact	

20	4.07	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and	No	No research has been conducted in this direction	Low
21	4.08	infectious agents that are endemic in the RA Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel	Not applicable	No research has been conducted in this direction	Low
22	4.09	to) the RA area? Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity?	Yes	C. idella is a large, herbivorous, freshwater fish species. Max length : 150 cm TL male/unsexed; common length : 10.7 cm SL male/unsexed; max. published weight: 45.0 kg. It is important fish for trade and widely used throughout the world.	Very high
23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)?	No	Adults occur in lakes, ponds, pools and backwaters of large rivers, preferring large, slow-flowing or standing water bodies with vegetation.	Very high
24	4.11	Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa?	Yes	Detrimental changes in water quality parameters (in-crease in nitrite, nitrate, phosphate concentrations) follow-ing vegetation control by grass carp were reported in moststudies that evaluated water quality (Table 5; Shireman andSmith 1983, Kirkagac and	High
25	4.12	Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)?	No	No such fact has been documented	Low
		e exploitation			
26	5.01	Is the taxon likely to consume threatened or protected native taxa in the RA area?	No	No such fact has been documented. In general, C. idella feed on higher aquatic plants and submerged grasses; takes also detritus, insects and other invertebrates (Frimodt, 1995).	Low
27	5.02	Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?	Yes	C. idella as an exotic species for the SC region should be competitor to native species	Medium
6. R	eprodu		I		I
	6.01	Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?	No	No research has been conducted in this direction	High
	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	No	This species does not reproduces naturally in the SC region	Very high
30	6.03	Is the taxon likely to hybridise naturally with native taxa?	No	Such fact is not known	Low
31	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	No	Such fact is not known	Medium
32	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features)	No	Such fact is not known	Medium
33	6.06	to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)?	Yes	Fecundity reachs up to 82 000 eggs (Ninua et al. 2013).	Medium
34	6.07	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	4	Sexually maturate from the age of 4 (Ninua et al. 2013).	Very high
7. D	ispersa	al mechanisms	1		
	7.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable	One	This species can only be spread within the SC region by humans.	Very high
36	7.02	Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)?	Yes	There is a possibility of that.	Medium
37	7.03	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances	No	This species does not have such means	High
38	7.04	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules	No	This species does not reproduces or spreads in the SC region.	Very high
39	7.05	(for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA	No	This species does not reproduces or spreads in the SC region.	Very high
40	7.06	area? Are older life stages of the taxon likely to migrate in the RA area for reproduction?	No	This species does not reproduces in the SC region.	Very high
	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No	No such fact has been detected.	Very high
42	7.08	Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or intentional) likely to be	Not applicable	Data deficient	Low
		Is dispersal of the taxon density dependent?	Not applicable	Data deficient	Low
		ce attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle?	No	No such fact has been described	High
45	8.02	Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being	Yes	Adults occur in lakes, ponds, pools and backwaters of large rivers, preferring large, slow-flowing or standing water bodies with vegetation. Tolerant of a wide range of temperatures from 0° to 38°C, and salinities to as much as 10 ppt and oxygen levels down	Very high

46		Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	Not applicable	Data deficient	Low
47	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	Yes	This species is mostly spread by humans.	High
48		Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	Yes	C. idella is tolerant of a wide range of temperatures from 0° to 38°C, and salinities to as much as 10 ppt.	High
49	8.06	Are there effective natural enemies (predators) of the taxon present in the RA area?	Yes	There are several predators distributed in the SC region which can controll the C. idella populations: eg. Esox lucius, Sander lucioperca, Silurus glanis, etc.	Very high
		e change			
		change			
50	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?	No change	Own judgement	Medium
51	9.02	Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	No change	Own judgement	Medium
52		Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase. decrease or not change?	No change	Own judgement	Medium
53	9.04	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	Lower	Own judgement	Medium
54	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Lower	Own judgement	Medium
55	9.06	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	Lower	Own judgement	Medium

Statistics	
Scores	
BRA	20.5
BRA Outcome	
BRA+CCA	14.5
BRA+CCA Outcome	
Score partition	
A. Biogeography/Historical	12.5
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	7.5
B. Biology/Ecology	8.0
4. Undesirable (or persistence) traits	6.0
5. Resource exploitation	2.0
6. Reproduction	-1.0
7. Dispersal mechanisms	-4.0
8. Tolerance attributes	5.0
C. Climate change	-6.0
9. Climate change	-6.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3
2. Climate, distribution and introduction risk 3. Invasive elsewhere	5
	5
B. Biology/Ecology	3 5 5 36
B. Biology/Ecology <i>4. Undesirable (or persistence) traits</i>	12
B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation	12
B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction	12 2 7
B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms	12 2 7
B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes	12 2 7 9 6
B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change	12 2 7 9 6 6
B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change	12 2 7 9 6
B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change 9. Climate change	12 2 7 9 6 6 6
B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial	12 2 7 9 6 6 6 6 8
B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial Environmental	12 2 7 9 6 6 6 6 8 8 -1
B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial	12 2 7 9 6 6 6 6 8
B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial Environmental	12 2 7 9 6 6 6 6 8 8 -1

Thresholds	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.69
BRA	0.71
CCA	0.50
Date and Time	

03/05/2022 17:12:18

Taxon and Assessor details						
Category	Fishes and Lampreys (freshwater)					
Taxon name	Ctenopharyngodon idella					
Common name	grass carp					
Assessor Tatia Kuljanishvili						
Risk screening context						
Reason and socio-economic benefits	Has been introduced for aqauculture worldwide					
Risk assessment area	South Caucasus					
Taxonomy	Actinopteri (ray-finned fishes) > Cypriniformes (Carps) > Xenocyprididae					
Native range	Esatern China and Russia					
Introduced range	Worldwide					
URL	https://www.fishbase.se/summary/Ctenopharyngodon-idella.html					

			Response	Justification (references and/or other information)	Confidence
Α.	Biogeo	graphy/Historical			
1. L		ication/Cultivation			
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	It has been grown in aquaculture facilities more than 20 generations	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	Yes. Taxon is harvested in wild and is sold in its live form	Very high
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	Yes. for example Hypophthalmichthys nobilis and H. molitrix	Very high
2. (Climate	, distribution and introduction risk			
4		How similar are the climatic conditions of the	Medium	The climate is more or less similar out of 19 stations, 15 match at	Very high
		Risk Assessment (RA) area and the taxon's native range?		value 9 (out of 10).	
5	2.02	What is the quality of the climate matching data?	Medium	Climatch data is medium since there are not much station on the RA area	Medium
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	This species is released in ponds and rivers in RA area	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	>1	Aquaculture, recreational fisheries	Very high
8	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA	Yes	This species is released in ponds and rivers in RA area	Very high
1		area in the near future (e.g. unintentional			
2 1	T	and intentional introductions)?			
<i>3.1</i> 9		e elsewhere Has the taxon become naturalised	Yes	Yes in some places of suitable climate.	High
	3.01	(established viable populations) outside its			-
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	Negative impact inculde the shaping of zooplanctonic comunities and predation pressure (competiton) on other planktonivorous species (Spataru & Gophen 1985	High
11	3.03	In the taxon's introduced range, are there	Yes	it is not known, but possibly the competition with native	Medium
		known adverse impacts to aquaculture?		planktonivorous fish can affect the aquaculture (Spataru & Gophen 1985)	
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	Yes	affects native fish fauna via shaping the zooplanktonic organisms	Medium
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	Not known	Medium
		y/Ecology			
		able (or persistence) traits	1		
		Is it likely that the taxon will be poisonous or pose other risks to human health?		Not poisonous	Very high
	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	They have ability to fine filter the water and also they grow very fast and can form dence populations, they are versatile in terms of feeding and this can often lead to habitat alterations amd disruption of food webs and nutrient cycles in new invaded ecosystems (Milstein et al. 1988; Cooke et al. 2009; Gozlan et al. 2010; Ma et al. 2010; Rosemberg et al. 2010. Such changes as zooplankton and phytoplancton exploatation, shaping the fish communities can affect native fishes populations that are sharing	Medium
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	No. does not parasite	Very high
17	4.04	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?	Yes	is tolerant of a wide range of temperatures from 0° to 38°C, and salinities to as much as 10 ppt and oxygen levels down to 0.5 ppm however, due to cold winters it is not reproducing in RA area	Medium
	4.05	Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA area?	Yes	They have ability to fine filter the water and also they grow very fast and can form dence populations, they are versatile in terms of feeding and this can often lead to habitat alterations and disruption of food webs and nutrient cycles in new invaded eccosystems (Milstein et al. 1988; Cooke et al. 2009; Gozlan et al. 2010; Ma et al. 2010; Rosemberg et al. 2010.	Medium
	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes	it is possible, however, it should be mentioned that they are not known to be independently reproducting in RA	Medium
20	4.07	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA	Yes	Possible, but not documented	Low

21	4.08	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel	Yes	it is possible. However, it is not documented.	Low
22	4.09	to) the RA area? Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity?	Yes	yes https://fishbase.mnhn.fr/summary/Ctenopharyngodon- idella.html	Very high
23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)?	No	No https://fishbase.mnhn.fr/summary/Ctenopharyngodon- idella.html	High
24	4.11	(e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa?	Yes	They have ability to fine filter the water and also they grow very fast and can form dence populations, they are versatile in terms of feeding and this can often lead to habitat alterations and disruption of food webs and nutrient cycles in new invaded ecosystems (Milstein et al. 1988; Cooke et al. 2009; Gozlan et al. 2010; Ma et al. 2010; Rosemberg et al. 2010)	High
	4.12	Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)?	Yes	depending on the water and weather conditions	Medium
		ce exploitation			1
26	5.01	Is the taxon likely to consume threatened or protected native taxa in the RA area?	No	Not known	Medium
27	5.02	Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?	Yes	It is possible	Medium
5. F	Reprodu				
28	6.01	Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response	No	No dos not exhibit parental care	Very high
29	6.02	, , ,	No	No. climate is not suitable	Very high
30	6.03	or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa?	No	No. Can not hibridize with native taxa. Own assumption.	Very high
31	6.04		No	No. https://fishbase.mnhn.fr/summary/Ctenopharyngodon- idella.html	Very high
32	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features)	No	No	Very high
33	6.06	to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring	Yes	can produce 1.5 million eggs per season	Very high
34	6.07	within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at-	5	5-6 years	Very high
		first-reproduction?			
		al mechanisms			1.1
55	7.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable	>1	Aquaculture and recreational fisheries	Very high
86	7.02	Will any of these vectors/pathways bring the taxon in close proximity to one or more	Yes	Yes. it is used for aqauculture and recriational fisheries which allows them to be brought to these places	High
37	7.03	protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal?	No	No. it does not have.	Very high
38	7.04	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?	No	No. Because does not reproduce in RA	Very high
39	7.05	Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?	No	They do not produce viable gametes and therfore can be distributed by larvae, or juveniles.	Very high
10	7.06	Are older life stages of the taxon likely to	No	Do not reproduce therefore, does not migrate.	Very high
41	7.07	migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No	No. can not be dispersed by other ananimals	Very high
12	7.08	Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be	Yes	Yes it seems very rapid	Very high
13	7.09	Is dispersal of the taxon density dependent?	Yes	it is possible	High
3. 7	Toleran	ce attributes			
4	8.01	Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life	No	No indormation	Low
		cycle?		"Tolerant of a wide range of temperatures from 0° to 38°C, and	Medium
	8.02	Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in	Yes Yes	salinities to as much as 10 ppt and oxygen levels down to 0.5 ppm." https://www.fishbase.se/summary/Ctenopharyngodon- idella.html it is possible	Medium

47	8.04	Is the taxon likely to tolerate or benefit from	No	No information, probably not	Low
		environmental/human disturbance?			
48	8.05	Is the taxon able to tolerate salinity levels	No	No. https://fishbase.mnhn.fr/summary/Ctenopharyngodon-	Very high
		that are higher or lower than those found in		idella.html	
		its usual environment?			
49	8.06	Are there effective natural enemies	No	No. No effective natural enemies present in RA area	Very high
		(predators) of the taxon present in the RA			
С. С	Climate	e change			
9. (Climate	change			
50	9.01	Under the predicted future climatic	Increase	It was hypotheses that climate change might alert the	Very high
		conditions, are the risks of entry into the RA		mechanisms of transportation and introduction of non-native	
		area posed by the taxon likely to increase,		species. Commercial and recreational activities will increase, that	
		decrease or not change?		itself increases the propagule pressure levels of non-native	
51	9.02	Under the predicted future climatic	Increase	if the temperatures increase, it will make their populations able to	High
		conditions, are the risks of establishment		reproduce indipendently, therefore the risk of their potential	-
		posed by the taxon likely to increase,		impact is increasingDispersal might increase	
		decrease or not change?			
52	9.03	Under the predicted future climatic	Increase	It could be higher. Because it is known that they create dance	High
		conditions, are the risks of dispersal within		populations when they reproduce in new environments and	
		the RA area posed by the taxon likely to		creating problems for the native species	
		increase, decrease or not change?			
53	9.04	Under the predicted future climatic	Higher	The magnitude of future potential impact on ecosysytem structure	High
		conditions, what is the likely magnitude of		and function is increasing	
		future potential impacts on biodiversity			
		and/or ecological integrity/status?			
54	9.05	Under the predicted future climatic	No change	No change	Medium
		conditions, what is the likely magnitude of	-		
		future potential impacts on ecosystem			
		structure and/or function?			
55	9.06	Under the predicted future climatic	No change	No change	Medium
		conditions, what is the likely magnitude of	-		
		future potential impacts on ecosystem			
]	services/socio-economic factors?			

Statistics	
Scores	
BRA	23.5
BRA Outcome	-
BRA+CCA	31.5
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	16.5
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	2.0
3. Invasive elsewhere	10.5
B. Biology/Ecology	7.0
4. Undesirable (or persistence) traits	9.0
5. Resource exploitation	2.0
6. Reproduction	-1.0
7. Dispersal mechanisms	-1.0
8. Tolerance attributes	-2.0
C. Climate change	8.0
9. Climate change	8.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3 5 5
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	
B. Biology/Ecology	36
	12
4. Undesirable (or persistence) traits	2
5. Resource exploitation	-
5. Resource exploitation 6. Reproduction	7
5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms	7
5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes	2 7 9 6
5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change	6
5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change	
5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected	6 6
5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial	6 6 13
5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial Environmental	6 6
5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial	6 6 13

Thresholds	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.77
BRA	0.78
CCA	0.71

Date and Time	
	20/05/2022 16:43:40

axon and Assessor details					
Category	Fishes and Lampreys (freshwater)				
Taxon name	Gambusia holbrooki				
Common name	eastern mosquitofish				
Assessor	Bella Japoshvili				
Risk screening context					
Reason and socio-economic benefits	The species have been introduced in Georgia and later on introduced/spread over the South				
Risk assessment area	South Caucasus				
Taxonomy	Actinopteri (ray-finned fishes) > Cyprinodontiformes (Rivulines, killifishes and live bearers)				
Native range	North America				
Introduced range	Worldwide				
URL	https://www.fishbase.de/summary/Gambusia-holbrooki.html				

			Response	Justification (references and/or other information)	Confidence
		ography/Historical			
		tication/Cultivation	1		1
L	1.01	Has the taxon been the subject of	No	No such information is available	High
		domestication (or cultivation) for at least 20			
		generations?			
	1.02	Is the taxon harvested in the wild and likely	No	No such fact is known	Medium
		to be sold or used in its live form?			
	1.03	Does the taxon have invasive races,	Yes	Congener	Very high
	1.05		103		very nigh
	Cline a tra	varieties, sub-taxa or congeners?			
. (e, distribution and introduction risk			
	2.01	How similar are the climatic conditions of the	High	Result of climatch algorithm	Medium
		Risk Assessment (RA) area and the taxon's			
		native range?			
;	2.02	What is the quality of the climate matching	Low	Due to low accuracy of local climate data	High
		data?			
,	2.03	Is the taxon already present outside of	Yes	CABI, 2021. Gambusoa holbrooki (eastern mosquitofish).	Very high
		captivity in the RA area?		https://www.cabi.org/isc/datasheet/82089 (accessed November	-, 5
		captivity in the fortured.		2021)	
_	2.04	How many notantial vectors could the taxon	One		Von/ high
	2.04	How many potential vectors could the taxon	one	Human mediated translocation for mosquito control.	Very high
	0.05	use to enter in the RA area?			
	2.05	Is the taxon currently found in close	Yes	Kuljanishvili, T., Mumladze, L., Japoshvili, B., Mustafayev, N.,	Very high
	1	proximity to, and likely to enter into, the RA		Ibrahimov, S., Patoka, J., & Kalous, L. (2021). The first unified	
	1	area in the near future (e.g. unintentional		inventory of non-native fishes of the South Caucasian countries,	
	1	and intentional introductions)?		Armenia, Azerbaijan, and Georgia. Knowledge & Management of	
	1	· ·		Aquatic Ecosystems, (422), 32.	
. 1	Invasiv	e elsewhere			
	3.01	Has the taxon become naturalised	Yes	e.g. Kuljanishvili, T., Mumladze, L., Japoshvili, B., Mustafayev, N.,	Very high
	5.01	(established viable populations) outside its		Ibrahimov, S., Patoka, J., & Kalous, L. (2021). The first unified	ter, ingi
		native range?		inventory of non-native fishes of the South Caucasian countries,	
				Armenia, Azerbaijan, and Georgia. Knowledge & Management of	
				Aquatic Ecosystems, (422), 32.	
0	3.02	In the taxon's introduced range, are there	Yes	Hurlbert, S. H., Zedler, J., & Fairbanks, D. (1972). Ecosystem	Very high
		known adverse impacts to wild stocks or		alteration by mosquitofish (Gambusia affinis) predation. Science,	
		commercial taxa?		175(4022), 639-641.	
1	3.03	In the taxon's introduced range, are there	No	No documended evidence	Low
		known adverse impacts to aquaculture?	-		-
2	3.04	In the taxon's introduced range, are there	Yes	Hurlbert, S. H., Zedler, J., & Fairbanks, D. (1972). Ecosystem	Medium
2	5.04		103		neulum
		known adverse impacts to ecosystem		alteration by mosquitofish (Gambusia affinis) predation. Science,	
_		services?		175(4022), 639-641.	
3	3.05	In the taxon's introduced range, are there	Yes	Hurlbert, S. H., Zedler, J., & Fairbanks, D. (1972). Ecosystem	Medium
		known adverse socio-economic impacts?		alteration by mosquitofish (Gambusia affinis) predation. Science,	
				175(4022), 639-641.	
	Biolog	y/Ecology			
. 1	Undesir	able (or persistence) traits			
4	4.01	Is it likely that the taxon will be poisonous or	No	Not a harmful species	Very high
	1	pose other risks to human health?			
5	4.02	Is it likely that the taxon will smother one or	Yes	By predation of egges (Myers, G. S. (1965). Gambusia, the fish	Very high
-		more native taxa (that are not threatened or		destroyer. Tropical Fish Hobbyist, 13(5), 31-32.)	,
	1	protected)?			
		protected)!		There are number of threatend or species in the RA area that can	Very high
6	1 02	Are there any threatened as protected to			
6	4.03	Are there any threatened or protected taxa	Yes		very mgn
6	4.03	that the non-native taxon would parasitise in	Yes	be altered by the species	very mgn
		that the non-native taxon would parasitise in the RA area?		be altered by the species	
	4.03	that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic	Yes	be altered by the species Pyke, G. H. (2005). A review of the biology of Gambusia affinis	Medium
		that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus		be altered by the species Pyke, G. H. (2005). A review of the biology of Gambusia affinis and G. holbrooki. Reviews in Fish Biology and Fisheries, 15(4),	
		that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic		be altered by the species Pyke, G. H. (2005). A review of the biology of Gambusia affinis	
		that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has		be altered by the species Pyke, G. H. (2005). A review of the biology of Gambusia affinis and G. holbrooki. Reviews in Fish Biology and Fisheries, 15(4),	
7	4.04	that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?	Yes	be altered by the species Pyke, G. H. (2005). A review of the biology of Gambusia affinis and G. holbrooki. Reviews in Fish Biology and Fisheries, 15(4), 339-365.	Medium
7		that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web		be altered by the species Pyke, G. H. (2005). A review of the biology of Gambusia affinis and G. holbrooki. Reviews in Fish Biology and Fisheries, 15(4), 339-365. Hurlbert, S. H., Zedler, J., & Fairbanks, D. (1972). Ecosystem	
7	4.04	that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it	Yes	 be altered by the species Pyke, G. H. (2005). A review of the biology of Gambusia affinis and G. holbrooki. Reviews in Fish Biology and Fisheries, 15(4), 339-365. Hurlbert, S. H., Zedler, J., & Fairbanks, D. (1972). Ecosystem alteration by mosquitofish (Gambusia affinis) predation. Science, 	Medium
7	4.04	that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA	Yes	be altered by the species Pyke, G. H. (2005). A review of the biology of Gambusia affinis and G. holbrooki. Reviews in Fish Biology and Fisheries, 15(4), 339-365. Hurlbert, S. H., Zedler, J., & Fairbanks, D. (1972). Ecosystem alteration by mosquitofish (Gambusia affinis) predation. Science, 175(4022), 639-641.	Medium
7	4.04	that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts	Yes	 be altered by the species Pyke, G. H. (2005). A review of the biology of Gambusia affinis and G. holbrooki. Reviews in Fish Biology and Fisheries, 15(4), 339-365. Hurlbert, S. H., Zedler, J., & Fairbanks, D. (1972). Ecosystem alteration by mosquitofish (Gambusia affinis) predation. Science, 175(4022), 639-641. Hurlbert, S. H., Zedler, J., & Fairbanks, D. (1972). Ecosystem 	Medium
7	4.04	that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA	Yes	 be altered by the species Pyke, G. H. (2005). A review of the biology of Gambusia affinis and G. holbrooki. Reviews in Fish Biology and Fisheries, 15(4), 339-365. Hurlbert, S. H., Zedler, J., & Fairbanks, D. (1972). Ecosystem alteration by mosquitofish (Gambusia affinis) predation. Science, 175(4022), 639-641. Hurlbert, S. H., Zedler, J., & Fairbanks, D. (1972). Ecosystem alteration by mosquitofish (Gambusia affinis) predation. Science, 	Medium
7 8 9	4.04 4.05 4.06	that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes Yes Yes	 be altered by the species Pyke, G. H. (2005). A review of the biology of Gambusia affinis and G. holbrooki. Reviews in Fish Biology and Fisheries, 15(4), 339-365. Hurlbert, S. H., Zedler, J., & Fairbanks, D. (1972). Ecosystem alteration by mosquitofish (Gambusia affinis) predation. Science, 175(4022), 639-641. Hurlbert, S. H., Zedler, J., & Fairbanks, D. (1972). Ecosystem alteration by mosquitofish (Gambusia affinis) predation. Science, 175(4022), 639-641. 	Medium
7 8 9	4.04	that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts	Yes	 be altered by the species Pyke, G. H. (2005). A review of the biology of Gambusia affinis and G. holbrooki. Reviews in Fish Biology and Fisheries, 15(4), 339-365. Hurlbert, S. H., Zedler, J., & Fairbanks, D. (1972). Ecosystem alteration by mosquitofish (Gambusia affinis) predation. Science, 175(4022), 639-641. Hurlbert, S. H., Zedler, J., & Fairbanks, D. (1972). Ecosystem alteration by mosquitofish (Gambusia affinis) predation. Science, 	Medium
7 8 9	4.04 4.05 4.06	that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes Yes Yes	 be altered by the species Pyke, G. H. (2005). A review of the biology of Gambusia affinis and G. holbrooki. Reviews in Fish Biology and Fisheries, 15(4), 339-365. Hurlbert, S. H., Zedler, J., & Fairbanks, D. (1972). Ecosystem alteration by mosquitofish (Gambusia affinis) predation. Science, 175(4022), 639-641. Hurlbert, S. H., Zedler, J., & Fairbanks, D. (1972). Ecosystem alteration by mosquitofish (Gambusia affinis) predation. Science, 175(4022), 639-641. 	Medium High Medium

21	4.08	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area?	Yes	Davis, J. R., & Huffman, D. G. (1977). A comparison of the helminth parasites of Gambusia affinis and Gambusia geiseri (Osteichthyes: Poeciliidae) from the upper San Marcos River. The Southwestern Naturalist, 359-366.; Tobler, M., & Schlupp, I. (2008). Influence of black spot disease on shoaling behaviour in female western mosquitofish, Gambusia affinis (Poeciliidae, Teleostei). Environmental Biology of Fishes, 81(1), 29-34.	High
22	4.09	Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity?	No	It is generally a small bodied species	Very high
23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)?	Yes	Pyke, G. H. (2005). A review of the biology of Gambusia affinis and G. holbrooki. Reviews in Fish Biology and Fisheries, 15(4), 339-365.	High
24	4.11	Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa?	Yes	Hurlbert, S. H., Zedler, J., & Fairbanks, D. (1972). Ecosystem alteration by mosquitofish (Gambusia affinis) predation. Science, 175(4022), 639-641.	High
25	4.12	Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)?	Yes	No documented evidence, professional judgement	Low
5. F	Resourc	ce exploitation			
26	5.01	Is the taxon likely to consume threatened or protected native taxa in the RA area?	Yes	At the egg/larval stage	Medium
27	5.02	Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?	Yes	Hurlbert, S. H., Zedler, J., & Fairbanks, D. (1972). Ecosystem alteration by mosquitofish (Gambusia affinis) predation. Science, 175(4022), 639-641.	Medium
6. F	Reprodu				I
		Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?	No	Pyke, G. H. (2005). A review of the biology of Gambusia affinis and G. holbrooki. Reviews in Fish Biology and Fisheries, 15(4), 339-365.	High
	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	The species is surviving for many decades in the RA area	Very high
	6.03	Is the taxon likely to hybridise naturally with native taxa?	No	No such fact is known or expected	Very high
	6.04 6.05	Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of	No	Pyke, G. H. (2005). A review of the biology of Gambusia affinis and G. holbrooki. Reviews in Fish Biology and Fisheries, 15(4), It can complete its life cycle without any fishes	High Very high
52	0.05	another taxon (or specific habitat features) to complete its life cycle?			very myn
33	6.06	Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)?	Yes	Page, L.M. and B.M. Burr, 1991. A field guide to freshwater fishes of North America north of Mexico. Houghton Mifflin Company, Boston.	Very high
34	6.07	How many time units (days, months, years) does the taxon require to reach the age-at-	3	Week	Very high
7.1	Disners	first-reproduction? al mechanisms			I
		How many potential internal vectors/pathways could the taxon use to	One	Unintentional translocation	High
		disperse within the RA area (with suitable			
36	7.02	Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)?	Yes	It is alreapdy widespread in several parts of RA area	Medium
37	7.03	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal?	No	No such an evidence is known	Very high
38	7.04	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?	No	No documented evidence exists	Medium
39	7.05	Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?	Yes	The species can easily disperse through water currents naturally at the juvenile stage	Low
40	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	No	Species does not require migration for ther eproduction	High
			No	No such fact is known	High
41	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	Vec	Due to large population density, the inintentional translocation or	Medium
41	7.07		Yes	Due to large population density, the inintentional translocation or dispersal through water current can be very intensive	Medium
41 42 43	7.08	be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent?	Yes		Medium Medium
41 42 43 8. 7	7.08 7.09 Toleran	be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? ce attributes	No	dispersal through water current can be very intensive	Medium
41 42 43 8. 7	7.08 7.09 Toleran	be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life		dispersal through water current can be very intensive	
41 42 43 8.7 44	7.08 7.09 Toleran	be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of	No	dispersal through water current can be very intensive	Medium

47	8.04	Is the taxon likely to tolerate or benefit from	No	Not known, no documented eveidence exists	Medium
		environmental/human disturbance?			
48	8.05	Is the taxon able to tolerate salinity levels	Yes	Alcaraz, C., & García-Berthou, E. (2007). Life history variation of	High
		that are higher or lower than those found in		invasive mosquitofish (Gambusia holbrooki) along a salinity	-
		its usual environment?		gradient. Biological Conservation, 139(1-2), 83-92.	
49	8.06	Are there effective natural enemies	No	Not known effective natural enemies from the RA area	High
		(predators) of the taxon present in the RA			-
С. (Climate	e change			
9. (Climate	change			
50	9.01	Under the predicted future climatic	No change	Professional judgement. The species is already in RA area with no	High
		conditions, are the risks of entry into the RA		new introduction events	
		area posed by the taxon likely to increase,			
		decrease or not change?			
51	9.02	Under the predicted future climatic	Increase	Professional judgement. Expected to increase since the species	Medium
		conditions, are the risks of establishment		prefers warm waters in RA area	
		posed by the taxon likely to increase,			
		decrease or not change?			
52	9.03	Under the predicted future climatic	Increase	Professional judgement	Medium
		conditions, are the risks of dispersal within			
		the RA area posed by the taxon likely to			
		increase, decrease or not change?			
53	9.04	Under the predicted future climatic	Higher	Professional judgement. I expect to increase its realized area as	Medium
		conditions, what is the likely magnitude of		well as density thus would have largerimpact	
		future potential impacts on biodiversity			
		and/or ecological integrity/status?			
54	9.05	Under the predicted future climatic	Higher	Professional judgement. I expect to increase its realized area as	Medium
		conditions, what is the likely magnitude of		well as density thus would have largerimpact	
		future potential impacts on ecosystem			
		structure and/or function?			
55	9.06	Under the predicted future climatic	Higher	Professional judgement. I expect to increase its realized area as	Medium
		conditions, what is the likely magnitude of		well as density thus would have largerimpact	
		future potential impacts on ecosystem			
		services/socio-economic factors?			

Statistics	
Scores	
BRA	34.0
BRA Outcome	-
BRA+CCA	44.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	15.0
1. Domestication/Cultivation	0.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	14.0
B. Biology/Ecology	19.0
4. Undesirable (or persistence) traits	9.0
5. Resource exploitation	7.0
6. Reproduction	1.0
7. Dispersal mechanisms	-1.0
8. Tolerance attributes	3.0
C. Climate change	10.0
9. Climate change	10.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
A. Biogeography/Historical 1. Domestication/Cultivation	13
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk	13
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere	13 3 5 5
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology	13 3 5 5 36
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits	13 3 5 5 36
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation	13 3 5 5 36
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction	13 3 5 5 36
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms	13 3 5 5 36
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes	13 3 5 5 36 12 2 7 7 9 6
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change	13 3 5 5 36 12 2 7 9 9 6 6
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change	13 3 5 5 36 12 2 7 7 9 6
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected	13 3 5 5 36 12 2 7 7 9 6 6 6 6
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial	13 3 5 5 36 12 2 7 9 6 6 6 6 6 11
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial Environmental	13 3 5 5 36 12 2 7 9 6 6 6 6 6 6 11
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial	13 3 5 5 36 12 2 7 7 9 6 6 6 6 11

Thresholds	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.70
BRA	0.72
CCA	0.54

Date and Time	
	16/05/2022 11:39:50

Taxon and Assessor details	
Category	Fishes and Lampreys (freshwater)
Taxon name	Gambusia holbrooki
Common name	eastern mosquitofish
Assessor	Giorgi Epitashvili
Risk screening context	
Reason and socio-economic benefits	G. holbrooki is one of the widspread species. Its distribution was facilitated by human mostly for
Risk assessment area	South Caucasus
Taxonomy	Gambusia holbrooki Girard 1859
Native range	The native habitat of mosquitofish is the lowland ponds, lakes and streams of southern USA
Introduced range	Introduced worldwide in tropical and subtropical countries. North America: Atlantic and Gulf Slope
URL	https://www.fishbase.se/summary/4521

			Response	Justification (references and/or other information)	Confidence
Α.	Biogeo	graphy/Historical	•		
		ication/Cultivation			
1		Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	No	G. holbrooki is small sized fish and is not an interesting object for aquaculture.	High
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	No	G. holbrooki is small sized fish and is not an interesting object for aquaculture.	High
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	Gambusia holbrooki is a remarkably successful invader of freshwater systems worldwide, with the capacity to detrimentally impact native fishes both directly (e.g. competition, predation, agonistic interactions) and indirectly (e.g. triggering trophic cascades) (Macdonald et al. 2012).	Very high
2. (Climate	, distribution and introduction risk			
4	2.01	How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range?	Medium	Köppen-Geiger climate classification system	Medium
5	2.02	What is the quality of the climate matching data?	Medium	Köppen-Geiger climate classification system	Medium
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	This species is widely distributed in the SC region (Ninua et al. 2013; Kuljanishvili et al. 2020; Epitashvili et al. 2020).	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	This species has spread in the Caucasus region intentionaly by humans (Ninua et al. 2013).	High
8	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)?	Yes	This species is widely distributed in Iran, Turkey and surrounding of the South Caucasus region (Patimar et al. 2011; Kurtul and Musa, 2020).	Very high
<u>3.</u> 1	nvasive	e elsewhere			
9		Has the taxon become naturalised (established viable populations) outside its	Yes	This species has become naturalised in the most countries and regions outside of its native range.	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	Because of their aggressive and predatory behavior, mosquitofish may negatively affect populations of small fish through predation and competition (Myers 1967; Courtenay and Meffe, 1989).	Very high
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	Yes	There is no data however it is expected to have an impact	Medium
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem services?	Yes	Pest fish including G. holbrooki may affect markets (e.g., changes in prices), and non-market attributes (e.g., changes in ecosystem services) (Rowe et al. 2008).	High
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	Yes	Alien pest fish are likely to affect people's way of life due to impacts on recreational fishing and commercial fishing industries. Some of the measurable likely impacts include impacts on recreational opportunities and impacts on employment (Rowe et	High
B.	Biology	//Ecology			
		able (or persistence) traits			
		Is it likely that the taxon will be poisonous or pose other risks to human health?	No	This species does not pose a threat to humans	High
	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	Since their introduction into Australia in 1925 for the purpose of mosquito control, gambusia have become widespread in NSW, especially modified waterways, and are considered to be a contributing factor to the decline of frogs (threatened or otherwise) as well as other native species such as freshwater fishes and macro-invertebrates.	Medium
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	Yes	There are several threatened and protected species in the SC region which are likely to be under pressure from this species (Ninua et al. 2013, Kuljanishvili et al. 2020).	Very high
	4.04	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?	Yes	This species has been successfully established in the SC region which means that it has crossed these barriers.	High
	4.05	Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA area?	Yes	Gambusia predation decreased markedly the overall abundance of zooplankton. Large crustaceans (Anostraca and Calanoida) were rapidly eliminated, while Cyclopoida and Cladocera peaked in March before in turn disappearing in the later stages of the hydroperiod. These results are congruent with the theory supporting the influence of both predation and competition as maior interacting forces shaping freshwater communities	Very high
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes	G. holbrooki may affect markets (e.g., changes in prices), and non-market attributes (e.g., changes in ecosystem services) (Rowe et al. 2008).	Medium

	one or more hours) at some stage of its life			1
4 8.0	water for extended periods (e.g. minimum of	No	Such a fact is not described	Medium
. Toler	ance attributes			1
3 7.0	seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent?	Yes	Probably yes	Low
	vectors/pathways mentioned in the previous			
2 7.0	be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the	Yes	help of other animals (birds, reptilies, etc.) Probably yes	Low
1 7.0	migrate in the RA area for reproduction?7Are propagules or eggs of the taxon likely to	Yes	migrate. This species should be propagated within the SC region with the	Medium
7.0	5 Are older life stages of the taxon likely to	No	This species lives permanently in specific reservoirs and does not	Very high
7.0	occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?		help of other animals (birds, reptilies, etc.) or move by water between waterbodies (Own observation)	
7.0	(for plants: seeds, spores) in the RA area?	Yes	This species should be propagated within the SC region with the	Medium
3 7.0	hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules	Yes	This species should be propagated within the SC region with the help of other animals (birds, reptilies, etc.) (Own observation)	Medium
7 7.0	B Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship	No	Such a fact is not described	Medium
6 7.0		Yes	G. holbrooki is distributed within the protected areas of the SC region, for instance in the Kolkheti National Park, Western Georgia (Own data).	Very high
5 7.0		>1	Currently this species spreading within the SC by itself/or other animals (birds) (own observation).	Medium
. Dispe	first-reproduction?			l
4 6.0	does the taxon require to reach the age-at-	1	G. holbrooki matures at 4-6 weeks (Kottelat and Freyhof, 2007).	Medium
	large number of propagules or offspring within a short time span (e.g. < 1 year)?		produced in one year. Gestation lasts 3-4 weeks. Brood may reach up to 354 young, but is generally around 40-60 (Riehl and Baensch, 1991; Kottelat and Freyhof, 2007).	
3 6.0	another taxon (or specific habitat features) to complete its life cycle? 5 Is the taxon known (or likely) to produce a	No	G. holbrooki matures at 4-6 weeks; 3 generations can be	Medium
2 6.0	display asexual reproduction?	No No	Such fact has not been detected yet No research has been conducted in this regard	Low
1 6.0	native taxa?			_
0 6.0	or propagules (in the RA area)?	No	al. 2020). Such fact has not been detected yet	High
9 6.0	and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes	Yes	This species breeds in the South Caucasus region (Kuljanishvili et	Very high
8 6.0	Is the taxon likely to exhibit parental care	No	No research has been conducted in this regard	Low
. Repr	resources (including nutrients) to the detriment of native taxa in the RA area?		species is likely to be a serious competitor to local fish.	
7 5.0		Not applicable	No research has been conducted in this regard however, this	Low
	Is the taxon likely to consume threatened or	Not applicable	Such data is not available	Low
. Reso	by way of a dormant form)? urce exploitation		l	
5 4.1	population even when present in low densities (or persisting in adverse conditions	Not applicable	No research has been conducted in this regard	Low
	(e.g. feeding) will reduce habitat quality for native taxa?		America which competes against and moves local species away (Cano-Rocabayera et al. 2019).	
4 4.1		Yes	pools of steams (Page & Burr 1991) Degradation of the quality of water and natural habitat are a threat to this invasive species from the Atlantic coast in North	Very high
3 4.1		No	Adult mosquitofish specimens occur in standing to slow-flowing water, mostly in vegetated ponds and lakes, backwaters and quiet	High
2 4.0	 to) the RA area? Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity? 	No	This fish is small sized and therefore is an uninteresting species for aquaculture	High
1 4.0	act as a vector for, recognised pests and infectious agents that are absent from (novel	NO		LOW
1 4.0	infectious agents that are endemic in the RA Is it likely that the taxon will host, and/or	No	No research has been conducted in this regard	Low
	infortions and that are and aris in the DA			

45	8.02	Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being considered.]	Yes	This study showed that G. holbrooki off drainage of Domat Al- Jandal Lake, KSA can tolerate abrupt changes in salinity, temperature and pH changes. The LC50 of salinity was 16 %. LC50 of lower and upper temperature on G. holbrooki were 3.5 and 36.5 0C when transferred abruptly from 22 0C. The LC50 of pH in acidity and alkalinity range were 3.5 and 11.5 respectively.	High
46	8.03	Can the taxon be controlled or eradicated in	No	From this study, it can be concluded that G. holbrooki can be used under different conditions of 15 ‰ salinity, range of pH from 4 to 11 and range of temperature from 4 to 35 0C for controlling mosouito if transferred abruptly without acclimatization (EL-Boray Attempts have been made to eradicate G. holbrooki from water	High
		agents/means?		bodies using the fish poison rotenone. Most native fish are killed by a rotenone concentration of 0.5 ppm but Gambusia can survive this concentration without mortality (Pyke, 2005). Impacts on native fishes and other native fauna have been mitigated by releasing potassium permanganate downstream of the rotenone release point in flowing waterways. Gambusia is more tolerant of the organo-phosphorus pesticide Dursban™ than several native fishes (Pyke, 2005). These observations mean that chemical control methods are highly likely to affect native fish and other aquatic biota well before useful levels of gambusia mortality can	' ng n
47	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	Yes	The inappropriate spread of Gambusia by humans for the purpose of mosquito control remains a problem in spite of repeated cautionary advice over the past 20 years (Arthington and Lloyd,	Medium
48	8.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	Yes	The broad salinity tolerance of mosquitofish allows them to colonise environments, such as salt lakes, estuaries, near coastal marine environments (Lloyd, 1987). The salinity LD50 for mosquitofish is more than 58g/L and they can tolerate direct transfers to salinity differences of up to seawater (35 g/L) with few mortalities (Chervinski, 1983).	High
49	8.06	Are there effective natural enemies (predators) of the taxon present in the RA	Yes	There are meny predators which can eat G. holbrooki in the SC region (fish, reptilies, birds etc.)	Very high
		e change			
	<i>limate</i> 9.01	change Under the predicted future climatic	Increase	Own observation	Low
		conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?			
	9.02	Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	Increase	Own observation	Low
	9.03	Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change?	Increase	Own observation	Low
	9.04	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	No change	Own osbervation	Low
54	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	No change	Own observation	Low
55	9.06	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	No change	Own osbervation	Low

Statistics	
Scores	
BRA	31.5
BRA Outcome	-
BRA+CCA	37.5
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	14.5
1. Domestication/Cultivation	0.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	13.5
B. Biology/Ecology	17.0
4. Undesirable (or persistence) traits	6.0
5. Resource exploitation	0.0
6. Reproduction	1.0
7. Dispersal mechanisms	5.0
8. Tolerance attributes	5.0
C. Climate change	6.0
9. Climate change	6.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3
2. Climate, distribution and introduction risk	13 3 5 5
3. Invasive elsewhere	5
B. Biology/Ecology	36

12	4. Undesirable (or persistence) traits
2	5. Resource exploitation
7	6. Reproduction
9	7. Dispersal mechanisms
6	8. Tolerance attributes
6	C. Climate change
6	9. Climate change
	Sectors affected
11	Commercial
7	Environmental
24	Species or population nuisance traits
	Thresholds

Thesholds	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.60
BRA	0.64
CCA	0.25

Date and Time 03/05/2022 18:03:42

Taxon and Assessor details	
Category	Fishes and Lampreys (freshwater)
Taxon name	Gambusia holbrooki
Common name	eastern mosquitofish
Assessor	Tatia Kuljanishvili
Risk screening context	
Reason and socio-economic benefits	was introduced into Georgia from Italy in 1925 by Dr. Rukhadze as a biological pest control agent
Risk assessment area	South Caucasus
Taxonomy	Actinopteri (ray-finned fishes) > Cyprinodontiformes (Rivulines, killifishes and live bearers) >
Native range	Gambusia holbrooki is native of North America
Introduced range	Armenia, Azerbaijan, Georgia
URL	https://fishbase.mnhn.fr/summary/Gambusia-holbrooki.html

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
1. D		tication/Cultivation			
1	1.01	Has the taxon been the subject of	No	This species has no ornamental value, however it is rarely kept	Medium
	1	domestication (or cultivation) for at least 20		indoors by hobbists	
	L	generations?			
2	1.02	Is the taxon harvested in the wild and likely	No	No. this species does not have a comercial value	High
	L	to be sold or used in its live form?			
3	1.03	Does the taxon have invasive races,	Yes	Gambusia affinis	High
		varieties, sub-taxa or congeners?			
2. C		, distribution and introduction risk			
4	2.01	How similar are the climatic conditions of the	High	It is somehow similar. Especially similar in the Kura river basin	Medium
	1	Risk Assessment (RA) area and the taxon's			
		native range?			
5	2.02	What is the quality of the climate matching	High	Good	High
		data?			
6	2.03	Is the taxon already present outside of	Yes	st has been introduced and released in natural water bodies of SC	Very high
	1	captivity in the RA area?		countries since 1920s	
7	2.04	How many potential vectors could the taxon	One	Biological control	Very high
	1	use to enter in the RA area?			, -
8	2.05	Is the taxon currently found in close	Yes	Currently, this species is distributed widely and is considered	Very high
	1	proximity to, and likely to enter into, the RA		invasive in the SC (Kuljanishvili et al., 2020)	
	Ì	area in the near future (e.g. unintentional			
		and intentional introductions)?			
3. Ir	nvasiv	e elsewhere			
		Has the taxon become naturalised	Yes	yes. not only naturalized but also invasive.	Very high
	1	(established viable populations) outside its			, , ,
10	3.02	In the taxon's introduced range, are there	Yes	It was said that this species exsistance had negative effect on	Very high
	1	known adverse impacts to wild stocks or		native biodiversity (Kottelat & Freyhof 2007).	- / 5
	1	commercial taxa?			
11	3.03	In the taxon's introduced range, are there	Yes	Yes, this could be due to competition with the planktonivourous	High
		known adverse impacts to aquaculture?		fishes	
12	3.04	In the taxon's introduced range, are there	Yes	Can be transmitting diseases, and not used for recreational	Medium
		known adverse impacts to ecosystem		fisheries	
13	3.05	In the taxon's introduced range, are there	Yes	This species is difficult to eradicate and it was predicted that it	High
	5.05	known adverse socio-economic impacts?		could be the major challange for fisheries an environmental	
	1	known daverse socio economic impacts.		managers	
	1			(https://docs.niwa.co.nz/library/public/RoweReviewofimpacts2008.	
BE	Siolog	y/Ecology		The part of the second se	
		aple (or persistence) traits			
		<i>Table (or persistence) traits</i> Is it likely that the taxon will be poisonous or	No	Not poisonous	Very high
15		Is it likely that the taxon will be poisonous or	No	Not poisonous	Very high
	4.01	Is it likely that the taxon will be poisonous or pose other risks to human health?			, -
13		Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or	No Yes	It was said that this species existence had negative effect on	Very high Very high
13	4.01	Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or			, -
	4.01 4.02	Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	It was said that this species existence had negative effect on native biodiversity (Kottelat & Freyhof 2007).	Very high
	4.01 4.02	Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa		It was said that this species existence had negative effect on	, -
	4.01 4.02	Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in	Yes	It was said that this species existence had negative effect on native biodiversity (Kottelat & Freyhof 2007).	Very high
16	4.01 4.02 4.03	Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	Yes	It was said that this species existence had negative effect on native biodiversity (Kottelat & Freyhof 2007). Does not parasite	Very high Very high
16	4.01 4.02	Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic	Yes	It was said that this species existence had negative effect on native biodiversity (Kottelat & Freyhof 2007). Does not parasite it may survive low oxigen environments via taking the oxygen	Very high
16	4.01 4.02 4.03	Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus	Yes	It was said that this species existence had negative effect on native biodiversity (Kottelat & Freyhof 2007). Does not parasite	Very high Very high
16	4.01 4.02 4.03	Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has	Yes	It was said that this species existence had negative effect on native biodiversity (Kottelat & Freyhof 2007). Does not parasite it may survive low oxigen environments via taking the oxygen	Very high Very high
16 17	4.01 4.02 4.03 4.04	Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?	Yes No Yes	It was said that this species existence had negative effect on native biodiversity (Kottelat & Freyhof 2007). Does not parasite it may survive low oxigen environments via taking the oxygen fromm upper levels (kottelat & Freyhof 2007)	Very high Very high High
16 17	4.01 4.02 4.03	Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web	Yes	It was said that this species existence had negative effect on native biodiversity (Kottelat & Freyhof 2007). Does not parasite it may survive low oxigen environments via taking the oxygen	Very high Very high
16 17	4.01 4.02 4.03 4.04	Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it	Yes No Yes	It was said that this species existence had negative effect on native biodiversity (Kottelat & Freyhof 2007). Does not parasite it may survive low oxigen environments via taking the oxygen fromm upper levels (kottelat & Freyhof 2007)	Very high Very high High
16 17 18	4.01 4.02 4.03 4.04 4.05	Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA	Yes No Yes Yes	It was said that this species existence had negative effect on native biodiversity (Kottelat & Freyhof 2007). Does not parasite it may survive low oxigen environments via taking the oxygen fromm upper levels (kottelat & Freyhof 2007) It may exploit food resources for native species	Very high Very high High Medium
16 17 18	4.01 4.02 4.03 4.04 4.05	Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts	Yes No Yes	It was said that this species existence had negative effect on native biodiversity (Kottelat & Freyhof 2007). Does not parasite it may survive low oxigen environments via taking the oxygen fromm upper levels (kottelat & Freyhof 2007) It may exploit food resources for native species It can transmit parasites and pathogens, is not used for	Very high Very high High
16 17 18 19	4.01 4.02 4.03 4.04 4.05 4.06	Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes No Yes Yes Yes	It was said that this species existence had negative effect on native biodiversity (Kottelat & Freyhof 2007). Does not parasite it may survive low oxigen environments via taking the oxygen fromm upper levels (kottelat & Freyhof 2007) It may exploit food resources for native species It can transmit parasites and pathogens, is not used for recreational fisheries.	Very high Very high High Medium
16 17 18 19	4.01 4.02 4.03 4.04 4.05	Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or	Yes No Yes Yes	It was said that this species existence had negative effect on native biodiversity (Kottelat & Freyhof 2007). Does not parasite it may survive low oxigen environments via taking the oxygen fromm upper levels (kottelat & Freyhof 2007) It may exploit food resources for native species It can transmit parasites and pathogens, is not used for	Very high Very high High Medium
16 17 18 19	4.01 4.02 4.03 4.04 4.05 4.06	Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and	Yes No Yes Yes Yes	It was said that this species existence had negative effect on native biodiversity (Kottelat & Freyhof 2007). Does not parasite it may survive low oxigen environments via taking the oxygen fromm upper levels (kottelat & Freyhof 2007) It may exploit food resources for native species It can transmit parasites and pathogens, is not used for recreational fisheries.	Very high Very high High Medium
16 17 18 19 20	4.01 4.02 4.03 4.04 4.05 4.06 4.07	Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA	Yes No Yes Yes Yes No	It was said that this species existence had negative effect on native biodiversity (Kottelat & Freyhof 2007). Does not parasite it may survive low oxigen environments via taking the oxygen fromm upper levels (kottelat & Freyhof 2007) It may exploit food resources for native species It can transmit parasites and pathogens, is not used for recreational fisheries. No information	Very high Very high High Medium Medium Low
16 17 18 19 20	4.01 4.02 4.03 4.04 4.05 4.06	Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA Is it likely that the taxon will host, and/or	Yes No Yes Yes Yes	It was said that this species existence had negative effect on native biodiversity (Kottelat & Freyhof 2007). Does not parasite it may survive low oxigen environments via taking the oxygen fromm upper levels (kottelat & Freyhof 2007) It may exploit food resources for native species It can transmit parasites and pathogens, is not used for recreational fisheries.	Very high Very high High Medium
16 17 18 19 20	4.01 4.02 4.03 4.04 4.05 4.06 4.07	Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA	Yes No Yes Yes Yes No	It was said that this species existence had negative effect on native biodiversity (Kottelat & Freyhof 2007). Does not parasite it may survive low oxigen environments via taking the oxygen fromm upper levels (kottelat & Freyhof 2007) It may exploit food resources for native species It can transmit parasites and pathogens, is not used for recreational fisheries. No information	Very high Very high High Medium Medium Low
16 17 18 19 20	4.01 4.02 4.03 4.04 4.05 4.06 4.07	Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel	Yes No Yes Yes Yes No	It was said that this species existence had negative effect on native biodiversity (Kottelat & Freyhof 2007). Does not parasite it may survive low oxigen environments via taking the oxygen fromm upper levels (kottelat & Freyhof 2007) It may exploit food resources for native species It can transmit parasites and pathogens, is not used for recreational fisheries. No information	Very high Very high High Medium Medium Low
16 17 18 19 20 21	4.01 4.02 4.03 4.04 4.05 4.06 4.07 4.08	Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA Is the likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area?	Yes No Yes Yes No Yes	It was said that this species existence had negative effect on native biodiversity (Kottelat & Freyhof 2007). Does not parasite it may survive low oxigen environments via taking the oxygen fromm upper levels (kottelat & Freyhof 2007) It may exploit food resources for native species It can transmit parasites and pathogens, is not used for recreational fisheries. No information It is possible	Very high Very high High Medium Low Medium
16 17 18 19 20 21	4.01 4.02 4.03 4.04 4.05 4.06 4.07	Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel	Yes No Yes Yes Yes No	It was said that this species existence had negative effect on native biodiversity (Kottelat & Freyhof 2007). Does not parasite it may survive low oxigen environments via taking the oxygen fromm upper levels (kottelat & Freyhof 2007) It may exploit food resources for native species It can transmit parasites and pathogens, is not used for recreational fisheries. No information	Very high Very high High Medium Medium Low
16 17 18 19 20 21	4.01 4.02 4.03 4.04 4.05 4.06 4.07 4.08	Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA Is the likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area?	Yes No Yes Yes No Yes	It was said that this species existence had negative effect on native biodiversity (Kottelat & Freyhof 2007). Does not parasite it may survive low oxigen environments via taking the oxygen fromm upper levels (kottelat & Freyhof 2007) It may exploit food resources for native species It can transmit parasites and pathogens, is not used for recreational fisheries. No information It is possible	Very high Very high High Medium Low Medium
16 17 18 19 20 21	4.01 4.02 4.03 4.04 4.05 4.06 4.07 4.08	Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area? Is it likely that the taxon will achieve a body	Yes No Yes Yes No Yes	It was said that this species existence had negative effect on native biodiversity (Kottelat & Freyhof 2007). Does not parasite it may survive low oxigen environments via taking the oxygen fromm upper levels (kottelat & Freyhof 2007) It may exploit food resources for native species It can transmit parasites and pathogens, is not used for recreational fisheries. No information It is possible	Very high Very high High Medium Low Medium
16 17 18 19 20 21 22	4.01 4.02 4.03 4.04 4.05 4.06 4.07 4.08	Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area? Is it likely that the taxon will achieve a body size that will make it more likely to be	Yes No Yes Yes No Yes	It was said that this species existence had negative effect on native biodiversity (Kottelat & Freyhof 2007). Does not parasite it may survive low oxigen environments via taking the oxygen fromm upper levels (kottelat & Freyhof 2007) It may exploit food resources for native species It can transmit parasites and pathogens, is not used for recreational fisheries. No information It is possible	Very high Very high High Medium Low Medium
16 17 18 19 20 21 22	4.01 4.02 4.03 4.04 4.05 4.06 4.07 4.08	Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA Is the likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area? Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity?	Yes No Yes Yes No Yes No	It was said that this species existence had negative effect on native biodiversity (Kottelat & Freyhof 2007). Does not parasite it may survive low oxigen environments via taking the oxygen fromm upper levels (kottelat & Freyhof 2007) It may exploit food resources for native species It can transmit parasites and pathogens, is not used for recreational fisheries. No information It is possible This is small bodied organism	Very high Very high High Medium Medium Low Medium Very high

4	4.11	Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for	No	Yes, this could be due to competition with the planktonivourous fishes	High
5	4.12	native taxa? Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)?	Yes	Reproduces from 3-4 month 3-4 times a year. Wthin one year 3 generations can be born (Kttelat & Freyhof 2007)	Very high
		e exploitation	×		lue i
6	5.01	Is the taxon likely to consume threatened or protected native taxa in the RA area?	Yes	it is likely to consume the eggs of threatened or protected native taxa	High
7	5.02	Is the taxon likely to sequester food resources (including nutrients) to the	Yes	It is possible	Medium
D	leprodu	detriment of native taxa in the RA area?			
	6.01	Is the taxon likely to exhibit parental care	Yes	These are livebearer species that rproducs from 3-4 month 3-4	Very high
		and/or to reduce age-at-maturity in response to environmental conditions?		times a year. Wthin one year 3 generations can be born (Kttelat & Freyhof 2007) they can give birth up to 60 fish	
9	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	Yes. It has been considered as established species since 1930ies	Very high
0	6.03	Is the taxon likely to hybridise naturally with native taxa?	No	No information available	Very high
1	6.04	Is the taxon likely to be hermaphroditic or to	No	No. reproduces sexually See:	Very high
2	6.05	display asexual reproduction? Is the taxon dependent on the presence of	No	https://www.fishbase.in/summary/Gambusia-holbrocki.html No. See: https://www.fishbase.in/summary/Gambusia-	Very high
2	0.05	another taxon (or specific habitat features) to complete its life cycle?	NO	holbrocki.html	very nigh
3	6.06	Is the taxon known (or likely) to produce a	Yes	Reproduces from 3-4 month 3-4 times a year. Wthin one year 3	Very high
ļ		large number of propagules or offspring		generations can be born (Kttelat & Freyhof 2007)	
4	6.07	within a short time span (e.g. < 1 year)? How many time units (days, months, years)	3	3-4 months	Very high
•	5.07	does the taxon require to reach the age-at-	-		, ingli
		first-reproduction?			
		al mechanisms How many potential internal	>1	Biological control, self-dispersal	Very high
,	7.01	vectors/pathways could the taxon use to disperse within the RA area (with suitable	~1		very mgn
6	7.02	Will any of these vectors/pathways bring the	Yes	Yes. This is possible since the accidental or deliberate releases	Very high
		taxon in close proximity to one or more		that are common in RA	-
7	7.03	protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively	No	Yes. This is possible since the accidental or deliberate releases	Very high
<i>,</i>	2.05	attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances		that are common in RA	very mgn
8	7.04	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules	No	this species do not lie egss	Very high
9	7.05	(for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?	Yes	Yes it is possible	Very high
0	7.06	Are older life stages of the taxon likely to	No	Does not migrate	Very high
1	7.07	migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No	No	Very high
2	7.08	Is dispersed in the two along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both	No	Introduction for biological control is not happening anymore, however it still spreads itself	Medium
2	7.00	unintentional or intentional) likely to be	¥		L li ele
	7.09 olerand	Is dispersal of the taxon density dependent? ce attributes	Yes	Yes (Cote et al 2010)	High
		Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life	No	No information	Low
5	8.02	cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the	Yes	Salinity (Chervinsky 19853), temperature (Uliano et al 2010; Meffe et al 1995), oxygen (Kottelat & Freyhof 2007)	High
6	8.03	relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other	Yes	It can be removed from streams however, it is difficult and costly to remove them from lakes and reservoirs	Low
		agents/means?			
	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	Yes	Can tollerate pollution caused by humans	Medium
8	8.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	Yes	They can tolerate high salinity levels (Chervinsky 1983)	Very high
9	8.06	Are there effective natural enemies (predators) of the taxon present in the RA	Yes	There are fish like Perch, Pike, Catfish But There is no information about their effectivness	Medium
		e change			
		change Under the predicted future climatic	Increase	It was hypotheses that climate change might alort the	High
J	9.01	conditions, are the risks of entry into the RA area posed by the taxon likely to increase,	Increase	It was hypotheses that climate change might alert the mechanisms of transportation and introduction of non-native species. Commercial and recreational activities will increase, that	High

51	9.02	Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	Increase	Increased temperatures will cause this species establish in higher altitudes	Very high
52	9.03	Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change?	Increase	It might favour by environmental changes (caused by climate change) that will increase resource availability, resulting their widespread.	Very high
53	9.04	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	Higher	Population densities will increase making them on one hand impossible to eradicate and on the other hand, affecting native organisms due to competition, that does not leave much resources for native ones.	High
54	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Higher	Future increased temperatures will favour the dispersal and success of this species establishment which itself, affects native species that are of main concern for conservation.	Medium
55	9.06	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	No change	The magnitude of future potential impact on ecosystem services will not change	Medium

Statistics

Scores	
BRA	38.0
BRA Outcome	-
BRA+CCA	48.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	19.0
1. Domestication/Cultivation	0.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	18.0
B. Biology/Ecology	19.0
4. Undesirable (or persistence) traits	7.0
5. Resource exploitation	7.0
6. Reproduction	2.0
7. Dispersal mechanisms	0.0
8. Tolerance attributes	3.0
C. Climate change	10.0
9. Climate change	10.0
Answered Questions	
Total	55
A. Biogeography/Historical	13 3 5 5
1. Domestication/Cultivation	3
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	36
B. Biology/Ecology	12
4. Undesirable (or persistence) traits	
5. Resource exploitation	2 7 9 6
6. Reproduction	/
<i>7. Dispersal mechanisms</i> <i>8. Tolerance attributes</i>	9
C. Climate change	6
9. Climate change	6
	0
Sectors affected	
Sectors affected	13
Commercial	13
Commercial Environmental	16
Commercial	
Commercial Environmental Species or population nuisance traits	16
Commercial Environmental	16

BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.79
BRA	0.79
CCA	0.75
Date and Time	
21/05/2	022 14:03:32

axon and Assessor details						
Category	Fishes and Lampreys (freshwater)					
Taxon name	Gasterosteus aculeatus					
Common name	three-spined stickleback					
Assessor	Bella Japoshvili					
Risk screening context						
Reason and socio-economic benefits	G. aculeatus has invided Caspian Sea and is widespread already there. It is translocated species					
Risk assessment area	South Caucasus					
Taxonomy	Actinopteri (ray-finned fishes) > Perciformes/Gasterosteoidei (Sticklebacks) > Gasterosteidae					
Native range	Curcum arctic temperate regions					
Introduced range	Caspian Sea					
URL	https://www.fishbase.de/summary/Gasterosteus-aculeatus.html					

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
1. l		ication/Cultivation	Ne	Not such fact is known	High
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	No	Not such fact is known	High
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	For the aquarium purpose. Not a documented evidence	Low
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	No	Not other congeneric or invasive races are known	High
2. (Climate	, distribution and introduction risk			
4	2.01	How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range?	High	based on Climatch results	Medium
5	2.02	What is the quality of the climate matching data?	Low	Due to low resolution of local climate data	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	Kuljanishvili, T., Mumladze, L., Japoshvili, B., Mustafayev, N., Ibrahimov, S., Patoka, J., & Kalous, L. (2021). The first unified inventory of non-native fishes of the South Caucasian countries, Armenia, Azerbaijan, and Georgia. Knowledge & Management of Aquatic Ecosystems, (422), 32.	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	>1	It spreads with help of human (direct translocation) and alos via the chennel system	Medium
8	2.05	Is the taxon currently found in close	Yes	Already in the RA area Kuljanishvili, T., Mumladze, L., Japoshvili,	High
		proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)?		B., Mustafayev, N., Ibrahimov, S., Patoka, J., & Kalous, L. (2021). The first unified inventory of non-native fishes of the South Caucasian countries, Armenia, Azerbaijan, and Georgia.	
3 1	Invaciv	e elsewhere		Knowledge & Management of Aguatic Ecosystems, (422), 32.	
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	Kuljanishvili, T., Mumladze, L., Japoshvili, B., Mustafayev, N., Ibrahimov, S., Patoka, J., & Kalous, L. (2021). The first unified inventory of non-native fishes of the South Caucasian countries, Armenia, Azerbaijan, and Georgia. Knowledge & Management of Aquatic Ecosystems, (422), 32.	High
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	Roch, S., von Ammon, L., Geist, J., & Brinker, A. (2018). Foraging habits of invasive three-spined sticklebacks (Gasterosteus aculeatus)-impacts on fisheries yield in Upper Lake Constance. Fisheries Research, 204, 172-180.	Medium
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	Yes	Roch, S., von Ammon, L., Geist, J., & Brinker, A. (2018). Foraging habits of invasive three-spined sticklebacks (Gasterosteus aculeatus)-impacts on fisheries yield in Upper Lake Constance. Fisheries Research, 204, 172-180.	High
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem services?	Yes	Candolin, U. (2019). The threespine stickleback (Gasterosteus aculeatus) as a modifier of ecological disturbances. Evolutionary Ecology Research.	Low
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	Yes	Roch, S., von Ammon, L., Geist, J., & Brinker, A. (2018). Foraging habits of invasive three-spined sticklebacks (Gasterosteus aculeatus)-impacts on fisheries yield in Upper Lake Constance. Fisheries Research, 204, 172-180.	High
		y/Ecology			
		able (or persistence) traits			
		Is it likely that the taxon will be poisonous or pose other risks to human health?		Not a poisonous or risky species for human health	High
15	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	Roch, S., von Ammon, L., Geist, J., & Brinker, A. (2018). Foraging habits of invasive three-spined sticklebacks (Gasterosteus aculeatus)-impacts on fisheries yield in Upper Lake Constance. Fisheries Research, 204, 172-180.	High
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	Species is not parasite	High
	4.04	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?	Yes	It is capable to survive in fresh, brackish and marine waters	High
18	4.05	Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA area?	Yes	Candolin, U. (2019). The threespine stickleback (Gasterosteus aculeatus) as a modifier of ecological disturbances. Evolutionary Ecology Research.; Roch, S., von Ammon, L., Geist, J., & Brinker, A. (2018). Foraging habits of invasive three-spined sticklebacks (Gasterosteus aculeatus)-impacts on fisheries yield in Upper Lake Constance. Fisheries Research, 204, 172-180.	Medium

19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes	Candolin, U. (2019). The threespine stickleback (Gasterosteus aculeatus) as a modifier of ecological disturbances. Evolutionary Ecology Research.; Roch, S., von Ammon, L., Geist, J., & Brinker, A. (2018). Foraging habits of invasive three-spined sticklebacks (Gasterosteus aculeatus)-impacts on fisheries yield in Upper Lake Constance. Fisheries Research, 204, 172-180.	Medium
20	4.07	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA	No	No documented evidence eixsts	Low
21	4.08	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area?	Yes	The species can be host of many parasites and infectious agents absent from the RA area in the past. e.g. hrelfall, W. (1968). A mass die-off of three-spined sticklebacks (Gasterosteus aculeatus L.) caused by parasites. Canadian Journal of Zoology, 46(1), 105- 106. Chappell, L. H. (1969). The parasites of the three-spined stickleback Gasterosteus aculeatus L. from a Yorkshire pond. I. Seasonal variation of parasite fauna. Journal of Fish Biology, 1(2),	High
22	4.09	Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity?	No	https://www.fishbase.de/summary/Gasterosteus-aculeatus.html	High
23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)?	Yes	The species is known from many different water bodies including lotinc and lentic systems	High
24	4.11	Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa?	No	No documented evidence exists	Low
25	4.12	Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions	Yes	No documented evidence. Based on professional judgement	Low
5. R	esourc	by way of a dormant form)?			
26	5.01	Is the taxon likely to consume threatened or protected native taxa in the RA area?	Yes	Species is predatory and thus can consume anything in freshwater while at juvenile stage	High
27	5.02	Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?	Yes	Thogh no documented evidence exists.	Low
	leprodu	uction			
28	6.01	Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?	Yes	Pinder, A.C., 2001. Keys to larval and juvenile stages of coarse fishes from fresh waters in the British Isles. Freshwater Biological Association. The Ferry House, Far Sawrey, Ambleside, Cumbria, UK. Scientific Publication No. 60. 136 p.	Very high
29	6.02	Is the taxon likely to produce viable gametes	Yes	It is already reproducing in RA area for decades	Very high
	6.03	or propagules (in the RA area)? Is the taxon likely to hybridise naturally with	No	No documented evidence eixsts	Very high
31	6.04	, .	No	The species is reproducing sexually	Very high
32	6.05	display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	No	No documented evidence eixsts	High
33	6.06	Is the taxon known (or likely) to produce a large number of propagules or offspring	No	Usually up to 400 eggs annualy	High
34	6.07	within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at-	1	Years	Very high
7 6		first-reproduction?			
	<i>ispersa</i> 7.01	al mechanisms How many potential internal	>1	Human mediated translocation and direct migration through	Very high
	,.01	vectors/pathways could the taxon use to disperse within the RA area (with suitable habitats nearby)?		chanal system. Kuljanishvili, T., Mumladze, L., Japoshvili, B., Mustafayev, N., Ibrahimov, S., Patoka, J., & Kalous, L. (2021). The first unified inventory of non-native fishes of the South Caucasian countries, Armenia, Azerbaijan, and Georgia. Knowledge & Management of Aquatic Ecosystems, (422), 32.	
36	7.02	Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)?	Yes	The species is already known from the Kolkheti national park along the Black Sea	High
37	7.03	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal?	No	No such fact is known	Very high
38	7.04	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?	No	No documented evidence eixsts	High
39	7.05	Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?	Yes	Highily expected but not documented evidence	Medium
	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	No	No documented evidence exists	Low
41	7.07	Are propagules or eggs of the taxon likely to	No	No documented evidence eixsts	High
42	7.08	be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous	Yes	The species can reach alrge number of freshwater bodies thorugh water currents in RA Area	Low

		Is dispersal of the taxon density dependent?	No	No documented evidence exists	Low
		<u>ce attributes</u>			
44	8.01	Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cvcle?	No	No documented evidence eixsts	Medium
45	8.02	Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being	No	No documented evidence eixsts	Low
46	8.03	Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	No	No such practice exists	Medium
47	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	Yes	Candolin, U. (2019). The threespine stickleback (Gasterosteus aculeatus) as a modifier of ecological disturbances. Evolutionary Ecology Research.	Medium
48	8.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	No	No documented evidence eixsts	Low
	8.06	Are there effective natural enemies (predators) of the taxon present in the RA	No	No documented evidence eixsts	Low
		e change			
		change	1		
50	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?	No change	Professional judgement - not expected	Medium
51	9.02	Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	No change	Professional judgement - not expected	Medium
52	9.03	Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change?	No change	Professional judgement - not expected	Medium
53	9.04	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	No change	Professional judgement - not expected	Medium
54	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Lower	Professional judgement - not expected	Low
55	9.06	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	Higher	Professional judgement - not expected	Low

Statistics	
Scores	
BRA	38.0
BRA Outcome	-
BRA+CCA	38.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	20.0
1. Domestication/Cultivation	0.0
2. Climate, distribution and introduction risk	2.0
3. Invasive elsewhere	18.0
B. Biology/Ecology	18.0
4. Undesirable (or persistence) traits	7.0
5. Resource exploitation	7.0
6. Reproduction	2.0
7. Dispersal mechanisms	0.0
8. Tolerance attributes	2.0
C. Climate change	0.0
9. Climate change	0.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3
2. Climate, distribution and introduction risk	3 5 5
3. Invasive elsewhere	5
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2
6. Reproduction	7
7. Dispersal mechanisms	9
8. Tolerance attributes	6
C. Climate change	6
9. Climate change	6
Sectors affected	
Commercial	19
Environmental Species or population nuisance traits	10
	14

Thresholds	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.60
BRA	0.62
CCA	0.42
Date and Time	
16/05/2	022 12:05:04

Taxon and Assessor details	
Category	Fishes and Lampreys (freshwater)
Taxon name	Gasterosteus aculeatus
Common name	three-spined stickleback
Assessor	Giorgi Epitashvili
Risk screening context	
Reason and socio-economic benefits	Gasterosteus aculeatus is a fish native to most inland and coastal waters north of 30°N. It has long
Risk assessment area	South Caucasus
Taxonomy	Gasterosteus aculeatus Linnaeus 1758
Native range	Circumarctic and temperate regions: Extending south to the Black Sea, southern Italy, Iberian
Introduced range	According to Miller and Hubbs (1969), the threespine stickleback was introduced into the Mohave
URL	https://www.fishbase.de/summary/Gasterosteus-aculeatus.html

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
1. L	Domest	ication/Cultivation			
1	1.01	Has the taxon been the subject of	Yes	Three-spined stickleback is easy to find in nature and easy to	High
		domestication (or cultivation) for at least 20		keep in aquaria.	
		generations?			
2	1.02	Is the taxon harvested in the wild and likely	No	This fish is small sized (8-9 cm) and dos not have a trade	Very high
		to be sold or used in its live form?		importance.	
3	1.03	Does the taxon have invasive races,	Yes	A massive increase in the pelagic population of non-endemic three-	Very high
		varieties, sub-taxa or congeners?		spined sticklebacks, Gasterosteus aculeatus L. in Lake Constance	
				has coincided with drastic declines in fishery yields. This study	
				assesses the possible direct and indirect impact of the mass	
				occurrence on native fish species in the lake (Roch et al. 2018).	
2. (<u>Climate</u>	, distribution and introduction risk			
4	2.01	How similar are the climatic conditions of the	High	G. aculeatus is naturally distributed in the Caucasus region	Very high
		Risk Assessment (RA) area and the taxon's			
		native range?			
5	2.02	What is the quality of the climate matching	High	G. aculeatus is naturally distributed in the Caucasus region	Very high
		data?			
6	2.03	Is the taxon already present outside of	Yes	G. aculeatus is naturally distributed in the Caucasus region	Very high
I		captivity in the RA area?			
7	2.04	How many potential vectors could the taxon	One	G. aculeatus is naturally spreads within the Caucasus region	High
		use to enter in the RA area?			
8	2.05	Is the taxon currently found in close	Yes	There are two sticklebacks (Gasterosteus aculeatus, an exotic, and	Very high
1		proximity to, and likely to enter into, the RA		Pungitius platygaster, a native) and one native pipefish	
1		area in the near future (e.g. unintentional		(Syngnathus caspius), the natives found in the Caspian Sea basin	
		and intentional introductions)?		and the exotic in that basin and adjacent basins (Coad 2015).	
		e elsewhere			1
9	3.01	Has the taxon become naturalised	Yes	Gasterosteus aculeatus, an exotic species found in the Caspian	High
		(established viable populations) outside its		Sea basin, Iran (Coad 2015).	
10	3.02	In the taxon's introduced range, are there	Yes	A massive increase in the pelagic population of non-endemic three-	Very high
		known adverse impacts to wild stocks or		spined sticklebacks, Gasterosteus aculeatus L. in Lake Constance	
		commercial taxa?		has coincided with drastic declines in fishery yields. This study	
1				assesses the possible direct and indirect impact of the mass	
-				occurrence on native fish species in the lake (Roch et al. 2018).	
11	3.03	In the taxon's introduced range, are there	Yes	A massive increase in the pelagic population of non-endemic three-	Medium
		known adverse impacts to aquaculture?		spined sticklebacks, Gasterosteus aculeatus L. in Lake Constance	
				has coincided with drastic declines in fishery yields (Roch et al.	
12	3.04	In the taxon's introduced range, are there	No	Data deficient	Medium
1		known adverse impacts to ecosystem			
13	3.05	In the taxon's introduced range, are there	No	Data deficient	Medium
		known adverse socio-economic impacts?			
		//Ecology			
		able (or persistence) traits			
14	4.01	· · ·	No	This species does not pose a threat to humans.	High
<u> </u>		pose other risks to human health?			
15	4.02	Is it likely that the taxon will smother one or	Yes	In absence of larval prey, sticklebacks were shown to feed	Very high
1		more native taxa (that are not threatened or		predominantly on Daphnia in the field, indicating a strong	
		protected)?		interspecific food competition with whitefish (Roch et al. 2018)	
16	4.03	Are there any threatened or protected taxa	Yes	G. aculeatus can eat Sturgeon (Acipenser spp) and other	Medium
		that the non-native taxon would parasitise in		threathened/protected species eggs.	
I		the RA area?			
17	4.04	Is the taxon adaptable in terms of climatic	Yes	This species is naturally occuring in the SC region (Kuljanishvili et	Very high
		and other environmental conditions, thus		al. 2020)	
		enhancing its potential persistence if it has			
I		invaded or could invade the RA area?			
18	4.05	Is the taxon likely to disrupt food-web	No		High
		structure/function in aquatic ecosystems if it		al. 2020) and therefore a similar fact is not to be expected.	
I		has invaded or is likely to invade the RA			
19	4.06	Is the taxon likely to exert adverse impacts	No		High
I		on ecosystem services in the RA area?		al. 2020) and no such fact has been observed at this stage.	
20	4.07	Is it likely that the taxon will host, and/or	Not applicable	Data deficient	Low
		act as a vector for, recognised pests and			
		infectious agents that are endemic in the RA			
21	4.08	Is it likely that the taxon will host, and/or	Not applicable	Data deficient	Low
1		act as a vector for, recognised pests and			
		infectious agents that are absent from (novel			
		to) the RA area?			

22	4.09	Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity?	No	This species is small sized and does not has a trade importance (Ninua et al. 2013).	Very high
23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)?	Yes	In freshwater, adults prefer to live in small stream but may occur in a variety of habitats including lakes and large rivers.	High
24	4.11		Yes	In 2015, nearly 180 million artificially hatched whitefish derived from wild offspring were released into Lake Constance (IBKF, 2016), resulting in an estimated biomass input of over a ton within a short time period. This easy, nutrient and energy rich food source in the oligotrophic water might facilitate the stickleback development, which permits the species to fully	Low
25	4.12	Is the taxon likely to maintain a viable population even when present in low	Yes	exploit the pelagic habitat and simultaneously reduce recruitment Own judgement	Low
		densities (or persisting in adverse conditions by way of a dormant form)?			
		e exploitation			I
26	5.01	Is the taxon likely to consume threatened or protected native taxa in the RA area?	Yes	The probability of this is high, because the G. aculeatus is a predator fish and can eat threatened or protected species larvaes/eggs (e.g. Sturgeons, Colchic barb - Capoeta sieboldii,	Medium
27	5.02	Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?	Yes	In case of lake Constanca study shows that in absence of larval prey, sticklebacks were shown to feed predominantly on Daphnia in the field, indicating a strong interspecific food competition with	High
6 D	eprodu	Iction		whitefish - Coregonus lavaretus (Roch et al. 2018).	
		Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response	Yes	This species displays elaborate breeding behavior (defending a territory, building a nest, taking care of the eggs and fry)	Medium
	6.02	or propagules (in the RA area)?	Yes	This species is naturally reproduces in the region (Ninua et al. 2013; Kuljanishvili et al. 2020).	Very high
	6.03	Is the taxon likely to hybridise naturally with native taxa?		Data deficient	Low
31	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	Yes	Sticklebacks were raised from syngamy through sexual maturity in untreated water and in three target concentrations of sodium perchlorate-treated water. Perchlorate was found to interfere with the expression of nuptial coloration, courtship behavior, and normal sexual development. Genetic testing revealed that some females were masculinized to the extent that they produced both sperm and eggs, and histological analysis showed that these individuals had intersexual gonads (ovotestes) containing both oocvtes and cells undergoing spermatogenesis (Bernhardt et al.	Very high
32	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	No	Data deficient	Medium
33	6.06	Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)?	No	Fecundity of G. aculeatus is 60-400 eggs (Ninua et al. 2013).	High
34	6.07	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	1	The fish becomes sexually mature at the age of 14-18 months (Ninua et al. 2013).	High
7. D) ispersa	al mechanisms			
35	7.01	How many potential internal vectors/pathways could the taxon use to	One	This species may be spread unintentionally by humans	Medium
36	7.02	disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)?	Yes	There is a possibility of that	Medium
	7.03	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal?	No	No such fact has been described	Medium
	7.04	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?	Yes	This species naturally reproduces in the region (Ninua et al. 2013).	Medium
39	7.05	Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?	Yes	This species naturally reproduces in the region (Ninua et al. 2013).	Medium
	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	Yes	This species naturally reproduces in the region (Ninua et al. 2013).	-
41	7.07	be dispersed in the RA area by other animals?	Yes	There is a possibility of that	Medium
-		Is dispersal of the taxon along any of the	No	Data deficient	Low
42	7.08	vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be			
43	7.09	vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or intentional) likely to be	Yes	Own judgement	Medium

45	0.00				h/ 1 · 1
45	8.02	Is the taxon tolerant of a wide range of	Yes	Adults occur in fresh waters, estuaries and coastal seas.	Very high
		water quality conditions relevant to that		Anadromous, with numerous non-anadromous populations in	
		taxon? [In the Justification field, indicate the		brackish or pure freshwater, rarely in marine waters. In the sea,	
		relevant water quality variable(s) being		confined to coastal waters. In freshwater, adults prefer to live in	
		considered.]		small stream but may occur in a variety of habitats including lakes	
				and large rivers. Inhabit shallow vegetated areas, usually over	
46	8.03	Can the taxon be controlled or eradicated in	Yes	Own judgement	Medium
		the wild with chemical, biological, or other			
		agents/means?			
47	8.04	Is the taxon likely to tolerate or benefit from	Yes	This species may be spread by humans	Medium
		environmental/human disturbance?			
48	8.05	Is the taxon able to tolerate salinity levels	Yes	Anadromous, with numerous non-anadromous populations of G.	Very high
		that are higher or lower than those found in		aculeatus in brackish or pure freshwater, rarely in marine waters.	
		its usual environment?		In the sea, confined to coastal waters.	
49	8.06	Are there effective natural enemies	Yes	There are meny species which can controll G. aculeatus population	High
		(predators) of the taxon present in the RA		in the region (Esox lucius, Squalius spp, Sander lucioperca, Perca	
		area?		fluviatilis, etc.)	
		e change			
		change	1-		[
50	9.01	Under the predicted future climatic	Increase	Own judgement	Medium
		conditions, are the risks of entry into the RA			
		area posed by the taxon likely to increase,			
		decrease or not change?			
51	9.02	Under the predicted future climatic	Increase	Own judgement	Medium
		conditions, are the risks of establishment			
		posed by the taxon likely to increase,			
		decrease or not change?			
52	9.03	Under the predicted future climatic	Increase	Own judgement	Medium
		conditions, are the risks of dispersal within			
		the RA area posed by the taxon likely to			
		increase, decrease or not change?			
53	9.04	Under the predicted future climatic	Higher	Own judgement	Medium
		conditions, what is the likely magnitude of			
		future potential impacts on biodiversity			
		and/or ecological integrity/status?			
54	9.05	Under the predicted future climatic	No change	Own judgement	Medium
		conditions, what is the likely magnitude of			
		future potential impacts on ecosystem			
		structure and/or function?			
55	9.06	Under the predicted future climatic	Lower	Own judgement	Medium
		conditions, what is the likely magnitude of			
		future potential impacts on ecosystem			
		services/socio-economic factors?			

Statistics	
Scores	
BRA	38.0
BRA Outcome	-
BRA+CCA	44.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	13.0
1. Domestication/Cultivation	2.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	10.0
B. Biology/Ecology	25.0
4. Undesirable (or persistence) traits	6.0
5. Resource exploitation	7.0
6. Reproduction	4.0
7. Dispersal mechanisms	5.0
8. Tolerance attributes	3.0
C. Climate change	6.0
9. Climate change	6.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	5
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2
6. Reproduction	
7. Dispersal mechanisms	9
8. Tolerance attributes	6
C. Climate change	6
9. Climate change	6
Sectors affected	-
Commercial	8
Environmental	9
	29
Species or population nuisance traits	
Thresholds	
	-

Confidence	
BRA+CCA	0.66
BRA	0.68
CCA	0.50
Date and Time	

05/05/2022 16:57:43

Taxon and Assessor details	
Category	Fishes and Lampreys (freshwater)
Taxon name	Gasterosteus aculeatus
Common name	three-spined stickleback
Assessor	Tatia Kuljanishvili
Risk screening context	
Reason and socio-economic benefits	Gasterosteus aculeatus is native to the Black Sea basin. The building of the Volga-Don canal
Risk assessment area	South Caucasus
Taxonomy	Actinopteri (ray-finned fishes) > Perciformes/Gasterosteoidei () > Gasterosteidae
Native range	The Black Sea basin
Introduced range	The Caspian Sea basin
URL	https://www.fishbase.in/summary/Gasterosteus-aculeatus.html

A. Biogeorraphy/Historical Conversion				Response	Justification (references and/or other information)	Confidence
Display Display Display Display Display Medium 2 1.0.0 Hisk the toxin ben the subject of domestication, however it is used as squarium fish or laboratory annual domestication, however it is used as squarium fish or laboratory annual domestication, however it is used as squarium fish or laboratory annual domestication, however it is harvested for public aquariums. No., is occasionally taken commercially in Scandiavia and processed into fishmeal and oil Medium 3 1.0.3 Applies a statistication, for a statistication, however it is narvested for public aquariums. No., is occasionally taken commercially in Scandiavia and processed into fishmeal and oil High 2 Commex Application and introduction risk High 2 2.0.1 Medium are the climatic adaption of the High It is non-box similar. High 3 2.0.2 Application and introduction risk High It is non-box similar. High 3 2.0.2 Medium are benchmark conditions of the High It is non-box similar. High 4 2.0.1 Medium are benchmark matching Low S. There are no climatic datafors in climatic datafors in climatic datafors in climatic datafors in climatic datafors in climatic datafors in climatic datafors in climatic datafors in climatic datafors andatexity present outstade data is a statistic windithy	Α.	Biogeo	graphy/Historical			
1 1.0.1 Has the taxon bene the subject of domestication, however it is used presentation (or critication) for at least 1 Medium 2 1.0.2 Is the taxon have invasive races, the subject of the least 1 Medium Medium 3 1.0.3 Does the taxon have invasive races, the subject of public quarkines, to can be have enclosed or public quarkines, to can be have commercial yin a commercial yin a commercial yin the subject of the least 1 Medium 2 1.0.3 Does the taxon have invasive races, the subject of the least 1 Medium 2 1.0.4 Does the taxon have invasive races, the subject of the least 1 Medium 2 1.0.4 How similar are the clinitatic conditions of the least 1 Medium 3 1.0.3 Is the quarking of the clinate matching data Low No No information available High 2 2.0.4 What the quarking of the clinate matching data Is the quarking of the clinate matching data Is the taxon already present outside of the clinate matching data Is the quarking reproduction with rate way for this species Very high 2 2.0.4 How many potential vectors could the taxon on the data could the taxon on the data data data data data data data dat						
energian energian Test of the second provided in the wild and likely version of the second provided in the second provide data considers for aquarisms by local hobbysts or can be harvested for public aquarity and processed into fishmeal and oil Medium 3 1.0.2 Site taxon have invasive races, but have consider races, but have considered and introduction races data by local hobbysts or can be harvested for public aquarity and processed into fishmeal and oil High 2 Conset, sub-have considered and introduction race High High 2 Conset, sub-have considered and introduction race High 3 1.0.2 Site taxon already present outside of captivity in the RA area? It is somehow similar. High 6 2.0.3 Is the taxon already present outside of captivity in the RA area? Yes The building of the Volgs-Don canal opened a way for this species in the Cappin as Ba and into the reveals (Bogutskay et al. 2013) and it is now widely distributed throughout the Azeraajani coast of the Cappin as Ba and into the reveals (Captivity in the RA area? Yes The building of the Volgs-Don canal opened a way for this species in the captivity in the RA area? Yes The building of the Volgs-Don canal opened a way for this species in the Captivity in the Cappin as Ba and into the reveals of the Cappin as Ba and into the reveals of the Cappin as Ba and into the reveals of the Cappin as Ba and into the reveals of the Cappin as Ba and into the reveals of the Cappin as Ba and inthe th	1	1.01	Has the taxon been the subject of	No	The taxon is not the subject of domestication, however it is used	Medium
In the solid or used in its live form? Sometimes for any arranums by local hobbysts or can be harvested for public aquaritymes. Also, is occasinally taken commortally in the communically in the communical in the information available High 3 1.00 Does the taxon have invasive races, No No No information available High 2 Common transmitter conditions of the High intervence according to Koppen-Geger map the climate is analysis. High intervence according to Koppen-Geger map the climate is analysis. High intervence according to Koppen-Geger map the climate is analysis. High intervence according to Koppen-Geger map the climate is analysis. High intervence according to Koppen-Geger map the climate is analysis. High intervence according to Koppen-Geger map the climate is analysis. High intervence according to Koppen-Geger map the climate is analysis. High intervence according to Koppen-Geger map the climate is analysis. High intervence according to Koppen-Geger map the climate is analysis. High intervence according to Koppen-Geger map the climate is analysis. High intervence according to Koppen-Geger map the climate is analysis. High intervence according to Koppen-Geger map the climate is analysis. High intervence according to Koppen-Geger map the climate is analysis. High intervence according to Koppen-Geger map the climate is analysis. High intervence according to Koppen-Geger map the climate is analysis. High intervence according to Koppen-Geger map the climate is analysis. High intervence according to Koppen-Geger map the climate is analysis. High intervence according to Koppen-Geger map the climate is analysis. High intervence according to Koppen-Geger map the climate is analysis. High intervence according to Koppen-Geger map the climate is analysis. High intervence according to Koppen-Ge			. ,		as aquarium fish or laboratory animal	
Image: Second and a market of the stand of the	2	1.02	Is the taxon harvested in the wild and likely	Yes	It does not have much fisheries value, however it is harvested	Medium
Image: Second line value of the second line of the line			to be sold or used in its live form?		sometimes for aquariums by local hobbysts or can be harvested	
3 10.3 Does the taxon have invasive races, invasive race, available No No information available High 2. Construct, distribution and introduction risk (Risk Assessment (RA) area and introduction risk (Risk Assessment (RA) area and introduction risk (Risk Assessment (RA) area and introduction risk (Risk Assessment (RA) area and introduction risk (Risk Assessment (RA) area and introduction risk (Risk Assessment (RA) area and introduction risk (Risk Assessment (RA) area and introduction risk (Risk Assessment (RA) area and introduction risk (Risk Assessment (RA) area and introduction risk (Risk Assessment (RA) area and introduction risk (Risk Assessment (RA) area and introduction risk (Risk Assessment (RA) area and introduction risk (Risk Assessment (RA) area and Risk Risk Risk Risk Risk Risk (Risk Risk Risk Risk Risk Risk Risk Risk						
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4 2.01 How similar are the climatic conditions of the High Risk Assessment (RA) area and the taxon's native range? It is somehow similar. High Risk Assessment (RA) area and the taxon's native range? 2 2.02 Wata Step senset autiside of capture range area and present autiside of capture range and into the river mumber (binshinov & House and populations in climatch to make this analysis, Houweer, according to Koppen-Geiger may the climate is somehow similar. High 6 2.02 Wata Step voltage and into the river mumber (binshinov & Mustafavev, 2015). The fish enter the rivers during reproduction Provided (BT) which (BT) and it is now which (BT) throms (BT) and the shorelines of the Caspian Sea and into the river mumber (BT) and mumber (BT) and the shorelines of the Caspian Sea in Azerbaljan (Cast) and the shorelines of the Caspian Sea in Azerbaljan (Cast) and the shorelines of the Caspian Sea in Azerbaljan (Cast) and the shorelines of the Caspian Sea in Azerbaljan (Cast) and the shorelines of the Caspian Sea in Azerbaljan (Cast) and the shorelines of the Caspian Sea in Azerbaljan (Cast) and intentional introductions? 7 2.04 How many potential vectors could the taxon One Set-Site Set Set Set Set Set Set Set Set Set S	2					
Risk Assessment (RA) area and the taxon's network ended? Image: Solution of the constraints of the consthe consthe constraints of the constraints of the cons				High	It is somehow similar	High
5 2.02 What is the quality of the climate matching data? Low 5. There are no climatic stations in climate to make this analysis. High However, according to Koppen-Geiger map the climate is somehow similar. 6 2.03 Is the taxon already present outside of captivity in the RA area? Yes The building of the Valga-Don canal opened a way for this speces to disperse into the Caspian Sea and into the river mouting (bardinuov & Mustafayer, 2015). The final region widely distributed throughout the Azerbaijan (cast wide) distributed throughout the Azerbaijan (cast wide) distributed throughout the Azerbaijan (cast wide) distributed throughout the Azerbaijan (cast wide) distributed throughout the Azerbaijan (cast wide) distributed throughout the Azerbaijan (cast wide) distributed throughout the Azerbaijan (cast wide) distributed throughout the Azerbaijan (cast wide) distributed throughout the Azerbaijan (cast wide) distributed	4	2.01	Risk Assessment (RA) area and the taxon's	Ingn		Ingn
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	18	4.05	Is the taxon likely to disrupt food-web	Yes		High
has invaded or is likely to invade the RA countries of similar climate it is quite likely	1		structure/function in aquatic ecosystems if it		documented, however according to the research from other	
	1		has invaded or is likely to invade the RA		countries of similar climate it is quite likely	

19			n		
	4.06	Is the taxon likely to exert adverse impacts	Yes	May decrease fishery yields	Medium
20	4.07	on ecosystem services in the RA area? Is it likely that the taxon will host, and/or	Not applicable	Nothing is known about this	Low
20	4.07	act as a vector for, recognised pests and	Not applicable		LOW
		infectious agents that are endemic in the RA			
21	4.08	Is it likely that the taxon will host, and/or	Yes	It is possible	Low
		act as a vector for, recognised pests and			
		infectious agents that are absent from (novel			
		to) the RA area?			
22	4.09	Is it likely that the taxon will achieve a body	No	This species is a small sized animal	High
		size that will make it more likely to be			
	4.10	released from captivity?	N	This species present themselves as anadromous, inhabitting	L l'ala
23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g.	Yes	different water environments: marine, coastal, riverine and even	High
		versatile in habitat use)?		lakes.	
24	4.11	Is it likely that the taxon's mode of existence	No	does not reduce the habitat quality for natives	High
		(e.g. excretion of by-products) or behaviours			
		(e.g. feeding) will reduce habitat quality for			
		native taxa?			
25	4.12	Is the taxon likely to maintain a viable	No	Not known	Low
		population even when present in low			
		densities (or persisting in adverse conditions			
_		by way of a dormant form)?			
		<i>te exploitation</i> Is the taxon likely to consume threatened or	Vec	It can be predator of native polagic fich larges. Also can be in	High
20	5.01	protected native taxa in the RA area?	Yes	It can be predator of native pelagic fish larvae. Also can be in competition with them for food	High
27	5.02	Is the taxon likely to sequester food	Yes	Eats, worms, small crustaceans, larvae and adult aquatic insects,	High
_ /	5.52	resources (including nutrients) to the		drowned aerial insects, fish larvae and small fishes	
_		detriment of native taxa in the RA area?			
	Reprodu	uction			
28	6.01	Is the taxon likely to exhibit parental care	Yes	Males build nests and they guard and ventilate the eggs and	Very high
		and/or to reduce age-at-maturity in response		young.	
20	6.02	to environmental conditions?	Vac	Vac and it has been successfully reproducing sizes its inter to it.	Vonchish
29	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	Yes and it has been successfully reproducing since its introduction	Very high
30	6.03	Is the taxon likely to hybridise naturally with	No	No information available	Very high
50	0.05	native taxa?	110		Very High
31	6.04	Is the taxon likely to be hermaphroditic or to	No	No. Does not display asexual reproduction	Very high
		display asexual reproduction?			, 3
32	6.05	Is the taxon dependent on the presence of	No	No See: https://www.fishbase.de/summary/Gasterosteus-	Very high
		another taxon (or specific habitat features)		aculeatus.html	
		to complete its life cycle?			
33	6.06	Is the taxon known (or likely) to produce a	Yes	"Anadromous forms usually die of exhaustion after spawning	Very high
		large number of propagules or offspring		cycle. Freshwater individuals are able to complete several cycles	
		within a short time span (e.g. < 1 year)?		within one year or sometimes over several years "	
34	6.07	, ,	1	https://www.fishbase.in/summary/Gasterosteus-aculeatus.html	Very high
34	6.07	How many time units (days, months, years)	1		Very high
34	6.07	, ,	1	https://www.fishbase.in/summary/Gasterosteus-aculeatus.html	Very high
7. [Dispers	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms	1	https://www.fishbase.in/summary/Gasterosteus-aculeatus.html 1 year	Very high
7. [How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal	1 One	https://www.fishbase.in/summary/Gasterosteus-aculeatus.html	Very high High
7. [Dispers	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to		https://www.fishbase.in/summary/Gasterosteus-aculeatus.html 1 year	
<i>7. l</i> 35	Dispers 7.01	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable	One	https://www.fishbase.in/summary/Gasterosteus-aculeatus.html 1 year Self spreading	High
7 <i>. 1</i> 35	Dispers	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the		https://www.fishbase.in/summary/Gasterosteus-aculeatus.html 1 year	
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7 <u>. 1</u> 35 36	Dispers 7.01 7.02	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively	One Yes	https://www.fishbase.in/summary/Gasterosteus-aculeatus.html 1 year Self spreading It is possible No. does not have morphological caracters that will allow it to	High
7. 1 35 36	Dispers. 7.01 7.02 7.03	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal?	One Yes No	https://www.fishbase.in/summary/Gasterosteus-aculeatus.html 1 year Self spreading It is possible No. does not have morphological caracters that will allow it to attach	High Medium Very high
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7. 1 35 36 37 38 39 40 41	Dispers. 7.01 7.02 7.03 7.04 7.05 7.06	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	One Yes No No Yes No	https://www.fishbase.in/summary/Gasterosteus-aculeatus.html 1 year Self spreading It is possible No. does not have morphological caracters that will allow it to attach No. Because eggs are being deposited in the nests which are guarded by the parent unless hatched. No. This is less likely It is anadromous species which migrates in the freshwaters for reproduction No	High Medium Very high Very high High Very high
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7. 1 35 36 37 38 39 40 41 42 43	Dispers. 7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 Toleran	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? ce attributes	One Yes No No Yes No Yes	https://www.fishbase.in/summary/Gasterosteus-aculeatus.html 1 year Self spreading It is possible No. does not have morphological caracters that will allow it to attach No. Because eggs are being deposited in the nests which are guarded by the parent unless hatched. No. This is less likely It is anadromous species which migrates in the freshwaters for reproduction No No information about it	High Medium Very high Very high High Very high Low
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7. 1 35 36 37 38 39 40 41 41 42 43 3. 1 44	Dispers. 7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 Toleran 8.01	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle?	One Yes No No Yes No Yes No	https://www.fishbase.in/summary/Gasterosteus-aculeatus.html 1 year Self spreading It is possible No. does not have morphological caracters that will allow it to attach No. Because eggs are being deposited in the nests which are guarded by the parent unless hatched. No. This is less likely It is anadromous species which migrates in the freshwaters for reproduction No No information about it No documented evidence No information avalable	High Medium Very high Very high High Low High
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46	8.03	Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	No	No. This is less likely.	High
47	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	No	No information avalable	High
48	8.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	Yes	This species do well on higher salinity levels (Metzger et al 2016)	Medium
		Are there effective natural enemies (predators) of the taxon present in the RA	No	No. No effective natural enemies present in RA area	High
		e change change			
		Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?	Increase	It was hypotheses that climate change might alert the mechanisms of transportation and introduction of non-native species. Commercial and recreational activities will increase, that litself increases the propagule pressure levels of non-native	High
51	9.02	Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	Increase	Since this species has high termal tolerance, the risks of its establishment might increase	High
52	9.03	Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change?	No change	No informatio. probably no change	Low
53	9.04	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	No change	No change	High
54	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	No change	No change	Medium
55	9.06	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	No change	No change	Medium

Statistics	
Scores	
BRA	37.0
BRA Outcome	-
BRA+CCA	41.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	19.0
1. Domestication/Cultivation	0.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	18.0
B. Biology/Ecology	18.0
4. Undesirable (or persistence) traits	6.0
5. Resource exploitation	7.0
6. Reproduction	3.0
7. Dispersal mechanisms	-1.0
8. Tolerance attributes	3.0
C. Climate change	4.0
9. Climate change	4.0
Answered Questions	1
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3
2. Climate, distribution and introduction risk	5 5
3. Invasive elsewhere	5
B. Biology/Ecology	36
4. Undesirable (or persistence) traits 5. Resource exploitation	12
6. Reproduction	2 7 9
7. Dispersal mechanisms	/
8. Tolerance attributes	9
C. Climate change	6
9. Climate change	6
Sectors affected	0
Commercial	15
Environmental	13
Species or population nuisance traits	17
Species of population indisance traits	17
Thresholds	
BRA	
BRA+CCA	-
Confidence	-
BRA+CCA	0.75
BRATCCA	0.78
BRA CCA	0.58
	0.50

Date and Time 21/05/2022 14:07:30

Faxon and Assessor details					
Category	Fishes and Lampreys (freshwater)				
Taxon name	Gobio artvinicus				
Common name	Artvin gudgeon				
Assessor	Bella Japoshvili				
Risk screening context					
Reason and socio-economic benefits	This species is reported from the east South Caucasus area as an introduced species.				
Risk assessment area	South Caucasus				
Taxonomy	Actinopteri (ray-finned fishes) > Cypriniformes (Carps) > Gobionidae (Gudgeons)				
Native range	South-eastern Black Sea basin				
Introduced range	Kura River basin				
URL	https://www.fishbase.de/summary/Gobio-artvinicus.html				

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical ication/Cultivation			
		Has the taxon been the subject of	No	Low economic value, not used in aquaculture/captivity	Very high
Ţ	1.01	domestication (or cultivation) for at least 20 denerations?	NO	Low economic value, not used in aquaculture/captivity	very nigh
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	No	Not an ornamental fish and not any economic value	High
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	Congeners are known to be invasive	High
2. C	limate,	, distribution and introduction risk			
4	2.01	How similar are the climatic conditions of the	Medium	Results of climatch	Low
		Risk Assessment (RA) area and the taxon's native range?			
	2.02	What is the quality of the climate matching data?	Low	Low quality of local climate data	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	Kuljanishvili, T., Mumladze, L., Japoshvili, B., Mustafayev, N., Ibrahimov, S., Patoka, J., & Kalous, L. (2021). The first unified inventory of non-native fishes of the South Caucasian countries, Armenia, Azerbaijan, and Georgia. Knowledge & Management of Aquatic Ecosystems, (422), 32.	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	None	Human mediated translocation	Medium
8	2.05	Is the taxon currently found in close	Yes	Kuljanishvili, T., Mumladze, L., Japoshvili, B., Mustafayev, N.,	Very high
		proximity to, and likely to enter into, the RA		Ibrahimov, S., Patoka, J., & Kalous, L. (2021). The first unified	
		area in the near future (e.g. unintentional		inventory of non-native fishes of the South Caucasian countries,	
		and intentional introductions)?		Armenia, Azerbaijan, and Georgia. Knowledge & Management of	
3. I	nunciuu	e elsewhere		Aquatic Ecosystems, (422), 32.	
		Has the taxon become naturalised	Yes	Kuljanishvili, T., Mumladze, L., Japoshvili, B., Mustafayev, N.,	Very high
5	5.01	(established viable populations) outside its	105	Ibrahimov, S., Patoka, J., & Kalous, L. (2021). The first unified	very nigh
		native range?		inventory of non-native fishes of the South Caucasian countries,	
				Armenia, Azerbaijan, and Georgia. Knowledge & Management of	
				Aquatic Ecosystems, (422), 32.	
10	3.02	In the taxon's introduced range, are there	No	No documented evidence. Guessed	High
		known adverse impacts to wild stocks or			
		commercial taxa?			
11	3.03	In the taxon's introduced range, are there	No	No documented evidence. Guessed	High
12	3.04	known adverse impacts to aquaculture? In the taxon's introduced range, are there	No	No documented evidence. Guessed	High
12	5.04	known adverse impacts to ecosystem	NO	No documented evidence. Guessed	ingn
13	3.05	In the taxon's introduced range, are there	No	No documented evidence. Guessed	High
		known adverse socio-economic impacts?			
B. E	Biology	//Ecology			
4. U		able (or persistence) traits			
14	4.01	Is it likely that the taxon will be poisonous or	No	No documented evidence. Guessed	High
15	4.02	pose other risks to human health?	Vac	No desumented avidence. Cueses t	Madium
12	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or	Yes	No documented evidence. Guessed	Medium
		protected)?			
16	4.03	Are there any threatened or protected taxa	No	No documented evidence. Guessed	High
		that the non-native taxon would parasitise in	-		5
		the RA area?			
17	4.04	Is the taxon adaptable in terms of climatic	No	No documented evidence. Guessed	Low
		and other environmental conditions, thus			
		enhancing its potential persistence if it has			
10	4.05	invaded or could invade the RA area?	N	No desurrented evidence. Curren 1	1
18	4.05	Is the taxon likely to disrupt food-web	No	No documented evidence. Guessed	Low
		structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA			
19	4.06	Is the taxon likely to exert adverse impacts	No	No documented evidence. Guessed	Low
		on ecosystem services in the RA area?			
20	4.07	Is it likely that the taxon will host, and/or	No	No endemic pests or infectious agents are known from the RA area	Medium
		act as a vector for, recognised pests and			
		infectious agents that are endemic in the RA			
21	4.08	Is it likely that the taxon will host, and/or	Yes	No documented evidence. Guessed	Medium
		act as a vector for, recognised pests and			
		infectious agents that are absent from (novel			
		to) the RA area?			1

Response Justification (references and/or other information) Confidence

22					
~~	4.09	Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity?	No	Species is not kept in captivity	Very high
23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)?	Yes	No documented evidence. Guessed	High
24	4.11	Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa?	No	No documented evidence. Guessed	Low
25	4.12	Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)?	No	No documented evidence. Guessed	Low
5. R	lesourc	e exploitation	1		
26	5.01	Is the taxon likely to consume threatened or	No	No documented evidence. Guessed	Low
27	5.02	protected native taxa in the RA area? Is the taxon likely to sequester food resources (including nutrients) to the	Yes	No documented evidence. Guessed	Low
		detriment of native taxa in the RA area?			
	leprodu		r		1
28	6.01	Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?	No	No documented evidence. Guessed	Medium
	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	Kuljanishvili, T., Mumladze, L., Japoshvili, B., Mustafayev, N., Ibrahimov, S., Patoka, J., & Kalous, L. (2021). The first unified inventory of non-native fishes of the South Caucasian countries, Armenia, Azerbaijan, and Georgia. Knowledge & Management of Aquatic Ecosystems, (422), 32.	High
30	6.03	Is the taxon likely to hybridise naturally with native taxa?	No	No documented evidence. Guessed	Medium
31	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	Yes	No documented evidence. Guessed	Low
32	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features)	No	No documented evidence. Guessed	High
33	6.06	to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring	Yes	No documented evidence. Guessed	Low
34	6.07	within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at-	1	Years	Low
7.0		first-reproduction?			
		al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable	One	Human mediated translocation	Medium
36	7.02	Will any of these vectors/pathways bring the	Yes	Already in RA area (Kuljanishvili et al., 2021)	Very high
· · · · ·		taxon in close proximity to one or more	103		
37	7.02		No	No documented evidence. Guessed	High
		taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances		No documented evidence. Guessed No documented evidence. Guessed	High High
38	7.03	taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules	No		
38 39	7.03	taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction?	No	No documented evidence. Guessed	High
38 39 40	7.03 7.04 7.05	taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to	No No Yes	No documented evidence. Guessed No documented evidence. Guessed	High Medium
38 39 40 41	7.03 7.04 7.05 7.06	taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both	No Yes No	No documented evidence. Guessed No documented evidence. Guessed No documented evidence. Guessed	High Medium High
38 39 40 41 42	7.03 7.04 7.05 7.06 7.07	taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be	No Yes No No	No documented evidence. Guessed No documented evidence. Guessed No documented evidence. Guessed No documented evidence. Guessed In that case starting point is located in RA area from which other parts of the RA area are accessible through the river system. No	High Medium High Medium
38 39 40 41 42 8. T	7.03 7.04 7.05 7.06 7.07 7.08 7.09 0lerano	taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? ce attributes	No Yes No Yes	No documented evidence. Guessed No documented evidence. Guessed No documented evidence. Guessed No documented evidence. Guessed In that case starting point is located in RA area from which other parts of the RA area are accessible through the river system. No documented evidence. Guessed No documented evidence. Guessed	High Medium High Medium Medium
38 39 40 41 42 8. T	7.03 7.04 7.05 7.06 7.07 7.08 7.09 0lerano	taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life	No Yes No Yes	No documented evidence. Guessed No documented evidence. Guessed No documented evidence. Guessed No documented evidence. Guessed In that case starting point is located in RA area from which other parts of the RA area are accessible through the river system. No documented evidence. Guessed	High Medium High Medium Medium
38 39 40 41 42 43 8. 7 44	7.03 7.04 7.05 7.06 7.07 7.08 7.09 0lerano	taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? Is the taxon able to withstand being out of water for extended periods (e.g. minimum of	No Yes No Yes No Yes	No documented evidence. Guessed No documented evidence. Guessed No documented evidence. Guessed No documented evidence. Guessed In that case starting point is located in RA area from which other parts of the RA area are accessible through the river system. No documented evidence. Guessed No documented evidence. Guessed	High Medium High Medium Medium
38 39 40 41 42 43 <u>8.7</u> 44	7.03 7.04 7.05 7.06 7.07 7.08 7.09 0lerano 8.01	taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the	No Yes No Yes No No	No documented evidence. Guessed No documented evidence. Guessed No documented evidence. Guessed No documented evidence. Guessed In that case starting point is located in RA area from which other parts of the RA area are accessible through the river system. No documented evidence. Guessed No documented evidence. Guessed No documented evidence. Guessed	High Medium High Medium Medium Low

48	8.05	Is the taxon able to tolerate salinity levels	No	No documented evidence. Guessed	Medium
		that are higher or lower than those found in			
		its usual environment?			
49	8.06	Are there effective natural enemies	No	No documented evidence. Guessed	Low
		(predators) of the taxon present in the RA			
		e change			
		change	1		
50	9.01	Under the predicted future climatic	No change	Based on professional judgment	Low
		conditions, are the risks of entry into the RA			
		area posed by the taxon likely to increase,			
		decrease or not change?			
51	9.02	Under the predicted future climatic	No change	Based on professional judgment	Low
		conditions, are the risks of establishment			
		posed by the taxon likely to increase,			
		decrease or not change?			
52	9.03	Under the predicted future climatic	No change	Based on professional judgment	Low
		conditions, are the risks of dispersal within			
		the RA area posed by the taxon likely to			
		increase, decrease or not change?			
53	9.04	Under the predicted future climatic	No change	Based on professional judgment	Low
		conditions, what is the likely magnitude of			
		future potential impacts on biodiversity			
		and/or ecological integrity/status?			
54	9.05	Under the predicted future climatic	No change	Based on professional judgment	Low
		conditions, what is the likely magnitude of			
		future potential impacts on ecosystem			
		structure and/or function?			
55	9.06	Under the predicted future climatic	No change	Based on professional judgment	Low
		conditions, what is the likely magnitude of			
		future potential impacts on ecosystem			
		services/socio-economic factors?			

Statistics	
Scores	
BRA	2
BRA Outcome	-
BRA+CCA	
BRA+CCA Outcome	
Score partition	
A. Biogeography/Historical	2.0
1. Domestication/Cultivation	0.0
2. Climate, distribution and introduction risk	0.0
3. Invasive elsewhere	2.0
B. Biology/Ecology	5.0
4. Undesirable (or persistence) traits	2.0
5. Resource exploitation	2.0
6. Reproduction	4.0
7. Dispersal mechanisms	-1.0
8. Tolerance attributes	-2.0
C. Climate change	0.0
9. Climate change	0.0
Answered Questions	
Total	55
A. Biogeography/Historical	
1. Domestication/Cultivation	3
2. Climate, distribution and introduction risk	3 5 5
3. Invasive elsewhere	5
B. Biology/Ecology	
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2 7 9 6
6. Reproduction	7
7. Dispersal mechanisms	9
	6
8. Tolerance attributes	
8. Tolerance attributes C. Climate change	6
8. Tolerance attributes C. Climate change 9. Climate change	
8. Tolerance attributes C. Climate change 9. Climate change Sectors affected	6 6
8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial	6 6 0
8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial Environmental	6 6 0
8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial	6 6 0
8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial Environmental Species or population nuisance traits	6 6 0
8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial Environmental	6 6 0 1 8

Thresholds	
BR	Α -
BRA+CC	A -
Confidence	
BRA+CC	A 0.52
BR	A 0.56
CC	A 0.25
Date and Time	
16/05/	2022 12:25:26
	2022 12:25:20

axon and Assessor details						
Category	Fishes and Lampreys (freshwater)					
Taxon name	Gobio artvinicus					
Common name	Artvin gudgeon					
Assessor	Giorgi Epitashvili					
Risk screening context						
Reason and socio-economic benefits	Gobio artvinicus is a small sized species of gudgeon, distributed in Turkey and Georgia. This					
Risk assessment area	South Caucasus					
Taxonomy	Gobio artvinicus Turan, Japoshvili, Aksu & Bektaş 2016					
Native range	Aralık and Çifteköpru streams, tributaries of the lower part of Çoruh River, Black Sea basin in					
Introduced range	According to Kuljanishvili et al. (2020) Gobio artvinicus is translocated within the South Caucasus					
URL	https://www.fishbase.se/summary/Gobio-artvinicus.html					

 eography/Historical estication/Cultivation Has the taxon been the subject of domestication (or cultivation) for at least 20 generations? Is the taxon harvested in the wild and likely to be sold or used in its live form? Does the taxon have invasive races, varieties, sub-taxa or congeners? te, distribution and introduction risk How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range? What is the quality of the climate matching data? Is the taxon already present outside of captivity in the RA area? How many potential vectors could the taxon use to enter in the RA area? Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)? 	No No No High Yes >1 Yes	Gobio artvinicus is a newly discribed small sized species. It has not commercial value. Gobio artvinicus is a newly discribed small sized fish and has not commercial value. Although the species was translocated to the Caucasus region, no such fact has been discribed yet This species is naturally distributed in the Caucasus region (Kuljanishvili et al. 2020). This species is naturally distributed in the Caucasus region (Kuljanishvili et al. 2020). This species is naturally distributed in the Caucasus region (Kuljanishvili et al. 2020). This species is naturally distributed in the Caucasus region (Kuljanishvili et al. 2020). This species is naturally distributed in the Caucasus region (Kuljanishvili et al. 2020). This species is naturally distributed in the Caucasus region (Kuljanishvili et al. 2020).	Very high Medium Very high Very high Very high
 Has the taxon been the subject of domestication (or cultivation) for at least 20 generations? Is the taxon harvested in the wild and likely to be sold or used in its live form? Does the taxon have invasive races, varieties, sub-taxa or congeners? te, distribution and introduction risk How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range? What is the quality of the climate matching data? Is the taxon already present outside of captivity in the RA area? How many potential vectors could the taxon use to enter in the RA area? Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional 	No No High High Yes >1	not commercial value. Gobio artvinicus is a newly discribed small sized fish and has not commercial value. Although the species was translocated to the Caucasus region, no such fact has been discribed yet This species is naturally distributed in the Caucasus region (Kuljanishvili et al. 2020). This species is naturally distributed in the Caucasus region (Kuljanishvili et al. 2020). This species is naturally distributed in the Caucasus region (Kuljanishvili et al. 2020). This species is naturally distributed in the Caucasus region (Kuljanishvili et al. 2020) This species is distributed in the region naturally and also	Medium Medium Very high Very high Very high
domestication (or cultivation) for at least 20 generations? 2 Is the taxon harvested in the wild and likely to be sold or used in its live form? 3 Does the taxon have invasive races, varieties, sub-taxa or congeners? te, distribution and introduction risk 1 How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range? 2 What is the quality of the climate matching data? 3 Is the taxon already present outside of captivity in the RA area? 4 How many potential vectors could the taxon use to enter in the RA area? 5 Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional	No No High High Yes >1	not commercial value. Gobio artvinicus is a newly discribed small sized fish and has not commercial value. Although the species was translocated to the Caucasus region, no such fact has been discribed yet This species is naturally distributed in the Caucasus region (Kuljanishvili et al. 2020). This species is naturally distributed in the Caucasus region (Kuljanishvili et al. 2020). This species is naturally distributed in the Caucasus region (Kuljanishvili et al. 2020). This species is naturally distributed in the Caucasus region (Kuljanishvili et al. 2020) This species is distributed in the region naturally and also	Medium Medium Very high Very high Very high
generations? Is the taxon harvested in the wild and likely to be sold or used in its live form? B Does the taxon have invasive races, varieties, sub-taxa or congeners? te, distribution and introduction risk How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range? What is the quality of the climate matching data? B Is the taxon already present outside of captivity in the RA area? How many potential vectors could the taxon use to enter in the RA area? 5 Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional	No High High Yes >1	Gobio artvinicus is a newly discribed small sized fish and has not commercial value. Although the species was translocated to the Caucasus region, no such fact has been discribed yet This species is naturally distributed in the Caucasus region (Kuljanishvili et al. 2020). This species is naturally distributed in the Caucasus region (Kuljanishvili et al. 2020). This species is naturally distributed in the Caucasus region (Kuljanishvili et al. 2020). This species is naturally distributed in the Caucasus region (Kuljanishvili et al. 2020) This species is distributed in the region naturally and also	Very high Very high Very high Very high
 Is the taxon harvested in the wild and likely to be sold or used in its live form? Does the taxon have invasive races, varieties, sub-taxa or congeners? te, distribution and introduction risk How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range? What is the quality of the climate matching data? Is the taxon already present outside of captivity in the RA area? How many potential vectors could the taxon use to enter in the RA area? Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional 	No High High Yes >1	commercial value. Although the species was translocated to the Caucasus region, no such fact has been discribed yet This species is naturally distributed in the Caucasus region (Kuljanishvili et al. 2020). This species is naturally distributed in the Caucasus region (Kuljanishvili et al. 2020). This species is naturally distributed in the Caucasus region (Kuljanishvili et al. 2020). This species is naturally distributed in the Caucasus region (Kuljanishvili et al. 2020) This species is distributed in the region naturally and also	Very high Very high Very high Very high
to be sold or used in its live form? B Does the taxon have invasive races, varieties, sub-taxa or congeners? te, distribution and introduction risk I How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range? What is the quality of the climate matching data? Is the taxon already present outside of captivity in the RA area? How many potential vectors could the taxon use to enter in the RA area? Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional	No High High Yes >1	commercial value. Although the species was translocated to the Caucasus region, no such fact has been discribed yet This species is naturally distributed in the Caucasus region (Kuljanishvili et al. 2020). This species is naturally distributed in the Caucasus region (Kuljanishvili et al. 2020). This species is naturally distributed in the Caucasus region (Kuljanishvili et al. 2020). This species is naturally distributed in the Caucasus region (Kuljanishvili et al. 2020) This species is distributed in the region naturally and also	Very high Very high Very high Very high
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data? B Is the taxon already present outside of captivity in the RA area? H How many potential vectors could the taxon use to enter in the RA area? Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional	Yes >1	(Kuljanishvili et al. 2020). This species is naturally distributed in the Caucasus region (Kuljanishvili et al. 2020) This species is distributed in the region naturally and also	Very high
 Is the taxon already present outside of captivity in the RA area? How many potential vectors could the taxon use to enter in the RA area? Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional 	>1	This species is naturally distributed in the Caucasus region (Kuljanishvili et al. 2020) This species is distributed in the region naturally and also	, ,
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 How many potential vectors could the taxon use to enter in the RA area? Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional 		This species is distributed in the region naturally and also	Very high
 use to enter in the RA area? Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional 			Very high
5 Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional	Yes	accidentally spread by humans through translocations	· ,
proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional	Yes		
area in the near future (e.g. unintentional		This species is naturally distributed in Çoruh River, Black Sea	Very high
area in the near future (e.g. unintentional	1	basin in Turkey (Turan et al. 2016).	
	1		
ive elsewhere			<u> </u>
Has the taxon become naturalised	Yes	This species was spread in eastern part of the Caucasus region	High
(established viable populations) outside its		(Caspian Basin) and it appears to have viable populations here.	
2 In the taxon's introduced range, are there	No	No such fact has been discribed	Medium
5 1	NO	No such fact has been discribed	healann
5,1	NO	No such fact has been discribed	Medium
5 1	No	No such fact has been detected	Medium
In the taxon's introduced range, are there	No	No such fact has been detected	Medium
known adverse socio-economic impacts?			
gy/Ecology			
sirable (or persistence) traits			
Is it likely that the taxon will be poisonous or	No	This species does not pose a threat to humans	Very high
pose other risks to human health?			, -
	No	No such fact has been detected	Medium
	-		
	Vec	There is a possibility of that. In the Caucasus region there are	Medium
, , , , , , , , , , , , , , , , , , , ,			
	Vec		Madium
	res		Medium
		conditions of the region are acceptable to it.	
			<u> </u>
<i>i</i>	No	Such a case is not expected	Medium
structure/function in aquatic ecosystems if it			
has invaded or is likely to invade the RA			
Is the taxon likely to exert adverse impacts	No	Such a case is not expected	Very high
on ecosystem services in the RA area?			
	No	Such a case is not expected	Medium
Is it likely that the taxon will host, and/or	No	Such a case is not expected	Medium
	No	C arthriniana is small sized (up to 10) fish and door	Vonchich
	INO		Very high
size that will make it more likely to be		commercial value	
released from captivity?			<u> </u>
Is the taxon capable of sustaining itself in a	No	G artvinicus occurs in streams with swift and warm flowing water,	Medium
range of water velocity conditions (e.g.		and cobbled and pebbled bottoms	
range of water velocity conditions (e.g.	1		
	 known adverse impacts to wild stocks or commercial taxa? In the taxon's introduced range, are there known adverse impacts to aquaculture? In the taxon's introduced range, are there known adverse impacts to ecosystem In the taxon's introduced range, are there known adverse socio-economic impacts? ygy/Ecology sirable (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to adverse impacts on ecosystem services in the RA area? 	known adverse impacts to wild stocks or commercial taxa? 3 In the taxon's introduced range, are there known adverse impacts to aquaculture? No 4 In the taxon's introduced range, are there known adverse impacts to ecosystem No 5 In the taxon's introduced range, are there known adverse socio-economic impacts? No gy/Ecology sirable (or persistence) traits No 1 Is it likely that the taxon will be poisonous or pose other risks to human health? No 2 Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? No 3 Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Yes 4 Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA 5 No 5 Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? No 6 Is the isley that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA S 8 Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area? No	known adverse impacts to wild stocks or commercial taxa? No No such fact has been discribed In the taxon's introduced range, are there known adverse impacts to aquaculture? No No such fact has been detected In the taxon's introduced range, are there known adverse impacts to ecosystem No No such fact has been detected In the taxon's introduced range, are there known adverse socio-economic impacts? No No such fact has been detected Sit Ilikely that the taxon will be poisonous or pose other risks to human health? This species does not pose a threat to humans pose other risks to human health? I is it likely that the taxon will smother one or protected)? No No such fact has been detected 3 Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Yes There is a possibility of that. In the Caucasus region there are distributed several threatened and protected species such as sturgeons, Salmo spp, etc. 4 Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or is likely to instruct the RA area? No Such a case is not expected 5 Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to instand the RA area? No Such a case is not expected 6 Is it li

6 5. . Rep 5. 8 6. 9 6. 1 6. 2 6. 3 6. . Dis, 5 7. 6 7. 6 7. 7 7. 6 7. 7 7. 9 7. 0 7. 1 7. 2 7. 3 7.	5.02 5.02 5.02 5.02 5.02 5.03 5.04 5.05 5.06 5.06 5.07	Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa? Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)? <i>e exploitation</i> Is the taxon likely to consume threatened or protected native taxa in the RA area? Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area? Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	No Yes	This can happen if the population of this species increases Data deficient No such fact has been detected There is a possibility of that Data deficient This species is naturally reproduces in the SC region There is a possibility of that. There are closed relative species distributed in the Caucasus Region such as G. caucasicus and Romanogobio macropterus which may hybridized with G. No such fact has been described No such fact has been described Data deficient	Low Low Medium Low Very high Medium Medium Medium
. Ree 6 5. 7 5. 7 5. 9 6. 9 6. 1 6. 1 6. 2 6. 3 6. 7 7. 6 7. 6 7. 7 7. 8 7. 9 7. 9 7. 9 7. 1 7. 3 7. 3 7.	5.01 5.02 5.02 5.03 5.04 5.05 5.06 5.07	Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)? <i>e exploitation</i> Is the taxon likely to consume threatened or protected native taxa in the RA area? Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area? <i>uction</i> Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? <i>a mechanisms</i>	No Yes Yes Yes No No	No such fact has been detected There is a possibility of that Data deficient This species is naturally reproduces in the SC region There is a possibility of that. There are closed relative species distributed in the Caucasus Region such as G. caucasicus and Romanogobio macropterus which may hybridized with G. No such fact has been described No such fact has been described	Low Medium Low Very high Medium Medium Medium
6 5. . Rep 5. . Rep 6.	5.01 5.02 5.02 5.01 5.02 5.03 5.04 5.05 5.06 5.06 5.07	by way of a dormant form)? e exploitation Is the taxon likely to consume threatened or protected native taxa in the RA area? Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area? uction Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms	Yes Not applicable Yes Yes No No	There is a possibility of that Data deficient This species is naturally reproduces in the SC region There is a possibility of that. There are closed relative species distributed in the Caucasus Region such as G. caucasicus and Romanogobio macropterus which may hybridized with G. No such fact has been described No such fact has been described	Medium Low Very high Medium Medium Medium
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. Rep . Rep 8 8 9 6. 9 1 6. 1 6. 3 6. 7 <t< td=""><td>5.02 prodd 5.01 5.02 5.03 5.04 5.05 5.06 5.07 5.07</td><td>protected native taxa in the RA area? Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area? <i>uction</i> Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete islife cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms</td><td>Yes Not applicable Yes Yes No No</td><td>There is a possibility of that Data deficient This species is naturally reproduces in the SC region There is a possibility of that. There are closed relative species distributed in the Caucasus Region such as G. caucasicus and Romanogobio macropterus which may hybridized with G. No such fact has been described No such fact has been described</td><td>Medium Low Very high Medium Medium Medium</td></t<>	5.02 prodd 5.01 5.02 5.03 5.04 5.05 5.06 5.07 5.07	protected native taxa in the RA area? Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area? <i>uction</i> Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete islife cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms	Yes Not applicable Yes Yes No No	There is a possibility of that Data deficient This species is naturally reproduces in the SC region There is a possibility of that. There are closed relative species distributed in the Caucasus Region such as G. caucasicus and Romanogobio macropterus which may hybridized with G. No such fact has been described No such fact has been described	Medium Low Very high Medium Medium Medium
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8 6. 9 6. 0 6. 1 6. 2 6. 3 6. 4 6. 5 7. 6 7. 7 7. 8 7. 9 7. 1 7. 1 7. 3 7. 3 7. 3 7.	5.01 5.02 5.03 5.04 5.05 5.06 5.07	Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms	Yes Yes No No	This species is naturally reproduces in the SC region There is a possibility of that. There are closed relative species distributed in the Caucasus Region such as G. caucasicus and Romanogobio macropterus which may hybridized with G. No such fact has been described No such fact has been described	Very high Medium Medium Medium
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1 6. 2 6. 3 6. 4 6. 5 7. 6 7. 7 7. 9 7. 1 7. 2 7. 3 7. 3 7. 3 7. 3 7.	5.04 5.05 5.06 5.07	Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms	No No	distributed in the Caucasus Region such as G. caucasicus and Romanogobio macropterus which may hybridized with G. No such fact has been described No such fact has been described	Medium Medium
2 6. 3 6. 4 6. 5 7. 6 7. 6 7. 7 7. 7 7. 8 7. 9 7. 9 7. 1 7. 2 7. 3 7. . Tolo	5.05 5.06 5.07	display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms	No	No such fact has been described No such fact has been described	Medium
2 6. 3 6. 4 6. 5 7. 6 7. 6 7. 7 7. 7 7. 8 7. 9 7. 9 7. 1 7. 2 7. 3 7. . Tolo	5.05 5.06 5.07	display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms	No	No such fact has been described	Medium
3 6.	5.06 5.07	another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms	No		
Dis, Dis,	5.07	Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms		Data deficient	1
. Dis . Dis 5 7. 6 7. 6 7. 7 7. 8 7. 9 7. 11 7. 22 7. 33 7.	spers	within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms	1		Low
. Dis . Dis 5 7. 6 7. 6 7. 7 7. 8 7. 9 7. 11 7. 22 7. 33 7.	spers	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms	1		
5 7. 6 7. 7 7. 7 7. 8 7. 8 7. 9 7. 9 7. 9 7. 1 7.		first-reproduction?		Data deficient	Medium
5 7. 6 7. 7 7. 7 7. 8 7. 8 7. 9 7. 9 7. 9 7. 1 7.		al mechanisms			
5 7. 6 7. 7 7. 7 7. 8 7. 8 7. 9 7. 9 7. 9 7. 1 7.					
7 7. 8 7. 9 7. 1 7. 1 7. 2 7. 3 7. . Tol.		How many potential internal	>1	This species is distributed in the region naturally and also	Medium
7 7. 8 7. 9 7. 1 7. 1 7. 2 7. 3 7. . Tol.		vectors/pathways could the taxon use to		accidentally spread by humans through translocations	
7 7. 8 7. 9 7. 1 7. 2 7. 3 7. . Tol.	2.02	disperse within the RA area (with suitable Will any of these vectors/pathways bring the	Yes	There is a probability of that	High
8 7. 9 7. 9 7. 1 7. 2 7. 3 7.	.52	taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)?			
9 7. 0 7. 1 7. 2 7. 3 7. . Tole	.03	Does the taxon have a means of actively	No	Own judgement	High
9 7. 0 7. 1 7. 2 7. 3 7. . Tole		attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances			
9 7. 0 7. 1 7. 2 7. 3 7. . Tole	.04	the likelihood of dispersal? Is natural dispersal of the taxon likely to	Yes	This species is naturally reproduces and spreading in the region	High
0 7. 1 7. 2 7. <u>3 7.</u> . <i>Tol</i>		occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?			-
1 7. 2 7. <u>3 7.</u>	.05	Is natural dispersal of the taxon likely to	Yes	This species is naturally reproduces and spreading in the region	High
1 7. 2 7. <u>3 7.</u>		occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA			
2 7. 3 7. . Tol	.06	area? Are older life stages of the taxon likely to migrate in the RA area for reproduction?	Yes	This species is naturally reproduces and spreading in the region	High
3 7. . Tol	.07	Are propagules or eggs of the taxon likely to	Yes	Own judgement	High
3 7. . Tol		be dispersed in the RA area by other animals?			-
. Tol	.08	Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous	Not applicable	Data deficient	Low
. Tol		seven questions (35–41; i.e. both unintentional or intentional) likely to be			
. Tol	. <u>09</u>	Is dispersal of the taxon density dependent?	Yes	Own judgement	Low
4 8.		ce attributes			:
	8.01	Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life	No	No such fact has been detected	Very high
		cycle?			
5 8.	0.00	Is the taxon tolerant of a wide range of	No	Own judgement	Medium
	5.02	water quality conditions relevant to that taxon? [In the Justification field, indicate the			
6 8	5.02	relevant water quality variable(s) being Can the taxon be controlled or eradicated in	Yes	Own judgement	Medium
		Can the taxon be controlled of elduicated III	1.03		
7 8.	3.02 3.03	the wild with chemical, biological, or other agents/means?	Yes	Own judgement	Medium
8 8.	8.03	agents/means? Is the taxon likely to tolerate or benefit from	No	This fish is typical freshwater species and does not occurring in the brackish or salinity water	High
9 8.	8.03 8.04	agents/means?		There are meny predator species which can controll the	Very high
	8.03 8.04 8.05	agents/means? Is the taxon likely to tolerate or benefit from environmental/human disturbance? Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment? Are there effective natural enemies	Yes		
. Cli	8.03 8.04 8.05	agents/means? Is the taxon likely to tolerate or benefit from environmental/human disturbance? Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment? Are there effective natural enemies (predators) of the taxon present in the RA	Yes	populations of G. artvinicus: e.g. Esox lucius, Squalius spp, Salmo	
. Clir	3.03 3.04 3.05 3.06	agents/means? Is the taxon likely to tolerate or benefit from environmental/human disturbance? Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment? Are there effective natural enemies	Yes		

50	9.01	Under the predicted future climatic	No change	Own judgement	Medium
		conditions, are the risks of entry into the RA			
		area posed by the taxon likely to increase,			
		decrease or not change?			
51	9.02	Under the predicted future climatic	Increase	Own judgement	Medium
		conditions, are the risks of establishment			
		posed by the taxon likely to increase,			
		decrease or not change?			
52	9.03	Under the predicted future climatic	Increase	Own judgement	Medium
		conditions, are the risks of dispersal within			
		the RA area posed by the taxon likely to			
		increase, decrease or not change?			
53	9.04	Under the predicted future climatic	No change	Own judgement	Medium
		conditions, what is the likely magnitude of			
		future potential impacts on biodiversity			
		and/or ecological integrity/status?			
54	9.05	Under the predicted future climatic	Lower	Own judgement	Medium
		conditions, what is the likely magnitude of			
		future potential impacts on ecosystem			
		structure and/or function?			
55	9.06	Under the predicted future climatic	Lower	Own judgement	High
		conditions, what is the likely magnitude of			
	1	future potential impacts on ecosystem			
		services/socio-economic factors?			

Statistics

Scores	
BRA	14.0
BRA Outcome	-
BRA+CCA	14.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	2.0
1. Domestication/Cultivation	-2.0
2. Climate, distribution and introduction risk	2.0
3. Invasive elsewhere	2.0
B. Biology/Ecology	12.0
4. Undesirable (or persistence) traits	3.0
5. Resource exploitation	2.0
6. Reproduction	3.0
7. Dispersal mechanisms	6.0
8. Tolerance attributes	-2.0
C. Climate change	0.0
9. Climate change	0.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3
2. Climate, distribution and introduction risk	5
2. Climate, distribution and introduction risk 3. Invasive elsewhere	5
2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology	5 5 36
2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits	5 5 36
2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation	5 5 36
2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology / Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction	5 5 36 12 2 7
2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms	5 5 36 12 2 7 7 9
2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology / Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes	5 5 36 12 2 7 7 9 6
2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change	5 5 36 12 2 7 9 6 6 6
2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change	5 5 36 12 2 7 7 9 6
2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected	5 5 36 12 2 7 9 6 6 6 6
2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial	5 5 36 12 2 7 9 6 6 6 6
2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial Environmental	5 5 36 12 2 7 9 6 6 6 6 6 0 0 0
2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial	5 5 36 12 2 7 9 6 6 6 6 6 0
2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial Environmental	5 5 36 12 2 7 9 6 6 6 6 6 0 0 0

Thresholds		
	BRA	-
	BRA+CCA	-
Confidence		
	BRA+CCA	0.62
	BRA	0.63
	CCA	0.54
Date and Time		
	05/05/20	022 18:16:52

Taxon and Assessor details	
Category	Fishes and Lampreys (freshwater)
Taxon name	Gobio artvinicus
Common name	Artvin gudgeon
Assessor	Tatia Kuljanishvili
Risk screening context	
Reason and socio-economic benefits	Kuljanishvili et al. 2020 described that G. artvinicus in the Kura-Aras River basin is alien.
Risk assessment area	South Caucasus
Taxonomy	Actinopteri (ray-finned fishes) > Cypriniformes (Carps) > Gobionidae (Gudgeons)
Native range	Black Sea basin, the lower Choruh River
Introduced range	Kura-Aras River system
URL	https://fishbase.mnhn.fr/summary/68289

			Response	Justification (references and/or other information)	Confidence
Α. Ι	Biogeo	graphy/Historical			
1. L	Domest	ication/Cultivation			
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	No	This is a newly described species and it has not been subject of domestication.	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	No	This taxon is not harvested from the wild. However it can be a contaminant of other trade important fish parcels, this is possibly the way how it got to the Kura-Aras river system (Kuljanishvili et	Medium
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	Gobio gobio is considered as invasive species for insance in Italy, reducing the native Gobio benacensis (Bianco & Ketmaier 2005)	High
2. (limate	, distribution and introduction risk			
4		How similar are the climatic conditions of the	High	The climate is somehow similar	High
	-	Risk Assessment (RA) area and the taxon's native range?	5		5
5	2.02	What is the quality of the climate matching data?	Low	There are no climatic stations in climatch to make this analysis. However, according to Koppen-Geiger map the climate is somehow similar.	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	Yes it has been found in Kura-Aras system in Turkey, east Georgia, Armenia and Azerbaijan (Kaya et al 2020; Kuljanishvili et	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	Aquaculture	High
8	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)?	Yes	Currently, this species is widely distributed in the Kura-Aras system (Kuljanishvili et al 2021)	Very high
3. I	nvasive	e elsewhere			
9		Has the taxon become naturalised (established viable populations) outside its	Yes	Yes (Kuljanishvili et al 2021)	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	No	Nothing is known yet, however one might assume there is some impact to wild stocks in terms of competition	Medium
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	No. No effective natural enemies present in RA area	Medium
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	No	No known adverse impacts to ecosystem services. Possible can be transmitting parasites or deseases	Low
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	No known adverse socio-economic impacts	Medium
B. I	Biology	//Ecology			
		able (or persistence) traits			
		pose other risks to human health?	No	Not poisonous	Very high
15	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	They might be in competition for food and resources with the native gobionid fishes.	High
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	Does not parasite	Very high
17	4.04	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has	Not applicable	This species is newly discovered and there is no information about its biology.	Low
1		invaded or could invade the RA area?			
18	4.05	Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it	No	Most likely it will not disrupt food-web structure	Medium
19	4.06	has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts	No	Not likely	High
	4.07	on ecosystem services in the RA area? Is it likely that the taxon will host, and/or		No information avalable	Medium
1		act as a vector for, recognised pests and infectious agents that are endemic in the RA			
21	4.08	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel	Yes	It is likely	Medium
	4.09	to) the RA area? Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity?	No	It is a small sized fish 10 cm max SL	High
23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)?	Yes	It inhabits in fast flowing rivers. Species of its genera are known to be adapting in different habitats (Turan et al 2016)	High

24	4.11	Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa?	No	It is not documented. However it is less likely	Medium
25	4.12	Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)?	Yes	There is no documented evidence that theyy can maintain a viable populations when present in low densities but the fact that they are so widespread in Kura Aras system, indicates that they can.	Medium
		e exploitation	[
26	5.01	Is the taxon likely to consume threatened or	No	No information avalable	Medium
27	5.02	protected native taxa in the RA area? Is the taxon likely to sequester food resources (including nutrients) to the	No	it is less likely	Low
_		detriment of native taxa in the RA area?			
	<i>eprodu</i> 6.01	Is the taxon likely to exhibit parental care	No	No. information avalabe	High
20	0.01	and/or to reduce age-at-maturity in response to environmental conditions?			High
		Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	Yes. The climate is quite similar	High
30	6.03	Is the taxon likely to hybridise naturally with native taxa?	Yes	It is likely	High
31	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	No	No. Does not display asexual reproduction	High
32	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features)	No	No. See: https://www.fishbase.de/summary/Gobio-artvinicus.html	Very high
33	6.06	to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring	Yes	The species reproduction biology is not known, however as its relatives spawn several times a year it can be possible	Low
34	6.07	within a short time span (e.g. < 1 year)? How many time units (days, months, years)	1	possibly 1	Low
		does the taxon require to reach the age-at- first-reproduction?			
7. D	ispersa	al mechanisms			
35	7.01	How many potential internal vectors/pathways could the taxon use to	One	Auqculture	High
36	7.02	disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more	No	Not this vectors. But it might disperce in the protected areas from neigbouring areas	Medium
37	7.03	protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively	No	No. Morphologically this species does not have a means of actively	Very high
		attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal?		attaching itself to hard substrata	
38	7.04	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?	No	No. can not be distributed as eggs.	High
39	7.05	Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?	Yes	Yes. it is possible.	High
40	7.06	Are older life stages of the taxon likely to	No	Does not migrate	High
41	7.07	migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No	No. Can not be dispersed by other ananimals	High
42	7.08	Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous	No	NO information avalable	Low
		seven questions (35–41; i.e. both unintentional or intentional) likely to be			
		Is dispersal of the taxon density dependent?	No	Not documented	Low
		ce attributes	Ne	No. information contable	11: ele
44	8.01	Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life	No	No information avalable	High
45	8.02	cvcle? Is the taxon tolerant of a wide range of	No	It is not documented, however we know that this species is a	Medium
		water quality conditions relevant to that		rheophilic which means that it prefers fast flowing and clean water.	
		taxon? [In the Justification field, indicate the			
46	8.03	relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other	No	It is very widespread and it will be impossible	High
		relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Is the taxon likely to tolerate or benefit from	No	It is very widespread and it will be impossible less likely	High Medium
47	8.04	relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	No		-
47	8.04	relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Is the taxon likely to tolerate or benefit from environmental/human disturbance? Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment? Are there effective natural enemies	No	less likely	Medium
47 48 49	8.04 8.05 8.06	relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Is the taxon likely to tolerate or benefit from environmental/human disturbance? Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment? Are there effective natural enemies (predators) of the taxon present in the RA	No Not applicable	less likely No information avalable	Medium Medium
47 48 49 C. C	8.04 8.05 8.06	relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Is the taxon likely to tolerate or benefit from environmental/human disturbance? Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment? Are there effective natural enemies	No Not applicable	less likely No information avalable	Medium Medium
47 48 49 C. C 9. C	8.04 8.05 8.06 limate	relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Is the taxon likely to tolerate or benefit from environmental/human disturbance? Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment? Are there effective natural enemies (predators) of the taxon present in the RA e change	No Not applicable	less likely No information avalable	Medium Medium

51	9.02	Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	Increase	It was discovered in warm flowing watres which makes us think that this species might benefit from the climate change	Medium
52	9.03	Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change?	Increase	If their populations will favour from warming temperatures their dispersal might increase	Medium
53	9.04	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	Higher	competition with other rheophilic species will increase since their populations will increase.	Medium
54	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	No change	I assume there won't be much change	Medium
55	9.06	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	Higher	Impact on ecosystem services and impact on socio-economic factors can be increased. If this species will contribute to the decline of native fish species	Medium

Statistics

Scores	
BRA	5.0
BRA Outcome	-
BRA+CCA	15.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	3.0
1. Domestication/Cultivation	0.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	2.0
B. Biology/Ecology	2.0
4. Undesirable (or persistence) traits	3.0
5. Resource exploitation	0.0
6. Reproduction	4.0
7. Dispersal mechanisms	-3.0
8. Tolerance attributes	-2.0
C. Climate change	10.0
9. Climate change	10.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3 5 5
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2
6. Reproduction	2 7 9
7. Dispersal mechanisms	
8. Tolerance attributes	6
C. Climate change	6
9. Climate change	6
Sectors affected Commercial	2
Environmental	2
Environmental Species or population nuisance traits	2
Species or population nulsance traits	12
Thresholds	
BRA	-

	BRA -
BRA	+CCA -
Confidence	
BRA	+CCA 0.63
	BRA 0.64
	CCA 0.54
Date and Time	
21/	05/2022 14:09:46

Taxon and Assessor details	
Category	Fishes and Lampreys (freshwater)
Taxon name	Gymnocephalus cernua
Common name	ruffe
Assessor	Bella Japoshvili
Risk screening context	
Reason and socio-economic benefits	This species is known to cause a significant changes in the introduced areas. In the RA area it was
Risk assessment area	South Caucasus
Taxonomy	Actinopteri (ray-finned fishes) > Perciformes/Percoidei (Perchs) > Percidae (Perches)
Native range	Caspian Sea, Black Sea, Baltic Sea basins but not in the South Caucasus
Introduced range	Widely in Europe and USA
URL	https://www.fishbase.de/summary/Gymnocephalus-cernua.html

Response Justification (references and/or other information)

Confidence

Α.	Biogeo	graphy/Historical	Response	Justification (references and/or other information)	Confidence
		ication/Cultivation			
1		Has the taxon been the subject of	No	Not an ornamental species and not an economic importance	Very high
	-	domestication (or cultivation) for at least 20	-	···· · · · · · · · · · · · · · · · · ·	., 5
		generations?			
2	1.02	Is the taxon harvested in the wild and likely	Yes	Maitland, P.S. and R.N. Campbell, 1992. Freshwater fishes of the	High
		to be sold or used in its live form?		British Isles. HarperCollins Publishers, London.368 p. ; Gutsch, M.,	-
				Hoffman, J. A review of Ruffe (Gymnocephalus cernua) life history	
				in its native versus non-native range. Rev Fish Biol Fisheries 26,	
				213-233 (2016). https://doi.org/10.1007/s11160-016-9422-5	
3	1.03	Does the taxon have invasive races,	No	No other congener or races are known as invasive	High
		varieties, sub-taxa or congeners?			
2. (, distribution and introduction risk	T		T
4	2.01		High	Result of climatch algorithm	Medium
		Risk Assessment (RA) area and the taxon's			
_	2.02	native range?			1.12.1
5	2.02	What is the quality of the climate matching	Low	Due to low accuracy of local climate data	High
6	2.03	data? Is the taxon already present outside of	Yes	Epitashvili C. Coigor M.E. Astrin 1.1. Hordor E. Japoshvili B.	Vony high
^v	2.05	captivity in the RA area?	105	Epitashvili, G., Geiger, M.F., Astrin, J.J., Herder, F., Japoshvili, B., Mumladze, L., 2020. Towards retrieving the Promethean treasure:	Very high
1		captivity in the ICA area!		a first molecular assessment of the freshwater fish diversity of]
1				Georgia. Biodivers. Data J. e57862.]
7	2.04	How many potential vectors could the taxon	One	Human mediated dispersal	High
ľ		use to enter in the RA area?			
8	2.05	Is the taxon currently found in close	Yes	Epitashvili, G., Geiger, M.F., Astrin, J.J., Herder, F., Japoshvili, B.,	Very high
1		proximity to, and likely to enter into, the RA		Mumladze, L., 2020. Towards retrieving the Promethean treasure:	.,
1		area in the near future (e.g. unintentional		a first molecular assessment of the freshwater fish diversity of]
		and intentional introductions)?		Georgia. Biodivers. Data J. e57862.	
3. I	nvasive	e elsewhere			
9	3.01	Has the taxon become naturalised	Yes	Gutsch, M., Hoffman, J. A review of Ruffe (Gymnocephalus	Very high
1		(established viable populations) outside its		cernua) life history in its native versus non-native range. Rev Fish]
<u> </u>		native range?		Biol Fisheries 26, 213–233 (2016).	
10	3.02	In the taxon's introduced range, are there	Yes	Rosch R. & Schmid W. 1996: Ruffe (Gymnocephalus cernuus L.,)	Medium
1		known adverse impacts to wild stocks or		newly introduced into Lake Costance: preliminary data on]
1		commercial taxa?		population biology and possible effects on whitefish (Coregonus]
				lavaretus L.). Ann. Zool. Fennici 33: 467–471.; Lorenzoni, M.,	
1				Pace, R., Pedicillo, G., Viali, P., & Carosi, A. (2009). Growth,	
1				catches and reproductive biology of ruffe Gymnocephalus cernuus]
11	3.03	In the taxon's introduced range, are there	Yes	in Lake Piediluco (Umbria. Italv). Folia Zoologica. 58(4). 420. Rosch R. & Schmid W. 1996: Ruffe (Gymnocephalus cernuus L.,)	Medium
1	2.00	known adverse impacts to aquaculture?		newly introduced into Lake Costance: preliminary data on	
1				population biology and possible effects on whitefish (Coregonus	
1				lavaretus L.). Ann. Zool. Fennici 33: 467–471.	
12	3.04	In the taxon's introduced range, are there	Yes	Not well documented evidence. Professional guess (affecting the	Low
		known adverse impacts to ecosystem		economically important fish populations)	
13	3.05	In the taxon's introduced range, are there	Yes	Not well documented evidences	Low
		known adverse socio-economic impacts?			
		y/Ecology			
		able (or persistence) traits			lue i
14	4.01	, , , , , , , , , , , , , , , , , , , ,	No	Not a harmful species	High
1 -	4.02	pose other risks to human health?	Vaa	It composites to at least a pative Deves fluctuatility Leist, D. (1999)	High
12	4.02	Is it likely that the taxon will smother one or	Yes	It competes to at least a native Perca fluviatilis. Leigh, P. (1998).	High
		more native taxa (that are not threatened or		Benefits and costs of the ruffe control program for the Great Lakes	
16	4.03	protected)? Are there any threatened or protected taxa	Yes	fishery. Journal of Great Lakes Research, 24(2), 351-360. Wide variety of food includes juvenile fishes, egs and invererbates	High
10	-1.03	that the non-native taxon would parasitise in	105	(CABI, 2022. Gymnocephalus cernuus. In: Invasive Species	i iigii
1		the RA area?		Compendium. Wallingford, UK: CAB International.	
17	4.04	Is the taxon adaptable in terms of climatic	Yes	Gutsch, M., Hoffman, J. A review of Ruffe (Gymnocephalus	Very high
1		and other environmental conditions, thus		cernua) life history in its native versus non-native range. Rev Fish	.,
1		enhancing its potential persistence if it has		Biol Fisheries 26, 213–233 (2016).]
1		invaded or could invade the RA area?		https://doi.org/10.1007/s11160-016-9422-5]
18	4.05	Is the taxon likely to disrupt food-web	No	No documented evidence	Low
1		structure/function in aquatic ecosystems if it]
L		has invaded or is likely to invade the RA			
19	4.06	Is the taxon likely to exert adverse impacts	Yes	By cometing/predation to economically valued species	Medium
	1	on ecosystem services in the RA area?			
			LAL	Not a documented evidence exists	Low
20	4.07	Is it likely that the taxon will host, and/or	No	Not a documented evidence exists	LOW
20	4.07	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA	NO	Not a documented evidence exists	LOW

21	4.08	Is it likely that the taxon will host, and/or	Yes	No documented evidence exists	Low
~ 1	4.00	act as a vector for, recognised pests and	165		LOW
		infectious agents that are absent from (novel			
		to) the RA area?			
22	4.09	Is it likely that the taxon will achieve a body	No	Generally small bodied species	Very high
		size that will make it more likely to be released from captivity?			
13	4.10	Is the taxon capable of sustaining itself in a	Yes	Gutsch, M., Hoffman, J. A review of Ruffe (Gymnocephalus	Medium
		range of water velocity conditions (e.g.		cernua) life history in its native versus non-native range. Rev Fish	. iouium
		versatile in habitat use)?		Biol Fisheries 26, 213–233 (2016).	
4	4.11	Is it likely that the taxon's mode of existence	Yes	Gutsch, M., Hoffman, J. A review of Ruffe (Gymnocephalus	Medium
		(e.g. excretion of by-products) or behaviours		cernua) life history in its native versus non-native range. Rev Fish	
		(e.g. feeding) will reduce habitat quality for		Biol Fisheries 26, 213–233 (2016).	
F	4.12	native taxa?	No	https://doi.org/10.1007/s11160-016-9422-5	1
5	4.12	Is the taxon likely to maintain a viable population even when present in low	NO	No documented evidence exists	Low
		densities (or persisting in adverse conditions			
		by way of a dormant form)?			
i. 1	Resourc	ce exploitation			
6	5.01	Is the taxon likely to consume threatened or	Yes	It is a predator (Bergman, E. (1988). Foraging abilities and niche	Medium
		protected native taxa in the RA area?		breadths of two percids, Perca fluviatilis and Gymnocephalus	
				cernua, under different environmental conditions. The Journal of	
7	5.02		N/s s	Animal Ecology, 443-453.)	Ma dissa
/	5.02	Is the taxon likely to sequester food	Yes	Competing with other predators (Bergman, E. (1988). Foraging	Medium
	1	resources (including nutrients) to the detriment of native taxa in the RA area?		abilities and niche breadths of two percids, Perca fluviatilis and Gymnocephalus cernua, under different environmental conditions.	
		actiment of native taxa in the KA area?		The Journal of Animal Ecology, 443-453.)	1
. 1	Reprodu	uction			
		Is the taxon likely to exhibit parental care	No	Not ever observed	High
	1	and/or to reduce age-at-maturity in response			
_		to environmental conditions?			
9	6.02	Is the taxon likely to produce viable gametes	Yes	No documented evidence exists though it have been recently	Medium
0	6.03	or propagules (in the RA area)? Is the taxon likely to hybridise naturally with	No	cought in wild Not known, and not expected	High
U	0.03	native taxa?	NO	Not known, and not expected	підп
1	6.04	Is the taxon likely to be hermaphroditic or to	No	Known as sexually reproducing species	High
-	0.01	display asexual reproduction?		nowin do sexually reproducing species	ingn
2	6.05	Is the taxon dependent on the presence of	No	Species can complete its life cycle independently	Very high
		another taxon (or specific habitat features)			, 5
		to complete its life cycle?			
3	6.06	Is the taxon known (or likely) to produce a	Yes	(CABI, 2022. Gymnocephalus cernuus. In: Invasive Species	High
		large number of propagules or offspring		Compendium. Wallingford, UK: CAB International.	
	6.07	within a short time span (e.g. < 1 year)?	2	www.cabi.org/isc.)	LU - h
84	6.07	How many time units (days, months, years)	2	www.cabi.org/isc.) Years	High
84	6.07	How many time units (days, months, years) does the taxon require to reach the age-at-	2		High
		How many time units (days, months, years)	2		High
'. I	Dispers	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	2		High High
'. I	Dispers	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to		Years	
'. 1 5	Dispers 7.01	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable	>1	Years Natural dispersal, Human mediated dispersal	High
5	Dispers	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the		Years Natural dispersal, Human mediated dispersal Already detected nearby to Protected areas of Black Sea Coast	
5	Dispers 7.01	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? <i>al mechanisms</i> How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more	>1	Years Natural dispersal, Human mediated dispersal	High
<u>.</u> 5	Dispers 7.01 7.02	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)?	>1 Yes	Years Natural dispersal, Human mediated dispersal Already detected nearby to Protected areas of Black Sea Coast with RA area	High
<u>.</u> 5	Dispers 7.01	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively	>1	Years Natural dispersal, Human mediated dispersal Already detected nearby to Protected areas of Black Sea Coast	High
5	Dispers 7.01 7.02	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship	>1 Yes	Years Natural dispersal, Human mediated dispersal Already detected nearby to Protected areas of Black Sea Coast with RA area	High
<u>.</u> 5	Dispers 7.01 7.02	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively	>1 Yes	Years Natural dispersal, Human mediated dispersal Already detected nearby to Protected areas of Black Sea Coast with RA area	High
5 6 7	Dispers 7.01 7.02	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to	>1 Yes	Years Natural dispersal, Human mediated dispersal Already detected nearby to Protected areas of Black Sea Coast with RA area	High
5 6 7	Dispers 7.01 7.02 7.03	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules	>1 Yes No	Years Natural dispersal, Human mediated dispersal Already detected nearby to Protected areas of Black Sea Coast with RA area No such fact is observed	High Medium Very high
5 6 7 8	Dispers 7.01 7.02 7.03 7.04	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?	>1 Yes No No	Years Natural dispersal, Human mediated dispersal Already detected nearby to Protected areas of Black Sea Coast with RA area No such fact is observed Not a documented evidence exists	High Medium Very high High
5 6 7 8	Dispers 7.01 7.02 7.03	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to	>1 Yes No	Years Natural dispersal, Human mediated dispersal Already detected nearby to Protected areas of Black Sea Coast with RA area No such fact is observed	High Medium Very high
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5 6 7 8	Dispers 7.01 7.02 7.03 7.04 7.05	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?	>1 Yes No Yes	Years Natural dispersal, Human mediated dispersal Already detected nearby to Protected areas of Black Sea Coast with RA area No such fact is observed Not a documented evidence exists Through water currents with RA area	High Medium Very high High
5 6 7 8	Dispers 7.01 7.02 7.03 7.04	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA	>1 Yes No No	Years Natural dispersal, Human mediated dispersal Already detected nearby to Protected areas of Black Sea Coast with RA area No such fact is observed Not a documented evidence exists	High Medium Very high High Medium
5 6 7 8 9	Dispers 7.01 7.02 7.03 7.04 7.05	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to	>1 Yes No Yes	Years Natural dispersal, Human mediated dispersal Already detected nearby to Protected areas of Black Sea Coast with RA area No such fact is observed Not a documented evidence exists Through water currents with RA area Not a migrant species and not such an evidence have ever been	High Medium Very high High Medium
5 6 7 8 9 0	Dispers 7.01 7.02 7.03 7.04 7.05 7.06	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	>1 Yes No Yes No No	Years Natural dispersal, Human mediated dispersal Already detected nearby to Protected areas of Black Sea Coast with RA area No such fact is observed Not a documented evidence exists Through water currents with RA area Not a migrant species and not such an evidence have ever been described from other areas Not expected based on professional judgement	High Medium Very high High Medium Medium
5 6 7 8 9 0	7.03 7.04 7.05 7.06	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? <i>al mechanisms</i> How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the	>1 Yes No Yes No	Years Natural dispersal, Human mediated dispersal Already detected nearby to Protected areas of Black Sea Coast with RA area No such fact is observed Not a documented evidence exists Through water currents with RA area Not a migrant species and not such an evidence have ever been described from other areas	High Medium Very high High Medium
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5 6 7 8 9 0	Dispers 7.01 7.02 7.03 7.04 7.05 7.06	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both	>1 Yes No Yes No No	Years Natural dispersal, Human mediated dispersal Already detected nearby to Protected areas of Black Sea Coast with RA area No such fact is observed Not a documented evidence exists Through water currents with RA area Not a migrant species and not such an evidence have ever been described from other areas Not expected based on professional judgement	High Medium Very high High Medium Medium
. . 5 . 6 7 8 . 9 . 1 . 2	Dispers 7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be	>1 Yes No Yes No Yes	Years Natural dispersal, Human mediated dispersal Already detected nearby to Protected areas of Black Sea Coast with RA area No such fact is observed Not a documented evidence exists Through water currents with RA area Not a migrant species and not such an evidence have ever been described from other areas Not expected based on professional judgement Due to large number of eggs/juveniles	High Medium Very high High Medium Medium High
.1 5 6 7 8 9 0 1 2 3	Dispers 7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? <i>al</i> mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon dintentional vectors/pathways mentioned in the seven questions (35–41; i.e. both	>1 Yes No Yes No No	Years Natural dispersal, Human mediated dispersal Already detected nearby to Protected areas of Black Sea Coast with RA area No such fact is observed Not a documented evidence exists Through water currents with RA area Not a migrant species and not such an evidence have ever been described from other areas Not expected based on professional judgement	High Medium Very high High Medium Medium
	Dispers 7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 Toleran	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be	>1 Yes No Yes No Yes	Years Natural dispersal, Human mediated dispersal Already detected nearby to Protected areas of Black Sea Coast with RA area No such fact is observed Not a documented evidence exists Through water currents with RA area Not a migrant species and not such an evidence have ever been described from other areas Not expected based on professional judgement Due to large number of eggs/juveniles	High Medium Very high High Medium Medium High
7 8 9 0 1 2 3	Dispers 7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 Toleran	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? Al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to be dispersed in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i>	>1 Yes No Yes No Yes No	Years Natural dispersal, Human mediated dispersal Already detected nearby to Protected areas of Black Sea Coast with RA area No such fact is observed Not a documented evidence exists Through water currents with RA area Not a migrant species and not such an evidence have ever been described from other areas Not expected based on professional judgement Due to large number of eggs/juveniles No information, though not expected	High Medium Very high High Medium Medium High Low
	Dispers 7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 Toleran	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? ce attributes Is the taxon able to withstand being out of	>1 Yes No Yes No Yes No	Years Natural dispersal, Human mediated dispersal Already detected nearby to Protected areas of Black Sea Coast with RA area No such fact is observed Not a documented evidence exists Through water currents with RA area Not a migrant species and not such an evidence have ever been described from other areas Not expected based on professional judgement Due to large number of eggs/juveniles No information, though not expected	High Medium Very high High Medium Medium High Low
5 6 7 8 9 0 1 2 3 4	Dispers 7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 Toleran 8.01	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? <i>al mechanisms</i> How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle?	>1 Yes No No Yes No No No	Years Natural dispersal, Human mediated dispersal Already detected nearby to Protected areas of Black Sea Coast with RA area No such fact is observed Not a documented evidence exists Through water currents with RA area Not a migrant species and not such an evidence have ever been described from other areas Not expected based on professional judgement Due to large number of eggs/juveniles No information, though not expected No information thoug not expected	High Medium Very high High Medium Medium High Low
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	Dispers 7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 Toleran 8.01	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? Al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that	>1 Yes No No Yes No No No	Years Natural dispersal, Human mediated dispersal Already detected nearby to Protected areas of Black Sea Coast with RA area No such fact is observed Not a documented evidence exists Through water currents with RA area Not a migrant species and not such an evidence have ever been described from other areas Not expected based on professional judgement Due to large number of eggs/juveniles No information, though not expected No information thoug not expected Phisical and chemical composition; Gutsch, M., Hoffman, J. A review of Ruffe (Gymnocephalus cernua) life history in its native	High Medium Very high High Medium Medium High Low
7 8 9 0 1 2 3 4	Dispers 7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 Toleran 8.01	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? <i>al mechanisms</i> How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the	>1 Yes No No Yes No No No	Years Natural dispersal, Human mediated dispersal Already detected nearby to Protected areas of Black Sea Coast with RA area No such fact is observed Not a documented evidence exists Through water currents with RA area Not a migrant species and not such an evidence have ever been described from other areas Not expected based on professional judgement Due to large number of eggs/juveniles No information, though not expected No information thoug not expected Phisical and chemical composition; Gutsch, M., Hoffman, J. A review of Ruffe (Gymnocephalus cernua) life history in its native versus non-native range. Rev Fish Biol Fisheries 26, 213–233	High Medium Very high High Medium Medium High Low
7.1 1 55 66 77 88 88 99 00 11 12 33 33 44 55 5	Dispers 7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 Toleran 8.01	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? <i>al</i> mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon deng out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being	>1 Yes No No Yes No No Yes No Yes	Years Natural dispersal, Human mediated dispersal Already detected nearby to Protected areas of Black Sea Coast with RA area No such fact is observed Not a documented evidence exists Through water currents with RA area Not a migrant species and not such an evidence have ever been described from other areas Not expected based on professional judgement Due to large number of eggs/juveniles No information, though not expected No information thoug not expected Phisical and chemical composition; Gutsch, M., Hoffman, J. A review of Ruffe (Gymnocephalus cernua) life history in its native versus non-native range. Rev Fish Biol Fisheries 26, 213–233 (2016). https://doi.org/10.1007/s11160-016-9422-5	High Medium Very high High Medium Medium High Low Low
7 8 9 0 1 2 3 4 5	Dispers 7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 Toleran 8.01	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? <i>al mechanisms</i> How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the	>1 Yes No No Yes No No No	Years Natural dispersal, Human mediated dispersal Already detected nearby to Protected areas of Black Sea Coast with RA area No such fact is observed Not a documented evidence exists Through water currents with RA area Not a migrant species and not such an evidence have ever been described from other areas Not expected based on professional judgement Due to large number of eggs/juveniles No information, though not expected No information thoug not expected Phisical and chemical composition; Gutsch, M., Hoffman, J. A review of Ruffe (Gymnocephalus cernua) life history in its native versus non-native range. Rev Fish Biol Fisheries 26, 213–233	High Medium Very high High Medium Medium High Low

47	8.04		No	No documented evidence exists	Low
		environmental/human disturbance?			
48	8.05	Is the taxon able to tolerate salinity levels	No	No documented evidence exists.	High
		that are higher or lower than those found in			
		its usual environment?			
49	8.06	Are there effective natural enemies	No	Not known, not expected	Medium
		(predators) of the taxon present in the RA			
С. С	Climate	e change			
9. (Climate	change			
50	9.01	Under the predicted future climatic	Increase	Based on professional judgement	Low
		conditions, are the risks of entry into the RA			
		area posed by the taxon likely to increase,			
		decrease or not change?			
51	9.02	Under the predicted future climatic	Increase	Based on professional judgement	Low
		conditions, are the risks of establishment			
		posed by the taxon likely to increase,			
		decrease or not change?			
52	9.03	Under the predicted future climatic	Increase	Based on professional judgement	Low
		conditions, are the risks of dispersal within			
		the RA area posed by the taxon likely to			
		increase, decrease or not change?			
53	9.04	Under the predicted future climatic	Higher	Based on professional judgement	Low
		conditions, what is the likely magnitude of			
		future potential impacts on biodiversity			
		and/or ecological integrity/status?			
54	9.05	Under the predicted future climatic	Higher	Based on professional judgement	Low
		conditions, what is the likely magnitude of			
		future potential impacts on ecosystem			
		structure and/or function?			
55	9.06	Under the predicted future climatic	Higher	Based on professional judgement	Low
		conditions, what is the likely magnitude of			
		future potential impacts on ecosystem			
		services/socio-economic factors?			

Statistics	
Scores	
BRA	34.0
BRA Outcome	-
BRA+CCA	46.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	19.0
1. Domestication/Cultivation	0.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	18.0
B. Biology/Ecology	15.0
4. Undesirable (or persistence) traits	7.0
5. Resource exploitation	7.0
6. Reproduction	1.0
7. Dispersal mechanisms	0.0
8. Tolerance attributes	0.0
C. Climate change	12.0
9. Climate change	12.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3
2. Climate, distribution and introduction risk	5 5
3. Invasive elsewhere	5
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2 7 9 6
6. Reproduction	7
	9
7. Dispersal mechanisms	
8. Tolerance attributes	
8. Tolerance attributes C. Climate change	6
8. Tolerance attributes C. Climate change 9. Climate change	
8. Tolerance attributes C. Climate change 9. Climate change Sectors affected	6 6
8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial	6 6 18
8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial Environmental	6 6 18 16
8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial	6 6 18

Thresholds	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.58
BRA	0.62
CCA	0.25

Date and Time	
	16/05/2022 12:54:13

Faxon and Assessor details				
Category	Fishes and Lampreys (freshwater)			
Taxon name	Gymnocephalus cernua			
Common name	ruffe			
Assessor	Giorgi Epitashvili			
Risk screening context				
Reason and socio-economic benefits	The Eurasian ruffe (Gymnocephalus cernua), is a freshwater fish found in temperate regions of			
Risk assessment area	South Caucasus			
Taxonomy	Gymnocephalus cernua (Linnaeus 1758)			
Native range	Europe: Caspian, Black, Baltic and North Sea basins; Great Britain; north to about 69° N in			
Introduced range	It has been introduced to parts of Western Europe (France, northern Italy) and Greece, as well as			
URL	https://www.fishbase.se/summary/gymnocephalus-cernua.html			

			Response	Justification (references and/or other information)	Confidence
		ography/Historical			
		tication/Cultivation			
1	1.01	Has the taxon been the subject of	No	Although the ruffe once was a popular fish for consumption and its	High
		domestication (or cultivation) for at least 20		flesh described as delicious and healthy, it has disappeared almost	
		generations?		entirely from central, northern and western European food culture.	
		5		It is no longer sought after in the market.	
2	1.02	Is the taxon harvested in the wild and likely	Yes	Although the ruffe once was a popular fish for consumption and its	High
2	1.02	to be sold or used in its live form?	103		ingii
		to be sold of used in its live form?		flesh described as delicious and healthy, it has disappeared almost	
				entirely from central, northern and western European food culture.	
				It is no longer sought after in the market. However, it has	
				survived to some extent as human food in Finland, Estonia,	
				Belarus and Russia. In Finland, it seems to be the roe that still	
				attracts some consumers, especially within restaurants serving	
				the New Nordic Cuisine. In Estonia, it is sold dried and salted as	
3	1.03	Does the taxon have invasive races,	No	snacks. In Russia, some people still make ukha, the typical clear No toehr congenerics or subspecies as invasive is known	High
5	1.05		NO	No toem congenerics of subspecies as invasive is known	ingn
_		varieties, sub-taxa or congeners?			
		e, distribution and introduction risk			1
4	2.01	How similar are the climatic conditions of the	High	Koppen - Geiger climate classification (This species is naturally	High
		Risk Assessment (RA) area and the taxon's		distributed in the Caucasus region)	
		native range?			
5	2.02	What is the quality of the climate matching	High	Koppen - Geiger climate classification (This species is naturally	High
		data?	5	distributed in the Caucasus region)	5
6	2.03	Is the taxon already present outside of	Yes	This species is naturally distributed in the Caucasus region. First	Very high
5	2.03		100		veryingn
7	2.04	captivity in the RA area?	<u>\</u>	record from Georgia was confirmed by Epitashvili et al. (2020)	Madium
/	2.04	How many potential vectors could the taxon	>1	Probably this species spreads within the region by humans	Medium
		use to enter in the RA area?		unintentionally and by animals (birds, etc.)	
8	2.05	Is the taxon currently found in close	Yes	Confirmed record of Gymnocephalus cernua (Linnaeus, 1758)	Very high
		proximity to, and likely to enter into, the RA		(Perciformes: Percidae) as a new exotic species for Turkey (Çiçek	
		area in the near future (e.g. unintentional		et al. 2021)	
		and intentional introductions)?			
3. T	nvasiv	e elsewhere			
9	3.01	Has the taxon become naturalised	Yes	The ruffe has already invaded Lake Superior and GARP modeling	Very high
-	0.01	(established viable populations) outside its		predicts it will find suitable habitat almost everywhere in all five	ici, ingli
10	2.02	native range?	X	Great lakes.	N 1 1
10	3.02	In the taxon's introduced range, are there	Yes	The ruffe has affected fish populations in other areas where	Very high
		known adverse impacts to wild stocks or		introduced. In Scotland, native perch populations declined, and in	
		commercial taxa?		Russia whitefish numbers have declined because of egg predation	
				by ruffe (McLean 1993)	
11	3.03	In the taxon's introduced range, are there	Yes	G. cernua is the second most costly invasive aquatic taxon in the	Low
		known adverse impacts to aquaculture?		world (Haubrock et al. 2022).	
12	3.04	In the taxon's introduced range, are there	Yes	Given that G. cernua is the second most costly invasive aquatic	Low
	5.54	known adverse impacts to ecosystem		taxon in the world it should have a serious impact on ecosystem	
17	2.05		Voc		Von hich
ιJ	3.05	In the taxon's introduced range, are there	Yes	When ruffe first invaded Lake Superior, it was thought that this	Very high
		known adverse socio-economic impacts?		species could generate a considerable cost for recreational fishing,	
				particularly by causing a decline in yellow perch (Perca	
				flavescens) populations (Leigh 1998). Under a moderate scenario	
				of spread and impact, it was predicted that ruffe could generate	
				costs in excess of \$500 million by 2050 (Leigh 1998). However,	
				these concerns have yet to be confirmed as the extent of ruffe's	
	1			contribution to declines in native fish populations remains	
1			1	undecided (Czypinksi et al. 2007). Ruffe abundance appeared to	1
				remain stable or decline annually in Lake Superior as late as 2001-	
				remain stable or decline annually in Lake Superior as late as 2001-2005 (Czyninski et al. 2007, Gorman et al. 2010).	
		y/Ecology			
4. U	Indesir	able (or persistence) traits		2005 (Czyninski et al. 2007. Gorman et al. 2010).	
4. U			No		High
4. U	Indesir	able (or persistence) traits	No	2005 (Czyninski et al. 2007. Gorman et al. 2010).	High
<u>4. l</u> 14	<i>Indesir</i> 4.01	able (or persistence) traits Is it likely that the taxon will be poisonous or	No	2005 (Czypinski et al. 2007. Gorman et al. 2010) This species does not pose a threat to humans.	-
<u>4. l</u> 14	Indesir	able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or		2005 (Czypinski et al. 2007. Gorman et al. 2010). This species does not pose a threat to humans. The ruffe has affected fish populations in other areas where	High Very high
<u>4. l</u> 14	<i>Indesir</i> 4.01	able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or		2005 (Czypinski et al. 2007. Gorman et al. 2010). This species does not pose a threat to humans. The ruffe has affected fish populations in other areas where introduced. In Scotland, native perch populations declined, and in	-
<u>4. l</u> 14	<i>Indesir</i> 4.01	able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or		2005 (Czypinski et al. 2007. Gorman et al. 2010). This species does not pose a threat to humans. The ruffe has affected fish populations in other areas where introduced. In Scotland, native perch populations declined, and in Russia whitefish numbers have declined because of egg predation	-
<u>4. U</u> 14 15	<i>Indesiri</i> 4.01 4.02	able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	2005 (Czypinski et al. 2007. Gorman et al. 2010). This species does not pose a threat to humans. The ruffe has affected fish populations in other areas where introduced. In Scotland, native perch populations declined, and in Russia whitefish numbers have declined because of egg predation by ruffe (McLean 1993).	Very high
<u>4. U</u> 14 15	<i>Indesir</i> 4.01	able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa		2005 (Czypinski et al. 2007. Gorman et al. 2010). This species does not pose a threat to humans. The ruffe has affected fish populations in other areas where introduced. In Scotland, native perch populations declined, and in Russia whitefish numbers have declined because of egg predation by ruffe (McLean 1993). There are meny threatened and protected species in the Caucasus	-
<u>4. U</u> 14 15	<i>Indesiri</i> 4.01 4.02	able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	2005 (Czypinski et al. 2007. Gorman et al. 2010). This species does not pose a threat to humans. The ruffe has affected fish populations in other areas where introduced. In Scotland, native perch populations declined, and in Russia whitefish numbers have declined because of egg predation by ruffe (McLean 1993).	Very high
<u>4. U</u> 14 15	<i>Indesiri</i> 4.01 4.02	able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in	Yes	2005 (Czypinski et al. 2007. Gorman et al. 2010). This species does not pose a threat to humans. The ruffe has affected fish populations in other areas where introduced. In Scotland, native perch populations declined, and in Russia whitefish numbers have declined because of egg predation by ruffe (McLean 1993). There are meny threatened and protected species in the Caucasus region which may be influenced by Ruffe: Luciobarbus capito, L.	Very high
<u>4. L</u> 14 15 16	4.01 4.02 4.03	able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	Yes	2005 (Czvninski et al. 2007. Gorman et al. 2010). This species does not pose a threat to humans. The ruffe has affected fish populations in other areas where introduced. In Scotland, native perch populations declined, and in Russia whitefish numbers have declined because of egg predation by ruffe (McLean 1993). There are meny threatened and protected species in the Caucasus region which may be influenced by Ruffe: Luciobarbus capito, L. mursa, Salmo spp, Rutilus spp, etc.	Very high Very high
<u>4. U</u> 14 15 16	<i>Indesiri</i> 4.01 4.02	able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic	Yes	2005 (Czvninski et al. 2007. Gorman et al. 2010). This species does not pose a threat to humans. The ruffe has affected fish populations in other areas where introduced. In Scotland, native perch populations declined, and in Russia whitefish numbers have declined because of egg predation by ruffe (McLean 1993). There are meny threatened and protected species in the Caucasus region which may be influenced by Ruffe: Luciobarbus capito, L. mursa, Salmo spp, Rutilus spp, etc. This species naturally inhabits the region and environmental	Very high
<u>4. U</u> 14 15 16	4.01 4.02 4.03	able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus	Yes	2005 (Czvninski et al. 2007. Gorman et al. 2010). This species does not pose a threat to humans. The ruffe has affected fish populations in other areas where introduced. In Scotland, native perch populations declined, and in Russia whitefish numbers have declined because of egg predation by ruffe (McLean 1993). There are meny threatened and protected species in the Caucasus region which may be influenced by Ruffe: Luciobarbus capito, L. mursa, Salmo spp, Rutilus spp, etc.	Very high Very high
<u>4. U</u> 14 15 16	4.01 4.02 4.03	able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic	Yes	2005 (Czvninski et al. 2007. Gorman et al. 2010). This species does not pose a threat to humans. The ruffe has affected fish populations in other areas where introduced. In Scotland, native perch populations declined, and in Russia whitefish numbers have declined because of egg predation by ruffe (McLean 1993). There are meny threatened and protected species in the Caucasus region which may be influenced by Ruffe: Luciobarbus capito, L. mursa, Salmo spp, Rutilus spp, etc. This species naturally inhabits the region and environmental	Very high Very high

	4.05	Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA	Yes	Such a case is expected if this species is widespread in the region.	Low
20 4	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes	Such a case is expected if this species is widespread in the region.	Low
	4.07	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and	Not applicable	No research has been conducted in this direction.	Low
		infectious agents that are endemic in the RA			
21 4	4.08	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and	Not applicable	No research has been conducted in this direction.	Low
		infectious agents that are absent from (novel to) the RA area?			
22 4	4.09	Is it likely that the taxon will achieve a body	Yes	Max length of Ruffe is 25.0 cm TL male/unsexed; common length	High
		size that will make it more likely to be released from captivity?		: 12.0 cm TL male/unsexed; max. published weight: 400.00 g, so this species can be used in aquaculture.	
23 4	4.10	Is the taxon capable of sustaining itself in a	No	Inhabits eutrophic lakes, lowland and piedmont rivers. Most	Medium
		range of water velocity conditions (e.g. versatile in habitat use)?		abundant in estuaries of large rivers, brackish lakes with salinities up to 10-12 ppt and reservoirs. In general, its abundance increases with increased eutrophication. Reported to prefer still or slow-flowing water with soft bottom and without vegetation and deep water with deposits of sand and gravel.	
24 4	4.11	Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for patient burg?	No	Data deficient	Low
25 4	4.12	native taxa? Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions	Yes	Data deficient	Low
		by way of a dormant form)?			l
		<i>e exploitation</i> Is the taxon likely to consume threatened or	Yes	Ruffe is a predator/omnivor species and can consume threatened	Medium
		protected native taxa in the RA area?		Acipenser spp, etc.	
27 5	5.02	Is the taxon likely to sequester food resources (including nutrients) to the	Yes	Ruffe is a predator/omnivor species and may be competitor for native species in terms of food and nutrient extraction.	High
_		detriment of native taxa in the RA area?			
	e <i>produ</i> 5.01	Iction Is the taxon likely to exhibit parental care	No	Data deficient	Low
.0 0	0.01	and/or to reduce age-at-maturity in response to environmental conditions?	UNU		
29 6	5.02	Is the taxon likely to produce viable gametes	Yes	It seems that this species is naturally reproduces in the region	High
30 6	5.03	or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa?	Yes	Such fact is not detected in the SC region. Natural hybridization between ruffe and perch has been recorded in the past. Regan	Very high
				(1911) cites a 1907 reference for perch and ruffe hybrids in the Danube, noting that "these hybrids are not fertile per se, but are quite fertile with either parent!" (see also Holcik and Hensel 1974). So far there is no evidence that ruffe have been	
\$1 6	5.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	No	Data deficient	Medium
32 6	5.05	Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	No	Own judgement	Medium
36	5.06	Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)?	Yes	The ruffe has the capacity to reproduce at an extremely high rate. A ruffe usually matures in two to three years, but a ruffe that lives in warmer waters has the ability to reproduce in the first year of life. A single female has the potential to lay from 130,000 to	Very high
34 6	5.07	How many time units (days, months, years)	1	200,000 eggs annually. A ruffe usually matures in two to three years, but a ruffe that lives	Very high
	5.07	does the taxon require to reach the age-at- first-reproduction?	±	in warmer waters has the ability to reproduce in the first year of life.	very mgn
		al mechanisms			
;5 7	7.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable	>1	This species can be spread within the SC region naturally and artificially by humans.	Medium
36 7	7.02	Will any of these vectors/pathways bring the taxon in close proximity to one or more	Yes	There is a probability of that exist	Medium
<u> </u>	7.03	protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship	No	The ruffe was probably introduced in US via ship ballast water discharged from a vessel arriving from a Eurasian port.	Medium
5/ 5		hulls, pilings, buoys) such that it enhances the likelihood of dispersal?			
s7 []	7.04	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules	Yes	This species should breed naturally in the region	Medium
			1		
	7.05	(for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to	Yes	This species should breed naturally in the region	Medium
38 7		(for plants: seeds, spores) in the RA area?	Yes	This species should breed naturally in the region	Medium
38 7		(for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA	Yes	This species should breed naturally in the region Data deficient	Medium

42	7.08	Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be	Yes	There is a probability of that exist	Medium
	7.09	Is dispersal of the taxon density dependent?	Yes	Data deficient	Low
		ce attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life	No	No such fact has been described	High
		cycle?			
	8.02	Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being considered.]	Yes	Adult Ruffe has characteristics that allow them to adapt to a range of environments, including rapid maturation, relatively long life and large size (allowing them to reproduce many times in large batches), batch spawning, genotype and phenotype (having plasticity in their genetic expression), tolerance to a wide range of water quality (Gutsch & Hoffman 2016).	Very high
	8.03	Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	Yes	Ever since the ruffe was introduced into the Great Lakes system, scientists and fishery managers have been searching for the right way to get rid of them. In the beginning, the main method of control was to increase the Walleye and Northern Pike populations, because they are natural predators of the ruffe. Other methods that have been considered are poison and chemical control. If a large school of ruffe is found, they can be poisoned. If some survive, however, they will rapidly reproduce. Chemicals can be targeted to act on specific species of fish. The chemical lampricide TFM kills ruffe, but leaves other fish unharmed.	High
47	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	Yes	The ruffe was probably introduced in US via ship ballast water discharged from a vessel arriving from a Eurasian port.	High
48	8.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	Yes	Ruffe tolerate a wide range of salinity (0–12 ppt) (Lind 1977).	High
49	8.06	Are there effective natural enemies (predators) of the taxon present in the RA area?	Yes	Esox lucius is a natural predators of the ruffe and distributed in the South Caucasus region. There are also other species which can controll ruffes population: Birds, Snakes, Otters, Sander lucioperca, Silurus glanis, Squalius spp, etc.	Very high
С. (Climat	e change			
		change	-		line i
50	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?	Increase	Such fact has been detected in East Georgia, where Ruffe was cateched by anglers in Taribana reservoir.	High
51	9.02	Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	Increase	Such fact has been detected in East Georgia, where Ruffe was cateched by anglers in Taribana reservoir.	High
52	9.03	Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change?	Increase	Own judgement	Medium
53	9.04	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	Higher	Own judgement	Medium
54	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Higher	Own judgement	Medium
55	9.06	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	Higher	Own judgement	Medium

Statistics	
Scores	
BRA	46.0
BRA Outcome	-
BRA+CCA	58.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	20.0
1. Domestication/Cultivation	0.0
2. Climate, distribution and introduction risk	2.0
3. Invasive elsewhere	18.0
B. Biology/Ecology	26.0
4. Undesirable (or persistence) traits	7.0
5. Resource exploitation	7.0
6. Reproduction	4.0
7. Dispersal mechanisms	5.0
8. Tolerance attributes	3.0
C. Climate change	12.0
9. Climate change	12.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3

Thresholds	
Species or population nuisance traits	28
Environmental	16
Commercial	19
Sectors affected	
9. Climate change	6
C. Climate change	6
8. Tolerance attributes	6
7. Dispersal mechanisms	9
6. Reproduction	7
5. Resource exploitation	2
4. Undesirable (or persistence) traits	12
B. Biology/Ecology	36
3. Invasive elsewhere	5
2. Climate, distribution and introduction risk	5

Theoholds	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.64
BRA	0.64
CCA	0.58

Date and Time 16/05/2022 12:55:12

Taxon and Assessor details	
Category	Fishes and Lampreys (freshwater)
Taxon name	Gymnocephalus cernua
Common name	ruffe
Assessor	Tatia Kuljanishvili
Risk screening context	
Reason and socio-economic benefits	Ruffe, Gymnocephalus cernua (Linnaeus, 1758), has caused substantial ecological damage in North
Risk assessment area	South Caucasus
Taxonomy	Actinopterygii (ray-finned fishes) Perciformes (Perch-likes) Percidae (Perches) Percinae
Native range	Basin of Northen Black Sea and Sea of Azo: Dneistr, South Bug, Dniepr, Don and Kuban drinages.
Introduced range	Has established populations in Lakes in Italy, England, Scotland, Wales, Germany, Austria,
URL	https://www.fishbase.de/summary/Gymnocephalus-cernua.html

			Response	Justification (references and/or other information)	Confidence
A. I	Biogeo	graphy/Historical			
1. L	Domest	ication/Cultivation			
1	1.01	Has the taxon been the subject of	No	This species is not a subject of domestication	Very high
		domestication (or cultivation) for at least 20			
		generations?			
2	1.02	Is the taxon harvested in the wild and likely	Yes	Used to be an object of commercial fishing around coastal regions	High
		to be sold or used in its live form?		of Baltic sea (Gutsch & Hoffman); In South-eastern England it has	
				been introduced as live bait which has lead to it's successful	
				establishment (Copp et al, 2005).	
3	1.03	Does the taxon have invasive races,	Yes	Perca fluviatilis and Sander lucioperca are is also known as an	High
		varieties, sub-taxa or congeners?		introduced species	
		, distribution and introduction risk			
4	2.01	How similar are the climatic conditions of the	High	Similar. According to Climatch application its 9 out of 10	Very high
		Risk Assessment (RA) area and the taxon's			
		native range?			
5	2.02	What is the quality of the climate matching	High	Quality of climate matching data is high	Very high
		data?			
6	2.03	Is the taxon already present outside of	Yes	Yes. It has been found in the rivers of north-weast Georgia (pers.	Very high
I		captivity in the RA area?		comm. G. Epitashvili)	
7	2.04	How many potential vectors could the taxon	>1	Recreational fisheries, aquaculture, ornamental trade, natural	High
_	D 6 -	use to enter in the RA area?		dispersal.	<u> </u>
8	2.05	Is the taxon currently found in close	Yes	The RA is a neighbouring area of G. cernua native range	Very high
1		proximity to, and likely to enter into, the RA			
		area in the near future (e.g. unintentional			
2 -		and intentional introductions)?	I		
	7	e elsewhere Has the taxon become naturalised	N	Terrendone de la contra de 1930 - 17 de la contra de 1930 - 17 de la contra de la c	Manu hist
9	3.01		Yes	Introduced and have become established (even inavasive) in	Very high
		(established viable populations) outside its		France; Northern Italy, northern Great Britain, the Great Lakes;	
		native range?		North America (Kottelat & Freyhof, 2007), Germany, Austria,	
10	3.02	In the taxon's introduced range, are there	Vac	Switzerland and Norway (Gutsch & Hoffman, 2016)	Medium
10	3.02		Yes	It was suggested that in introduced lakes G. cernua was affecting	Mealum
		known adverse impacts to wild stocks or		the native Coregonid species, However it is not well documented	
1 1	3.03	commercial taxa?	Vac	(Copp. et al 2005). Since the exsistance of G. cernua in new environment is affecting	Medium
11	5.05	In the taxon's introduced range, are there	Yes		Medium
		known adverse impacts to aquaculture?		native organisms throught competition, we can assume it will	
12	3.04	In the taxon's introduced range, are there	Yes	affect the aquaculture provisioning - can affect production of food (trade important	Medium
12	5.04	known adverse impacts to ecosystem	Tes	coregonids); cultural - can affect recreational fisheries.	Medium
13	3.05	In the taxon's introduced range, are there	Yes	G. cernua is oppressing native Perca fluviatilis populations which	Low
13	5.05	known adverse socio-economic impacts?	165	are the main resource for the lakes fishermen (Lorenzoni et al	LOW
R I	Biology	v/Ecology			
		able (or persistence) traits			
		Is it likely that the taxon will be poisonous or	No	Not poisonous	Very high
- ·		pose other risks to human health?			• c. ,g.
15	4.02	Is it likely that the taxon will smother one or	Yes	G. cernua is oppressing native Perca fluviatilis and Coregonid fish	High
1		more native taxa (that are not threatened or		populations.	
1		protected)?		h.h	
16	4.03	Are there any threatened or protected taxa	No	Not parasite, however, can be predating on young of the year or	Low
1		that the non-native taxon would parasitise in		small native fishes.	
1		the RA area?			
17	4.04	Is the taxon adaptable in terms of climatic	Yes	Ruffe can tolerate to very low temperature conditions. it is also	Medium
1		and other environmental conditions, thus		very tolerant to in waters ranging from oligotrophic to eutrophic.	
1		enhancing its potential persistence if it has		Thanks to advance lateral line and sensori organs it can easily	
1		invaded or could invade the RA area?		coordinate in turbid waters.	
18	4.05	Is the taxon likely to disrupt food-web	Yes	It can affect native organisms through competition for food due to	High
1		structure/function in aquatic ecosystems if it		niche overlap; consume fish eggs, and can prey on young- of-the-	
		has invaded or is likely to invade the RA		year fish or small fishes.	
19	4.06	Is the taxon likely to exert adverse impacts	Yes	Can affect production of food (aquaculture); cultural - can affect	Medium
		on ecosystem services in the RA area?		recreational fisheries.	
20	4.07	Is it likely that the taxon will host, and/or	No	No information	Low
Í		act as a vector for, recognised pests and			
Ĩ		infectious agents that are endemic in the RA	-		
21	4.08	Is it likely that the taxon will host, and/or	No	No information	Low
Í		act as a vector for, recognised pests and			
Í		infectious agents that are absent from (novel			
		to) the RA area?			<u> </u>
22	4.09	Is it likely that the taxon will achieve a body	No	It is a small body sized organism (12 cm).	High
		size that will make it more likely to be released from captivity?			

23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)?	No	it prefers still slow-flowing rivers, estuaries, brackish lakes.	Medium
24	4.11		Yes	Can feed in low light, in deep and oligotrophic conditions. can alter population dynamics of prey (benthic invertebrates and zooplankton prey), competes with fishes	High
	4.12	Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)?	Yes	In North America, Ruffe was introduced to the Laurentian Great Lakes in the 1980s via ballast water releases, establishing populations in both US and Canadian waters of Lake Superior, Lake Michigan, MI, and Lake Huron, MI. Propagule pressure (i.e., the abundance and frequency of Ruffe introduced) on the Great Lakes has been low (Kolar and Lodge 2001); genetic evidence suggests there was a single founding population from the Elbe River drainage region. Germany (Stepien et al. 2005)" (See	High
		te exploitation Is the taxon likely to consume threatened or	Yes	There is no updated res list assessments for RA countries.	Medium
20	5.01	protected native taxa in the RA area?	Tes	However, we can assume that G. cernua can affect endangered benthic invertebrates and fish fry.	Medium
27	5.02	Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?	Yes	Neogobius melanostomus has a RIP score of 2.83. therefore, I assume that G. cernua can be the sequester for food resources, because this two species were almost at the same rate invading	Medium
6. R	leprodu			because this two species were almost at the same rate invading	
	_	Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?	Yes	Early maturity could be caused by a response to high mortality rates at the population level (Lind 1977) or to warmer water at a physiological level (Fedorova and Vetkasov 1974; Craig 1987).	High
	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	RA conditions are favourable for maturation and reproduction of G. cernua	
30	6.03	Is the taxon likely to hybridise naturally with native taxa?	No	No information available	High
31	6.04	Is the taxon likely to be hermaphroditic or to	No	No. Does not display asexual reproduction	Very high
32	6.05	display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features)	No	https://www.fishbase.de/summary/4474 No See" https://www.fishbase.de/summary/4474	Very high
33	6.06	to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)?	Yes	sexual maturity occurs at 1-3 y.o. during season they spawn multiple times. Especially in non-native range. for instance "In Lake Glubokoe in the Moscow region of Russia, Ruffe spawned up	High
34	6.07	How many time units (days, months, years)	2	to three batches in a two-month period (Koshelev 1963)." 1-3.	Medium
		does the taxon require to reach the age-at- first-reproduction?	2		liculum
		al mechanisms		Descriptional fishering assure with my least habby interficient	LL: -h
35	7.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable	>1	Recreational fisheries, aquaculture, local hobbyists (international releases for curiosities), natural dispersal.	High
36	7.02		Yes	appearing of G. cernua in flowing waters will bring it to the protected areas.	High
37	7.03	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal?	No	No morphological structure that would allow to attach to different surfaces.	High
38	7.04	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?	No	No. can not be distributed as eggs.	Medium
39	7.05	Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?	No	No. Less likely	High
40	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	No	Does not migrate for reproduction	High
41	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No	No. Can not be dispersed by other ananimals	High
42	7.08	Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be	Not applicable	We do not really know the exact time of it's appearance in the region therefore it is difficult to answer this question.	Low
	7.09	Is dispersal of the taxon density dependent?	No	Not documented	High
		ce attributes	NI-		
44	8.01	Is the taxon able to withstand being out of water for extended periods (e.g. minimum of	No	No information avalable	High
		one or more hours) at some stage of its life			
	8.02		Yes	G. cernua exhibits plasticity with regard to chemical, physical, biological, and habitat requirements (See Gutsch & Hoffman, 2016)	Medium

47		Is the taxon likely to tolerate or benefit from environmental/human disturbance?	Yes	Can tolerate eutrophication	Medium
48		Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	No	Can tolerate salinities up to 10-12%.	High
49	8.06	Are there effective natural enemies (predators) of the taxon present in the RA	No	No information avalable	Medium
С. С	Climate	e change			
9. (Climate	change			
50		Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?	Increase	It was hypotheses that climate change might alert the mechanisms of transportation and introduction of non-native species. Commercial and recreational activities will increase, that itself increases the propagule pressure levels of non-native	High
51	9.02	Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	Increase	Yes. Increase	High
52	9.03	Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change?	Increase	So far this species was detected only in northwester Georgia but it is predicted that it will spread widely.	High
53	9.04	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	Higher	Can affect native fish species with competition for food and resources	Medium
		Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	No change	It probably will have no change in ecosystem structure of function	Medium
55		Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	Higher	aquaculture and recriational fisheries can be affected	High

Statistics	
Scores	
BRA	38.0
BRA Outcome	-
BRA+CCA	48.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	22.0
1. Domestication/Cultivation	2.0
2. Climate, distribution and introduction risk	2.0
3. Invasive elsewhere	18.0
B. Biology/Ecology	16.0
4. Undesirable (or persistence) traits	6.0
5. Resource exploitation	7.0
6. Reproduction	2.0
7. Dispersal mechanisms	-3.0
8. Tolerance attributes	4.0
C. Climate change	10.0
9. Climate change	10.0
Answered Questions	
Total	55
Total A. Biogeography/Historical	13
Total A. Biogeography/Historical 1. Domestication/Cultivation	13
Total A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk	13
Total A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere	13 3 5 5
Total A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology	13 3 5 5 36
Total A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits	13 3 5 5 36
Total A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation	13 3 5 5 36
Total A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction	13 3 5 5 36 12 2 7
Total A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms	13 3 5 5 36 12 2 7 7 9
Total A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes	13 3 5 5 36 12 2 7 9 9 6
Total A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change	13 3 5 5 36 12 2 7 9 9 6 6
Total A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change	13 3 5 5 36 12 2 7 9 9 6
Total A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change 9. Scitors affected	13 3 5 5 36 12 2 7 7 9 6 6 6 6 6
Total A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial	13 3 5 5 36 12 2 7 7 9 6 6 6 6 6 6 18
Total A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial Environmental	13 3 5 5 36 12 2 7 9 6 6 6 6 6 6 18 8 15
Total A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial	13 3 5 5 36 12 2 2 7 7 9 6 6 6 6 6 18

Thresholds	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.67
BRA	0.67
CCA	0.67

Date and Time	
	21/05/2022 14:11:34

raxon and Assessor details						
Category	Fishes and Lampreys (freshwater)					
Taxon name	Hemiculter leucisculus					
Common name	sharpbelly					
Assessor	Bella Japoshvili					
Risk screening context						
Reason and socio-economic benefits	It is a pest fish with no economic value					
Risk assessment area	South Caucasus					
Taxonomy	Actinopteri (ray-finned fishes) > Cypriniformes (Carps) > Xenocyprididae (East Asian minnows)					
Native range	East Asia					
Introduced range	Asia, Middle Aast					
URL	https://www.fishbase.de/summary/Hemiculter-leucisculus.html					

	. .		Response	Justification (references and/or other information)	Confidence
		graphy/Historical ication/Cultivation	_		
1. L 1		Has the taxon been the subject of	No	This is not a fish with any economic or ornamental value	Very high
T	1.01	domestication (or cultivation) for at least 20 generations?	NO	This is not a fish with any economic or ornamental value	very nigh
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	No	No such fact is known	Very high
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	No	No other congeners or races within species is known as invasive	High
2. (Climate	, distribution and introduction risk			
4	2.01	How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range?	High	Dong, X., Ju, T., Grenouillet, G., Laffaille, P., Lek, S., & Liu, J. (2020). Spatial pattern and determinants of global invasion risk of an invasive species, sharpbelly Hemiculter leucisculus (Basilesky, 1855). Science of The Total Environment, 711, 134661.	High
5	2.02	What is the quality of the climate matching data?	Medium	Due to low accuracy of local climate data	Medium
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	Esmaeili, H. R., & Gholamifard, A. (2011). Short communication Range extension and translocation for Hemiculter leucisculus (Basilewsky, 1855)(Cyprinidae) in western and northwestern Iran. J. Appl. Ichthyol, 27, 1394-1395; Dong, X., Ju, T., Grenouillet, G., Laffaille, P., Lek, S., & Liu, J. (2020). Spatial pattern and determinants of global invasion risk of an invasive species, sharpbelly Hemiculter leucisculus (Basilesky, 1855). Science of	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	Accidental translocation	Very high
8	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)?	Yes	Mustafayev, N. J., Ibrahimov, S. R., & Levin, B. A. (2015). Korean sharpbelly Hemiculter leucisculus (Basilewsky, 1855)(Cypriniformes, Cyprinidae) is a new species of Azerbaijan fauna. Russian journal of biological invasions, 6(4), 252-259.	Very high
3. I	nvasiv	e elsewhere			
9	3.01	Has the taxon become naturalised	Yes	Esmaeili, H. R., & Gholamifard, A. (2011). Short communication	Very high
		(established viable populations) outside its native range?		Range extension and translocation for Hemiculter leucisculus (Basilewsky, 1855)(Cyprinidae) in western and northwestern Iran. J. Appl. Ichthyol, 27, 1394-1395; Dong, X., Ju, T., Grenouillet, G., Laffaille, P., Lek, S., & Liu, J. (2020). Spatial pattern and determinants of global invasion risk of an invasive species, sharobelly Hemiculter leucisculus (Basilesky. 1855). Science of	
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	CABI, 2021. Hemiculter leucisculus (common sawbelly). https://www.cabi.org/isc/datasheet/110574 (accessed septemebr 2021)	High
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	Yes	CABI, 2021. Hemiculter leucisculus (common sawbelly). https://www.cabi.org/isc/datasheet/110574 (accessed septemebr 2021)	Medium
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem services?	Yes	CABI, 2021. Hemiculter leucisculus (common sawbelly). https://www.cabi.org/isc/datasheet/110574 (accessed septemebr 2021)	Low
	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	Yes	CABI, 2021. Hemiculter leucisculus (common sawbelly). https://www.cabi.org/isc/datasheet/110574 (accessed septemebr 2021)	Low
		y/Ecology			
		able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health?	Yes	Sattari, M., Mokhayer, B., Khara, H., Nezami, S., & Shafii, S. (2007). Occurrence and intensity of parasites in some bonyfish species of Anzali wetland from the southwest of the Caspian Sea. Bulletin of the European Association of Fish Pathologists, 27(2),	High
15	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or	Yes	Rosenthal, H., 1976. Implications of transplantations to aquaculture and ecosystems, in: FAO Technical Conference on	High
16	4.03	protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	Aquaculture. Kyoto, Japan, pp. 1–19. Not a prasite species	High
17	4.04	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?	Yes	CABI, 2021. Hemiculter leucisculus (common sawbelly). https://www.cabi.org/isc/datasheet/110574 (accessed septemebr 2021)	High
18	4.05	Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA	Yes	CABI, 2021. Hemiculter leucisculus (common sawbelly). https://www.cabi.org/isc/datasheet/110574 (accessed septemebr 2021)	Medium

Response Justification (references and/or other information) Confidence

e taxon will host, and/or r, recognised pests and that are endemic in the RA e taxon will host, and/or r, recognised pests and that are absent from (novel that are absent from (novel te taxon will achieve a body e it more likely to be stivity?	No Yes	2021) Not known and not expected Sattari, M., Mokhayer, B., Khara, H., Nezami, S., & Shafii, S.	Low
r, recognised pests and that are absent from (novel e taxon will achieve a body se it more likely to be	Yes		1
	No	(2007). Occurrence and intensity of parasites in some bonyfish species of Anzali wetland from the southwest of the Caspian Sea. Bulletin of the European Association of Fish Pathologists, 27(2), Since no species is kept in captivity this is not expected	Very high Very high
ble of sustaining itself in a	Yes	Usually is living in stagnant waters although have been frequently	High
elocity conditions (e.g. at use)?		reported form flowing waters	
e taxon's mode of existence by-products) or behaviours I reduce habitat quality for	Yes	Sattari, M., Mokhayer, B., Khara, H., Nezami, S., & Shafii, S. (2007). Occurrence and intensity of parasites in some bonyfish species of Anzali wetland from the southwest of the Caspian Sea. Bulletin of the European Association of Fish Pathologists, 27(2),	High
y to maintain a viable when present in low isting in adverse conditions ant form)?	Yes	Usually population develops from a small batch of individuals in an invided areas	Medium
	Ĩ		
y to consume threatened or taxa in the RA area?	Yes	CABI, 2021. Hemiculter leucisculus (common sawbelly). https://www.cabi.org/isc/datasheet/110574 (accessed septemebr 2021)	Medium
y to sequester food ing nutrients) to the ve taxa in the RA area?	Yes	CABI, 2021. Hemiculter leucisculus (common sawbelly). https://www.cabi.org/isc/datasheet/110574 (accessed septemebr 2021)	Very high
y to exhibit parental care age-at-maturity in response conditions?	No	Not well documented	Low
y to produce viable gametes the RA area)?	Yes	N.J. Mustafayev, S.R. Ibrahimov, B.A. Levin Korean sharpbelly Hemiculter leucisculus (Basilewsky, 1855) (Cypriniformes, Cyprinidae) is a new species of Azerbaijan fauna Russ. J. Biol. Invasions., 6 (2015), pp. 252-259, 10.1134/S2075111715040049	Very high
y to hybridise naturally with	No	Not documented evidence and not expected	Very high
y to be hermaphroditic or to eproduction?	No	Species is tyoical sexually reproducing	High
endent on the presence of r specific habitat features) re cycle?	No	Can complete life cycle independently	Very high
vn (or likely) to produce a propagules or offspring ne span (e.g. < 1 year)?	Yes	Hundreeds of thousands of egges a year	Very high
units (days, months, years) equire to reach the age-at- ?	1	Years	High
tial internal s could the taxon use to ne RA area (with suitable	>1	Natural dispersal and as a hitchhiker pest	Very high
vectors/pathways bring the oximity to one or more e.g. MCZ, MPA, SSSI)?	Yes	Due to large number of propagules with active swiming abbilities and with the help of water current	High
ave a means of actively b hard substrata (e.g. ship bys) such that it enhances dispersal?	No	No such fact have ever been detected. Biology also does not suppert such behavior	Very high
al of the taxon likely to r animals) or as propagules s, spores) in the RA area?	No	No documented evidence exists	Low
al of the taxon likely to Jveniles (for animals) or as ngs (for plants) in the RA	Yes	Not a documented evidence exists, though expected	High
ges of the taxon likely to A area for reproduction?	No	Dispersal is not depends on the density - no such fact is known	High
r eggs of the taxon likely to ne RA area by other animals?		No such an evidence exists	High
e taxon along any of the mentioned in the previous	Yes	Due to a large number of juveniles produced by an individual	High
	No	No documented evidence exists	Low
ntentional) likely to be			
ntentional) likely to be a taxon density dependent?			Medium
	35-41; i.e. both ntentional) likely to be	35–41; i.e. both htentional) likely to be	35–41; i.e. both neutrino and the second sec

			I		
45	8.02	Is the taxon tolerant of a wide range of	Yes	It is tolerant to various polution source, temperature etc. CABI,	Very high
		water quality conditions relevant to that		2021. Hemiculter leucisculus (common sawbelly).	
		taxon? [In the Justification field, indicate the		https://www.cabi.org/isc/datasheet/110574 (accessed septemebr	
		relevant water quality variable(s) being		2021)	
46	8.03	Can the taxon be controlled or eradicated in	No	No documented evidence exists	Very high
		the wild with chemical, biological, or other			
		agents/means?			
47	8.04	Is the taxon likely to tolerate or benefit from	No	No documented evidence exists	Medium
		environmental/human disturbance?			
48	8.05	Is the taxon able to tolerate salinity levels	No	No documented evidence exists	Medium
		that are higher or lower than those found in			
		its usual environment?			
49	8.06	Are there effective natural enemies	No	No effective predator is known from the RA area. Based on	Medium
		(predators) of the taxon present in the RA		professional judgement	
		e change			
		change	Tex . 1		
50	9.01	Under the predicted future climatic	No change	Based on professional judgement	Medium
		conditions, are the risks of entry into the RA			
		area posed by the taxon likely to increase,			
		decrease or not change?			
51	9.02	Under the predicted future climatic	Increase	Based on professional judgement	Medium
		conditions, are the risks of establishment			
		posed by the taxon likely to increase,			
		decrease or not change?			
52	9.03	Under the predicted future climatic	Increase	Based on professional judgement	High
		conditions, are the risks of dispersal within			
		the RA area posed by the taxon likely to			
		increase, decrease or not change?			
53	9.04	Under the predicted future climatic	Higher	Based on professional judgement	Medium
		conditions, what is the likely magnitude of			
		future potential impacts on biodiversity			
		and/or ecological integrity/status?			
54	9.05	Under the predicted future climatic	Higher	Based on professional judgement	Medium
		conditions, what is the likely magnitude of			
		future potential impacts on ecosystem			
		structure and/or function?			
55	9.06	Under the predicted future climatic	Higher	Based on professional judgement	Medium
		conditions, what is the likely magnitude of			
1		future potential impacts on ecosystem			
		services/socio-economic factors?			

Statistics

Scores	
BRA	35.0
BRA Outcome	-
BRA+CCA	45.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	17.0
1. Domestication/Cultivation	-2.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	18.0
B. Biology/Ecology	18.0
4. Undesirable (or persistence) traits	9.0
5. Resource exploitation	7.0
6. Reproduction	2.0
7. Dispersal mechanisms	0.0
8. Tolerance attributes	0.0
C. Climate change	10.0
9. Climate change	10.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	5
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	12
5. Resource exploitation 6. Reproduction	12 2 7
5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms	12 2 7 9
5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes	12 2 7 9 6
5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change	12 2 7 9 6 6
5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change	12 2 7 9 6
5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected	12 2 7 9 6 6 6
5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial	12 2 7 9 6 6 6 6 16
5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial Environmental	12 2 7 9 6 6 6 6 6 1 6 1 7
5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial	12 2 7 9 6 6 6 6 16
5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change 9. Climate change Sectors affected Commercial Environmental Species or population nuisance traits	12 2 7 9 6 6 6 6 6 1 6 1 7
5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change 9. Climate change Sectors affected Commercial Environmental Species or population nuisance traits Thresholds	12 2 7 9 6 6 6 6 6 1 6 1 7
5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change 9. Climate change Sectors affected Commercial Environmental Species or population nuisance traits	12 2 7 9 6 6 6 6 6 1 6 1 7

2.01	
BRA+CCA	-
Confidence	
BRA+CCA	0.70
BRA	0.72

	CCA	0.54
Date and Time		
	16/05/2022	12:49:39

Taxon and Assessor details				
Category	Fishes and Lampreys (freshwater)			
Taxon name	Hemiculter leucisculus			
Common name	sharpbelly			
Assessor	Giorgi Epitashvili			
Risk screening context				
Reason and socio-economic benefits	Hemiculter leucisculus, an invasive species, has expanded its range throughout much of Asia and			
Risk assessment area	South Caucasus			
Taxonomy	Hemiculter leucisculus (Basilewsky, 1855)			
Native range	The native range of H. leucisculus is East Asia: from Far East Russia and Mongolia in the north,			
Introduced range	H. leucisculus was unintentionally introduced into the Aral Sea Basin, Central Asia. It is currently			
URL	https://www.fishbase.se/summary/4755			

			Response	Justification (references and/or other information)	Confidence
A. I	Biogeo	graphy/Historical			
1. L		ication/Cultivation			
1		Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	No	The species is common in large streams and reservoirs in Hong Kong but not favored as a table fish because the flesh is unpalatable and very bony. Therefore, H. leucisculus has not	High
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	No	The species is common in large streams and reservoirs in Hong Kong but not favored as a table fish because the flesh is unpalatable and very bony (fishbase.org).	Medium
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	H. leucisculus as an invasive species has become established in several countries, including Iran, Afghanistan, and the former Soviet Union, where it has displaced local species.	Very high
2. (, distribution and introduction risk			
4	2.01	How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range?	Medium	World Map of the Köppen-Geiger climate classification	Medium
5	2.02	What is the quality of the climate matching data?	Medium	World Map of the Köppen-Geiger climate classification	Medium
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	Hemiculter leucisculus is fast expanding its range into the southern Caspian Sea basin in Iran (Zareian, Esmaeili, Zamanian Nejad, & Vatandoust, 2015) and was recently recorded from Azerbaijan by Mustafayev, Ibrahimov, and Levin (2015). This species is also found in the Alazani River, Georgia by G.	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	>1	This species may be spread by humans accidentally and also it can grows its range by itself (this fish found in the Alazani river which means that it came from Mingachevir Reservoir). Nowadays, Korean sharpbelly H. leucisculus is a common naturalized species that is widely distributed throughout Azerbaijan. Probably, it penetrated into freshwaters of Azerbaijan from the water bodies of neighboring countries, where this species was detected previously as an invasive one, or it settled here owing to the accidental appearance during the introduction of other species of water organisms to Azerbaijan (Mustafavev et al.	Very high
8	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)?	Yes	H. leucisculus was first reported from Central Asia in the Amu Darya Basin in 1958, and in the Syr Darya Basin in 1961. In Iran, it was first found in the Anzali Lagoon (Holcík and Razavi, 1992) where it was probably introduced with Asian carp in 1967.	Very high
3. I		e elsewhere	1		1
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	H. leucisculus is a common naturalized species that is widely distributed throughout Azerbaijan (Mustafayev et al. 2015). H. leucisculus was unintentionally introduced into the Aral Sea Basin, Central Asia. It is currently widespread in the plains of the region up to foothills, and in the drainages of the Amu Darya, Syr Darya, Zarafshan, Qashqadarya, and Tedzhen rivers. In Iran it was reported from the Caspian Sea (Safid River, Aras River, Golestan Province) and Tigris basins. It is thought to be widespread in Iran, although this may be the native fish the Danube bleak (Chalcalburnus chalcoides). which is very similar.	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	It has become established as an exotic species in several countries, including Iran, Afghanistan, and the former Soviet Union, where it has displaced local species.	Very high
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	Yes	H. leucisculus is considered as a pest in fish farms where it competes with juveniles of commercial species.	Very high
	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	No	Data deficient	Low
		In the taxon's introduced range, are there known adverse socio-economic impacts?	No	Data deficient	Low
		//Ecology			
		, , , , , , , , , , , , , , , , , , , ,	No	This species does not pose a threat to humans.	High
15		pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	H. leucisculus has become established as an exotic species in several countries, including Iran, Afghanistan, and the former Soviet Union, where it has displaced local species.	Very high
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	Yes	There are several protected and threatened species in the SC region which may have been affected by H. leucisculus e.g. Salmo spp, Acipencer spp, Luciobarbus capito, L. mursa, etc.	Very high

17	4.04	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?	Yes	H. leucisculus has been successfully established in Azerbaijan which means that climatic conditions in the SC region is acceptable for this species.	Very high
18	4.05	Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA	Yes	The probability of this is very high because this species is a predator.	Very high
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes	There is a probability of that.	High
20	4.07	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA	Not applicable	Data deficient	Low
21	4.08	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area?	Yes	As most fish species, the sharpbelly harbours several species of parasites. One of them is Paradiplozoon hemiculteri, a monogenean living on the gills.	Medium
22	4.09	Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity?	Yes	Max length of H. leucisculus is 23.0 cm, therefore this species can be kept in an aquarium or pond and then released into the wild.	Medium
23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)?	Yes	H. leucisculus is found in rivers, lakes, reservoirs, canals, and marshes. It keeps to the water surface in stagnant waters.	High
24	4.11	Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa?	Yes	H. leucisculus as an benthivorous fish may affect the water quality by inducing sediment disturbance and resuspension, resulting in reduced water transparency and increased nutrient release from the sediment (Yu et al. 2021).	Medium
25	4.12	Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)?	Yes	Data deficient	Low
5. R	lesourc	e exploitation			1
26	5.01	Is the taxon likely to consume threatened or protected native taxa in the RA area?	Yes	The probability of this is high but there is no evidence yet	Medium
27	5.02	Is the taxon likely to sequester food resources (including nutrients) to the	Yes	The probability of this is high but there is no evidence yet	Medium
6. R	eprodu	detriment of native taxa in the RA area?	I		
		Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?	Not applicable	Data deficient	Medium
29	6.02		Yes	H. leucisculus is a common naturalized species that is widely distributed throughout Azerbaijan (Mustafayev et al. 2015).	Very high
30	6.03		No	Data deficient	Low
	6.04	display asexual reproduction?	No	Data deficient	Low
	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	No	No such fact has been described.	Medium
33	6.06	Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)?	Yes	The average fecundities of H. leucisculus is about 19978.6 eggs (Mousavi-Sabet et al. 2019).	High
34	6.07	How many time units (days, months, years) does the taxon require to reach the age-at-	1	(Mousavi-Sabet et al. 2019)	Very high
7. D)ispersa	first-reproduction? al mechanisms			
	7.01	How many potential internal	>1	Probably, it penetrated into freshwaters of Azerbaijan from the	Very high
		vectors/pathways could the taxon use to disperse within the RA area (with suitable habitats nearby)?		water bodies of neighboring countries, where this species was detected previously as an invasive one, or it settled here owing to the accidental appearance during the introduction of other species of water organisms to Azerbaijan (Mustafayev et al. 2015).	
36	7.02	Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)?	Yes	The probability of this is high but there is no evidence yet	High
37	7.03	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal?	No	This species does not have similar means	High
38	7.04	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?	Yes	H. leucisculus is a common naturalized species that is widely distributed throughout Azerbaijan (Mustafayev et al. 2015). It seems that this species is naturally reproduces in the SC region.	Very high
39	7.05	Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?	Yes	H. leucisculus is a common naturalized species that is widely distributed throughout Azerbaijan (Mustafayev et al. 2015). It seems that this species is naturally reproduces in the SC region.	Very high
40	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	Yes	H. leucisculus is a common naturalized species that is widely distributed throughout Azerbaijan (Mustafayev et al. 2015). It seems that this species is regularly migrates within the water bodies of the SC region for reproduction.	Very high
41	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	Yes	There is a possibility of this but we have no evidence yet	Medium
42	7.08	Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous	Yes	Own judgement	Medium

43	7.09	Is dispersal of the taxon density dependent?	Not applicable	Data deficient	Low
8. 1	Toleran	ce attributes			
44	8.01	Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle?	No	No such fact has been recorded	Very high
		Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being	Yes	This species is highly tolerant of water pollution (Coad, 2014)	Very high
46	8.03	Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	Yes	The average biomass of unwanted fishes like Carassius aurat us, Hemiculter leucisculus, Alburnus alburnus and Pseudoras bora parva of the first and second treatments in comparison to control showed a reduction of 94, 88.9, 62.4 and 56.82 percent, respectively by Esox lucius (Khaval et al. 2010).	Very high
47	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	Yes	This species has been spread by humans in many countries.	Very high
	8.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	No	Data deficient	Low
49	8.06	Are there effective natural enemies (predators) of the taxon present in the RA area?	Yes	There is several predators which can controll the populations of H. leucisculus, e.g.: Esox lucius, Silurus glanis, Salmo spp, Squalius spp, etc.	Very high
С. (Climate	e change			
9. (Climate	change			
50	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?	Increase	Own judgement	Medium
51	9.02	Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	Increase	Own judgement	Medium
52	9.03	Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change?	Increase	Own judgement	Medium
		Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	Higher	Own judgement	Medium
	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Higher	Own judgement	Low
55	9.06	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	No change	Own judgement	Low

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Statistics	
Scores	
BRA	34.5
BRA Outcome	-
BRA+CCA	44.5
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	9.5
1. Domestication/Cultivation	0.0
2. Climate, distribution and introduction risk	2.0
3. Invasive elsewhere	7.5
B. Biology/Ecology	25.0
4. Undesirable (or persistence) traits	10.0
5. Resource exploitation	7.0
6. Reproduction	2.0
7. Dispersal mechanisms	6.0
8. Tolerance attributes	0.0
C. Climate change	10.0
9. Climate change	10.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	3 5 5
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2
6. Reproduction	2
7. Dispersal mechanisms	9
8. Tolerance attributes	6
C. Climate change	6
9. Climate change	6
Sectors affected	
Commercial	9

Environmental	13
Species or population nuisance traits	28
Thresholds	
Inresnolas	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.69
BRA	0.72
CCA	0.42
Date and Time	
05/05/2	022 19:37:04

axon and Assessor details						
Category	Fishes and Lampreys (freshwater)					
Taxon name	Hemiculter leucisculus					
Common name	sharpbelly					
Assessor	Tatia Kuljanishvili					
Risk screening context						
Reason and socio-economic benefits	The species appeared on the Iranian shores of the Caspian Sea in the 1990s as an accidental					
Risk assessment area	South Caucasus					
Taxonomy	Actinopteri (ray-finned fishes) > Cypriniformes (Carps) > Xenocyprididae					
Native range	Southeastern Asia and the Amur River basin					
Introduced range	Armenia, Azerbaijan, Georgia					
URL	https://www.fishbase.se/summary/4755					

			Response	Justification (references and/or other information)	Confidence
Α. Ι	Biogeo	graphy/Historical			
		ication/Cultivation			
1	1.01	Has the taxon been the subject of	No	The taxon hasn't been subject of domestication	Very high
		domestication (or cultivation) for at least 20			
		generations?			
2	1.02	Is the taxon harvested in the wild and likely	No	The taxon is not harvested in the wild however it is often	Medium
		to be sold or used in its live form?		accidentally sold together with other aquaculture important fishes	
2	1.02			(Coad & Abdoli 1993)	
3	1.03	Does the taxon have invasive races,	No	The species doesn't have invasive races variatieshowever it is	Medium
2 (limate	varieties, sub-taxa or congeners? , distribution and introduction risk	1	from the same family as most worldwide introduced Chinese carps	
4	2.01	How similar are the climatic conditions of the	High	The climate is very similar	Very high
Ľ	2.01	Risk Assessment (RA) area and the taxon's			ici, ingli
		native range?			
5	2.02	What is the quality of the climate matching	High	The quality of climate matching is high	Very high
		data?			
6	2.03	Is the taxon already present outside of	Yes	It was recorded in Azerbaijan for the first time in 2012	Very high
		captivity in the RA area?		(Mustafayev et al., 2015), but the exact time of its introduction	
				and the vectors or pathways are still unknown. Most probably it	
				entered from the neighboring areas, where it was already	
				introduced (Mustafayev et al., 2015). H. leuciscus was also recently discovered in Armenia, in the Arpa River by (Pipoyan &	
				Arakelyan, 2021). The first introduction date and pathway of this	
				species' introduction in Armenia is unknown, but it probably	
				penetrated from neighboring areas. The species is currently well	
				established in the Caspian Sea basin and Kuljanishvili et al.	
				(2020) and it is assumed that it will soon penetrate the Black Sea	
7	2.04	How many potential vectors could the taxon	>1	Aquaculture and self spread	Very high
		use to enter in the RA area?			
8	2.05	Is the taxon currently found in close	Yes	This species is recorded from Azerbaijan Armenia and probably	Very high
		proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional		exist in Georgia	
		and intentional introductions)?			
3. I	nvasiv	e elsewhere			
	_				
9	3.01	Has the taxon become naturalised	Yes	Yes, for example in Iran and Iraq	Very high
		Has the taxon become naturalised (established viable populations) outside its	Yes		Very high
	3.01 3.02	(established viable populations) outside its In the taxon's introduced range, are there	Yes Yes	It has not documented, however we might assume that since it is	Very high Medium
		(established viable populations) outside its In the taxon's introduced range, are there known adverse impacts to wild stocks or		It has not documented, however we might assume that since it is with competition of native alburnus species(Coad and Hussain	
10	3.02	(established viable populations) outside its In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	It has not documented, however we might assume that since it is with competition of native alburnus species(Coad and Hussain 2013) it might have adverse impact on commercial taxa	Medium
10		(established viable populations) outside its In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? In the taxon's introduced range, are there		It has not documented, however we might assume that since it is with competition of native alburnus species(Coad and Hussain 2013) it might have adverse impact on commercial taxa It has not been documented however we may assume that since	
10	3.02	(established viable populations) outside its In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	It has not documented, however we might assume that since it is with competition of native alburnus species(Coad and Hussain 2013) it might have adverse impact on commercial taxa It has not been documented however we may assume that since this species feeds on fish eggs and young (Holčík and Razavi,	Medium
10 11	3.02	(established viable populations) outside its In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? In the taxon's introduced range, are there known adverse impacts to aquaculture?	Yes	It has not documented, however we might assume that since it is with competition of native alburnus species(Coad and Hussain 2013) it might have adverse impact on commercial taxa It has not been documented however we may assume that since this species feeds on fish eggs and young (Holčík and Razavi, 1992)can have adverse impact to aquaculture	Medium
10 11	3.02 3.03	(established viable populations) outside its In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? In the taxon's introduced range, are there	Yes	It has not documented, however we might assume that since it is with competition of native alburnus species(Coad and Hussain 2013) it might have adverse impact on commercial taxa It has not been documented however we may assume that since this species feeds on fish eggs and young (Holčík and Razavi,	Medium
10 11 12	3.02 3.03	(established viable populations) outside its In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? In the taxon's introduced range, are there known adverse impacts to aquaculture? In the taxon's introduced range, are there known adverse impacts to ecosystem In the taxon's introduced range, are there	Yes	It has not documented, however we might assume that since it is with competition of native alburnus species(Coad and Hussain 2013) it might have adverse impact on commercial taxa It has not been documented however we may assume that since this species feeds on fish eggs and young (Holčík and Razavi, 1992)can have adverse impact to aquaculture	Medium
10 11 12 13	3.02 3.03 3.04 3.05	(established viable populations) outside its In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? In the taxon's introduced range, are there known adverse impacts to aquaculture? In the taxon's introduced range, are there known adverse impacts to ecosystem In the taxon's introduced range, are there known adverse socio-economic impacts?	Yes Yes Yes	It has not documented, however we might assume that since it is with competition of native alburnus species(Coad and Hussain 2013) it might have adverse impact on commercial taxa It has not been documented however we may assume that since this species feeds on fish eggs and young (Holčík and Razavi, 1992)can have adverse impact to aquaculture Can be transmitting deseases	Medium Medium Low
10 11 12 13 B.	3.02 3.03 3.04 3.05 Biology	(established viable populations) outside its In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? In the taxon's introduced range, are there known adverse impacts to aquaculture? In the taxon's introduced range, are there known adverse impacts to ecosystem In the taxon's introduced range, are there known adverse socio-economic impacts? y/Ecology	Yes Yes Yes	It has not documented, however we might assume that since it is with competition of native alburnus species(Coad and Hussain 2013) it might have adverse impact on commercial taxa It has not been documented however we may assume that since this species feeds on fish eggs and young (Holčík and Razavi, 1992)can have adverse impact to aquaculture Can be transmitting deseases	Medium Medium Low
10 11 12 13 B. I 4. (3.02 3.03 3.04 3.05 Biology <i>Jndesir</i>	(established viable populations) outside its In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? In the taxon's introduced range, are there known adverse impacts to aquaculture? In the taxon's introduced range, are there known adverse impacts to ecosystem In the taxon's introduced range, are there known adverse socio-economic impacts? //Ecology able (or persistence) traits	Yes Yes Yes No	It has not documented, however we might assume that since it is with competition of native alburnus species(Coad and Hussain 2013) it might have adverse impact on commercial taxa It has not been documented however we may assume that since this species feeds on fish eggs and young (Holčík and Razavi, 1992)can have adverse impact to aquaculture Can be transmitting deseases There is no information	Medium Medium Low Low
10 11 12 13 B. I 4. (3.02 3.03 3.04 3.05 Biology <i>Jndesir</i>	(established viable populations) outside its In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? In the taxon's introduced range, are there known adverse impacts to aquaculture? In the taxon's introduced range, are there known adverse impacts to ecosystem In the taxon's introduced range, are there known adverse impacts to ecosystem In the taxon's introduced range, are there known adverse socio-economic impacts? //Ecology Is it likely that the taxon will be poisonous or	Yes Yes Yes No	It has not documented, however we might assume that since it is with competition of native alburnus species(Coad and Hussain 2013) it might have adverse impact on commercial taxa It has not been documented however we may assume that since this species feeds on fish eggs and young (Holčík and Razavi, 1992)can have adverse impact to aquaculture Can be transmitting deseases	Medium Medium Low
10 11 12 13 B. I 4. <i>U</i> 14	3.02 3.03 3.04 3.05 Biology <i>Jndesir</i> 4.01	(established viable populations) outside its In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? In the taxon's introduced range, are there known adverse impacts to aquaculture? In the taxon's introduced range, are there known adverse impacts to ecosystem In the taxon's introduced range, are there known adverse socio-economic impacts? //Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health?	Yes Yes No No	It has not documented, however we might assume that since it is with competition of native alburnus species(Coad and Hussain 2013) it might have adverse impact on commercial taxa It has not been documented however we may assume that since this species feeds on fish eggs and young (Holčík and Razavi, 1992)can have adverse impact to aquaculture Can be transmitting deseases There is no information	Medium Medium Low Low Very high
10 11 12 13 B. I 4. (3.02 3.03 3.04 3.05 Biology <i>Jndesir</i>	(established viable populations) outside its In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? In the taxon's introduced range, are there known adverse impacts to aquaculture? In the taxon's introduced range, are there known adverse impacts to ecosystem In the taxon's introduced range, are there known adverse socio-economic impacts? //Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or	Yes Yes Yes No	It has not documented, however we might assume that since it is with competition of native alburnus species(Coad and Hussain 2013) it might have adverse impact on commercial taxa It has not been documented however we may assume that since this species feeds on fish eggs and young (Holčík and Razavi, 1992)can have adverse impact to aquaculture Can be transmitting deseases There is no information It is not poisonous Since this species is known to grow more rapidly and have higher	Medium Medium Low Low
10 11 12 13 B. I 4. (3.02 3.03 3.04 3.05 Biology <i>Jndesir</i> 4.01	(established viable populations) outside its In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? In the taxon's introduced range, are there known adverse impacts to aquaculture? In the taxon's introduced range, are there known adverse impacts to ecosystem In the taxon's introduced range, are there known adverse socio-economic impacts? //Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health?	Yes Yes No No	It has not documented, however we might assume that since it is with competition of native alburnus species(Coad and Hussain 2013) it might have adverse impact on commercial taxa It has not been documented however we may assume that since this species feeds on fish eggs and young (Holčík and Razavi, 1992)can have adverse impact to aquaculture Can be transmitting deseases There is no information It is not poisonous Since this species is known to grow more rapidly and have higher fecundity in introduced habitats than in native habitats (Esmaeili	Medium Medium Low Low Very high
10 11 12 13 B. I 4. (3.02 3.03 3.04 3.05 Biology <i>Jndesir</i> 4.01	(established viable populations) outside its In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? In the taxon's introduced range, are there known adverse impacts to aquaculture? In the taxon's introduced range, are there known adverse impacts to ecosystem In the taxon's introduced range, are there known adverse socio-economic impacts? y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or	Yes Yes No No	It has not documented, however we might assume that since it is with competition of native alburnus species(Coad and Hussain 2013) it might have adverse impact on commercial taxa It has not been documented however we may assume that since this species feeds on fish eggs and young (Holčík and Razavi, 1992)can have adverse impact to aquaculture Can be transmitting deseases There is no information It is not poisonous Since this species is known to grow more rapidly and have higher	Medium Medium Low Low Very high
10 11 12 13 B. I 14 14	3.02 3.03 3.04 3.05 Biology <i>Jndesir</i> 4.01	(established viable populations) outside its In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? In the taxon's introduced range, are there known adverse impacts to aquaculture? In the taxon's introduced range, are there known adverse impacts to ecosystem In the taxon's introduced range, are there known adverse socio-economic impacts? //Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa	Yes Yes No No	It has not documented, however we might assume that since it is with competition of native alburnus species(Coad and Hussain 2013) it might have adverse impact on commercial taxa It has not been documented however we may assume that since this species feeds on fish eggs and young (Holčík and Razavi, 1992)can have adverse impact to aquaculture Can be transmitting deseases There is no information It is not poisonous Since this species is known to grow more rapidly and have higher fecundity in introduced habitats than in native habitats (Esmaeili et al., 2010; Zareian et al., 2015) we may assume that this tax on	Medium Medium Low Low Very high
10 11 12 13 B. I 14 14	3.02 3.03 3.04 3.05 Biology <i>Indesir</i> 4.01 4.02	(established viable populations) outside its In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? In the taxon's introduced range, are there known adverse impacts to aquaculture? In the taxon's introduced range, are there known adverse impacts to ecosystem In the taxon's introduced range, are there known adverse socio-economic impacts? //Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in	Yes Yes No No Yes	It has not documented, however we might assume that since it is with competition of native alburnus species(Coad and Hussain 2013) it might have adverse impact on commercial taxa It has not been documented however we may assume that since this species feeds on fish eggs and young (Holčík and Razavi, 1992)can have adverse impact to aquaculture Can be transmitting deseases There is no information It is not poisonous Since this species is known to grow more rapidly and have higher fecundity in introduced habitats than in native habitats (Esmaeili et al., 2010; Zareian et al., 2015) we may assume that this tax on can smother one or more native taxa	Medium Medium Low Low Very high High
10 11 12 13 B. I 14 15 16	3.02 3.03 3.04 3.05 Biology <i>Indesir</i> 4.01 4.02 4.03	(established viable populations) outside its In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? In the taxon's introduced range, are there known adverse impacts to aquaculture? In the taxon's introduced range, are there known adverse impacts to ecosystem In the taxon's introduced range, are there known adverse impacts to ecosystem In the taxon's introduced range, are there known adverse socio-economic impacts? y/Ecology <i>able (or persistence) traits</i> Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	Yes Yes Yes No Yes No	It has not documented, however we might assume that since it is with competition of native alburnus species(Coad and Hussain 2013) it might have adverse impact on commercial taxa It has not been documented however we may assume that since this species feeds on fish eggs and young (Holčík and Razavi, 1992)can have adverse impact to aquaculture Can be transmitting deseases There is no information It is not poisonous Since this species is known to grow more rapidly and have higher fecundity in introduced habitats than in native habitats (Esmaeili et al., 2010; Zareian et al., 2015) we may assume that this tax on can smother one or more native taxa Does not parasite	Medium Medium Low Low Very high High Very high
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10 11 12 13 B. 1 4. <i>(</i> 14 15 16	3.02 3.03 3.04 3.05 Biolog <i>Indesir</i> 4.01 4.02 4.03	(established viable populations) outside its In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? In the taxon's introduced range, are there known adverse impacts to aquaculture? In the taxon's introduced range, are there known adverse impacts to ecosystem In the taxon's introduced range, are there known adverse impacts to ecosystem In the taxon's introduced range, are there known adverse socio-economic impacts? //Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will be poisonous or pose other risks to human health? Is the taxon adptable of protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?	Yes Yes No No Yes No Yes	It has not documented, however we might assume that since it is with competition of native alburnus species(Coad and Hussain 2013) it might have adverse impact on commercial taxa It has not been documented however we may assume that since this species feeds on fish eggs and young (Holčík and Razavi, 1992)can have adverse impact to aquaculture Can be transmitting deseases There is no information It is not poisonous Since this species is known to grow more rapidly and have higher fecundity in introduced habitats than in native habitats (Esmaeili et al., 2010; Zareian et al., 2015) we may assume that this tax on can smother one or more native taxa Does not parasite This fish is very adaptive to variable and environmental conditions and this allows it to breed and established in areas outside their native range (Martin et al 2010).This fish can with stand heavily modified water conditions and is very tolerant to water pollution	Medium Medium Low Low Very high High Very high Very high
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10 11 12 13 <u>4. (</u> 14 15 16 17 17 18	3.02 3.03 3.04 3.05 Biology <i>Indesir</i> 4.01 4.02 4.03 4.04	(established viable populations) outside its In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? In the taxon's introduced range, are there known adverse impacts to aquaculture? In the taxon's introduced range, are there known adverse impacts to ecosystem In the taxon's introduced range, are there known adverse impacts to ecosystem In the taxon's introduced range, are there known adverse socio-economic impacts? //Ecology //Ecology Jecology Jecology Jecology Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or	Yes Yes No No Yes No Yes Yes	It has not documented, however we might assume that since it is with competition of native alburnus species(Coad and Hussain 2013) it might have adverse impact on commercial taxa It has not been documented however we may assume that since this species feeds on fish eggs and young (Holčík and Razavi, 1992)can have adverse impact to aquaculture Can be transmitting deseases There is no information It is not poisonous Since this species is known to grow more rapidly and have higher fecundity in introduced habitats than in native habitats (Esmaeili et al., 2010; Zareian et al., 2015) we may assume that this tax on can smother one or more native taxa Does not parasite This fish is very adaptive to variable and environmental conditions and this allows it to breed and established in areas outside their native range (Martin et al 2010).This fish can with stand heavily modified water conditions and is very tolerant to water pollution These fish has the ability to easily modify their food habit as the conditions change (Holčík and Razavi, 1992) therefore it can give us idea that this species actually can disrupt food web structure	Medium Medium Low Low Very high High Very high Very high
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21					
	4.08	Is it likely that the taxon will host, and/or	Yes	It is possible	High
		act as a vector for, recognised pests and			
		infectious agents that are absent from (novel			
22	4.09	to) the RA area? Is it likely that the taxon will achieve a body	No	This fish can achieve maximum of 18 centimetres total length	High
~~	4.05	size that will make it more likely to be	NO	This har can deneve maximum or 10 centimetres total rength	ingn
		released from captivity?			
23	4.10	Is the taxon capable of sustaining itself in a	No	This base inhabits large streams and reservoirs (Radkhah et al	Low
		range of water velocity conditions (e.g.		2013) however it is not known is this specie is capable of	
		versatile in habitat use)?		sustaining itself in a range of water velocity conditions	
24	4.11	Is it likely that the taxon's mode of existence	No	No information available	High
		(e.g. excretion of by-products) or behaviours			
		(e.g. feeding) will reduce habitat quality for native taxa?			
25	4.12	Is the taxon likely to maintain a viable	Yes	Yes. That is what contributed in its successful spread	Very high
		population even when present in low			rei, ingi
		densities (or persisting in adverse conditions			
		by way of a dormant form)?			
		ce exploitation	N		
26	5.01	Is the taxon likely to consume threatened or	Yes	Yes.It is possible that this species will consume threatened or	Medium
77	5.02	protected native taxa in the RA area? Is the taxon likely to sequester food	No	protected native taxa larvae or eggs No info	Medium
21	5.02	resources (including nutrients) to the	NO		Medium
		detriment of native taxa in the RA area?			
5. F	Reprod				
28	6.01	Is the taxon likely to exhibit parental care	Yes	This fish has ability to have higher fecundity in a newly invaded	Medium
		and/or to reduce age-at-maturity in response		environments (Esmaeili et al., 2010; Zareian et al., 2015).]
	6.00	to environmental conditions?	¥	however it's does not exhibit parental care) (and laid
29	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	No information availableNo information available	Very high
30	6.03		No	No information available	High
	0.05	native taxa?			
31	6.04		No	No. Does not display asexual reproduction	Very high
		display asexual reproduction?			
32	6.05	Is the taxon dependent on the presence of	No	No See: https://www.fishbase.se/summary/4755	Very high
		another taxon (or specific habitat features)			
		to complete its life cycle?			
33	6.06	Is the taxon known (or likely) to produce a	Yes	It can spawn 16 times during the season and the potential annual	Very high
		large number of propagules or offspring		fecundity was something around 200,000 oocytes over the whole	
		within a short time span (e.g. < 1 year)?		spawning season (Wang et al 2014). high annual fecundity is likely to be one of the factors of successful invasion of this fish in	
				a new environment (Wang et al 2014).	
34	6.07	How many time units (days, months, years)	1	Maturity occurs over one year (Mousavi-Sabet et al 2019)	Very high
		does the taxon require to reach the age-at-			-, 5
		first-reproduction?			
		al mechanisms			
35					
	7.01	How many potential internal	>1	Aquaculture and self spread	Very high
	7.01	How many potential internal vectors/pathways could the taxon use to	>1	Aquaculture and self spread	Very high
86		How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable			
36	7.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the	>1 Yes	Aquaculture and self spread Yes	Very high High
36		How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more			
		How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the			
	7.02	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship	Yes	Yes	High
	7.02	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances	Yes	Yes No. Morphologically this species does not have a means of actively	High
37	7.02	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal?	Yes	Yes No. Morphologically this species does not have a means of actively attaching itself to hard substrata	High Very high
37	7.02	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to	Yes	Yes No. Morphologically this species does not have a means of actively	High
37	7.02	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules	Yes	Yes No. Morphologically this species does not have a means of actively attaching itself to hard substrata	High Very high
37	7.02 7.03 7.04	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?	Yes No	Yes No. Morphologically this species does not have a means of actively attaching itself to hard substrata No. can not be distributed as eggs.	High Very high Very high
37	7.02	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to	Yes	Yes No. Morphologically this species does not have a means of actively attaching itself to hard substrata	High Very high
37	7.02 7.03 7.04	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as	Yes No	Yes No. Morphologically this species does not have a means of actively attaching itself to hard substrata No. can not be distributed as eggs.	High Very high Very high
37	7.02 7.03 7.04	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to	Yes No	Yes No. Morphologically this species does not have a means of actively attaching itself to hard substrata No. can not be distributed as eggs.	High Very high Very high
37 38 39	7.02 7.03 7.04	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to	Yes No	Yes No. Morphologically this species does not have a means of actively attaching itself to hard substrata No. can not be distributed as eggs.	High Very high Very high
37 38 39	7.02 7.03 7.04 7.05 7.06	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction?	Yes No Yes	Yes No. Morphologically this species does not have a means of actively attaching itself to hard substrata No. can not be distributed as eggs. Yes. It is possoible Does not migrate for reproduction	High Very high Very high Medium High
37 38 39	7.02 7.03 7.04 7.05	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to	Yes No Yes	Yes No. Morphologically this species does not have a means of actively attaching itself to hard substrata No. can not be distributed as eggs. Yes. It is possoible	High Very high Very high Medium
37 38 39	7.02 7.03 7.04 7.05 7.06 7.07	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	Yes No Yes No No	Yes No. Morphologically this species does not have a means of actively attaching itself to hard substrata No. can not be distributed as eggs. Yes. It is possoible Does not migrate for reproduction No. Can not be dispersed by other ananimals	High Very high Very high Medium High Very high
37 38 39 40 41	7.02 7.03 7.04 7.05 7.06	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the	Yes No Yes No	Yes No. Morphologically this species does not have a means of actively attaching itself to hard substrata No. can not be distributed as eggs. Yes. It is possoible Does not migrate for reproduction	High Very high Very high Medium High
37 38 39 40	7.02 7.03 7.04 7.05 7.06 7.07	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersal of the taxon along any of the vectors/pathways mentioned in the previous	Yes No Yes No No	Yes No. Morphologically this species does not have a means of actively attaching itself to hard substrata No. can not be distributed as eggs. Yes. It is possoible Does not migrate for reproduction No. Can not be dispersed by other ananimals	High Very high Very high Medium High Very high
37 38 39 40	7.02 7.03 7.04 7.05 7.06 7.07	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the	Yes No Yes No No	Yes No. Morphologically this species does not have a means of actively attaching itself to hard substrata No. can not be distributed as eggs. Yes. It is possoible Does not migrate for reproduction No. Can not be dispersed by other ananimals	High Very high Very high Medium High Very high
8 9 1 2	7.02 7.03 7.04 7.05 7.06 7.07	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be	Yes No Yes No No	Yes No. Morphologically this species does not have a means of actively attaching itself to hard substrata No. can not be distributed as eggs. Yes. It is possoible Does not migrate for reproduction No. Can not be dispersed by other ananimals	High Very high Very high Medium High Very high
7 8 9 9 1 2 2 3 7	7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 7.09	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i>	Yes No Yes No No No	Yes No. Morphologically this species does not have a means of actively attaching itself to hard substrata No. can not be distributed as eggs. Yes. It is possoible Does not migrate for reproduction No. Can not be dispersed by other ananimals We do not know about it No information about it	High Very high Very high Medium High Very high Low
7 8 9 9 1 2 2 3 7	7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? Is the taxon able to withstand being out of	Yes No Yes No No	Yes No. Morphologically this species does not have a means of actively attaching itself to hard substrata No. can not be distributed as eggs. Yes. It is possoible Does not migrate for reproduction No. Can not be dispersed by other ananimals We do not know about it	High Very high Very high Medium High Very high Low
37 38 39 40 41 41 42 43 3. 7	7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 7.09	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of	Yes No Yes No No No	Yes No. Morphologically this species does not have a means of actively attaching itself to hard substrata No. can not be distributed as eggs. Yes. It is possoible Does not migrate for reproduction No. Can not be dispersed by other ananimals We do not know about it No information about it	High Very high Very high Medium High Very high Low
37 38 39 10 11 12	7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 7.09	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersit of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? ce attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life	Yes No Yes No No No	Yes No. Morphologically this species does not have a means of actively attaching itself to hard substrata No. can not be distributed as eggs. Yes. It is possoible Does not migrate for reproduction No. Can not be dispersed by other ananimals We do not know about it No information about it	High Very high Very high Medium High Very high Low
37 38 39 40 41 41 42 43 <u>3. 7</u> 44	7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 7.09 7.09	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle?	Yes No No Yes No No No	Yes No. Morphologically this species does not have a means of actively attaching itself to hard substrata No. can not be distributed as eggs. Yes. It is possoible Does not migrate for reproduction No. Can not be dispersed by other ananimals We do not know about it No information about it No information avalable	High Very high Very high Medium High Very high Low High
37 38 39 40 41 42 43 3. 7 44	7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 7.09	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycel? Is the taxon tolerant of a wide range of	Yes No Yes No No No	Yes No. Morphologically this species does not have a means of actively attaching itself to hard substrata No. can not be distributed as eggs. Yes. It is possoible Does not migrate for reproduction No. Can not be dispersed by other ananimals We do not know about it No information about it	High Very high Very high Medium High Very high Low
37 38 39 40 41 42 42 43 8.7 44	7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 7.09 7.09	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed or the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that	Yes No No Yes No No No	Yes No. Morphologically this species does not have a means of actively attaching itself to hard substrata No. can not be distributed as eggs. Yes. It is possoible Does not migrate for reproduction No. Can not be dispersed by other ananimals We do not know about it No information about it No information avalable	High Very high Very high Medium High Very high Low High
37 38 39 40 41 42 43 3, 7 44	7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 7.09 7.09	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the	Yes No No Yes No No No	Yes No. Morphologically this species does not have a means of actively attaching itself to hard substrata No. can not be distributed as eggs. Yes. It is possoible Does not migrate for reproduction No. Can not be dispersed by other ananimals We do not know about it No information about it No information avalable	High Very high Very high Medium High Very high Low High
37 38 39 40 41 42 42 45	7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 7.09 7.09	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed or the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that	Yes No No Yes No No No	Yes No. Morphologically this species does not have a means of actively attaching itself to hard substrata No. can not be distributed as eggs. Yes. It is possoible Does not migrate for reproduction No. Can not be dispersed by other ananimals We do not know about it No information about it No information avalable	High Very high Very high Medium High Very high Low High
37 38 39 40 41 42 42 45	7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 7.09 7.09 8.01 8.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon dening out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being	Yes No No Yes No No No Yes Yes	Yes No. Morphologically this species does not have a means of actively attaching itself to hard substrata No. can not be distributed as eggs. Yes. It is possoible Does not migrate for reproduction No. Can not be dispersed by other ananimals We do not know about it No information about it No information avalable Polution and salinity	High Very high Very high Medium High Very high Low Low High

47	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	Yes	Can tolerate polluted environments	Very high
48	8.05	Is the taxon able to tolerate salinity levels	No	No information	Low
10	0.05	that are higher or lower than those found in	110		2011
		its usual environment?			
49	8.06	Are there effective natural enemies	No	No. No effective natural enemies present in RA area	Medium
		(predators) of the taxon present in the RA			
С. (Climate	e change			
		change			
		Under the predicted future climatic	Increase	It was hypotheses that climate change might alert the	Very high
		conditions, are the risks of entry into the RA		mechanisms of transportation and introduction of non-native	· · · , · · · j · ·
		area posed by the taxon likely to increase,		species. Commercial and recreational activities will increase, that	
		decrease or not change?		itself increases the propagule pressure levels of non-native	
51	9.02	Under the predicted future climatic	Increase	Increased temperatures will cause this species establish in higher	Verv high
	5.02	conditions, are the risks of establishment	111010000	altitudes	ter, mgn
		posed by the taxon likely to increase,			
		decrease or not change?			
52	9.03	Under the predicted future climatic	Increase	It might favour by environmental changes (caused by climate	High
		conditions, are the risks of dispersal within		change) that will increase resource availability, resulting their	
		the RA area posed by the taxon likely to		widespread.	
		increase, decrease or not change?		mucopredu.	
53	9.04	Under the predicted future climatic	Higher	Population densities will increase making them on one hand	High
		conditions, what is the likely magnitude of	5	impossible to eradicate and on the other hand, affecting native	5
		future potential impacts on biodiversity		organisms due to competition, that does not leave much resources	
		and/or ecological integrity/status?		for native ones.	
54	9.05	Under the predicted future climatic	No change	Difficult to judge	Medium
		conditions, what is the likely magnitude of	ine energe		
		future potential impacts on ecosystem			
		structure and/or function?			
55	9.06	Under the predicted future climatic	Higher	Under the predicted future climatic conditions, this species will	High
		conditions, what is the likely magnitude of	5	disperse even wider, that will itself create the problem for native	5
		future potential impacts on ecosystem		aquatic organisms. The widespread and abundance of this fish	
		services/socio-economic factors?		which is quite adaptive and plastic to different environmental	
				conditions, will increase its impact on ecosystem services and	
				socio-economic factors. For example: transmission of diseasesIt	
				can also affect aquaculture and recreational fisheries	

Scores	
BRA	32.0
BRA Outcome	-
BRA+CCA	42.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	14.0
1. Domestication/Cultivation	-2.0
2. Climate, distribution and introduction risk	2.0
3. Invasive elsewhere	14.0
B. Biology/Ecology	18.0
4. Undesirable (or persistence) traits 5. Resource exploitation	7.0
6. Reproduction	5.0 3.0
7. Dispersal mechanisms	-1.0
8. Tolerance attributes	-1.0 4.0
C. Climate change	4.0 10.0
9. Climate change	10.0
Answered Questions	10.0
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	5
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2
6. Reproduction	7
7. Dispersal mechanisms	9
8. Tolerance attributes	6
C. Climate change	6
9. Climate change	6
Sectors affected	
Commercial	12
Environmental	14
Species or population nuisance traits	20
Thresholds	
BRA	-
BRA BRA+CCA	-
BRA BRA+CCA Confidence	-
BRA BRA+CCA Confidence BRA+CCA	- - 0.74
BRA BRA+CCA Confidence	- - 0.74 0.73 0.79

Date and Time 21/05/2022 14:15:42

Faxon and Assessor details					
Category	Fishes and Lampreys (freshwater)				
Taxon name	Hypophthalmichthys molitrix				
Common name	silver carp				
Assessor	Bella Japoshvili				
Risk screening context					
Reason and socio-economic benefits	Is regularly stocked in South Caucasus				
Risk assessment area	South Caucasus				
Taxonomy	Actinopteri (ray-finned fishes) > Cypriniformes (Carps) > Xenocyprididae (East Asian minnows)				
Native range	China				
Introduced range	Europe and Middle East, USA				
URL	https://www.fishbase.de/summary/Hypophthalmichthys-molitrix.html				

			Response	Justification (references and/or other information)	Confidence
Α. Ι	Biogeo	graphy/Historical			
		ication/Cultivation			
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	CABI, 2021. Hypophphalmichthys molitrix (Silver carp). https://www.cabi.org/isc/datasheet/79036 (accessed septemebr 2021)	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	Not a documented evidnece however based on personal data the species is captured in wild and sold in it native areas	High
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	Other congeners	Very high
2. (Climate	, distribution and introduction risk			
4	2.01	How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range?	Medium	Based on Climatch algorythm	Medium
5	2.02	What is the quality of the climate matching data?	Low	Due to low accuracy of local climate data	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	Have been detected in eDNA in wild (Beridze et al. 2022)	Medium
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	Aquacitural purpose	High
8	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional	Yes	The species can be found in many areas with RA area (Beridze et al 2022)	High
2 1	la va cive	and intentional introductions)?			
<u>3. 1</u> 9		Has the taxon become naturalised (established viable populations) outside its native range?	Yes	CABI, 2021. Hypophphalmichthys molitrix (Silver carp). https://www.cabi.org/isc/datasheet/79036 (accessed septemebr 2021)	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	CABI, 2021. Hypophphalmichthys molitrix (Silver carp). https://www.cabi.org/isc/datasheet/79036 (accessed septemebr 2021)	Low
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	No documented evidences exists	Low
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem services?	Yes	CABI, 2021. Hypophphalmichthys molitrix (Silver carp). https://www.cabi.org/isc/datasheet/79036 (accessed septemebr 2021)	Low
	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	Yes	CABI, 2021. Hypophphalmichthys molitrix (Silver carp). https://www.cabi.org/isc/datasheet/79036 (accessed septemebr 2021)	Medium
		y/Ecology			
		able (or persistence) traits	1		
		Is it likely that the taxon will be poisonous or pose other risks to human health?		Not harmful species	Very high
15	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	CABI, 2021. Hypophphalmichthys molitrix (Silver carp). https://www.cabi.org/isc/datasheet/79036 (accessed septemebr 2021)	Low
	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	Not a parasite species	Very high
	4.04	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?	No	No documented evidences exists	Low
	4.05	Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA	Yes	CABI, 2021. Hypophphalmichthys molitrix (Silver carp). https://www.cabi.org/isc/datasheet/79036 (accessed septemebr 2021)	Low
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	No documented evidences exists from other areas	Low
	4.07	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA	No	Not such pest/parasites are known from the RA area	Medium
21	4.08	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area?	Yes	This is expected though not documented	High
22	4.09	Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity?	Yes	Growing over 1 m in length	High

23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)?	No	Lotic systems or slowly moving water bodies only	Very high
4	4.11		No	Not known, not a documented evidence exists.	Low
	4.12	Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)?	Yes	Stuck JG, Porreca AP, Wahl DH, Colombo RE (2015) Contrasting population demographic of invasive silver carp between an impounded and free-flowing river. North American Journal of Fisheries Management 35: 114-122, http://dx.doi.org/10.1080/0275 5947.2014.986343	Low
		e exploitation Is the taxon likely to consume threatened or	No	No documented evidence exists	Low
		protected native taxa in the RA area? Is the taxon likely to sequester food	Yes	Based on professional judgement though no documented	Low
		resources (including nutrients) to the		evidences exists	
R	leprodu	detriment of native taxa in the RA area?			
		Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response	No	Kottelat, M., & Freyhof, J. (2007). Handbook of European freshwater fishes. Publications Kottelat.	Very high
9	6.02	to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)?	No	Not reported yet	Medium
	6.03	Is the taxon likely to hybridise naturally with native taxa?	No	No such case is knwon	High
	6.04	display asexual reproduction?	No	Not a documented evidence exists	High
	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	No	It completes its life cycle without any other species	Very high
	6.06	Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)?	Yes	Half a milion of eggs per year - Kottelat, M., & Freyhof, J. (2007). Handbook of European freshwater fishes. Publications Kottelat.	Very high
4	6.07	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	5	years	High
		al mechanisms	-		1
5	7.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable	>1	Species is intentionally introduced to water bodies for recreational prurposes while its suveniles can also unintentionaly be spread as a hitchicker	High
6	7.02	Will any of these vectors/pathways bring the taxon in close proximity to one or more	Yes	Along the Black Sea Within RA area there is great chance for thsi species to occure in PA using the intentionally or through water	High
7	7.03	protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances	No	currents No such fact has ever been observed	Very high
8	7.04	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?	Yes	Eggs need to drift before hutching - Kottelat, M., & Freyhof, J. (2007). Handbook of European freshwater fishes. Publications Kottelat.	Very high
9	7.05	Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?	Yes	Kottelat, M., & Freyhof, J. (2007). Handbook of European freshwater fishes. Publications Kottelat.	Medium
0	7.06	Are older life stages of the taxon likely to	No	No such an evidence exists	Low
1	7.07	migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No	No such an evidence is known	High
2	7.08	Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be	Yes	The eggs can be spread with large quantity through water currents	High
	7.09	Is dispersal of the taxon density dependent?	No	No documented evidence exists	Medium
		ce attributes	Ne		LU ala
4	8.01	water for extended periods (e.g. minimum of one or more hours) at some stage of its life	No	No documented evidence exists	High
5	8.02	cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being	No	No documented evidence exists	Low
6	8.03		No	No documented evidence exist	High
7	8.04		No	Not expected, no documented evidence exist	Medium
8	8.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	No	No documented evidence exist	Low
		Are there effective natural enemies	No	Based on professional judgement	High
9	8.06	(predators) of the taxon present in the RA		Subou on protosolonal judgement	

FO	0.01	Under the predicted future climatic	No change	Based on professional judgement	Low
50	9.01	Under the predicted future climatic	No change	Based on professional judgement	Low
		conditions, are the risks of entry into the RA			
		area posed by the taxon likely to increase,			
		decrease or not change?			
51	9.02	Under the predicted future climatic	Increase	Based on professional judgement	Low
		conditions, are the risks of establishment			
		posed by the taxon likely to increase,			
		decrease or not change?			
52	9.03	Under the predicted future climatic	Increase	Based on professional judgement	Low
		conditions, are the risks of dispersal within			
		the RA area posed by the taxon likely to			
		increase, decrease or not change?			
53	9.04	Under the predicted future climatic	Higher	Based on professional judgement	Low
		conditions, what is the likely magnitude of			
		future potential impacts on biodiversity			
		and/or ecological integrity/status?			
54	9.05	Under the predicted future climatic	Higher	Based on professional judgement	Low
		conditions, what is the likely magnitude of			
		future potential impacts on ecosystem			
		structure and/or function?			
55	9.06	Under the predicted future climatic	Higher	Based on professional judgement	Low
	1	conditions, what is the likely magnitude of			
	1	future potential impacts on ecosystem			
		services/socio-economic factors?			

Statistics

BRA	24.0
BRA Outcome	-
BRA+CCA	34.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	19.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	14.0
B. Biology/Ecology	5.0
4. Undesirable (or persistence) traits	4.0
5. Resource exploitation	2.0
6. Reproduction	-1.0
7. Dispersal mechanisms	2.0
8. Tolerance attributes	-2.0
C. Climate change	10.0
9. Climate change	10.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	3 5 5 36
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12 2 7
5. Resource exploitation	2
6. Reproduction	7
7. Dispersal mechanisms	9
8. Tolerance attributes	
C. Climate change	6
9. Climate change	6
Sectors affected	
	16
Commercial	
Commercial Environmental	10
Commercial	10 12

Thresholds	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.58
BRA	0.62
CCA	0.25
Date and Time	
16/05/2	022 13:17:19

Taxon and Assessor details	
Category	Fishes and Lampreys (freshwater)
Taxon name	Hypophthalmichthys molitrix
Common name	silver carp
Assessor	Giorgi Epitashvili
Risk screening context	
Reason and socio-economic benefits	H. molitrix has long been cultivated in China. By weight, more silver carp are produced worldwide
Risk assessment area	South Caucasus
Taxonomy	Hypophthalmichthys molitrix (Valenciennes, 1844)
Native range	Asia: Native to most major Pacific dainages of East Asia from Amur to Xi Jiang, China and Hanoi,
Introduced range	Introduced around the world for aquaculture and control of algal blooms. The species has also been
URL	https://www.fishbase.in/summary/274

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
1. l		ication/Cultivation			
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20	Yes	This fish is one of among 3 or 4 species of cyprinids whose world production in aquaculture exceeds 1 million tons per year.	Very high
2	1.02	generations? Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	Own data	Very high
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	Several countries report adverse ecological impact after introduction of H. molitrix.	Very high
2. (Climate	, distribution and introduction risk			4
4	2.01	How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range?	Medium	World Map of the Köppen-Geiger climate classification	Medium
5	2.02	What is the quality of the climate matching data?	Medium	World Map of the Köppen-Geiger climate classification	Medium
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	It was introduced in Georgia from China and now it is distributed in Jandari, Kumisi, Lisi lakes and in other places (Ninua et al.	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	This species enters the region by human intentionally for aquacultural purposes.	High
8	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)?	Yes	This species is already occuring in the SC region. As for the neighbouring regions, H. molitrix introduced to Iran from China in 1992.	Very high
3. 1	Invasiv	e elsewhere			
9	3.01	Has the taxon become naturalised (established viable populations) outside its	Yes	Data deficient	Medium
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	In the USA native fishes are likely already being impacted by reduced phytoplankton available for feeding in areas where silver carp are found.	Very high
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	Such a fact is not known	Low
	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	No	Such a fact is not known	Low
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	Yes	The Commercial Fishing Industry depends heavily on the health and ecological state of the Great Lakes, USA. The total value of the Commercial Fisheries in the Great Lakes during 2011 was over \$33 million dollars. The presence of Asian carp would have multiple impacts, including: Increased costs and decreased revenues for commercial harvesters. Small prey fish of commercially fished species would be impacted through direct consumption by Asian carp. Increased competition for food resources with young and mature native species. This decrease in revenue would in turn reduce the level of gross profits and	High
B.	Biology	y/Ecology			
		able (or persistence) traits			1 .
		Is it likely that the taxon will be poisonous or pose other risks to human health?		This species does not pose a threat to humans.	Very high
	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	Planktivorous Silver Carp Hypophthalmichthys molitrix and Bighead Carp H. nobilis have successfully invaded much of the Upper Mississippi River System and its tributaries during the last 30 years. During the initial years of the invasion, concurrent declines in the body condition and the catch per unit effort (CPUE) of planktivorous Gizzard Shad Dorosoma cepedianum and Bigmouth Buffalo Ictiobus cyprinellus were attributed to competition with Asian carp (Pendleton et al. 2017).	High
	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	Yes	There are several threathened and protected species in the SC region which may have been under pressure of H. molitrix, e.g. Luciobarbus capito, L. mursa, Salmo spp, Acipenser spp, etc.	Medium
17	4.04	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?	Yes	Own judgement	Medium
18	4.05	Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA	Yes	H. molitrix threaten to invade the Great Lakes and disrupt aquatic food webs and fisheries in USA (Zhang et al. 2011). This is expected to happen in the SC region.	High
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	It is not expected that this will happen	Medium

20			i		1
	4.07	Is it likely that the taxon will host, and/or	Not applicable		Low
		act as a vector for, recognised pests and		conducted	
21	4.08	infectious agents that are endemic in the RA Is it likely that the taxon will host, and/or	Not applicable	Whether bigheaded carps act as carriers and/or hosts for exotic	Medium
21	4.08	act as a vector for, recognised pests and	Not applicable	and native parasitic and infectious diseases is largely unknown.	Medium
		infectious agents that are absent from (novel		The prevalence of infectious diseases in bigheaded carps is also	
		to) the RA area?		largely unknown.	
22	4.09	Is it likely that the taxon will achieve a body	Yes	H. molitrix is widely used in aquaculture. Its max length is 120	Very high
		size that will make it more likely to be		cm. Common length : 18.0 cm, max. published weight: 50.0 kg	, 5
		released from captivity?			
23	4.10	Is the taxon capable of sustaining itself in a	No	Found in their natural range in rivers with marked water-level	Very high
		range of water velocity conditions (e.g.		fluctuations and overwinters in middle and lower stretches,	
		versatile in habitat use)?		swimming just beneath the surface. They feed in shallow (0.5-1.0	
				m deep) and warm (over 21°C) backwaters, lakes and flooded	
24	4 1 1		Ma a	areas with slow current on phytoplankton and zooplankton.	1
24	4.11	Is it likely that the taxon's mode of existence	Yes	Data deficient	Low
		(e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for			
		native taxa?			
25	4.12	Is the taxon likely to maintain a viable	Yes	Data deficient	Low
		population even when present in low			
		densities (or persisting in adverse conditions			
		by way of a dormant form)?			
5. I	Resourd	ce exploitation			
26	5.01	Is the taxon likely to consume threatened or	No	H. molitrix is plankton-feeding species and consumption of	Medium
		protected native taxa in the RA area?		protected species by it has not been recorded in the SC region.	
27	5.02	Is the taxon likely to sequester food	Yes	This species is a competitor to local species	Medium
		resources (including nutrients) to the]
6	Ronrod	detriment of native taxa in the RA area?	L		L
	Reprodu 6.01	Is the taxon likely to exhibit parental care	Not applicable	Data deficient	Low
-0	0.01	and/or to reduce age-at-maturity in response	appricable		
		to environmental conditions?			
29	6.02	Is the taxon likely to produce viable gametes	No	This species does not breed in the region	High
		or propagules (in the RA area)?	-		5
30	6.03	Is the taxon likely to hybridise naturally with	No	Such a fact is not known	Low
		native taxa?			
31	6.04	Is the taxon likely to be hermaphroditic or to	No	Such a fact is not known	Medium
	6.05	display asexual reproduction?			
32	6.05	Is the taxon dependent on the presence of	No	Own judgement	Medium
		another taxon (or specific habitat features)			
22	6.06	to complete its life cycle? Is the taxon known (or likely) to produce a	Yes	Fecundity of H. molitrix is 500000-600000 eggs (Ninua et al.	High
55	0.00	large number of propagules or offspring	165	2013).	ingn
		within a short time span (e.g. < 1 year)?		2013).	
34	6.07	How many time units (days, months, years)	5	H. molitrix sexually maturates at the age of 5-6 (Ninua et al.	Very high
				2013).	, 3
	1	does the taxon require to reach the age-at-			
		does the taxon require to reach the age-at- first-reproduction?		2013).	
		first-reproduction? al mechanisms			
	D <i>ispers</i> 7.01	first-reproduction? al mechanisms How many potential internal	One	This species is spread by humans in the SC region (Ninua et al.	High
		first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to	One		High
35	7.01	first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable		This species is spread by humans in the SC region (Ninua et al. 2013).	
35		first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the	One Yes	This species is spread by humans in the SC region (Ninua et al.	High
35	7.01	first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more		This species is spread by humans in the SC region (Ninua et al. 2013).	
35 36	7.01	first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)?	Yes	This species is spread by humans in the SC region (Ninua et al. 2013). There is a probability of this	Low
35 36	7.01	first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively		This species is spread by humans in the SC region (Ninua et al. 2013).	
35 36	7.01	first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship	Yes	This species is spread by humans in the SC region (Ninua et al. 2013). There is a probability of this	Low
35 36	7.01	first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively	Yes	This species is spread by humans in the SC region (Ninua et al. 2013). There is a probability of this	Low
35 36 37	7.01	first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances	Yes	This species is spread by humans in the SC region (Ninua et al. 2013). There is a probability of this	Low
35 36 37	7.01 7.02 7.03	first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal?	Yes	This species is spread by humans in the SC region (Ninua et al. 2013). There is a probability of this This species does not have such means.	Low Very high
35 36 37 38	7.01 7.02 7.03 7.04	first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?	Yes No	This species is spread by humans in the SC region (Ninua et al. 2013). There is a probability of this This species does not have such means. This species does not reproduces in the SC region.	Low Very high Medium
35 36 37 38	7.01 7.02 7.03	first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to	Yes	This species is spread by humans in the SC region (Ninua et al. 2013). There is a probability of this This species does not have such means.	Low Very high
35 36 37 38	7.01 7.02 7.03 7.04	first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as	Yes No	This species is spread by humans in the SC region (Ninua et al. 2013). There is a probability of this This species does not have such means. This species does not reproduces in the SC region.	Low Very high Medium
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35 36 37 38 39	7.01 7.02 7.03 7.04 7.05	first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?	Yes No No	This species is spread by humans in the SC region (Ninua et al. 2013). There is a probability of this This species does not have such means. This species does not reproduces in the SC region. This species does not reproduces in the SC region.	Low Very high Medium Medium
35 36 37 38 39	7.01 7.02 7.03 7.04	first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedings (for plants) in the RA area? Are older life stages of the taxon likely to	Yes No	This species is spread by humans in the SC region (Ninua et al. 2013). There is a probability of this This species does not have such means. This species does not reproduces in the SC region.	Low Very high Medium
35 36 37 38 39	7.01 7.02 7.03 7.04 7.05 7.06	first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction?	Yes No No No	This species is spread by humans in the SC region (Ninua et al. 2013). There is a probability of this This species does not have such means. This species does not reproduces in the SC region. This species does not reproduces in the SC region. This species does not reproduces in the SC region.	Low Very high Medium Medium
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35 36 37 38 38 39 40 41	7.01 7.02 7.03 7.04 7.05 7.06	first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to	Yes No No No No	This species is spread by humans in the SC region (Ninua et al. 2013). There is a probability of this This species does not have such means. This species does not reproduces in the SC region. This species does not reproduces in the SC region. This species does not reproduces in the SC region.	Low Very high Medium Medium
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35 36 37 38 39 40 41 41 42 43 3.	7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 7.09	first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? ce attributes	Yes No No No No Not applicable Yes	This species is spread by humans in the SC region (Ninua et al. 2013). There is a probability of this This species does not have such means. This species does not reproduces in the SC region. This species does not reproduces in the SC region. This species does not reproduces in the SC region. No such fact has been detected Data deficient Data deficient	Low Very high Medium Medium Medium Low
35 36 37 38 39 40 41 41 42 43 3.	7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09	first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? ce attributes Is the taxon able to withstand being out of	Yes No No No No Not applicable	This species is spread by humans in the SC region (Ninua et al. 2013). There is a probability of this This species does not have such means. This species does not reproduces in the SC region. This species does not reproduces in the SC region. This species does not reproduces in the SC region. No such fact has been detected Data deficient	Low Very high Medium Medium Medium Low
35 36 37 38 39 40 41 42 43 8.	7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 7.09	first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of	Yes No No No No Not applicable Yes	This species is spread by humans in the SC region (Ninua et al. 2013). There is a probability of this This species does not have such means. This species does not reproduces in the SC region. This species does not reproduces in the SC region. This species does not reproduces in the SC region. No such fact has been detected Data deficient Data deficient	Low Very high Medium Medium Medium Low
35 36 37 38 39 40 41 41 42 43 3.	7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 7.09	first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? ce attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life	Yes No No No No Not applicable Yes	This species is spread by humans in the SC region (Ninua et al. 2013). There is a probability of this This species does not have such means. This species does not reproduces in the SC region. This species does not reproduces in the SC region. This species does not reproduces in the SC region. No such fact has been detected Data deficient Data deficient	Low Very high Medium Medium Medium Low
35 36 37 38 39 40 41 42 43 3. 7 44	7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 7.09 7.09	first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle?	Yes No No No No Not applicable Yes	This species is spread by humans in the SC region (Ninua et al. 2013). There is a probability of this This species does not have such means. This species does not reproduces in the SC region. This species does not reproduces in the SC region. This species does not reproduces in the SC region. This species does not reproduces in the SC region. This species does not reproduces in the SC region. No such fact has been detected Data deficient No such fact has been described	Low Very high Medium Medium Medium Low Low
35 36 37 38 39 40 41 42 43 3. 7 44	7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 7.09	first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or intentional) likely to be Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of	Yes No No No No Not applicable Yes	This species is spread by humans in the SC region (Ninua et al. 2013). There is a probability of this This species does not have such means. This species does not reproduces in the SC region. This species does not reproduces in the SC region. This species does not reproduces in the SC region. This species does not reproduces in the SC region. No such fact has been detected Data deficient No such fact has been described Found in their natural range in rivers with marked water-level	Low Very high Medium Medium Medium Low
35 36 37 38 39 40 41 41 42 43 3. 1 44	7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 7.09 7.09	first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle?	Yes No No No No Not applicable Yes	This species is spread by humans in the SC region (Ninua et al. 2013). There is a probability of this This species does not have such means. This species does not reproduces in the SC region. This species does not reproduces in the SC region. This species does not reproduces in the SC region. This species does not reproduces in the SC region. This species does not reproduces in the SC region. No such fact has been detected Data deficient No such fact has been described	Low Very high Medium Medium Medium Low Low

46	8.03	Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	Yes	Own judgement	Medium
47	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	Yes	This species is spread by humans for aquacultural purposes	High
48	8.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	Yes	H. molitrix can tolerate salinities up to 12 ppt and low dissolved oxygen (3mg/L).	High
	8.06	Are there effective natural enemies (predators) of the taxon present in the RA area?	Yes	There are several predators distributed in the SC region which can controll the H. molitrix populations, e.g. Esox lucius, Silurus glanis, Squalius spp, Sander lucioperca, etc.	Very high
		e change			
		change			
50	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?	No change	Own judgement	Medium
51	9.02	Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	No change	Own judgement	Medium
52	9.03	Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change?	No change	Own judgement	Medium
53	9.04	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	No change	Own judgement	Medium
54	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	No change	Own judgement	Medium
55	9.06	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	Lower	Own judgement	Medium

Statistics	
Scores	
BRA	20.5
BRA Outcome	
BRA+CCA	18.5
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	12.5
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	7.5
B. Biology/Ecology	8.0
4. Undesirable (or persistence) traits	7.0
5. Resource exploitation	2.0
6. Reproduction	-1.0
7. Dispersal mechanisms	-3.0
8. Tolerance attributes	3.0
C. Climate change	-2.0
9. Climate change	-2.0
Answered Questions	
Total	55 13
A. Biogeography/Historical 1. Domestication/Cultivation	
2. Climate, distribution and introduction risk	5
3 Invasive elsewhere	5
3. Invasive elsewhere	3 5 5 36
B. Biology/Ecology	36
B. Biology/Ecology <i>4. Undesirable (or persistence) traits</i>	36 12
B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation	36 12
B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction	36 12
B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation	36
B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes	36 12 2 7 9 6
B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change	36 12 2 7 9
B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes	36 12 2 7 9 6 6
B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change	36 12 2 7 9 6 6
B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change	36 12 2 7 9 6 6 6 6
B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial	36 12 2 7 9 6 6 6 6 8
B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial Environmental	36 12 2 7 9 6 6 6 6 8 8 3
B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial Environmental	36 12 2 7 9 6 6 6 6 8 8 3

Inresholds	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.60
BRA	0.61
CCA	0.50
BRA	0.

Date and Time

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Taxon and Assessor details					
Category	Fishes and Lampreys (freshwater)				
Taxon name	Hypophthalmichthys molitrix				
Common name	silver carp				
Assessor	Tatia Kuljanishvili				
Risk screening context					
Reason and socio-economic benefits	Has been introduced worldwide for Aquaculture and algae control				
Risk assessment area	South Caucasus				
Taxonomy	Actinopteri (ray-finned fishes) > Cypriniformes (Carps) > Xenocyprididae				
Native range	East China and Russia				
Introduced range	South Caucasus (Arm, Azr Geo)				
URL	https://www.fishbase.se/summary/Ctenopharyngodon-idella.html				

			Response	Justification (references and/or other information)	Confidence
Α.	Biogeo	graphy/Historical			
1. l		ication/Cultivation			
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20	Yes	It has beeen grown in aquaculture facilities more than 20 generations	Very high
2	1.02	generations? Is the taxon harvested in the wild and likely	Yes	Yes. Taxon is harvested in wild and is sold in its live form	Very high
3	1.03	to be sold or used in its live form? Does the taxon have invasive races,	Yes	for example Hypophthalmichthys nobilis and Ctenopharyngodon	High
-		varieties, sub-taxa or congeners?		idella	
2. (, distribution and introduction risk			
4	2.01	How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range?	High	The climate is more or less similar out of 19 stations, 15 match at value 9 (out of 10).	High
5	2.02	What is the quality of the climate matching data?	Medium	Climatch data is medium since there are not much station on the RA area	Medium
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	This species is released in ponds and rivers in RA area	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	>1	Aquaculture, recreational fisheries	Very high
8	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA	Yes	This species is released in ponds and rivers in RA area	Very high
		area in the near future (e.g. unintentional			
		and intentional introductions)?	<u> </u>		
		e elsewhere			Linh
9		Has the taxon become naturalised (established viable populations) outside its	Yes	Yes. has become naturalised for example in Taiwan (Thang 1960).	High
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or	Yes	negative impact inculde the shaping of zooplanctonic comunities and predation pressure (competiton) on other planktonivorous	High
11	3.03	commercial taxa? In the taxon's introduced range, are there	No	species (Spataru & Gophen 1985) it is not known, but possibly the competition with native	Medium
	5.05	known adverse impacts to aquaculture?		planktonivorous fish can affect the aquaculture (Spataru & Gophen 1985)	neulum
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	Yes	affects native fish fauna via shaping the zooplanktonic organisms	Medium
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	It is not known	Medium
B .	Biology	y/Ecology			
4. l		able (or persistence) traits			
		Is it likely that the taxon will be poisonous or pose other risks to human health?		Not poisonous	Very high
	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	They have ability to fine filter the water and also they grow very fast and can form dence populations, they are versatile in terms of feeding and this can often lead to habitat alterations amd disruption of food webs and nutrient cycles in new invaded ecosystems (Milstein et al. 1988; Cooke et al. 2009; Gozlan et al. 2010; Ma et al. 2010; Rosemberg et al. 2010. Such changes as zooplankton and phytoplancton exploatation, shaping the fish communities can affect native fishes populations that are sharing	Medium
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	Does not parasite	Very high
17	4.04	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?	Yes	yes foe example, in India and Bangladesh	High
	4.05	Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA area?	Yes	They have ability to fine filter the water and also they grow very fast and can form dence populations, they are versatile in terms of feeding and this can often lead to habitat alterations amd disruption of food webs and nutrient cycles in new invaded ecosystems (Milstein et al. 1988; Cooke et al. 2009; Gozlan et al. 2010; Ma et al. 2010; Rosemberg et al. 2010.	High
	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes	it is possible, however, it should be mentioned that they are not known to be independently reproducting in RA	Medium
20	4.07	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA	Yes	Possible, but not documented	Medium

21	4.08	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel	Yes	it is possible. However, it is not documented.	High
22	4.09	to) the RA area? Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity?	Yes	yes	Very high
23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g.	Yes	in their natural habitat they migrate upstreams for reproduction.	Medium
24	4.11	versatile in habitat use)? Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa?	Yes	They have ability to fine filter the water and also they grow very fast and can form dence populations, they are versatile in terms of feeding and this can often lead to habitat alterations and disruption of food webs and nutrient cycles in new invaded ecosystems (Milstein et al. 1988; Cooke et al. 2009; Gozlan et al. 2010; Ma et al. 2010; Rosembero et al. 2010)	High
25	4.12	Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)?	Yes	depending on the water and weather conditions	Medium
5. F	esourc	e exploitation			
			No	It is not known	Low
27	5.02	protected native taxa in the RA area? Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?	Yes	Yes it is possible	High
6. R	eprodu				
	6.01	Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?	No	No information available	Very high
29	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	No	As far as it is known, No.	Very high
	6.03	native taxa?	No	No information available	Very high
	6.04	display asexual reproduction?	No	No. Does not display asexual reproduction	Very high
32	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	No	No. See: https://www.fishbase.de/summary/Hypophthalmichthys- molitrix.html	Very high
33	6.06	Is the taxon known (or likely) to produce a large number of propagules or offspring	Yes	females lay 500 000 eggs in one or seveal seasons depending on conditions	Very high
34	6.07	within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at-	4	4-5 years	Very high
		first-reproduction?			
	_	al mechanisms	Ĩ		
35	7.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable	>1	Aquaculture and recreational fisheries	Very high
36	7.02	Will any of these vectors/pathways bring the taxon in close proximity to one or more	Yes	Yes. it is possible	High
37	7.03	protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal?	No	No. Morphologically this species does not have a means of actively attaching itself to hard substrata	Very high
38	7.04	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?	No	No. Because does not reproduce in RA	Very high
39	7.05	Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?	No	They do not produce viable gametes and therfore can be distributed by larvae, or juveniles.	Very high
	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	No	Do notreproduce therefore, does not migrate.	Very high
	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No	No. Can not be dispersed by other ananimals	Very high
42	7.08	Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be	Yes	Yes, It seems to be rapid	Very high
43	7.09		Yes	Yes, it is possible.	Medium
8. 7	olerand	ce attributes			
44	8.01	Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle?	No	No information	Low
45	8.02	Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the	Yes	"Tolerant of a wide range of temperatures from 0° to 38°C, and salinities to as much as 10 ppt and oxygen levels down to 0.5 ppm."https://www.fishbase.se/summary/Ctenopharyngodon-	High
	8.03	relevant water quality variable(s) being Can the taxon be controlled or eradicated in	Yes	idella.html yes it can be	Medium

47	8.04	Is the taxon likely to tolerate or benefit from	No	No information. probably not.	Low
		environmental/human disturbance?			
48	8.05	Is the taxon able to tolerate salinity levels	No	no, iT can maximum tolerate salinity levels up to 7%o.	Very high
		that are higher or lower than those found in			
		its usual environment?			
49	8.06	Are there effective natural enemies	No	No. No effective natural enemies present in RA area	High
		(predators) of the taxon present in the RA			
С. С	Climate	e change			
9. (Climate	change			
50	9.01	Under the predicted future climatic	Increase	It was hypotheses that climate change might alert the	Very high
		conditions, are the risks of entry into the RA		mechanisms of transportation and introduction of non-native	
		area posed by the taxon likely to increase,		species. Commercial and recreational activities will increase, that	
		decrease or not change?		itself increases the propagule pressure levels of non-native	
51	9.02	Under the predicted future climatic	Increase	if the temperatures increase, it will make their populations able to	High
		conditions, are the risks of establishment		reproduce indipendently, therefore the risk of their potential	
		posed by the taxon likely to increase,		impact is increasing	
		decrease or not change?			
52	9.03	Under the predicted future climatic	Increase	Dispersal might increase	High
		conditions, are the risks of dispersal within			
		the RA area posed by the taxon likely to			
		increase, decrease or not change?			
53	9.04	Under the predicted future climatic	Higher	It could be higher. Because it is known that they create dance	High
		conditions, what is the likely magnitude of		populations when they reproduce in new environments and	
		future potential impacts on biodiversity		creating problems for the native species	
		and/or ecological integrity/status?			
54	9.05	Under the predicted future climatic	Higher	The magnitude of future potential impact on ecosysytem structure	High
		conditions, what is the likely magnitude of		and function is increasing	
		future potential impacts on ecosystem			
		structure and/or function?			
55	9.06	Under the predicted future climatic	No change	No Change	High
		conditions, what is the likely magnitude of			
		future potential impacts on ecosystem			
		services/socio-economic factors?			

Statistics	
Scores	
BRA	24.0
BRA Outcome	-
BRA+CCA	34.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	16.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	2.0
3. Invasive elsewhere	10.0
B. Biology/Ecology	8.0
4. Undesirable (or persistence) traits	10.0
5. Resource exploitation	2.0
6. Reproduction	-1.0
7. Dispersal mechanisms	-1.0
8. Tolerance attributes	-2.0
C. Climate change	10.0
9. Climate change	10.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3 5 5 36
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	5
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12 2 7 9 6
5. Resource exploitation	2
6. Reproduction	7
7. Dispersal mechanisms	9
8. Tolerance attributes	
C. Climate change	6
9. Climate change	6
Sectors affected	
Commercial	11
	12
Environmental	
Environmental Species or population nuisance traits	16

Thresholds	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.78
BRA	0.78
CCA	0.79

Date and Time	
	21/05/2022 14:19:36

Taxon and Assessor details					
Category	Fishes and Lampreys (freshwater)				
Taxon name	Hypophthalmichthys nobilis				
Common name	bighead carp				
Assessor Bella Japoshvili					
Risk screening context					
Reason and socio-economic benefits	Is regularly stocked in South Caucasus				
Risk assessment area	South Caucasus				
Taxonomy	Actinopteri (ray-finned fishes) > Cypriniformes (Carps) > Xenocyprididae (East Asian minnows)				
Native range	China				
Introduced range Worldwide					
URL					

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
1. l		ication/Cultivation			
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	e.g. Tave, D. (1993). Growth of triploid and diploid bighead carp, Hypophthalmichthys nobilis. Journal of Applied Aquaculture, 2(2), 13-26.	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	The Species is usually harvested and sold in its live form in native areas as well as from aquaculture	Very high
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	Congeners	Very high
2. (Climate	, distribution and introduction risk			
4	2.01	How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range?	High	Result climatch algorithm	Medium
5	2.02	What is the quality of the climate matching data?	Low	Due to low accuracy of local climate data	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	No	Not such an evidence exist	Medium
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	Aquacultural purpose	High
8	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and interfered interfered with the start	No	No such an evidence exists	High
3 1	nyaciw	and intentional introductions)?			
9		Has the taxon become naturalised (established viable populations) outside its native range?	Yes	CABI, 2021. Hypophphalmichthys nobilis (Bighead carp). https://www.cabi.org/isc/datasheet/92426 (accessed septemebr 2021); Kottelat, M., & Freyhof, J. (2007). Handbook of European freshwater fishes. Publications Kottelat.	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	No documented evdience, only expected	Low
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	No documented evdience exist	Low
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	Yes	No documented evdience exist, only expected	Low
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	Yes	Welcomme, R.L., 1988. International introductions of inland aquatic species. FAO Fish. Tech. Pap. 294. 318 p.	Medium
в.	Biology	y/Ecology			
		able (or persistence) traits			
14	4.01	Is it likely that the taxon will be poisonous or pose other risks to human health?	No	Not a harmful species	Very high
15	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	No	No documented evdience exist	Low
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	Not a parasite species	Very high
17	4.04	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?	Yes	Based on its invasion history - CABI, 2021. Hypophphalmichthys nobilis (Bighead carp). https://www.cabi.org/isc/datasheet/92426 (accessed septemebr 2021)	Low
18	4.05	Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA	No	No documented evdience exist	Low
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	Not expected - CABI, 2021. Hypophphalmichthys nobilis (Bighead carp). https://www.cabi.org/isc/datasheet/92426 (accessed septemebr 2021)	Low
20	4.07	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA	No	Not expected and no documented evdience exist	Medium
21	4.08	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel	Yes	Expected but no documented evdience exist	Low
22	4.09	to) the RA area? Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity?	Yes	Kottelat, M., & Freyhof, J. (2007). Handbook of European freshwater fishes. Publications Kottelat.	Very high

	4.10	Is the taxon capable of sustaining itself in a	Yes	Kottelat, M., & Freyhof, J. (2007). Handbook of European	High
14		range of water velocity conditions (e.g.		freshwater fishes. Publications Kottelat.	
<u>۸</u>		versatile in habitat use)?			
-4	4.11	Is it likely that the taxon's mode of existence	No	Not expected - CABI, 2021. Hypophphalmichthys nobilis (Bighead	Low
		(e.g. excretion of by-products) or behaviours		carp). https://www.cabi.org/isc/datasheet/92426 (accessed	
		(e.g. feeding) will reduce habitat quality for native taxa?		septemebr 2021)	
25	4.12	Is the taxon likely to maintain a viable	No	No documented evdience exist	Low
		population even when present in low	110		2011
		densities (or persisting in adverse conditions			
		by way of a dormant form)?			
		ce exploitation	r.	1	
26	5.01	Is the taxon likely to consume threatened or	No	Not expected	Medium
_	5.02	protected native taxa in the RA area?			M
27	5.02	Is the taxon likely to sequester food resources (including nutrients) to the	Yes	Based on professional judgement, no repsective evidence exists	Medium
		detriment of native taxa in the RA area?			
5. F	Reprodu				
	6.01	Is the taxon likely to exhibit parental care	No	Kottelat, M., & Freyhof, J. (2007). Handbook of European	Very high
		and/or to reduce age-at-maturity in response		freshwater fishes. Publications Kottelat.	
		to environmental conditions?			
29	6.02	Is the taxon likely to produce viable gametes	No	Kuljanishvili, T., Mumladze, L., Japoshvili, B., Mustafayev, N.,	Very high
		or propagules (in the RA area)?		Ibrahimov, S., Patoka, J., & Kalous, L. (2021). The first unified	
				inventory of non-native fishes of the South Caucasian countries,	
				Armenia, Azerbaijan, and Georgia. Knowledge & Management of	
30	6.03	Is the taxon likely to hybridise naturally with	No	Aquatic Ecosystems, (422), 32. Not expected	Medium
	0.05	native taxa?			
31	6.04	Is the taxon likely to be hermaphroditic or to	No	Usually reproducing sexually	Medium
		display asexual reproduction?			
32	6.05	Is the taxon dependent on the presence of	No	Species can complete its lifecycle without any other species	Very high
	1	another taxon (or specific habitat features)			
	+	to complete its life cycle?			
33	6.06	Is the taxon known (or likely) to produce a	Yes	Kottelat, M., & Freyhof, J. (2007). Handbook of European	Very high
		large number of propagules or offspring		freshwater fishes. Publications Kottelat.	
24	6.07	within a short time span (e.g. < 1 year)?	5	Voarc	High
,+,	0.07	How many time units (days, months, years) does the taxon require to reach the age-at-	<u> </u>	Years	High
		first-reproduction?			
7. [Dispers	al mechanisms			
35	7.01	How many potential internal	>1	Species is intentionally introduced to water bodies for recreational	Medium
		vectors/pathways could the taxon use to		prurposes while its suveniles can also unintentionaly be spread as	
		disperse within the RA area (with suitable		a hitchicker	
36	7.02	Will any of these vectors/pathways bring the	Yes	Because of large number of eggs/juveniles produced that are able	Medium
		taxon in close proximity to one or more		to cover lareg distace through water curretns	
27	7.03	protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively	No	No such an evidence exists	Very high
,,	7.05	attaching itself to hard substrata (e.g. ship	NO		very nigh
		hulls, pilings, buoys) such that it enhances			
20					
ъŏ	7.04	the likelihood of dispersal? Is natural dispersal of the taxon likely to	Yes	Kottelat, M., & Freyhof, J. (2007). Handbook of European	Very high
סמ	7.04	the likelihood of dispersal?	Yes	Kottelat, M., & Freyhof, J. (2007). Handbook of European freshwater fishes. Publications Kottelat.	Very high
		the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?		freshwater fishes. Publications Kottelat.	, ,
	7.04	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to	Yes	freshwater fishes. Publications Kottelat. Eggs are free floating and juveniles also drifting through water	Very high High
		the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as		freshwater fishes. Publications Kottelat.	, ,
		the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA		freshwater fishes. Publications Kottelat. Eggs are free floating and juveniles also drifting through water	, ,
39	7.05	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?	Yes	freshwater fishes. Publications Kottelat. Eggs are free floating and juveniles also drifting through water currents	High
39		the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to		freshwater fishes. Publications Kottelat. Eggs are free floating and juveniles also drifting through water	, ,
39 10	7.05	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction?	Yes	freshwater fishes. Publications Kottelat. Eggs are free floating and juveniles also drifting through water currents No such an evidence exists	High
39 10	7.05	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to	Yes	freshwater fishes. Publications Kottelat. Eggs are free floating and juveniles also drifting through water currents	High
39 40 41	7.05	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction?	Yes	freshwater fishes. Publications Kottelat. Eggs are free floating and juveniles also drifting through water currents No such an evidence exists	High
39 40 41	7.05 7.06 7.07	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	Yes No No	freshwater fishes. Publications Kottelat. Eggs are free floating and juveniles also drifting through water currents No such an evidence exists No such an evidence exists	High High Very high
39 40 41	7.05 7.06 7.07	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both	Yes No No	freshwater fishes. Publications Kottelat. Eggs are free floating and juveniles also drifting through water currents No such an evidence exists No such an evidence exists Due to a large number of eggs produced that are freely floating	High High Very high
39 40 41	7.05 7.06 7.07 7.08	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be	Yes No Yes	freshwater fishes. Publications Kottelat. Eggs are free floating and juveniles also drifting through water currents No such an evidence exists No such an evidence exists Due to a large number of eggs produced that are freely floating through water cuurents	High High Very high Very high
39 10 11 12	7.05 7.06 7.07 7.08 7.09	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent?	Yes No No	freshwater fishes. Publications Kottelat. Eggs are free floating and juveniles also drifting through water currents No such an evidence exists No such an evidence exists Due to a large number of eggs produced that are freely floating	High High Very high
39 10 11 12	7.05 7.06 7.07 7.08 7.09 7.09	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? ce attributes	Yes No Yes No	freshwater fishes. Publications Kottelat. Eggs are free floating and juveniles also drifting through water currents No such an evidence exists No such an evidence exists Due to a large number of eggs produced that are freely floating through water cuurents No relevant information is available	High High Very high Very high Low
39 10 11 12 13 3. 7	7.05 7.06 7.07 7.08 7.09 7.09	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of	Yes No Yes	freshwater fishes. Publications Kottelat. Eggs are free floating and juveniles also drifting through water currents No such an evidence exists No such an evidence exists Due to a large number of eggs produced that are freely floating through water cuurents	High High Very high Very high
39 10 11 12 13 3. 7	7.05 7.06 7.07 7.08 7.09 7.09	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of	Yes No Yes No	freshwater fishes. Publications Kottelat. Eggs are free floating and juveniles also drifting through water currents No such an evidence exists No such an evidence exists Due to a large number of eggs produced that are freely floating through water cuurents No relevant information is available	High High Very high Very high Low
39 10 11 12	7.05 7.06 7.07 7.08 7.09 7.09	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life	Yes No Yes No	freshwater fishes. Publications Kottelat. Eggs are free floating and juveniles also drifting through water currents No such an evidence exists No such an evidence exists Due to a large number of eggs produced that are freely floating through water cuurents No relevant information is available	High High Very high Very high Low
39 10 11 12 13 14	7.05 7.06 7.07 7.08 7.09 7.09 7.09	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle?	Yes No Yes No	freshwater fishes. Publications Kottelat. Eggs are free floating and juveniles also drifting through water currents No such an evidence exists No such an evidence exists Due to a large number of eggs produced that are freely floating through water cuurents No relevant information is available Not expected and no such an evidence exists	High Very high Very high Low
39 10 11 12 13 14	7.05 7.06 7.07 7.08 7.09 7.09	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life	Yes No Yes No	freshwater fishes. Publications Kottelat. Eggs are free floating and juveniles also drifting through water currents No such an evidence exists No such an evidence exists Due to a large number of eggs produced that are freely floating through water cuurents No relevant information is available	High High Very high Very high Low
39 40 41 42 43 3. 7 44	7.05 7.06 7.07 7.08 7.09 7.09 7.09	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life (cvcle? Is the taxon tolerant of a wide range of	Yes No Yes No	freshwater fishes. Publications Kottelat. Eggs are free floating and juveniles also drifting through water currents No such an evidence exists No such an evidence exists Due to a large number of eggs produced that are freely floating through water cuurents No relevant information is available Not expected and no such an evidence exists Kottelat, M., & Freyhof, J. (2007). Handbook of European	High Very high Very high Low
10 11 12 13 14	7.05 7.06 7.07 7.08 7.09 7.09 7.09 7.09 8.01	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being	Yes No Yes No	freshwater fishes. Publications Kottelat. Eggs are free floating and juveniles also drifting through water currents No such an evidence exists No such an evidence exists Due to a large number of eggs produced that are freely floating through water cuurents No relevant information is available Not expected and no such an evidence exists Kottelat, M., & Freyhof, J. (2007). Handbook of European	High Very high Very high Low
10 11 12 13 14	7.05 7.06 7.07 7.08 7.09 7.09 7.09	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in	Yes No Yes No	freshwater fishes. Publications Kottelat. Eggs are free floating and juveniles also drifting through water currents No such an evidence exists No such an evidence exists Due to a large number of eggs produced that are freely floating through water cuurents No relevant information is available Not expected and no such an evidence exists Kottelat, M., & Freyhof, J. (2007). Handbook of European	High Very high Very high Low
9 0 1 2 3 7 4	7.05 7.06 7.07 7.08 7.09 7.09 7.09 7.09 8.01	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other	Yes No Yes No Yes	freshwater fishes. Publications Kottelat. Eggs are free floating and juveniles also drifting through water currents No such an evidence exists No such an evidence exists Due to a large number of eggs produced that are freely floating through water cuurents No relevant information is available Not expected and no such an evidence exists Kottelat, M., & Freyhof, J. (2007). Handbook of European freshwater fishes. Publications Kottelat.	High Very high Very high Low High
9 0 1 2 3 .7 4 5 6	7.05 7.06 7.07 7.08 7.09 7.09 7.09 7.09 8.01 8.01 8.02 8.03	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	Yes No Yes No Yes No	freshwater fishes. Publications Kottelat. Eggs are free floating and juveniles also drifting through water currents No such an evidence exists No such an evidence exists Due to a large number of eggs produced that are freely floating through water cuurents No relevant information is available Not expected and no such an evidence exists Kottelat, M., & Freyhof, J. (2007). Handbook of European freshwater fishes. Publications Kottelat. No such an evidence exists	High High Very high Very high Low High High
9 0 1 2 3 .7 4 5 6	7.05 7.06 7.07 7.08 7.09 7.09 7.09 7.09 8.01	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon tolerant of a wide range of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Is the taxon likely to tolerate or benefit from	Yes No Yes No Yes	freshwater fishes. Publications Kottelat. Eggs are free floating and juveniles also drifting through water currents No such an evidence exists No such an evidence exists Due to a large number of eggs produced that are freely floating through water cuurents No relevant information is available Not expected and no such an evidence exists Kottelat, M., & Freyhof, J. (2007). Handbook of European freshwater fishes. Publications Kottelat.	High Very high Very high Low High
10 11 12 13 14 15 16	7.05 7.06 7.07 7.08 7.09 7.09 7.09 7.09 8.01 8.01 8.02 8.03 8.04	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or intentional) likely to be Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Is the taxon likely to tolerate or benefit from environmental/human disturbance?	Yes No Yes No Yes No No	freshwater fishes. Publications Kottelat. Eggs are free floating and juveniles also drifting through water currents No such an evidence exists No such an evidence exists Due to a large number of eggs produced that are freely floating through water cuurents No relevant information is available Not expected and no such an evidence exists Kottelat, M., & Freyhof, J. (2007). Handbook of European freshwater fishes. Publications Kottelat. No such an evidence exists No such an evidence exists	High Very high Very high Low High High Medium
10 11 12 13 14 15 16	7.05 7.06 7.07 7.08 7.09 7.09 7.09 7.09 8.01 8.01 8.02 8.03	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life relevant water quality variable(s) being Can the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon biological, or other agents/means? Is the taxon likely to tolerate or benefit from environmental/human disturbance? Is the taxon able to otherate salinity levels	Yes No Yes No Yes No	freshwater fishes. Publications Kottelat. Eggs are free floating and juveniles also drifting through water currents No such an evidence exists No such an evidence exists Due to a large number of eggs produced that are freely floating through water cuurents No relevant information is available Not expected and no such an evidence exists Kottelat, M., & Freyhof, J. (2007). Handbook of European freshwater fishes. Publications Kottelat. No such an evidence exists No such an evidence exists Kottelat, M., & Freyhof, J. (2007). Handbook of European	High High Very high Very high Low High High
9 0 1 2 3 7 4	7.05 7.06 7.07 7.08 7.09 7.09 7.09 7.09 8.01 8.01 8.02 8.03 8.04	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Is the taxon able to tolerate or benefit from environmental/human disturbance? Is the taxon able to tolerate salinity levels that are higher or lower than those found in	Yes No Yes No Yes No No	freshwater fishes. Publications Kottelat. Eggs are free floating and juveniles also drifting through water currents No such an evidence exists No such an evidence exists Due to a large number of eggs produced that are freely floating through water cuurents No relevant information is available Not expected and no such an evidence exists Kottelat, M., & Freyhof, J. (2007). Handbook of European freshwater fishes. Publications Kottelat. No such an evidence exists No such an evidence exists	High Very high Very high Low High High Medium
10 11 12 13 14 15 16 17	7.05 7.06 7.07 7.08 7.09 7.09 7.09 7.09 8.01 8.01 8.02 8.03 8.04	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life relevant water quality variable(s) being Can the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon biological, or other agents/means? Is the taxon likely to tolerate or benefit from environmental/human disturbance? Is the taxon able to otherate salinity levels	Yes No Yes No Yes No No	freshwater fishes. Publications Kottelat. Eggs are free floating and juveniles also drifting through water currents No such an evidence exists No such an evidence exists Due to a large number of eggs produced that are freely floating through water cuurents No relevant information is available Not expected and no such an evidence exists Kottelat, M., & Freyhof, J. (2007). Handbook of European freshwater fishes. Publications Kottelat. No such an evidence exists No such an evidence exists Kottelat, M., & Freyhof, J. (2007). Handbook of European	High Very high Very high Low High High Medium

С. (C. Climate change				
9. (Climate	change			
50	9.01	Under the predicted future climatic	No change	Based on professional judgement	Medium
		conditions, are the risks of entry into the RA			
		area posed by the taxon likely to increase,			
5.4	0.00	decrease or not change?	-		N4 11
51	9.02	Under the predicted future climatic	Increase	Based on professional judgement	Medium
		conditions, are the risks of establishment			
		posed by the taxon likely to increase,			
-	-	decrease or not change?	-		
52	9.03	Under the predicted future climatic	Increase	Based on professional judgement	Medium
		conditions, are the risks of dispersal within			
		the RA area posed by the taxon likely to			
		increase, decrease or not change?			
53	9.04	Under the predicted future climatic	Higher	Based on professional judgement	Medium
		conditions, what is the likely magnitude of			
		future potential impacts on biodiversity			
		and/or ecological integrity/status?			
54	9.05	Under the predicted future climatic	Higher	Based on professional judgement	Medium
		conditions, what is the likely magnitude of			
		future potential impacts on ecosystem			
		structure and/or function?			
55	9.06	Under the predicted future climatic	Higher	Based on professional judgement	Medium
		conditions, what is the likely magnitude of			
	1	future potential impacts on ecosystem			
		services/socio-economic factors?			

Statistics	
Scores	
BRA	28.0
BRA Outcome	-
BRA+CCA	38.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	18.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	0.0
3. Invasive elsewhere	14.0
B. Biology/Ecology	10.0
4. Undesirable (or persistence) traits	4.0
5. Resource exploitation	2.0
6. Reproduction	-1.0
7. Dispersal mechanisms	2.0
8. Tolerance attributes	3.0
C. Climate change	10.0
9. Climate change	10.0
Answered Questions	
Total	55
A. Biogeography/Historical	55 13
	13
A. Biogeography/Historical	13 3 5
A. Biogeography/Historical 1. Domestication/Cultivation	13 3 5 5
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk	13 3 5 5
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere	13 3 5
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology	13 3 5 5 36 12
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits	13 3 5 5 36 12
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation	13 3 5 5 36 12
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction	13 3 5 5 36 12 2 7 9 6
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms	13 3 5 5 36 12
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes	13 3 5 5 36 12 2 7 9 6
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change	13 3 5 5 36 12 2 7 9 9 6 6
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change	13 3 5 5 36 12 2 7 9 9 6 6 6
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected	13 3 5 5 36 12 2 7 9 6 6 6 6 6
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial	13 3 5 5 36 12 2 7 7 9 6 6 6 6 6
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial Environmental	13 3 5 5 36 12 2 7 7 9 6 6 6 6 6
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial Environmental Species or population nuisance traits	13 3 5 5 36 12 2 7 7 9 6 6 6 6 6
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial Environmental	13 3 5 5 36 12 2 7 7 9 6 6 6 6 6

BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.63
BRA	0.64
CCA	0.50
Date and Time	
16/05/2	022 13:24:54

Taxon and Assessor details	
Category	Fishes and Lampreys (freshwater)
Taxon name	Hypophthalmichthys nobilis
Common name	bighead carp
Assessor	Giorgi Epitashvili
Risk screening context	
Reason and socio-economic benefits	H. nobilis has long been cultivated in the world. This species is a good object for pond fishery. It
Risk assessment area	South Caucasus
Taxonomy	Hypophthalmichthys nobilis (Richardson, 1845)
Native range	It is a native freshwater fish in China, with a broad distribution from the drainage areas of the
Introduced range	Though it has been introduced into many other countries (mainly Asia and Eastern Europe), very
URL	https://www.fishbase.se/summary/275

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
1. L		ication/Cultivation			
1		Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	This species has a trade importance and considered as good object for pond fishery (Ninua et al. 2013).	
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	The broodstock used for artificial propagation is usually raised in captivity with seed from the wild or from breeding stations, where good natural stock are maintained.	High
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	Several countries report adverse ecological impact after introduction of H. nobilis. This fish is considered as serious invasive species in the USA.	Very high
2. (Climate	, distribution and introduction risk			
4	2.01	How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range?	Medium	World Map of the Köppen-Geiger climate classification	Medium
5	2.02	What is the quality of the climate matching data?	Medium	World Map of the Köppen-Geiger climate classification	Medium
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	Own data	Medium
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	This species is enters in the SC region by humans for aquacultural purposes	Medium
8	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)?	Yes	This species is acclimatized in the neighbouring countries of the SC region (Iran, Turkey).	Very high
3. I	nvasive	e elsewhere			
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	As noted by Jennings (1988), there is a lack of specific information on longevity and mortality of naturalized or indigenous populations of Bighead Carp in USA (Kolar et al. 2005).	High
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	USGS-NAS (2005) reports that, "Because bighead carp are planktivorous and attain a large size, Laird and Page (1996) suggested these carp have the potential to deplete zooplankton populations. A decline in the availability of plankton can lead to reductions in populations of native species that rely on plankton for food, including all larval fishes, some adult fishes, and native	High
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	Yes	The spread of this species adversely affects commercial fishery in parts of the Mississippi River Basin, USA (Maher 2005).	Very high
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	Yes	Data deficient	Medium
	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	Yes	Hypophthalmichthys nobilis has a high potential socio-economic impact in the Great Lakes, USA.	High
		y/Ecology			
		able (or persistence) traits Is it likely that the taxon will be poisonous or	No	This species does not pose a threat to humans.	High
15	4.02	pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	Because bighead carp are planktivorous and attain a large size, Laird and Page (1996) suggested these carp have the potential to deplete zooplankton populations. As Laird and Page pointed out, a decline in the availability of plankton can lead to reductions in populations of native species that rely on plankton for food.	Medium
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	Yes	There are several protected and threathened species in the SC region which may be affected by this species: e.g. Cyprinus carpio, Luciobarbus capito, etc.	Very high
		Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?	No	This species does not reproduces in the SC region.	Medium
18	4.05	Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA	Yes	There is such a risk.	High
	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	Such a risk is unlikely	Medium
20	4.07	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA	Not applicable	Data deficient	Low
21	4.08	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area?	Yes	Bighead carp are often infected with bacterial and parasitic diseases (Kolar et al. 2005).	High

				considerable additional expense.	
46	8.03	Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	Yes	The toxicity of many chemicals to bighead, grass, and silver carps has been examined (13 chemicals, 34 studies for bighead carp; 75 chemicals, 233 studies for grass carp; 21 chemicals, 83 studies for silver carp; Pesticide Action Network 2005). Rotenone and antimycin are the only registered piscicides available to potentially control Asian carps in the United States without	Very high
	8.02	cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being	No	Soft water has been said to cause the bursting of Bighead carp eggs and thus has been suggested as a factor that would limit the spread of this species (Chapman and Deters 2009).	High
14	8.01	Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life	No	No such fact has been described.	Medium
		ce attributes			1. I.
	7.09	Is dispersal of the taxon density dependent?	Yes	Own judgement	Low
		seven questions (35-41; i.e. both unintentional or intentional) likely to be			
		vectors/pathways mentioned in the previous			
12	7.08	Is dispersal of the taxon along any of the	Not applicable	Data deficient	Low
1	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No	No such fact has been detected	High
	7.06	area? Are older life stages of the taxon likely to migrate in the RA area for reproduction?	No	This species does not reproduces in the SC region.	High
39	7.05	Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA	No	This species does not reproduces in the SC region.	High
88	7.04	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?	No	This species does not reproduces in the SC region.	High
37	7.03	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances	No	This species does not has such means	
86	7.02	Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)?	Yes	There is a probability of that.	
5	7.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable	One	This species can only disperse within the SC region by humans.	Very high
		al mechanisms			1
		does the taxon require to reach the age-at- first-reproduction?			
84	6.07	large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years)	4	500 000 eggs. This fish sexually matures at the age of 4-7 (Ninua et al. 2013).	Very high
3	6.06	another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a	No	This fish sexually matures at the age of 4-7 and fecundity is about	High
32	6.05	display asexual reproduction? Is the taxon dependent on the presence of	No	in the Missouri River some reproductive abnormalities such as intersex, atresia, and sterility were observed. No such data available	Medium
	6.04	native taxa? Is the taxon likely to be hermaphroditic or to	Yes	Bighead and silver carps are successfully maturing and spawning	High
	6.02 6.03	Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with	No	This species does not reproduces in the Caucasus region. Data deficient	Very high Medium
<u>.</u>	6.63	and/or to reduce age-at-maturity in response to environmental conditions?	N-		
	R <i>eprodu</i> 6.01	Is the taxon likely to exhibit parental care	Not applicable	Data deficient	Low
5 /	Paprod	resources (including nutrients) to the detriment of native taxa in the RA area?			
27	5.02	protected native taxa in the RA area? Is the taxon likely to sequester food	Yes	There is a probability of that.	Medium
	5.01	Is the taxon likely to consume threatened or	No	No such fact has been detected.	Medium
. 1	Pocoura	by way of a dormant form)?			
25	4.12	Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions	Yes	The minimum numbers of bighead and silver carp required to maintain a viable population in the Great Lakes.	Low
-4	4.11	(e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa?	Tes	that spread quickly once they are established in a water body. These carp damage habitat and reduce water-quality for native fish.	very nigh
4	4.11	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)? Is it likely that the taxon's mode of existence	Yes	In its natural environment, it occurs in rivers with marked water- level fluctuations, overwinters in middle and lower stretches. Adult bighead, silver, and hybrid carp are invavsive species of fish	Medium Very high
3	4.10				

48	8.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	Yes	In aquaculture, adults can survive brackish water (up to 7 ppt) when released into estuaries and coastal lakes.	Low
49	8.06	Are there effective natural enemies (predators) of the taxon present in the RA	Yes	There are several predators in the SC region which can controll the H. nobilis populations: Esox lucius, Silurus glanis, Squalius	Medium
С. (Climat	e change			
9. (Climate	change			
50	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?	No change	Own judgement	Medium
51	9.02	Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	No change	Own judgement	Medium
52	9.03	Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change?	Decrease	Own judgement	Medium
53	9.04	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	No change	Own judgement	Medium
	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Lower	Own judgement	Medium
55	9.06	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	Lower	Own judgement	Medium

Statistics		
	Scores	
	BRA	25.5
	BRA Outcome	-
	BRA+CCA	19.5
BRA+	CCA Outcome	-
Score partition		
A. Biogeograp	hy/Historical	18.5
1. Domesticati	ion/Cultivation	4.0
2. Climate, distribution and in	troduction risk	1.0
3. Inva	sive elsewhere	13.5
B. Bio	logy/Ecology	7.0
4. Undesirable (or pers	sistence) traits	7.0
5. Resour	ce exploitation	2.0
6	. Reproduction	0.0
7. Dispersa	al mechanisms	-3.0
8. Tolera	ance attributes	1.0
C. Cl	imate change	-6.0
9. 0	Climate change	-6.0
Answered Question	ons	
	Total	55
A. Biogeograp	hy/Historical	13
1. Domesticat	ion/Cultivation	3
2. Climate, distribution and in	troduction risk	3 5 5 36
3. Invas	sive elsewhere	5
B. Bio	logy/Ecology	
4. Undesirable (or pers	sistence) traits	12
5. Resour	ce exploitation	2 7 9 6
6	. Reproduction	7
7. Dispersa	al mechanisms	9
8. Tolera	ance attributes	6
C. Cl	imate change	6
	Climate change	6
Sectors affected	1	
	Commercial	11
E	nvironmental	4
Species or population n	uisance traits	7
Thresholds		

BRA	-
BRA+CCA	-
BRA+CCA	0.65
BRA	0.66
CCA	0.50
10/05/20	022 17:35:01
	BRA+CCA BRA+CCA BRA CCA

Taxon and Assessor details					
Category	Fishes and Lampreys (freshwater)				
Taxon name	Hypophthalmichthys nobilis				
Common name	bighead carp				
Assessor	Tatia Kuljanishvili				
Risk screening context					
Reason and socio-economic benefits	Introduced for aquaculture and algae control				
Risk assessment area	South Caucasus				
Taxonomy	Actinopteri (ray-finned fishes) > Cypriniformes (Carps) > Xenocyprididae				
Native range	Asia. China				
Introduced range	Worldwide				
URL	https://www.fishbase.se/summary/Hypophthalmichthys-nobilis.html				

			Response	Justification (references and/or other information)	Confidence
A.	Biogeo	ography/Historical	-		
1. l	Domest	tication/Cultivation			
1	1.01	Has the taxon been the subject of	Yes	It has been grown in aquaculture facilities more than 20	Very high
		domestication (or cultivation) for at least 20		generations	
		generations?			
2	1.02	Is the taxon harvested in the wild and likely	Yes	Yes. Taxon is harvested in wild and is sold in its live form	Very high
-	1 00	to be sold or used in its live form?			
3	1.03	Does the taxon have invasive races,	Yes	for example Hypophthalmichthys moltrix and Ctenopharyngodon	High
2		varieties, sub-taxa or congeners?		Idella	
∠. (e, distribution and introduction risk How similar are the climatic conditions of the	High	The climate is more or less similar out of 19 stations, 15 match at	Medium
4	2.01	Risk Assessment (RA) area and the taxon's	ingn	value 9 (out of 10).	Medium
		native range?			
5	2.02	What is the quality of the climate matching	Medium	Climatch data is medium since there are not much station on the	High
_		data?		RA area	
6	2.03	Is the taxon already present outside of	Yes	This species is released in ponds and rivers in RA area	Very high
		captivity in the RA area?			
7	2.04	How many potential vectors could the taxon	>1	Aquaculture, recreational fisheries	High
		use to enter in the RA area?			
8	2.05	Is the taxon currently found in close	Yes	This species is released in ponds and rivers in RA area	Very high
1		proximity to, and likely to enter into, the RA			
1		area in the near future (e.g. unintentional			
2	Invaciv	and intentional introductions)?			
<i>3.</i> 1 9	3.01	e elsewhere Has the taxon become naturalised	Yes	Yes. has become naturalised for example in Taiwan (Thang 1960).	High
<i>_</i>	5.01	(established viable populations) outside its	103	res. has become naturalised for example in raiwan (mang 1500).	ingn
10	3.02	In the taxon's introduced range, are there	Yes	negative impact inculde the shaping of zooplanctonic comunities	High
		known adverse impacts to wild stocks or		and predation pressure (competiton) on other planktonivorous	5
		commercial taxa?		species (Spataru & Gophen 1985)	
11	3.03	In the taxon's introduced range, are there	Yes	It is not known, but possibly the competition with native	Medium
		known adverse impacts to aquaculture?		planktonivorous fish can affect the aquaculture	
12	3.04	In the taxon's introduced range, are there	Yes	affects native fish fauna via shaping the zooplanktonic organisms	Medium
		known adverse impacts to ecosystem			
13	3.05	In the taxon's introduced range, are there	No	it is not known	Low
		known adverse socio-economic impacts?	No	it is not known	Low
в.	Biolog	known adverse socio-economic impacts? y/Ecology	No	it is not known	Low
B. 4. (Biolog Undesir	known adverse socio-economic impacts? y/Ecology rable (or persistence) traits			
B. 4. (Biolog Undesir	known adverse socio-economic impacts? y/Ecology rable (or persistence) traits Is it likely that the taxon will be poisonous or		it is not known Not poisonous	Low Very high
B. 4. (14	Biolog Undesir	known adverse socio-economic impacts? y/Ecology rable (or persistence) traits			
B. 4. (14	Biolog Undesir 4.01	known adverse socio-economic impacts? y/Ecology rable (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health?	No	Not poisonous	Very high
B. 4. (14	Biolog Undesir 4.01	known adverse socio-economic impacts? y/Ecology rable (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or	No	Not poisonous Chinese carps have ability to fine filter the water and also they	Very high
B. 4. (14	Biolog Undesir 4.01	known adverse socio-economic impacts? y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or	No	Not poisonous Chinese carps have ability to fine filter the water and also they grow very fast and can form dence populations, they are versatile in terms of feeding and this can often lead to habitat alterations amd disruption of food webs and nutrient cycles in new invaded	Very high
B. 4. (14	Biolog Undesir 4.01	known adverse socio-economic impacts? y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or	No	Not poisonous Chinese carps have ability to fine filter the water and also they grow very fast and can form dence populations, they are versatile in terms of feeding and this can often lead to habitat alterations amd disruption of food webs and nutrient cycles in new invaded ecosystems (Milstein et al. 1988; Cooke et al. 2009; Gozlan et al.	Very high
B. 4. (14	Biolog Undesir 4.01	known adverse socio-economic impacts? y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or	No	Not poisonous Chinese carps have ability to fine filter the water and also they grow very fast and can form dence populations, they are versatile in terms of feeding and this can often lead to habitat alterations amd disruption of food webs and nutrient cycles in new invaded ecosystems (Milstein et al. 1988; Cooke et al. 2009; Gozlan et al. 2010; Ma et al. 2010; Rosemberg et al. 2010. Such changes as	Very high
B. 4. (14	Biolog Undesir 4.01	known adverse socio-economic impacts? y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or	No	Not poisonous Chinese carps have ability to fine filter the water and also they grow very fast and can form dence populations, they are versatile in terms of feeding and this can often lead to habitat alterations amd disruption of food webs and nutrient cycles in new invaded ecosystems (Milstein et al. 1988; Cooke et al. 2009; Gozlan et al. 2010; Ma et al. 2010; Rosemberg et al. 2010. Such changes as zooplankton and phytoplancton exploatation, shaping the fish	Very high
B. 4. (14	Biolog Undesir 4.01	known adverse socio-economic impacts? y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or	No	Not poisonous Chinese carps have ability to fine filter the water and also they grow very fast and can form dence populations, they are versatile in terms of feeding and this can often lead to habitat alterations amd disruption of food webs and nutrient cycles in new invaded ecosystems (Milstein et al. 1988; Cooke et al. 2009; Gozlan et al. 2010; Ma et al. 2010; Rosemberg et al. 2010. Such changes as zooplankton and phytoplancton exploatation, shaping the fish communities can affect native fishes populations that are sharing	Very high
B. 4. (14	Biolog <i>Undesin</i> 4.01 4.02	known adverse socio-economic impacts? y/Ecology Table (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	No Yes	Not poisonous Chinese carps have ability to fine filter the water and also they grow very fast and can form dence populations, they are versatile in terms of feeding and this can often lead to habitat alterations amd disruption of food webs and nutrient cycles in new invaded ecosystems (Milstein et al. 1988; Cooke et al. 2009; Gozlan et al. 2010; Ma et al. 2010; Rosemberg et al. 2010. Such changes as zooplankton and phytoplancton exploatation, shaping the fish communities can affect native fishes populations that are sharing the same niche.	Very high High
B. 4. (14	Biolog Undesir 4.01	known adverse socio-economic impacts? y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa	No	Not poisonous Chinese carps have ability to fine filter the water and also they grow very fast and can form dence populations, they are versatile in terms of feeding and this can often lead to habitat alterations amd disruption of food webs and nutrient cycles in new invaded ecosystems (Milstein et al. 1988; Cooke et al. 2009; Gozlan et al. 2010; Ma et al. 2010; Rosemberg et al. 2010. Such changes as zooplankton and phytoplancton exploatation, shaping the fish communities can affect native fishes populations that are sharing	Very high
B. 4. (14	Biolog <i>Undesin</i> 4.01 4.02	known adverse socio-economic impacts? y/Ecology rable (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in	No Yes	Not poisonous Chinese carps have ability to fine filter the water and also they grow very fast and can form dence populations, they are versatile in terms of feeding and this can often lead to habitat alterations amd disruption of food webs and nutrient cycles in new invaded ecosystems (Milstein et al. 1988; Cooke et al. 2009; Gozlan et al. 2010; Ma et al. 2010; Rosemberg et al. 2010. Such changes as zooplankton and phytoplancton exploatation, shaping the fish communities can affect native fishes populations that are sharing the same niche.	Very high High
B. 4. (14 15	Biolog <i>Undesin</i> 4.01 4.02	known adverse socio-economic impacts? y/Ecology rable (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No Yes	Not poisonous Chinese carps have ability to fine filter the water and also they grow very fast and can form dence populations, they are versatile in terms of feeding and this can often lead to habitat alterations amd disruption of food webs and nutrient cycles in new invaded ecosystems (Milstein et al. 1988; Cooke et al. 2009; Gozlan et al. 2010; Ma et al. 2010; Rosemberg et al. 2010. Such changes as zooplankton and phytoplancton exploatation, shaping the fish communities can affect native fishes populations that are sharing the same niche. Does not parasite	Very high High Very high
B. 4. (14 15	Biolog <i>Undesir</i> 4.01 4.02 4.02	known adverse socio-economic impacts? y/Ecology rable (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in	No Yes No	Not poisonous Chinese carps have ability to fine filter the water and also they grow very fast and can form dence populations, they are versatile in terms of feeding and this can often lead to habitat alterations amd disruption of food webs and nutrient cycles in new invaded ecosystems (Milstein et al. 1988; Cooke et al. 2009; Gozlan et al. 2010; Ma et al. 2010; Rosemberg et al. 2010. Such changes as zooplankton and phytoplancton exploatation, shaping the fish communities can affect native fishes populations that are sharing the same niche.	Very high High
B. 4. (14 15	Biolog <i>Undesir</i> 4.01 4.02 4.02	known adverse socio-economic impacts? y/Ecology rable (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic	No Yes No	Not poisonous Chinese carps have ability to fine filter the water and also they grow very fast and can form dence populations, they are versatile in terms of feeding and this can often lead to habitat alterations amd disruption of food webs and nutrient cycles in new invaded ecosystems (Milstein et al. 1988; Cooke et al. 2009; Gozlan et al. 2010; Ma et al. 2010; Rosemberg et al. 2010. Such changes as zooplankton and phytoplancton exploatation, shaping the fish communities can affect native fishes populations that are sharing the same niche. Does not parasite	Very high High Very high
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21	4.08	Is it likely that the taxon will host, and/or	Yes	it is possible. However, it is not documented.	Medium
		act as a vector for, recognised pests and			
		infectious agents that are absent from (novel			
		to) the RA area?			
22	4.09	Is it likely that the taxon will achieve a body	Yes	yes See: https://www.fishbase.se/summary/Hypophthalmichthys-	High
		size that will make it more likely to be		nobilis.html	
		released from captivity?			
23	4.10	Is the taxon capable of sustaining itself in a	No	No information avalable	Medium
		range of water velocity conditions (e.g.			
		versatile in habitat use)?			
24	4.11	Is it likely that the taxon's mode of existence	Yes	They have ability to fine filter the water and also they grow very	High
		(e.g. excretion of by-products) or behaviours		fast and can form dence populations, they are versatile in terms of	
		(e.g. feeding) will reduce habitat quality for		feeding and this can often lead to habitat alterations and	
		native taxa?		disruption of food webs and nutrient cycles in new invaded	
				ecosystems (Milstein et al. 1988; Cooke et al. 2009; Gozlan et al.	
				2010; Ma et al. 2010; Rosemberg et al. 2010)	
25	4.12	Is the taxon likely to maintain a viable	Yes	depending on the water and weather conditions	Medium
		population even when present in low			
		densities (or persisting in adverse conditions			
		by way of a dormant form)?			
5. F	Resourc	e exploitation			
	5.01	Is the taxon likely to consume threatened or	No	Not known	Low
		protected native taxa in the RA area?			
27	5.02	Is the taxon likely to sequester food	Yes	Yes, it is possible	Medium
		resources (including nutrients) to the			
		detriment of native taxa in the RA area?			
5. F	Reprodu	Iction			
	6.01	Is the taxon likely to exhibit parental care	No	No doe not exhibit parental care. See:	High
		and/or to reduce age-at-maturity in response		https://www.fishbase.se/summary/Hypophthalmichthys-	-
		to environmental conditions?		nobilis.html	
29	6.02	Is the taxon likely to produce viable gametes	No	No. climate is not suitable	High
		or propagules (in the RA area)?			5
80	6.03	Is the taxon likely to hybridise naturally with	No	No information available	Very high
		native taxa?			
1	6.04	Is the taxon likely to be hermaphroditic or to	Yes	they can be triploids usually for fisheries production	Very high
		display asexual reproduction?		· · · · · · · · · · · · · · · · · · ·	-, 5
32	6.05	Is the taxon dependent on the presence of	No	No. See: https://www.fishbase.se/summary/Hypophthalmichthys-	Very high
		another taxon (or specific habitat features)	-	nobilis.html	-, 5
		to complete its life cycle?			
33	6.06	Is the taxon known (or likely) to produce a	Yes	yes, produces up to 100 000 eggs per season	High
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	0.00	large number of propagules or offspring	105		ingn
		within a short time span (e.g. < 1 year)?			
34	6.07	How many time units (days, months, years)	5	5-6 years	Very high
	0.07	does the taxon require to reach the age-at-	5		very nigh
		first-reproduction?			
7. [Disnersa	al mechanisms			
	7.01	How many potential internal	>1	Aquaculture and recreational fisheries	High
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	7.01	vectors/pathways could the taxon use to	~1		riigii
		disperse within the RA area (with suitable			
86	7.02	Will any of these vectors/pathways bring the	Yes	Yes. it is possible	High
	1.02	taxon in close proximity to one or more			
		protected areas (e.g. MCZ, MPA, SSSI)?			
27	7.03	Does the taxon have a means of actively	No	No. Morphologically this species does not have a means of actively	Very high
	1.05	attaching itself to hard substrata (e.g. ship	NU	attaching itself to hard substrata	very nign
		hulls, pilings, buoys) such that it enhances		מתמכווווש ונסכוו נט וומוע סטטטנומנמ	
0	7.04	the likelihood of dispersal? Is natural dispersal of the taxon likely to	No	No. Recourse door not reproduce in PA	Von bish
Ø	7.04	occur as eggs (for animals) or as propagules	No	No. Because does not reproduce in RA	Very high
		33 () I I 3			
0	7.05	(for plants: seeds, spores) in the RA area?	No	They do not produce viable comptations and therefore and the	Van (bi-b
9	7.05	Is natural dispersal of the taxon likely to	No	They do not produce viable gametes and therfore can be	Very high
		occur as larvae/juveniles (for animals) or as		distributed by larvae, or juveniles.	
	1	fragments/seedlings (for plants) in the RA			
			1		Von (hint
0	7.00	area?	No		Very high
0	7.06	Are older life stages of the taxon likely to	No	Do not reproduce therefore, does not migrate.	, 5
		Are older life stages of the taxon likely to migrate in the RA area for reproduction?			, _
	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to	No No	Do not reproduce therefore, does not migrate. No. Can not be dispersed by other ananimals	Very high
1	7.07	Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No	No. Can not be dispersed by other ananimals	Very high
1		Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the			, _
1	7.07	Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous	No	No. Can not be dispersed by other ananimals	Very high
1	7.07	Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both	No	No. Can not be dispersed by other ananimals	Very high
2	7.07	Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be	No Yes	No. Can not be dispersed by other ananimals Yes, It seems to be rapid	Very high High
1	7.07 7.08 7.09	Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent?	No	No. Can not be dispersed by other ananimals	Very high
1 2 3 7.7	7.07 7.08 7.09 7.09	Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? ce attributes	No Yes Yes	No. Can not be dispersed by other ananimals Yes, It seems to be rapid Yes, it is possible	Very high High High
1 1 1 1 2 1 3 . 7	7.07 7.08 7.09 7.09	Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of	No Yes	No. Can not be dispersed by other ananimals Yes, It seems to be rapid	Very high High
1 2 3 7.7	7.07 7.08 7.09 7.09	Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? ce attributes	No Yes Yes	No. Can not be dispersed by other ananimals Yes, It seems to be rapid Yes, it is possible	Very high High High
41 42 4 <u>3</u> 3.7	7.07 7.08 7.09 7.09	Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of	No Yes Yes	No. Can not be dispersed by other ananimals Yes, It seems to be rapid Yes, it is possible	Very high High High

		Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being considered.]	No	Forages in shallow (0.5-1.5 m deep) and warm (over 24°C) backwaters, lakes and flooded areas with slow current. Feeds on zooplankton throughout its life under natural conditions (Ref. 120904). Breeds in very deep, very turbid and warm water above 18°C (usually 22-30°C), with high current (1.1-1.9 m/s) and high oxygen concentrations. Stocked to large rivers and almost all still water bodies as lakes and ponds. In aquaculture, adults can survive brackish water (up to 7 ppt) when released into estuaries and coastal lakes"	Medium
	8.03	Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	Yes	Yes it can be	High
47	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	No	No information, probably not	Low
48	8.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	No	No, iT can maximum tolerate salinity levels up to 7%o.	Very high
49	8.06	Are there effective natural enemies (predators) of the taxon present in the RA	No	No.No effective natural enemies present in RA area	Very high
С. (Climate	e change			
		change			
		Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?	Increase	It was hypotheses that climate change might alert the mechanisms of transportation and introduction of non-native species. Commercial and recreational activities will increase, that itself increases the propagule pressure levels of non-native	Very high
51	9.02	Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	Increase	if the temperatures increase, it will make their populations able to reproduce indipendently, therefore the risk of their potential impact is increasing	High
	9.03	Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change?	Increase	It could be higher. Because it is known that they create dance populations when they reproduce in new environments and creating problems for the native species	Very high
	9.04	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	Higher	The magnitude of future potential impact on ecosysytem structure and function is increasing	High
	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	No change	No change	High
55	9.06	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	No change	NO change	High

Statistics	
Scores	
BRA	27.0
BRA Outcome	-
BRA+CCA	35.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	20.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	2.0
3. Invasive elsewhere	14.0
B. Biology/Ecology	7.0
4. Undesirable (or persistence) traits	9.0
5. Resource exploitation	2.0
6. Reproduction	1.0
7. Dispersal mechanisms	-1.0
8. Tolerance attributes	-4.0
C. Climate change	8.0
9. Climate change	8.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3 5 5
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12 2 7
5. Resource exploitation	2
6. Reproduction	7
7. Dispersal mechanisms	9
8. Tolerance attributes	6
C. Climate change	6
9. Climate change	6
Sectors affected	
Commercial	15
Environmental	10
Species or population nuisance traits	15
Thresholds	

BRA	
BRA+CCA	-
Confidence	
BRA+CCA	0.75
BRA	0.74
CCA	0.83
Date and Time	
21/05/2	022 14:23:56

Taxon and Assessor details	
Category	Fishes and Lampreys (freshwater)
Taxon name	Ictalurus punctatus
Common name	channel catfish
Assessor	Bella Japoshvili
Risk screening context	
Reason and socio-economic benefits	The species was introduced to the RA area in the past. Most probably not yet established, but could
Risk assessment area	South Caucasus
Taxonomy	Actinopteri (ray-finned fishes) > Siluriformes (Catfishes) > Ictaluridae (North American freshwater
Native range	North America
Introduced range	Worldwide sporadicaly
URL	https://www.fishbase.de/summary/Ictalurus-punctatus.html

			Response	Justification (references and/or other information)	Confidence
A. I	Biogeo	graphy/Historical			
		ication/Cultivation			
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	Welcomme RL, 1988. International introductions of inland aquatic species. FAO Fisheries Technical Paper, No. 294:x + 318 pp	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	The species is introduced more than 30 countries and in many cases captured in wild. Actually the species is actively aquaculterd though the wild catch and selling its life forms is still a usuall	High
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	No	Not known other congeneres or a specific race as invasive	High
2. (Climate,	, distribution and introduction risk			
4	2.01	How similar are the climatic conditions of the	High	Results of climatch algorithm	Medium
		Risk Assessment (RA) area and the taxon's native range?			
5	2.02	What is the quality of the climate matching data?	Low	Due to low accuracy of local climate data	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	Invasive Species Compendium, Datasheet report for Ictalurus punctatus (channel catfish) https://www.cabi.org/isc/datasheetreport/79127	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	None	Human mediated translocation	High
8	2.05	Is the taxon currently found in close	Yes	Invasive Species Compendium, Datasheet report for Ictalurus	High
		proximity to, and likely to enter into, the RA		punctatus (channel catfish)	5
		area in the near future (e.g. unintentional		https://www.cabi.org/isc/datasheetreport/79127	
_		and intentional introductions)?	<u> </u>		
		e elsewhere			
9	3.01	Has the taxon become naturalised	Yes	Haubrock, P. J., Azzini, M., Balzani, P., Inghilesi, A. F., & Tricarico,	Very high
		(established viable populations) outside its native range?		E. (2020). When alien catfish meet—Resource overlap between the North American Ictalurus punctatus and immature European	
		hauve range?		Silurus glanis in the Arno River (Italy). Ecology of Freshwater Fish, 29(1), 4-17.	
10	3.02	In the taxon's introduced range, are there	No	Although the species is an oportunistic predator, no hard	Medium
		known adverse impacts to wild stocks or commercial taxa?		evidences exists on its adverse impact on wild stock	
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	Yes	CABI, 2022. Ictalurus punctatus. In: Invasive Species Compendium. Wallingford, UK: CAB International.	Medium
12	3.04	In the taxon's introduced range, are there	Yes	CABI, 2022. Ictalurus punctatus. In: Invasive Species	Medium
12	2.05	known adverse impacts to ecosystem	No	Compendium. Wallingford, UK: CAB International.	1
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	Not reported	Low
B. I	Biology	//Ecology			
		able (or persistence) traits			
		Is it likely that the taxon will be poisonous or pose other risks to human health?	No	It possesses toxic difence mechanisms but not the negative effect on human is reported	Medium
15	4.02	Is it likely that the taxon will smother one or	Yes	The species at least partly competes at least with native Silurus	Low
1		more native taxa (that are not threatened or		glanis for food (Haubrock, P. J., Azzini, M., Balzani, P., Inghilesi,	
1		protected)?		A. F., & Tricarico, E. (2020). When alien catfish meet-Resource	
1				overlap between the North American Ictalurus punctatus and	
1				immature European Silurus glanis in the Arno River (Italy).	
16	4.03	Are there any threatened or protected taxa	Yes	Ecology of Freshwater Fish, 29(1), 4-17). Since it is active predator, any other fishes in the RA area can be	High
10	1.05	that the non-native taxon would parasitise in the RA area?	1.03	smoothered	gii
17	4.04	Is the taxon adaptable in terms of climatic	Yes	Based on the widespread distribution of the species, its	Medium
1		and other environmental conditions, thus		adaptability of diverse environmental conditions can be deduced	
1		enhancing its potential persistence if it has			
1		invaded or could invade the RA area?			
18	4.05	Is the taxon likely to disrupt food-web	No	Not documented evidence exist	Low
1		structure/function in aquatic ecosystems if it			
10	4.06	has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts	Yes	Is expected due to its predatory lifestyle	Low
19	+.00	on ecosystem services in the RA area?	105	is expected due to its predatory illestyle	LUW
20	4.07	Is it likely that the taxon will host, and/or	No	Not expected	High
		act as a vector for, recognised pests and			
-	4.00	infectious agents that are endemic in the RA			
21	4.08	Is it likely that the taxon will host, and/or	Yes	e.g. Geng, Y., Wang, K., Chen, D., Huang, X., He, M., & Yin, Z. (2010). Stenotrophomonas maltophilia, an emerging opportunist	High
1		act as a vector for, recognised pests and infectious agents that are absent from (novel		pathogen for cultured channel catfish, Ictalurus punctatus, in	
1		to) the RA area?		China. Aquaculture, 308(3-4), 132-135.	
			1		1

22					
	4.09	Is it likely that the taxon will achieve a body size that will make it more likely to be	Yes	It is also kept for recreational purpose and can reach the size unsuitable for a small bodyed water reserviors	High
23	4.10	released from captivity? Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)?	Yes	As the species can live in a diverse types of waterbodies	High
24	4.11	Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for	No	No such an effect is documented	Medium
25	4.12	native taxa? Is the taxon likely to maintain a viable	No	No such an evidence exists	Medium
25	4.12	population even when present in low	NO		healain
		densities (or persisting in adverse conditions			
		by way of a dormant form)?			
		e exploitation			
26	5.01	Is the taxon likely to consume threatened or	Yes	Th species is predator and consums wide variety of freshwater	Very high
~ =		protected native taxa in the RA area?		animals	
27	5.02	Is the taxon likely to sequester food resources (including nutrients) to the	Yes	E.g. Silurus glanis	Very high
		detriment of native taxa in the RA area?			
6 F	Reprodu				
	6.01	Is the taxon likely to exhibit parental care	Yes	The species exhibit parental care behavior	Very high
-		and/or to reduce age-at-maturity in response to environmental conditions?			-, 5
29	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	No	No documented evidence	Low
30	6.03	Is the taxon likely to hybridise naturally with native taxa?	Yes	hybrid Ictalurus punctatus× I. furcatus exhibits higher resistance to columnaris disease than the parental species. Diseases of	High
24	c		N-	aquatic organisms, 100(1), 77-81.)	11:-1-
31	6.04	Is the taxon likely to be hermaphroditic or to	No	Not such an evidence is known	High
32	6.05	display asexual reproduction? Is the taxon dependent on the presence of	No	Species does not depend on any particular taxa	High
52	0.05	another taxon (or specific habitat features) to complete its life cycle?	110		ingn
33	6.06	Is the taxon known (or likely) to produce a	Yes	Usually produces thousands of eggs annually	High
		large number of propagules or offspring			-
		within a short time span (e.g. < 1 year)?			
34	6.07	How many time units (days, months, years)	2	Years	High
		does the taxon require to reach the age-at- first-reproduction?			
7 /	Dispers	Ifirst-reproduction? al mechanisms			l
	7.01	How many potential internal	>1	By human mediated translocations as well as direct dispersal	High
		vectors/pathways could the taxon use to	-	using channel system	
		disperse within the RA area (with suitable		- ,	
36	7.02	Will any of these vectors/pathways bring the	Yes	Colchis national park	Medium
		taxon in close proximity to one or more			
27	7.00	protected areas (e.g. MCZ, MPA, SSSI)?	N-	No such fact is slowering	Marris Inital
/د	7.03	Does the taxon have a means of actively	No	No such fact is sknown	Very high
		attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances			
		the likelihood of dispersal?			
38	1				
	7.04	Is natural dispersal of the taxon likely to	No	No such an evidence exists	Medium
	7.04		No	No such an evidence exists	Medium
		Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?	-		
39	7.04	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to	No Yes		Medium Medium
39		Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as	-		
39		Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA	-		
	7.05	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?	Yes	Expected though no documented evidence exist	Medium
		Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA	-		
40	7.05	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to	Yes	Expected though no documented evidence exist	Medium
40 41	7.05 7.06 7.07	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	Yes No No	Expected though no documented evidence exist Not a migrant species Not expected and not observed	Medium High High
40 41	7.05	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the	Yes	Expected though no documented evidence exist Not a migrant species	Medium High
40 41	7.05 7.06 7.07	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous	Yes No No	Expected though no documented evidence exist Not a migrant species Not expected and not observed	Medium High High
40 41	7.05 7.06 7.07	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both	Yes No No	Expected though no documented evidence exist Not a migrant species Not expected and not observed	Medium High High
40 41 42	7.05 7.06 7.07 7.08	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be	Yes No No	Expected though no documented evidence exist Not a migrant species Not expected and not observed Not expected	Medium High High Medium
40 41 42 43	7.05 7.06 7.07 7.08 7.09	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent?	Yes No No	Expected though no documented evidence exist Not a migrant species Not expected and not observed	Medium High High
40 41 42 43 8.7	7.05 7.06 7.07 7.08 7.09	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be	Yes No No	Expected though no documented evidence exist Not a migrant species Not expected and not observed Not expected	Medium High High Medium
40 41 42 43 8.7	7.05 7.06 7.07 7.08 7.09	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? ce attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of	Yes No No No	Expected though no documented evidence exist Not a migrant species Not expected and not observed Not expected Not ocumented evidence exists	Medium High High Medium Low
40 41 42 43 8.7	7.05 7.06 7.07 7.08 7.09	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life	Yes No No No	Expected though no documented evidence exist Not a migrant species Not expected and not observed Not expected Not ocumented evidence exists	Medium High High Medium Low
40 41 42 <u>43</u> 8. 7 44	7.05 7.06 7.07 7.08 7.09 7.09 7.09 8.01	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle?	Yes No No No	Expected though no documented evidence exist Not a migrant species Not expected and not observed Not expected No documented evidence exists Not a documented evidence exists	Medium High High Medium Low
40 41 42 <u>43</u> 8. 7 44	7.05 7.06 7.07 7.08 7.09	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of	Yes No No No	Expected though no documented evidence exist Not a migrant species Not expected and not observed Not expected Not ocumented evidence exists	Medium High High Medium Low
40 41 42 <u>43</u> 8. 7 44	7.05 7.06 7.07 7.08 7.09 7.09 7.09 8.01	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? Ce attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that	Yes No No No	Expected though no documented evidence exist Not a migrant species Not expected and not observed Not expected No documented evidence exists Not a documented evidence exists	Medium High High Medium Low
40 41 42 <u>43</u> 8. 7 44	7.05 7.06 7.07 7.08 7.09 7.09 7.09 8.01	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the	Yes No No No	Expected though no documented evidence exist Not a migrant species Not expected and not observed Not expected No documented evidence exists Not a documented evidence exists	Medium High High Medium Low
40 41 42 43 8.7 44	7.05 7.06 7.07 7.08 7.09 7.09 7.09 8.01	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? Ce attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that	Yes No No No	Expected though no documented evidence exist Not a migrant species Not expected and not observed Not expected No documented evidence exists Not a documented evidence exists	Medium High High Medium Low
40 41 42 43 8.7 44	7.05 7.07 7.08 7.09 7.09 7.09 8.01 8.01	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being	Yes No No No No	Expected though no documented evidence exist Not a migrant species Not expected and not observed Not expected Not ocumented evidence exists Not a documented evidence exists Not a documented evidence exists Not relevan research reports are available	Medium High High Medium Low
40 41 42 43 8.7 44 45	7.05 7.06 7.07 7.08 7.09 7.09 8.01 8.01 8.02 8.03	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in	Yes No No No No	Expected though no documented evidence exist Not a migrant species Not expected and not observed Not expected Not ocumented evidence exists Not a documented evidence exists Not a documented evidence exists Not relevan research reports are available	Medium High High Medium Low
40 41 42 43 <u>8.7</u> 44 45	7.05 7.07 7.08 7.09 7.09 7.09 8.01 8.01	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Is the taxon likely to tolerate or benefit from	Yes No No No No	Expected though no documented evidence exist Not a migrant species Not expected and not observed Not expected Not ocumented evidence exists Not a documented evidence exists Not a documented evidence exists Not relevan research reports are available	Medium High High Medium Low
40 41 42 43 8.7 44 45 46 46	7.05 7.07 7.08 7.09 7.09 7.09 7.09 8.01 8.01 8.01 8.02 8.03 8.04	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Is the taxon likely to tolerate or benefit from environmental/human disturbance?	Yes No No No No No	Expected though no documented evidence exist Not a migrant species Not expected and not observed Not expected No documented evidence exists Not a documented evidence exists Not relevan research reports are available No such a practice is known Not expected and no documented evidence	Medium High High Medium Low Low Low
40 41 42 43 8.7 44 45 46 46	7.05 7.06 7.07 7.08 7.09 7.09 8.01 8.01 8.02 8.03	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Is the taxon likely to tolerate or benefit from environmental/human disturbance? Is the taxon able to vibrate or benefit from environmental/human disturbance?	Yes No No No No No	Expected though no documented evidence exist Not a migrant species Not expected and not observed Not expected No documented evidence exists Not a documented evidence exists No relevan research reports are available No such a practice is known Not expected and no documented evidence No evidence that it tolerates more variable level than presented in	Medium High High Medium Low Low
40 41 42 43 44 45 45 46 47	7.05 7.07 7.08 7.09 7.09 7.09 7.09 7.09 8.01 8.01 8.01 8.02 8.03 8.04	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Is the taxon likely to tolerate or benefit from environmental/human disturbance?	Yes No No No No No	Expected though no documented evidence exist Not a migrant species Not expected and not observed Not expected No documented evidence exists Not a documented evidence exists Not relevan research reports are available No such a practice is known Not expected and no documented evidence	Medium High High Medium Low Low Low

40	0.00	A 11 66 11 1 1 1	N.	The second second second second second second second second second second second second second second second se	lue i
49	8.06	Are there effective natural enemies	No	There is no effective natural enemy in RA area	High
		(predators) of the taxon present in the RA			
		e change	_		
-		change	1		
50		Under the predicted future climatic	No change	Based on professional judgment	High
		conditions, are the risks of entry into the RA			
		area posed by the taxon likely to increase,			
		decrease or not change?			
51	9.02	Under the predicted future climatic	No change	Based on professional judgment	Low
		conditions, are the risks of establishment			
		posed by the taxon likely to increase,			
		decrease or not change?			
52	9.03	Under the predicted future climatic	No change	Based on professional judgment	Medium
		conditions, are the risks of dispersal within			
		the RA area posed by the taxon likely to			
		increase, decrease or not change?			
53	9.04	Under the predicted future climatic	Higher	Species is not currently established in the region. If it will	Low
		conditions, what is the likely magnitude of		establish in the future, given the changing climate conditions, the	
		future potential impacts on biodiversity		effect on biodiversity/ecological integrity is expected	
		and/or ecological integrity/status?			
54	9.05	Under the predicted future climatic	Higher	Species is not currently established in the region. If it will	Low
		conditions, what is the likely magnitude of		establish in the future, given the changing climate conditions, the	
		future potential impacts on ecosystem		effect on biodiversity/ecological integrity is expected	
		structure and/or function?			
55	9.06	Under the predicted future climatic	Higher	Species is not currently established in the region. If it will	Low
		conditions, what is the likely magnitude of		establish in the future, given the changing climate conditions, the	
		future potential impacts on ecosystem		effect on biodiversity/ecological integrity is expected	
		services/socio-economic factors?			

Statistics	
Scores	
BRA	26.0
BRA Outcome	-
BRA+CCA	32.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	12.0
1. Domestication/Cultivation	2.0
2. Climate, distribution and introduction risk	0.0
3. Invasive elsewhere	10.0
B. Biology/Ecology	14.0
4. Undesirable (or persistence) traits	7.0
5. Resource exploitation	7.0
6. Reproduction	3.0
7. Dispersal mechanisms	-1.0
8. Tolerance attributes	-2.0
C. Climate change	6.0
9. Climate change	6.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
A. Biogeography/Historical 1. Domestication/Cultivation	13
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk	13
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere	13 3 5 5
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology	13 3 5 5 36
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and Introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits	13 3 5 5 36 12
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation	13 3 5 5 36 12
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction	13 3 5 5 36 12 2 7
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms	13 3 5 5 36 12 2 7 7 9
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes	13 3 5 5 36 12 2 7 7 9 6
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and Introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change	13 3 5 36 12 2 7 9 6 6
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change	13 3 5 5 36 12 2 7 7 9 6
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected	13 3 5 5 36 12 2 7 7 9 6 6 6
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial	13 3 5 5 36 12 2 7 9 6 6 6 6 6 10
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial Environmental	13 3 5 5 36 12 2 7 9 6 6 6 6 6 6 10 15
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial	13 3 5 5 36 12 2 7 9 6 6 6 6 6 6 10
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change 9. Climate change Sectors affected Commercial Environmental Species or population nuisance traits	13 3 5 5 36 12 2 7 9 6 6 6 6 6 6 10 15
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial Environmental	13 3 5 5 36 12 2 7 9 6 6 6 6 6 6 10 15

BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.59
BRA	0.62
CCA	0.38
Date and Time	

16/05/2022 14:13:10

Taxon and Assessor details					
Category	Fishes and Lampreys (freshwater)				
Taxon name	Ictalurus punctatus				
Common name	channel catfish				
Assessor	Giorgi Epitashvili				
Risk screening context					
Reason and socio-economic benefits	Interest in channel catfish began when the United States Fish and Fisheries Commission began				
Risk assessment area	South Caucasus				
Taxonomy	Ictalurus punctatus (Rafinesque 1818)				
Native range	North America: St. Lawrence-Great Lakes, Hudson Bay (Red River drainage), and Missouri-				
Native range Introduced range	North America: St. Lawrence-Great Lakes, Hudson Bay (Red River drainage), and Missouri- Introduced throughout most of US. Channel catfish have been introduced into Europe, Russian				

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
1. L		ication/Cultivation			
1		Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	Commercial aquaculture was first considered to be economically practical in the late 1950s. Catfish farming developed rapidly during the 1960s and 1970s as improvements in pond management, disease identification and control, and prepared feeds were developed and adopted by farmers. The commercial	Very high
2	1.00		No.	industry developed in the southern United States within the original range of the species. At least 90 percent of the farmed fish are produced in the Mississippi River Valley region.	
2		Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	Catfish are the most consumed native freshwater fish in the US (NASS 2006). Although commercial aquaculture produces most catfish consumed (NASS 2006), free living populations of channel catfish (Ictalurus punctatus) still provide important sport and commercial fisheries throughout the US.	Very high
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	I. punctatus recorded as invasive species in 28 cauntries and iselands. The North American channel catfish Ictalurus punctatus has been introduced to several locations in Europe but has received little or no scientific study despite its invasive attributes, including prolific reproduction, tolerance to a wide range of conditions, opportunistic feeding, at least partial 'predator release', and some evidence of environmental impacts (e.g. disease transmission) (Haubrock et al. 2021).	Very high
2. (Climate,	, distribution and introduction risk			
4	2.01	How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range?	High	Koppen - Geiger climate classification	Medium
5	2.02	What is the quality of the climate matching data?	Medium	Koppen - Geiger climate classification	Medium
6		Is the taxon already present outside of captivity in the RA area?	No	No such fact has been detected	Low
7		How many potential vectors could the taxon use to enter in the RA area?	One	This species may be spread by humans intentionally.	Medium
8		Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)?	Yes	There appears to be some disagreement regarding the presence of the channel catfish in Turkey; Cildir (2001) reported that its introduction into Lake Egirdir was unsuccessful. However, it is listed as being present in a report listing its use in aquaculture and stocking operations (Olenin et al., 2008) and in reservoir systems (Innal and Erk'akan, 2006: Innal, 2012).	Low
3.1		e elsewhere			
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	The channel catfish, Ictalurus punctatus, is an invasive alien species introduced from North America. We investigated the present status of the fish in Japan and found that it is widely distributed in the Abukuma, Tone, and Yahagi River systems, as well as in Lake Shimokotori (Katano et al. 2010).	Very high
		In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	In the metric "Relative Impact Potential" (RIP), the functional response (FR) of a non-native species can be compared with that of a native analogue and combined with the species abundance to predict its environmental impact. Here, using the River Guaraguaçu (Brazil) as a case study, this methodology was implemented to identify the impacts of the non-native channel catfish Ictalurus punctatus (Rafinesque) compared with a native species Rhamdia quelen (Quoy & Gaimard) towards small prey fish. Both species exhibited Type II FRs, but handling times were lower for I. punctatus, resulting in a greater maximum feeding rate in this species. Consequently, an RIP > 1 was found, indicating that I. punctatus represents a superior impact to prey compared with its native analogue. These results demonstrate	Very high
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	This species has been introduced to at least 11 countries but the ecological and economic impacts of this nonnative species are fairly unknown throughout most of its introduced range	Low
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem services?	No	This species has been introduced to at least 11 countries but the ecological and economic impacts of this nonnative species are fairly unknown throughout most of its introduced range	Low
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	This species has been introduced to at least 11 countries but the ecological and economic impacts of this nonnative species are fairly unknown throughout most of its introduced range	Low
		//Ecology	1	nanny analomi anoughout most of its introduced range	

B. Biology/Ecology

		<i>able (or persistence) traits</i> Is it likely that the taxon will be poisonous or	No	This species does not pose a threat to humans.	High
		pose other risks to human health?			5
5	4.02	Is it likely that the taxon will smother one or	Yes	Invasive channel catfish exerted heavy predation on P. clarkii and	Very high
		more native taxa (that are not threatened or		P. parva in Japan opposed to available native prey (Endo et al.	
-	4.03	protected)? Are there any threatened or protected taxa	Vaa	2015) There are meny threatened and protected species in the Caucasus	Very high
2	4.05	that the non-native taxon would parasitise in	Yes	region which can be hunted by this species (Salmo spp, Acipencer	very nign
		the RA area?		spp, Luciobarbus capito, etc.)	
,	4.04	Is the taxon adaptable in terms of climatic	Yes	Own judgement	High
		and other environmental conditions, thus			5
		enhancing its potential persistence if it has			
		invaded or could invade the RA area?			
8	4.05	Is the taxon likely to disrupt food-web	Yes	Introduced channel catfish can exert a major negative effect on	High
		structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA		populations of native and endangered species, and commercial fisheries, through competition for food, habitat or through	
		area?		predation (cabi.org).	
9	4.06	Is the taxon likely to exert adverse impacts	Yes	A similar fact is to be expected because I. punctatus is an	Medium
-		on ecosystem services in the RA area?		aggressive predator and can have a negative impact on local fish	
0	4.07	Is it likely that the taxon will host, and/or	Not applicable	Data deficient	Low
		act as a vector for, recognised pests and			
	1.00	infectious agents that are endemic in the RA	N		
1	4.08	Is it likely that the taxon will host, and/or	Not applicable	Data deficient	Low
		act as a vector for, recognised pests and infectious agents that are absent from (novel			
		to) the RA area?			
2	4.09	Is it likely that the taxon will achieve a body	Yes	Max length: 132 cm TL male/unsexed; common length: 57.0 cm	Very high
		size that will make it more likely to be		SL male/unsexed; max. published weight: 26.3 kg.	
		released from captivity?			
3	4.10	Is the taxon capable of sustaining itself in a	Yes	Inhabits lakes and deep pools and runs over sand or rocks in small	High
		range of water velocity conditions (e.g.		to large rivers. Adults occur in rivers and streams and prefer	
۵	4.11	versatile in habitat use)? Is it likely that the taxon's mode of existence	Yes	clean, well oxygenated water, but also in ponds and reservoirs. Studies in this regard are not known it is expected, however, that	High
.4	4.11	(e.g. excretion of by-products) or behaviours	Tes	habitat quality will be affected by its distribution.	riigii
		(e.g. feeding) will reduce habitat quality for			
		native taxa?			
5	4.12	Is the taxon likely to maintain a viable	Yes	With an optimum water temperature range between 24 and 30 °C,	Medium
		population even when present in low		channel catfish possesses the demonstrated ability to establish	
		densities (or persisting in adverse conditions		self-sustaining populations outside its native range, both when	
- ,		by way of a dormant form)?		translocated within North America and introduced elsewhere.	
		ce exploitation Is the taxon likely to consume threatened or	Yes	This species is predator and can consume as threathened and	Very high
.0	5.01	protected native taxa in the RA area?	103	protected species in the Caucasus Region, such as Salmo spp,	very nigh
				Acipencer spp, Luciobarbus capito, etc.	
27	5.02	Is the taxon likely to sequester food	Yes	Acipencer spp, Luciobarbus capito, etc. This species is predator and will be a serious competitor for local	Very high
27	5.02	Is the taxon likely to sequester food resources (including nutrients) to the	Yes		Very high
		Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?	Yes	This species is predator and will be a serious competitor for local	Very high
5. F	Reprodi	Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area? uction		This species is predator and will be a serious competitor for local species	
5. F	Reprodi	Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area? <i>uction</i> Is the taxon likely to exhibit parental care	Yes	This species is predator and will be a serious competitor for local species Behavioral observations have suggested that Channel Catfish	Very high High
5. F	Reprodi	Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area? <i>uction</i> Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response		This species is predator and will be a serious competitor for local species Behavioral observations have suggested that Channel Catfish spawn as monogamous pairs and that males alone provide	
i. F 18	Reprodi	Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area? <i>uction</i> Is the taxon likely to exhibit parental care		This species is predator and will be a serious competitor for local species Behavioral observations have suggested that Channel Catfish	
. F 8	6.02	Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area? <i>uction</i> Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?	Yes	This species is predator and will be a serious competitor for local species Behavioral observations have suggested that Channel Catfish spawn as monogamous pairs and that males alone provide subsequent care to the resulting embryos and fry (Tatarenkov et	High
5. F 18	eprodi 6.01	Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area? <i>uction</i> Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with	Yes	This species is predator and will be a serious competitor for local species Behavioral observations have suggested that Channel Catfish spawn as monogamous pairs and that males alone provide subsequent care to the resulting embryos and fry (Tatarenkov et	High
. <i>F</i> 8 9	6.02	Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area? <i>uction</i> Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa?	Yes No No	This species is predator and will be a serious competitor for local species Behavioral observations have suggested that Channel Catfish spawn as monogamous pairs and that males alone provide subsequent care to the resulting embryos and fry (Tatarenkov et So far this species cannot reproduce in the region Data deficient	High High Medium
5. F 28 29	6.02	Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area? <i>uction</i> Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to	Yes No No	This species is predator and will be a serious competitor for local species Behavioral observations have suggested that Channel Catfish spawn as monogamous pairs and that males alone provide subsequent care to the resulting embryos and fry (Tatarenkov et So far this species cannot reproduce in the region	High
5. <i>F</i> 28 29 30	6.02 6.04	Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area? <i>uction</i> Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction?	Yes No No	This species is predator and will be a serious competitor for local species Behavioral observations have suggested that Channel Catfish spawn as monogamous pairs and that males alone provide subsequent care to the resulting embryos and fry (Tatarenkov et So far this species cannot reproduce in the region Data deficient Data deficient	High High Medium Low
5. F 8 9 9	6.02	Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area? <i>uction</i> Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of	Yes No No	This species is predator and will be a serious competitor for local species Behavioral observations have suggested that Channel Catfish spawn as monogamous pairs and that males alone provide subsequent care to the resulting embryos and fry (Tatarenkov et So far this species cannot reproduce in the region Data deficient	High High Medium
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5. F 28 29 30 31 32 33 34 35 36 37	Reprodu 6.01 6.02 6.03 6.04 6.05 6.06 6.06 6.07 7.01 7.02 7.03	Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area? <i>uction</i> Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propaqules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances	Yes No No Yes 2 One Yes No	This species is predator and will be a serious competitor for local species Behavioral observations have suggested that Channel Catfish spawn as monogamous pairs and that males alone provide subsequent care to the resulting embryos and fry (Tatarenkov et So far this species cannot reproduce in the region Data deficient Data deficient Channel catfish requires cool water and short day lengths during the winter months for proper egg development; an egg mass can contain up to 20,000 eqgs. Sexual maturity is reached at 2-3 Sexual maturity in Channel catfish is reached at 2-3 years. This species may spread as a result of escaping from the fish farms The probability of this is high (own judgement) This species does not have such means	High High Medium Low Medium Very high High High Medium
<u>, F</u> 8 9 0 1 2 2 3 4 4 . <u>C</u> 6 6 7 7 8	2eprodi 6.01 6.02 6.03 6.04 6.05 6.06 6.06 6.07 7.01 7.02 7.03	Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area? <i>uction</i> Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?	Yes No No Yes 2 One Yes No	This species is predator and will be a serious competitor for local species Behavioral observations have suggested that Channel Catfish spawn as monogamous pairs and that males alone provide subsequent care to the resulting embryos and fry (Tatarenkov et So far this species cannot reproduce in the region Data deficient Data deficient Channel catfish requires cool water and short day lengths during the winter months for proper egg development; an egg mass can contain up to 20,000 eqgs. Sexual maturity is reached at 2-3 Sexual maturity in Channel catfish is reached at 2-3 years. This species may spread as a result of escaping from the fish farms The probability of this is high (own judgement) This species does not have such means	High High Medium Low Medium Very high High High Medium
<u>. F</u> 88 9 0 1 1 2 2 3 3 4 4 . <u>C</u> 5 6 6 7 7	Reprodu 6.01 6.02 6.03 6.04 6.05 6.06 6.06 6.07 7.01 7.02 7.03	Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area? <i>uction</i> Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propaqules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? <i>al mechanisms</i> How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to	Yes No No Yes 2 One Yes No	This species is predator and will be a serious competitor for local species Behavioral observations have suggested that Channel Catfish spawn as monogamous pairs and that males alone provide subsequent care to the resulting embryos and fry (Tatarenkov et So far this species cannot reproduce in the region Data deficient Data deficient Channel catfish requires cool water and short day lengths during the winter months for proper egg development; an egg mass can contain up to 20,000 eqgs. Sexual maturity is reached at 2-3 Sexual maturity in Channel catfish is reached at 2-3 years. This species may spread as a result of escaping from the fish farms The probability of this is high (own judgement) This species does not have such means	High High Medium Low Medium Very high High High Medium
. <i>F</i> 	2eprodi 6.01 6.02 6.03 6.04 6.05 6.06 6.06 6.07 7.01 7.02 7.03	Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area? <i>uction</i> Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?	Yes No No Yes 2 One Yes No No No	This species is predator and will be a serious competitor for local species Behavioral observations have suggested that Channel Catfish spawn as monogamous pairs and that males alone provide subsequent care to the resulting embryos and fry (Tatarenkov et So far this species cannot reproduce in the region Data deficient Data deficient Channel catfish requires cool water and short day lengths during the winter months for proper egg development; an egg mass can contain up to 20,000 eggs. Sexual maturity is reached at 2-3 Sexual maturity in Channel catfish is reached at 2-3 years. This species may spread as a result of escaping from the fish farms The probability of this is high (own judgement) This species does not have such means This species does not reproduces in the region	High Medium Low Medium Medium Very high High High Medium

	7.06	Are older life stages of the taxon likely to	No	This species does not reproduces in the region	High
		migrate in the RA area for reproduction?	110		ingn
41	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No	Such fact has not been detected yet	High
42	7.08	Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous	Not applicable	Data deficient	Low
		seven questions (35–41; i.e. both			
		unintentional or intentional) likely to be			
	7.09	Is dispersal of the taxon density dependent?	Not applicable	Data deficient	Low
		ce attributes Is the taxon able to withstand being out of	No	No such fact has been detected	Medium
44	0.01	water for extended periods (e.g. minimum of	NO	No such fact has been detected	healann
		one or more hours) at some stage of its life			
45	0.02	cycle?			Ma divers
45	8.02	Is the taxon tolerant of a wide range of water quality conditions relevant to that	Yes	Inhabits lakes and deep pools and runs over sand or rocks in small to large rivers. Adults occur in rivers and streams and prefer	Medium
		taxon? [In the Justification field, indicate the		clean, well oxygenated water, but also in ponds and reservoirs.	
		relevant water quality variable(s) being		, ,,, , ,	
46	8.03	Can the taxon be controlled or eradicated in	No	Data deficient	Low
		the wild with chemical, biological, or other agents/means?			
47	8.04	Is the taxon likely to tolerate or benefit from	Yes	This fish is spread mainly from the fish farms	High
		environmental/human disturbance?			
48	8.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in	Yes	Channel catfish fry were more resistant to saltiness than hybrid catfish and blue catfish (P< 0.0001) at 6.0 ppt for swim-up fry	Medium
		its usual environment?		(Abass & Dunham 2017).	
49	8.06	Are there effective natural enemies	Yes	Channel catfish has a limited number of natural predators, which	High
		(predators) of the taxon present in the RA		include pikeperches Sander spp. (Scott and Crossman 1973;	
		area?		Hanchin et al. 2002), cormorants Phalacrocorax spp., herons Ardea spp., pelicans Pelecanus spp. and otters (Lutra lutra).	
				Younger (smaller) channel catfish are particularly susceptible to	
				avian predators (Glahn and Dorr 2002; Wywialowski 1999).	
				However, despite its strongly piscivorous diet, the northern pike	
				Esox lucius is not likely to take ictalurid catfishes. In the Caucasus	
				region only Otter and Sander lucioperca can be considered as notential patural enemies of L nunctatus.	
		e change			
		change	-	Our interment	
50	9.01	Lindow the survey distant for the second for the			
		Under the predicted future climatic	Increase	Own judgement	Low
		Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase,	Increase	Gwn Judgement	Low
		conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?			
51	9.02	conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic	Increase	Own judgement	Low
51	9.02	conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment			
51	9.02	conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic			
-	9.02	conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic			
-		conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within	Increase	Own judgement	Low
-		conditions, are the risks of entry into the RA area posed by the taxon likely to increase, <u>decrease or not change?</u> Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, <u>decrease or not change?</u> Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to	Increase	Own judgement	Low
52		conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within	Increase	Own judgement	Low
52	9.03	conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of	Increase Increase	Own judgement Own judgement	Low
52	9.03	conditions, are the risks of entry into the RA area posed by the taxon likely to increase, <u>decrease or not change?</u> Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, <u>decrease or not change?</u> Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, <u>decrease or not change?</u> Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity	Increase Increase	Own judgement Own judgement	Low
52	9.03	conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magintude of future potential impacts on biodiversity and/or ecological integrity/status?	Increase Increase Higher	Own judgement Own judgement Own judgement	Low Low
52	9.03	conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic	Increase Increase	Own judgement Own judgement	Low
52	9.03	conditions, are the risks of entry into the RA area posed by the taxon likely to increase, <u>decrease or not change?</u> Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, <u>decrease or not change?</u> Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to <u>increase</u> , <u>decrease or not change?</u> Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity <u>and/or ecological integrity/status?</u> Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem	Increase Increase Higher	Own judgement Own judgement Own judgement	Low Low
52 53 54	9.03 9.04 9.05	conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Increase Increase Higher Higher	Own judgement Own judgement Own judgement Own judgement	Low Low Low
52 53 54	9.03	conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? Under the predicted future climatic	Increase Increase Higher	Own judgement Own judgement Own judgement	Low Low
52 53 54	9.03 9.04 9.05	conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Increase Increase Higher Higher	Own judgement Own judgement Own judgement Own judgement	Low Low Low

Statistics	
Scores	
BRA	28.0
BRA Outcome	-
BRA+CCA	40.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	10.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	0.0
3. Invasive elsewhere	6.0
B. Biology/Ecology	18.0
4. Undesirable (or persistence) traits	9.0
5. Resource exploitation	7.0
6. Reproduction	1.0
7. Dispersal mechanisms	-4.0
8. Tolerance attributes	5.0
C. Climate change	12.0
9. Climate change	12.0
Answered Questions	
Total	55
A. Biogeography/Historical	13

3	1. Domestication/Cultivation
5	2. Climate, distribution and introduction risk
5	3. Invasive elsewhere
36	B. Biology/Ecology
12	4. Undesirable (or persistence) traits
2	5. Resource exploitation
7	6. Reproduction
9	7. Dispersal mechanisms
6	8. Tolerance attributes
6	C. Climate change
6	9. Climate change
	Sectors affected
9	Commercial
13	Environmental
19	Species or population nuisance traits
	Thresholds
	DDA

Intestionas		
	BRA	-
	BRA+CCA	-
Confidence		
	BRA+CCA	0.59
	BRA	0.63
	CCA	0.25
Date and Time		
	10/05/20	022 19:07:02

Taxon and Assessor details					
Category	Fishes and Lampreys (freshwater)				
Taxon name	Ictalurus punctatus				
Common name	channel catfish				
Assessor	Tatia Kuljanishvili				
Risk screening context					
Reason and socio-economic benefits	Aquaculture species				
Risk assessment area	South Caucasus				
Taxonomy	Actinopteri (ray-finned fishes) > Siluriformes (Catfish) > Ictaluridae				
Native range	North America				
Introduced range	Worldwide				
URL	https://www.fishbase.se/summary/Ictalurus-punctatus.html				

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
		ication/Cultivation	1.4		
1	1.01	Has the taxon been the subject of	Yes	Yes. Comercially valuable fish.	Very high
		domestication (or cultivation) for at least 20		https://www.fishbase.de/summary/275	
-		generations?			
2	1.02	Is the taxon harvested in the wild and likely	Yes	Yes. Taxon is harvested in wild and is sold in its live form	Very high
2	1 0 0	to be sold or used in its live form?			115 1
3	1.03	Does the taxon have invasive races,	No	No does not have invasive races	High
2 (varieties, sub-taxa or congeners?			
2. (4		, distribution and introduction risk	High	Cimilar out of 20 stations, 15 matches at the value of 0	Medium
4	2.01	How similar are the climatic conditions of the	підп	Similar, out of 20 stations, 15 matches at the value of 9	Medium
		Risk Assessment (RA) area and the taxon's native range?			
5	2.02	What is the quality of the climate matching	Medium	Medium	Medium
5	2.02	data?	inculum	reduin	riculum
6	2.03	Is the taxon already present outside of	No	No evidence.	Very high
Ŭ	2.00	captivity in the RA area?			• ci)g.i
7	2.04	How many potential vectors could the taxon	One	Aquaculture	Very high
<i>.</i>	2.0.	use to enter in the RA area?	0.10		ter, ngn
8	2.05	Is the taxon currently found in close	Yes	Yes. Established in neigbouring areas	Very high
	-	proximity to, and likely to enter into, the RA			
		area in the near future (e.g. unintentional			
		and intentional introductions)?			
<u>3.</u> I	nvasive	e elsewhere			
9	3.01	Has the taxon become naturalised	Yes	Cultured worldwide, it has been introduced in more than 32	High
		(established viable populations) outside its		countries including Italy, Brazil, China, Japan and Russia for	
		native range?		aquaculture and recreational fisheries. It has been introduced for	
				aquaculture and recreational fisheries to over 32 countries, and	
				widely throughout the USA, and has established itself in most	
				waters to which it has been introduced.	
10	3.02	In the taxon's introduced range, are there	Yes	it can threaten the wild stocks through predation, hybridization,	Very high
		known adverse impacts to wild stocks or		and competition.	
		commercial taxa?			
11	3.03	In the taxon's introduced range, are there	Yes	Channel catfish in the James River estuary in Virginia were	Very high
		known adverse impacts to aquaculture?		reported to prey on blue crab (Callinectes sapidus) and white	
				perch (Morone americana) and are known to eat the spawn of	
				many other commercial sport and fishery species, including	
				Atlantic shad (Alosa sapidissima), blueback herring (A. aestivalis),	
				alewife (A. pseudoharengus) (Menzel, 1945). McGovern and Olney	
				(1988) found M. americana eggs and M. saxatilis eggs and larvae	
				in gut contents of juvenile channel catfish from the Pamunkey	
12	3.04	In the taxon's introduced range, are there	Yes	River in Virginia. Transmit deseases	Medium
12	5.04	known adverse impacts to ecosystem	105		neulum
12	3.05	In the taxon's introduced range, are there	Yes	Channel catfish in the James River estuary in Virginia were	Very high
13	5.05	known adverse socio-economic impacts?	105	reported to prey on blue crab (Callinectes sapidus) and white	very mgn
		nom adverse socio-economic impacts?		perch (Morone americana) and are known to eat the spawn of	
				many other commercial sport and fishery species, including	
				Atlantic shad (Alosa sapidissima), blueback herring (A. aestivalis),	
				alewife (A. pseudoharengus) (Menzel, 1945). McGovern and Olney	
				(1988) found M. americana eggs and M. saxatilis eggs and larvae	
				in gut contents of juvenile channel catfish from the Pamunkey	
				River in Virginia.	
<u>B.</u> I	Biology	y/Ecology			
		able (or persistence) traits			
14	4.01	Is it likely that the taxon will be poisonous or	No	Not poisonous	Very high
		pose other risks to human health?			
		Is it likely that the taxon will smother one or	Yes	threatenes vulnerable and endangered species such as Rana	High
15	4.02		1	chiricahuensis (Chiricahua leopard frog) and Gila cypha and others	
15	4.02	more native taxa (that are not threatened or			
		protected)?		https://www.cabi.org/isc/datasheet/79127#tothreatenedSpecies	
	4.02 4.03	protected)? Are there any threatened or protected taxa	No	https://www.cabi.org/isc/datasheet/79127#tothreatenedSpecies Does not parasite	Very high
		protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in	No		Very high
16	4.03	protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?		Does not parasite	
16		protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic	No Yes	Does not parasite It was documented that this species was breeding independently	Very high High
16	4.03	protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus		Does not parasite	
16	4.03	protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic		Does not parasite It was documented that this species was breeding independently	

18					
	4.05	Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA area?	Yes	Larval stages feed on midge larvae and pupae. Channel catfish smaller than 102 mm total length (TL) feed primarily on insects; while those larger than 102 mm TL continue to feed on aquatic insects, they also begin to feed on large species of mayflies and caddis flies. Larger fish tend to feed on terrestrial insects, seeds (from elm and cottonwood trees), crayfish, aquatic insect nymphs, snakes, birds, spiders and plant matter	High
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	https://www.cabi.org/isc/datasheet/79127#tothreatenedSpecies Transmit diseases	Low
20	4.07	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA	Yes	No information	Low
21	4.08	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel	Yes	No info	Low
22	4.09	to) the RA area? Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity?	Yes	Yes. See: https://www.fishbase.se/summary/Ictalurus- punctatus.html	Very high
23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)?	No	Juveniles prefer depths of 50-70 cm while adults go for the deepest water possible (Holland and Peters, 1992); both juveniles and adults prefer areas of slow to moderate currents e.g. less than 60 cm/sec (Holland and Peters, 1992). McMahon and Terrell (1982) however report that current velocities of less than 15 cm/sec are preferred in deep ponds and backwaters and optimal turbidity levels of below 100 ppm.	Medium
24	4.11	Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for	No	No expectation based on professional judgement	Medium
25	4.12	native taxa? Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions	Yes	It is possible	Low
		by way of a dormant form)?			
	5.01	<i>ce exploitation</i> Is the taxon likely to consume threatened or	Yes	It is possible however there is no information about it	Low
	5.01	Is the taxon likely to consume threatened of protected native taxa in the RA area? Is the taxon likely to sequester food	Yes	Yes it is possible	Medium
6 1	Reprodu	resources (including nutrients) to the detriment of native taxa in the RA area?			
	6.01	Is the taxon likely to exhibit parental care	Yes	males guard the nests	Very high
	0101	and/or to reduce age-at-maturity in response to environmental conditions?			i ci y iligit
29	6.02	Is the taxon likely to produce viable gametes	Yes	"In some trial water bodies, the natural breeding of channel	Low
30		or propagules (in the RA area)?		catfishes were observed, proving the existence of independent (self-breeding) population" (Goradze et al 2012)	
	6.03	or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa?	Yes	catfishes were observed, proving the existence of independent (self-breeding) population" (Goradze et al 2012) The channel catfish hybridizes with the threatened Yaqui catfish (Ictalurus pricei) in Mexico (Sublette et al., 1990; Kelsch and Jensen, 1997) while in New Mexico, it hybridizes with the native headwater catfish (I. lupus) (Kelsch and Hendricks, 1990).	High
31	6.03 6.04	Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to		catfishes were observed, proving the existence of independent (self-breeding) population" (Goradze et al 2012) The channel catfish hybridizes with the threatened Yaqui catfish (Ictalurus pricei) in Mexico (Sublette et al., 1990; Kelsch and Jensen, 1997) while in New Mexico, it hybridizes with the native	High Very high
		Is the taxon likely to hybridise naturally with native taxa?		catfishes were observed, proving the existence of independent (self-breeding) population" (Goradze et al 2012) The channel catfish hybridizes with the threatened Yaqui catfish (Ictalurus pricei) in Mexico (Sublette et al., 1990; Kelsch and Jensen, 1997) while in New Mexico, it hybridizes with the native headwater catfish (I. lupus) (Kelsch and Hendricks, 1990). https://www.cabi.org/isc/datasheet/79127#tothreatenedSpecies	
32 33	6.04 6.05 6.06	Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)?	No No Yes	catfishes were observed, proving the existence of independent (self-breeding) population" (Goradze et al 2012) The channel catfish hybridizes with the threatened Yaqui catfish (Ictalurus pricei) in Mexico (Sublette et al., 1990; Kelsch and Jensen, 1997) while in New Mexico, it hybridizes with the native headwater catfish (I. lupus) (Kelsch and Hendricks, 1990). https://www.cabi.org/isc/datasheet/79127#tothreatenedSpecies No. Does not display asexual reproduction No. See: https://www.fishbase.se/summary/Ictalurus-	Very high
32 33 34	6.04 6.05 6.06 6.07	Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	No	catfishes were observed, proving the existence of independent (self-breeding) population" (Goradze et al 2012) The channel catfish hybridizes with the threatened Yaqui catfish (Ictalurus pricei) in Mexico (Sublette et al., 1990; Kelsch and Jensen, 1997) while in New Mexico, it hybridizes with the native headwater catfish (I. lupus) (Kelsch and Hendricks, 1990). https://www.cabi.org/isc/datasheet/79127#tothreatenedSpecies No. Does not display asexual reproduction No. See: https://www.fishbase.se/summary/Ictalurus- punctatus.html	Very high Very high
32 33 34 <i>7. [</i>	6.04 6.05 6.06 6.07	Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms	No No Yes 2	catfishes were observed, proving the existence of independent (self-breeding) population" (Goradze et al 2012) The channel catfish hybridizes with the threatened Yaqui catfish (Ictalurus pricei) in Mexico (Sublette et al., 1990; Kelsch and Jensen, 1997) while in New Mexico, it hybridizes with the native headwater catfish (I. lupus) (Kelsch and Hendricks, 1990). https://www.cabi.org/isc/datasheet/79127#tothreatenedSpecies No. Does not display asexual reproduction No. See: https://www.fishbase.se/summary/Ictalurus- punctatus.html can produce 20,000 eggs 2-3 years	Very high Very high Medium Very high
32 33 34 <i>7. [</i>	6.04 6.05 6.06 6.07	Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	No No Yes	catfishes were observed, proving the existence of independent (self-breeding) population" (Goradze et al 2012) The channel catfish hybridizes with the threatened Yaqui catfish (Ictalurus pricei) in Mexico (Sublette et al., 1990; Kelsch and Jensen, 1997) while in New Mexico, it hybridizes with the native headwater catfish (I. lupus) (Kelsch and Hendricks, 1990). https://www.cabi.org/isc/datasheet/79127#tothreatenedSpecies No. Does not display asexual reproduction No. See: https://www.fishbase.se/summary/Ictalurus- punctatus.html can produce 20,000 eggs	Very high Very high Medium
32 33 34 <i>7. [</i> 35	6.04 6.05 6.06 6.07	Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more	No No Yes 2	catfishes were observed, proving the existence of independent (self-breeding) population" (Goradze et al 2012) The channel catfish hybridizes with the threatened Yaqui catfish (Ictalurus pricei) in Mexico (Sublette et al., 1990; Kelsch and Jensen, 1997) while in New Mexico, it hybridizes with the native headwater catfish (I. lupus) (Kelsch and Hendricks, 1990). https://www.cabi.org/isc/datasheet/79127#tothreatenedSpecies No. Does not display asexual reproduction No. See: https://www.fishbase.se/summary/Ictalurus- punctatus.html can produce 20,000 eggs 2-3 years	Very high Very high Medium Very high
32 33 34 <u>7. [</u> 35 36	6.04 6.05 6.06 6.07 <i>Dispers</i> 7.01	Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances	No No Yes 2 One	catfishes were observed, proving the existence of independent (self-breeding) population" (Goradze et al 2012) The channel catfish hybridizes with the threatened Yaqui catfish (Ictalurus pricei) in Mexico (Sublette et al., 1990; Kelsch and Jensen, 1997) while in New Mexico, it hybridizes with the native headwater catfish (I. lupus) (Kelsch and Hendricks, 1990). https://www.cabi.org/isc/datasheet/79127#tothreatenedSpecies No. Does not display asexual reproduction No. See: https://www.fishbase.se/summary/Ictalurus- punctatus.html can produce 20,000 eggs 2-3 years	Very high Very high Medium Very high
32 33 34 <u>7. [</u> 35 36 37	6.04 6.05 6.06 6.07 7.01 7.02	Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules	No No Yes 2 One Yes	catfishes were observed, proving the existence of independent (self-breeding) population" (Goradze et al 2012) The channel catfish hybridizes with the threatened Yaqui catfish (Ictalurus pricei) in Mexico (Sublette et al., 1990; Kelsch and Jensen, 1997) while in New Mexico, it hybridizes with the native headwater catfish (I. lupus) (Kelsch and Hendricks, 1990). https://www.cabi.org/isc/datasheet/79127#tothreatenedSpecies No. Does not display asexual reproduction No. See: https://www.fishbase.se/summary/Ictalurus- punctatus.html can produce 20,000 eggs 2-3 years Aquaculture It is likely No. Morphologically this species does not have a means of actively	Very high Very high Medium Very high Very high Medium
32 33 34 <u>7. [</u> 35 36 37 38	6.04 6.05 6.06 6.07 7.01 7.02 7.03	Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to	No No Yes 2 One Yes No	catfishes were observed, proving the existence of independent (self-breeding) population" (Goradze et al 2012) The channel catfish hybridizes with the threatened Yaqui catfish (Ictalurus pricei) in Mexico (Sublette et al., 1990; Kelsch and Jensen, 1997) while in New Mexico, it hybridizes with the native headwater catfish (I. lupus) (Kelsch and Hendricks, 1990). https://www.cabi.org/isc/datasheet/79127#tothreatenedSpecies No. Does not display asexual reproduction No. See: https://www.fishbase.se/summary/Ictalurus- punctatus.html can produce 20,000 eggs 2-3 years Aquaculture It is likely No. Morphologically this species does not have a means of actively attaching itself to hard substrata	Very high Very high Medium Very high Medium Very high

41	7.07	Are propagules or eggs of the taxon likely to	No	No. Can not be dispersed by other ananimals	Very high
40	7.00	be dispersed in the RA area by other animals?			1.1
42	7.08	Is dispersal of the taxon along any of the	No	Not rapid	Very high
		vectors/pathways mentioned in the previous			
		seven questions (35-41; i.e. both			
12	7.00	unintentional or intentional) likely to be	X		
	7.09	Is dispersal of the taxon density dependent?	Yes	It is possible	Low
		ce attributes	1		h
44	8.01	Is the taxon able to withstand being out of	No	No information avalable	Very high
		water for extended periods (e.g. minimum of			
		one or more hours) at some stage of its life			
		cycle?			
45	8.02	Is the taxon tolerant of a wide range of	Yes	temperature, dissolved oxygen	Medium
		water quality conditions relevant to that		https://www.cabi.org/isc/datasheet/79127#tothreatenedSpecies	
		taxon? [In the Justification field, indicate the			
		relevant water quality variable(s) being			
46	8.03	Can the taxon be controlled or eradicated in	Yes	it is possible but it is very costy and sometimes ineffective	Low
		the wild with chemical, biological, or other			
		agents/means?			
47	8.04	Is the taxon likely to tolerate or benefit from	No	No information avalable	High
		environmental/human disturbance?			
48	8.05	Is the taxon able to tolerate salinity levels	No	No documentation	High
		that are higher or lower than those found in			
		its usual environment?			
49	8.06	Are there effective natural enemies	No	No. No effective natural enemies present in RA area	Very high
		Are there effective natural enemies (predators) of the taxon present in the RA	No	No. No effective natural enemies present in RA area	Very high
C. 1	Climat	Are there effective natural enemies (predators) of the taxon present in the RA e change	No	No. No effective natural enemies present in RA area	Very high
C. 9. (Climat Climate	Are there effective natural enemies (predators) of the taxon present in the RA e change e change			
C. 9. (Climat	Are there effective natural enemies (predators) of the taxon present in the RA e change change Under the predicted future climatic	No	It was hypotheses that climate change might alert the	Very high Very high
C. 9. (Climat Climate	Are there effective natural enemies (predators) of the taxon present in the RA e change Under the predicted future climatic conditions, are the risks of entry into the RA		It was hypotheses that climate change might alert the mechanisms of transportation and introduction of non-native	
C. 9. (Climat Climate	Are there effective natural enemies (predators) of the taxon present in the RA e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase,		It was hypotheses that climate change might alert the mechanisms of transportation and introduction of non-native species. Commercial and recreational activities will increase, that	
<u>C.</u> 9. (50	Climate Climate 9.01	Are there effective natural enemies (predators) of the taxon present in the RA e change change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?	Increase	It was hypotheses that climate change might alert the mechanisms of transportation and introduction of non-native species. Commercial and recreational activities will increase, that itself increases the propagule pressure levels of non-native	Very high
<u>C.</u> 9. (50	Climat Climate	Are there effective natural enemies (predators) of the taxon present in the RA e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic		It was hypotheses that climate change might alert the mechanisms of transportation and introduction of non-native species. Commercial and recreational activities will increase, that	
<u>C.</u> 9. (50	Climate Climate 9.01	Are there effective natural enemies ((predators) of the taxon present in the RA e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment	Increase	It was hypotheses that climate change might alert the mechanisms of transportation and introduction of non-native species. Commercial and recreational activities will increase, that itself increases the propagule pressure levels of non-native	Very high
<u>C.</u> 9. (50	Climate Climate 9.01	Are there effective natural enemies ((predators) of the taxon present in the RA e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase,	Increase	It was hypotheses that climate change might alert the mechanisms of transportation and introduction of non-native species. Commercial and recreational activities will increase, that itself increases the propagule pressure levels of non-native	Very high
<u>C.</u> 9. (50	Climat <i>Climate</i> 9.01 9.02	Are there effective natural enemies (predators) of the taxon present in the RA e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	Increase Increase	It was hypotheses that climate change might alert the mechanisms of transportation and introduction of non-native species. Commercial and recreational activities will increase, that itself increases the propagule pressure levels of non-native Increase	Very high High
<u>C.</u> 9. (50	Climate Climate 9.01	Are there effective natural enemies (predators) of the taxon present in the RA e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic	Increase	It was hypotheses that climate change might alert the mechanisms of transportation and introduction of non-native species. Commercial and recreational activities will increase, that itself increases the propagule pressure levels of non-native	Very high
<u>C.</u> 9. (50	Climat <i>Climate</i> 9.01 9.02	Are there effective natural enemies ((predators) of the taxon present in the RA e change change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within	Increase Increase	It was hypotheses that climate change might alert the mechanisms of transportation and introduction of non-native species. Commercial and recreational activities will increase, that itself increases the propagule pressure levels of non-native Increase	Very high High
C. 9. 0 50	Climat <i>Climate</i> 9.01 9.02	Are there effective natural enemies ((predators) of the taxon present in the RA e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to	Increase Increase	It was hypotheses that climate change might alert the mechanisms of transportation and introduction of non-native species. Commercial and recreational activities will increase, that itself increases the propagule pressure levels of non-native Increase	Very high High
<u>9. (</u> 50 51	Climate 9.01 9.02 9.03	Are there effective natural enemies (predators) of the taxon present in the RA e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change?	Increase Increase	It was hypotheses that climate change might alert the mechanisms of transportation and introduction of non-native species. Commercial and recreational activities will increase, that itself increases the propagule pressure levels of non-native Increase	Very high High High
<u>9. (</u> 50 51	Climat <i>Climate</i> 9.01 9.02	Are there effective natural enemies (predators) of the taxon present in the RA e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic	Increase Increase	It was hypotheses that climate change might alert the mechanisms of transportation and introduction of non-native species. Commercial and recreational activities will increase, that itself increases the propagule pressure levels of non-native Increase	Very high High
<u>9. (</u> 50 51	Climate 9.01 9.02 9.03	Are there effective natural enemies ((predators) of the taxon present in the RA e change change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of	Increase Increase	It was hypotheses that climate change might alert the mechanisms of transportation and introduction of non-native species. Commercial and recreational activities will increase, that itself increases the propagule pressure levels of non-native Increase	Very high High High
<u>9. (</u> 50 51	Climate 9.01 9.02 9.03	Are there effective natural enemies ((predators) of the taxon present in the RA e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity	Increase Increase	It was hypotheses that climate change might alert the mechanisms of transportation and introduction of non-native species. Commercial and recreational activities will increase, that itself increases the propagule pressure levels of non-native Increase	Very high High High
C. 9. (50 51 52 53	9.02 9.03 9.04	Are there effective natural enemies ((predators) of the taxon present in the RA e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	Increase Increase Higher	It was hypotheses that climate change might alert the mechanisms of transportation and introduction of non-native species. Commercial and recreational activities will increase, that itself increases the propagule pressure levels of non-native Increase Increase Higher	Very high High High Very high
C. 9. (50 51 52 53	Climate 9.01 9.02 9.03	Are there effective natural enemies (predators) of the taxon present in the RA e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic	Increase Increase	It was hypotheses that climate change might alert the mechanisms of transportation and introduction of non-native species. Commercial and recreational activities will increase, that itself increases the propagule pressure levels of non-native Increase	Very high High High
C. 9. (50 51 52 53	9.02 9.03 9.04	Are there effective natural enemies (predators) of the taxon present in the RA e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of	Increase Increase Higher	It was hypotheses that climate change might alert the mechanisms of transportation and introduction of non-native species. Commercial and recreational activities will increase, that itself increases the propagule pressure levels of non-native Increase Increase Higher	Very high High High Very high
C. 9. 0 50 51 52	9.02 9.03 9.04	Are there effective natural enemies ((predators) of the taxon present in the RA e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem	Increase Increase Higher	It was hypotheses that climate change might alert the mechanisms of transportation and introduction of non-native species. Commercial and recreational activities will increase, that itself increases the propagule pressure levels of non-native Increase Increase Higher	Very high High High Very high
C. 9. 0 50 51 52 53	Climate 9.01 9.02 9.03 9.04 9.05	Are there effective natural enemies ((predators) of the taxon present in the RA e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Increase Increase Higher Higher	It was hypotheses that climate change might alert the mechanisms of transportation and introduction of non-native species. Commercial and recreational activities will increase, that itself increases the propagule pressure levels of non-native Increase Increase Higher HIgher	Very high High Very high Very high
C. 9. 0 50 51 52 53	9.02 9.03 9.04	Are there effective natural enemies ((predators) of the taxon present in the RA e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? Under the predicted future climatic	Increase Increase Higher	It was hypotheses that climate change might alert the mechanisms of transportation and introduction of non-native species. Commercial and recreational activities will increase, that itself increases the propagule pressure levels of non-native Increase Increase Higher	Very high High High Very high
C. 9. 0 50 51 52 53	Climate 9.01 9.02 9.03 9.04 9.05	Are there effective natural enemies (predators) of the taxon present in the RA e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Increase Increase Higher Higher	It was hypotheses that climate change might alert the mechanisms of transportation and introduction of non-native species. Commercial and recreational activities will increase, that itself increases the propagule pressure levels of non-native Increase Increase Higher HIgher	Very high High Very high Very high
C. 9. 0 50 51 52 53	Climate 9.01 9.02 9.03 9.04 9.05	Are there effective natural enemies ((predators) of the taxon present in the RA e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? Under the predicted future climatic	Increase Increase Higher Higher	It was hypotheses that climate change might alert the mechanisms of transportation and introduction of non-native species. Commercial and recreational activities will increase, that itself increases the propagule pressure levels of non-native Increase Increase Higher HIgher	Very high High Very high Very high

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Statistics	
Scores	33.0
BRA	33.0
BRA Outcome BRA+CCA	- 45.0
	45.0
BRA+CCA Outcome	-
Score partition	20.0
A. Biogeography/Historical	
1. Domestication/Cultivation	2.0
2. Climate, distribution and introduction risk	0.0
3. Invasive elsewhere	18.0
B. Biology/Ecology	13.0
4. Undesirable (or persistence) traits	7.0
5. Resource exploitation	7.0
6. Reproduction	4.0
7. Dispersal mechanisms	-3.0
8. Tolerance attributes	-2.0
C. Climate change	12.0
9. Climate change	12.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	5
B. Biology/Ecology	3 5 5 36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2
6. Reproduction	7
7. Dispersal mechanisms	9
8. Tolerance attributes	2 7 9 6
C. Climate change	6

9. Climate change	6			
Sectors affected				
Commercial	17			
Environmental	15			
Species or population nuisance traits	14			
Thresholds				
BRA	-			
BRA+CCA	-			
Confidence				
BRA+CCA	0.75			
BRA	0.74			
CCA	0.79			
Date and Time				
22/05/2022 21:59:41				

Taxon and Assessor details							
Category	Fishes and Lampreys (freshwater)						
Taxon name	Lepomis gibbosus						
Common name	pumpkinseed						
Assessor	Bella Japoshvili						
Risk screening context							
Reason and socio-economic benefits	The species extensively used for different purpose in EU and introduced/established in many						
Risk assessment area	South Caucasus						
Taxonomy	Actinopteri (ray-finned fishes) > Centrarchiformes (Basses) > Centrarchidae (Sunfishes)						
Native range	USA						
Introduced range	Parts of Europe, Middle east						
URL	https://www.fishbase.de/summary/Lepomis-gibbosus.html						

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
		ication/Cultivation			
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	CABI, 2021. Lepomis gibbosus (pumpkinseed). https://www.cabi.org/isc/datasheet/77080 (accessed November 2021)	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	The species is a subject of recreationa fisheries and they are captured in wild and transported to new areas	High
3	1.03	Does the taxon have invasive races,	Yes	Congeners	High
2 (limato	varieties, sub-taxa or congeners? , distribution and introduction risk			
	2.01	How similar are the climatic conditions of the	Medium	Results of climatch algorithm	Medium
7	2.01	Risk Assessment (RA) area and the taxon's native range?	Medium		Heulum
5	2.02	What is the quality of the climate matching data?	Low	Due to low accuracy of Ical climate data	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	No	CABI, 2021. Lepomis gibbosus (pumpkinseed). https://www.cabi.org/isc/datasheet/77080 (accessed November 2021)	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	>1	Aquacluture, recreation	High
8	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)?	Yes	Esteblished in neighbour country (Turkey) - Ağdamar, S., Tarkan, A. S., Keskin, E., Top, N., Doğaç, E., Baysal, Ö., & Emiroğlu, Ö. (2015). The role of environmental factors and genetic diversity on colonization success of a non-native fish, Lepomis gibbosus from western part of Turkey. Biochemical Systematics and Ecology, 58.	High
3. I	nvasive	e elsewhere			
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	CABI, 2021. Lepomis gibbosus (pumpkinseed). https://www.cabi.org/isc/datasheet/77080 (accessed November 2021)	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	No	No documented evidence exist	Medium
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	No documented evidence exist	Low
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	No	No documented evidence exist	Medium
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	No documented evidence exist	Medium
В. В	Biology	y/Ecology			
4. L	Indesir	able (or persistence) traits			
14	4.01	Is it likely that the taxon will be poisonous or pose other risks to human health?	No	Not a harmful species	High
15	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	Since the species can reach high density and is oportunistic feeder	Medium
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	Yes	It can consume ;variety of foods including fish eggs and juveniles thus predate on many different threatend taxa	High
17	4.04	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?	Yes	Is considered warmwater species while is established in northern European countries	High
18	4.05	Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA	Yes	Expected but not documented	Low
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes	Possible due to its lifestyle and agressive spread, however not well documented elsewhere	Low
20	4.07	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA	No	Not expected	High
21	4.08	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area?	Yes	It hosts a number of parasatises/deaseaze that are absent in the region	High
22	4.09	Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity?	No	Small bodied species	High

23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g.	No	Avoids fast flowing rivers	High
24	4.11	versatile in habitat use)? Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours	No	No documented evidence exists	Low
		(e.g. feeding) will reduce habitat quality for native taxa?			
25	4.12	Is the taxon likely to maintain a viable	No	No documented evidence exists	Medium
		population even when present in low			
		densities (or persisting in adverse conditions by way of a dormant form)?			
5. F	Resourc	e exploitation			
	5.01	Is the taxon likely to consume threatened or	Yes	e.g. García-Berthou E; Moreno-Amich R, 2000. Food of introduced	Medium
		protected native taxa in the RA area?		pumpkinseed sunfish: ontogenetic diet shift and seasonal	
27	5.02	Is the taxon likely to sequester food	Yes	variation. Journal of Fish Biology, 57(1):29-40. Because species can develop dense populations	Medium
		resources (including nutrients) to the			
<u> </u>		detriment of native taxa in the RA area?			
	R <i>eprodu</i> 6.01	Is the taxon likely to exhibit parental care	Yes	Gross, M.R. and R.C. Sargent, 1985. The evolution of male and	Very high
	0.01	and/or to reduce age-at-maturity in response		female parental care in fishes. Am. Zool. 25(3):807-822.	,,
		to environmental conditions?			-
29	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	Expected but not documented evidence	Low
30	6.03	Is the taxon likely to hybridise naturally with	Yes	CABI, 2021. Lepomis gibbosus (pumpkinseed).	High
		native taxa?		https://www.cabi.org/isc/datasheet/77080 (accessed November	5
24	6.64	To the town Block to be 1 1 100 1	NI-	2021)	
1ک	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	No	Species is reproducing sexually (https://www.fishbase.se/)	Very high
32	6.05	Is the taxon dependent on the presence of	No	No such fact is known. It can complete its lifecycle independently	High
		another taxon (or specific habitat features)			
22	6.06	to complete its life cycle? Is the taxon known (or likely) to produce a	No	Only few thousand eggs per year	High
22	0.00	large number of propagules or offspring	NO	only lew thousand eggs per year	High
		within a short time span (e.g. < 1 year)?			
34	6.07	How many time units (days, months, years)	1	Years	Very high
		does the taxon require to reach the age-at- first-reproduction?			
7. L	Dispersa	al mechanisms			
	7.01	How many potential internal	>1	Intentional introduction for recreational fisheries, unintentioal	High
		vectors/pathways could the taxon use to		introduction as a hitchicker	
36	7.02	disperse within the RA area (with suitable Will any of these vectors/pathways bring the	Yes	Colchis national park along the Black Sea is the most easily	High
	/.02	taxon in close proximity to one or more		attainable	
		protected areas (e.g. MCZ, MPA, SSSI)?			
37	7.03	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship	No	No such beavoir is known	Very high
		hulls, pilings, buoys) such that it enhances			
		the likelihood of dispersal?			
38	7.04	Is natural dispersal of the taxon likely to	No	Not expected	Very high
		occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?			
39	7.05	Is natural dispersal of the taxon likely to	Yes	Juveniles can spread via water currents easily (Copp GH; Cellot B,	High
		occur as larvae/juveniles (for animals) or as		1988. Drift of embryonic and larval fishes, especially lepomis	-
		fragments/seedlings (for plants) in the RA		gibbosus (L.) in the upper Rhône river. J. Freshwat. Ecol, 4:419-	
40	7.06	area? Are older life stages of the taxon likely to	No	423.) No such an vidence is known	High
		migrate in the RA area for reproduction?			-
41	7.07	Are propagules or eggs of the taxon likely to	No	Not expected and not observed	Very high
42	7.08	be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the	Yes	Less expected because the absence of direct water connection	Low
		vectors/pathways mentioned in the previous		between RA area and the surroundings, however, human	
		seven questions (35-41; i.e. both		mediated introduction with large quantity is possible	
43	7.09	unintentional or intentional) likely to be Is dispersal of the taxon density dependent?	No	No such fact is known	High
	Foleran	ce attributes			
44	8.01	Is the taxon able to withstand being out of	No	No such fact is known	High
		water for extended periods (e.g. minimum of			
		one or more hours) at some stage of its life cvcle?			
45	8.02	Is the taxon tolerant of a wide range of	Yes	Salinity and temperature	Medium
		water quality conditions relevant to that			
		taxon? [In the Justification field, indicate the relevant water quality variable(s) being			
46	8.03	Can the taxon be controlled or eradicated in	No	No effective eradication evidence exists	Very high
		the wild with chemical, biological, or other			
47	0.04	agents/means?	Voc	Almoida Dr. Almodóvar Ar Nicola CC: Elvira B. 2000. Eacitiza	Modium
+/	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	Yes	Almeida D; Almodóvar A; Nicola GG; Elvira B, 2009. Feeding tactics and body condition of two introduced populations of	Medium
				pumpkinseed Lepomis gibbosus: taking advantages of human	
		1		disturbances? Ecology of Freshwater Fish, 18(1):15-23.	
19	8.05	Is the taxon able to tolerate calinity levels	No	http://www.blackwell-synergy.com/loi/eff	Medium
18	8.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in	No		Medium

40	8.06	Are there effective natural enemies	No	Based on professional judgement although no documented	Very high
49	0.00	(predators) of the taxon present in the RA	NO	evidence exists	very nigh
С. (Climate	e change			
		change			
50	9.01	Under the predicted future climatic	No change	Based on professional judgement	High
		conditions, are the risks of entry into the RA			
		area posed by the taxon likely to increase,			
		decrease or not change?			
51	9.02	Under the predicted future climatic	Increase	Based on professional judgement	High
		conditions, are the risks of establishment			
		posed by the taxon likely to increase,			
		decrease or not change?	-		
52	9.03	Under the predicted future climatic	Increase	Based on professional judgement	High
		conditions, are the risks of dispersal within			
		the RA area posed by the taxon likely to			
52	0.04	increase, decrease or not change?	l li ala an	Deced on uniferritual indecessor	Medium
53	9.04	Under the predicted future climatic	Higher	Based on professional judgement	Medium
		conditions, what is the likely magnitude of			
		future potential impacts on biodiversity and/or ecological integrity/status?			
54	9.05	Under the predicted future climatic	Higher	Based on professional judgement	Low
54	5.05	conditions, what is the likely magnitude of	riigiici	based on professional judgement	LOW
		future potential impacts on ecosystem			
		structure and/or function?			
55	9.06	Under the predicted future climatic	Higher	Based on professional judgement	Low
		conditions, what is the likely magnitude of			
		future potential impacts on ecosystem			
		services/socio-economic factors?			

Statistics	
Scores	
BRA	28.0
BRA Outcome	-
BRA+CCA	38.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	7.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	2.0
B. Biology/Ecology	21.0
4. Undesirable (or persistence) traits	6.0
5. Resource exploitation	7.0
6. Reproduction	4.0
7. Dispersal mechanisms	0.0
8. Tolerance attributes	4.0
C. Climate change	10.0
9. Climate change	10.0
Answered Questions	
Total	55
A. Biogeography/Historical	13 3 5 5
1. Domestication/Cultivation	3
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	5
B. Biology/Ecology	36
B. Biology/Ecology 4. Undesirable (or persistence) traits	36 12
B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation	36 12
B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction	36 12
B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms	36 12 2 7 9
B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes	36 12 2 7 9 6
B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change	36 12 2 7 9 6 6
B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change	36 12 2 7 9 6
B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected	36 12 2 7 9 6 6 6 6
B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial	36 12 2 7 9 6 6
B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial Environmental	36 12 2 7 9 6 6 6 6
B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial	36 12 2 7 9 6 6 6 6
B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change 9. Climate change Sectors affected Commercial Environmental Species or population nuisance traits	36 12 2 7 9 6 6 6 6
B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial Environmental	36 12 2 7 9 6 6 6 6

Inresnolas	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.67
BRA	0.69
CCA	0.54
Date and Time	

16/05/2022 14:29:28

Taxon and Assessor details	
Category	Fishes and Lampreys (freshwater)
Taxon name	Lepomis gibbosus
Common name	pumpkinseed
Assessor	Giorgi Epitashvili
Risk screening context	
Reason and socio-economic benefits	In Europe, the pumpkinseed is considered an invasive species. They were introduced to European
Risk assessment area	South Caucasus
Taxonomy	Lepomis gibbosus (Linnaeus, 1758)
Native range	North America: New Brunswick in Canada south to Savannah River in Georgia, USA; Great Lakes,
Introduced range	Introduced to Europe from North America in the late 1800s (Maes, 1898), L. gibbosus is now
URL	https://www.fishbase.se/summary/Lepomis-gibbosus.html

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
1. L	1	ication/Cultivation	1.4		
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	The Pumpkinseed was introduced to Europe in the 1880s for use in outdoor ponds and as aquarium fish (Hanel, 2011, CABI, 2018).	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	The pathways by which the L. gibbosus reached Norway are not known. Pumpkinseed is not commonly sold in aquarium shops in Oslo, but the species is occasionally imported by special order. Pet shop owners in Oslo have mentioned the Czech Republic as the most likely origin of the fish (Sterud and Jørgensen 2006).	Medium
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	This species is invasive in Netherlands (Van Kleef et al., 2008), Portugal, Romania, Spain, UK (CABI, 2018), and potentially invasive in Germany (Nehring et al, 2015), Austria (NOBANIS, 2011), Belgium (Anseeuw et al., 2011) and Poland (Grabowska et al, 2010; NOBANIS, 2011). It seems to be able to form established populations in almost all countries in Europe	Very high
2. (Climate	, distribution and introduction risk			
4	2.01	How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range?	Medium	World Map of the Köppen-Geiger climate classification	Medium
5	2.02	What is the quality of the climate matching data?	Medium	World Map of the Köppen-Geiger climate classification	Medium
5	2.03	Is the taxon already present outside of captivity in the RA area?	No	Currently this species does not occurring in the SC region.	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	This species may be introduced into the region by humans	Medium
3	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)?	Yes	Lepomis gibbosus is now established in at least 28 countries of Europe and in Turkey the species' spread has been especially rapid between 2001 and 2006, with its distribution including the following areas: Kemer Reservoir, Akçay river catchment and inland waters of the Aegean and Anatolian regions (Ozcan 2007).	Very high
3.1	1	e elsewhere	1.4		
J	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	L. gibbosus is now established in a minimum of 28 countries in Europe and Asia Minor (Copp and Fox, 2007), with a population reported for Brazil and possibly also Chile.	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	The impact of L. gibbosus in Europe remains poorly assessed. The species has been reported to prey on fish eggs (García de Jalón et al., 1993; García-Berthou and Moreno-Amich, 2000a) as well as an endemic mollusc subspecies (García-Berthou and Moreno-Amich, 2000a), and it has been said to contribute to the decline of some indigenous fish species (Godinho and Ferreira, 1998). However, the only known study to document impacts of L. aibbosus on biodiversity comes from the Netherlands (van Kleef et	Very high
1	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	Data deficient	Low
2	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem services?	No	There are no studies regarding the current economic costs but if thinking about the efforts to avoid loss of native species and loss of ecosystem services this cost may only grow in the future.	Medium
.3	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	Yes	L. gibbosus has long been considered a pest (Künstler, 1908; Roule 1928, 1935), but there is no documented evidence of the species having an adverse effect other than public perception.	Low
		y/Ecology			
		able (or persistence) traits	1		1
		Is it likely that the taxon will be poisonous or pose other risks to human health?		Such a fact is not known	Very high
15	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	L. gibbosus is an effective competitor of native fish due to plasticity of diet, parental care behaviour which enhances reproductive success, and aggressive behaviour which can affect native species' foraging success, reproduction and microhabitat	Very high
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	Yes	There are meny threathened and protected species in the SC region who would be affected by L. gibbosus if this species spreads in the region e.g. Salmo spp; Acipenser spp, Capoeta spp, Huso huso, Luciobarbus capito, etc.	Very high

17	4.04	Is the taxon adaptable in terms of climatic	Yes	L. gibbosus can tolerate a wide range of climatic conditions. It is	Very high
		and other environmental conditions, thus		established in all biogeographic areas (Fox et al, 2007):	
		enhancing its potential persistence if it has		Continental area, Mediterranean area, Atlantic area, Black Sea	
		invaded or could invade the RA area?		area, Pannonian area, Alpine area, Macaronesian area and Steppic	
				Area. It could establish in Boreal area, where population where	
				recorded in Lithuania (Elvira, 2001) and Sweden	
				(http://www.smp.se/kronoberg/solabborre-i-asnen-vacker-oro/).	
.8	4.05	Is the taxon likely to disrupt food-web	Yes	The probability of this is very high.	Very high
		structure/function in aquatic ecosystems if it			
		has invaded or is likely to invade the RA			
.9	4.06	Is the taxon likely to exert adverse impacts	Yes	The probability of this is high.	High
		on ecosystem services in the RA area?			
0	4.07	Is it likely that the taxon will host, and/or	No	Data deficient	Low
		act as a vector for, recognised pests and			
		infectious agents that are endemic in the RA			
1	4.08	Is it likely that the taxon will host, and/or	Not applicable	Data deficient	Low
		act as a vector for, recognised pests and			
		infectious agents that are absent from (novel			
2	1.00	to) the RA area?	¥		
2	4.09	Is it likely that the taxon will achieve a body	Yes	Max length is 40.0 cm TL male/unsexed; common length : 9.9 cm	Very high
		size that will make it more likely to be		TL male/unsexed; max. published weight: 630.00 g. Therefore,	
2	4.10	released from captivity?	¥	this species has commercial value.	M a di una
.3	4.10	Is the taxon capable of sustaining itself in a	Yes	Inhabits vegetated lakes and ponds, as well as quiet pools of	Medium
		range of water velocity conditions (e.g.		creeks and small rivers.	
1	4.11	versatile in habitat use)? Is it likely that the taxon's mode of existence	Yes	The pumpkinseed affects the quality of the water, increasing the	Very high
+	7.11	(e.g. excretion of by-products) or behaviours	105	levels of chlorophyll and turbidity and the concentrations of	very myn
		(e.g. feeding) will reduce habitat quality for		nitrogen and phosphorus.	
		(e.g. feeding) will reduce habitat quality for native taxa?			
5	4.12	Is the taxon likely to maintain a viable	Not applicable	Data deficient	Low
	7.12	population even when present in low	not applicable		2011
		densities (or persisting in adverse conditions			
		by way of a dormant form)?			
	Resourd	ce exploitation			
		Is the taxon likely to consume threatened or	Yes	If this species spreads within the SC region the probability of this	Very high
		protected native taxa in the RA area?		is very high.	, 5
7	5.02	Is the taxon likely to sequester food	Yes	L. gibbosus will be competitor to native species.	Very high
		resources (including nutrients) to the			
		detriment of native taxa in the RA area?			
	Reprod				
8	6.01	Is the taxon likely to exhibit parental care	Yes	L. gibbosus is an effective competitor of native fish due to	Very high
		and/or to reduce age-at-maturity in response		plasticity of diet, parental care behaviour which enhances	
		to environmental conditions?		reproductive success.	
9	6.02	Is the taxon likely to produce viable gametes	No	At this stage this species is not distributed in the SC region.	Very high
		or propagules (in the RA area)?			
80	6.03	Is the taxon likely to hybridise naturally with	No	There is no evidence of possibility of hybridisation with native	Medium
		native taxa?		species but hybridisation within species of the same family occurs,	
				making more difficult to distinguish between species (Misra and	
1	6.04	To the tayon likely to be hermanhyaditic or to	No	Holdsworth, 1972). Data deficient	Medium
τ	0.04	Is the taxon likely to be hermaphroditic or to	No		Medium
2	6.05	display asexual reproduction? Is the taxon dependent on the presence of	No	No such fact has been described	Medium
2	0.05		NO	No such fact flas been described	Medium
		another taxon (or specific habitat features)			
12	6.06	to complete its life cycle? Is the taxon known (or likely) to produce a	No	This species produces up to 1000 eggs.	High
د،	0.00	large number of propagules or offspring	110	This species produces up to 1000 eggs.	i ligit
		within a short time span (e.g. < 1 year)?			
4	6.07	How many time units (days, months, years)	2	Pumpkinseeds usually reach sexual maturity at age 2.	High
	0.07		-	i amplinaceus usuany reach sexual maturity at age 2.	i i gi i
+					
+		does the taxon require to reach the age-at-			
	Dispers	does the taxon require to reach the age-at- first-reproduction?			
		does the taxon require to reach the age-at- first-reproduction? and mechanisms	One	This species can be spread by humans for	High
		does the taxon require to reach the age-at- first-reproduction? sal mechanisms How many potential internal	One	This species can be spread by humans for aquacultural/recreational purposes.	High
		does the taxon require to reach the age-at- first-reproduction? and mechanisms	One		High
5		does the taxon require to reach the age-at- first-reproduction? sal mechanisms How many potential internal vectors/pathways could the taxon use to	One Yes		High High
5	7.01	does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable		aquacultural/recreational purposes.	
5 6	7.01	does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)?	Yes	aquacultural/recreational purposes. The probability of this is high.	
5 6	7.01	does the taxon require to reach the age-at- first-reproduction? sal mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively		aquacultural/recreational purposes.	
5 6	7.01	does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship	Yes	aquacultural/recreational purposes. The probability of this is high.	High
5 6	7.01	does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances	Yes	aquacultural/recreational purposes. The probability of this is high.	High
5 6 7	7.01 7.02 7.03	does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal?	Yes	aquacultural/recreational purposes. The probability of this is high. No such fact has been described.	High
5 6 7	7.01	does the taxon require to reach the age-at- first-reproduction? sal mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to	Yes	aquacultural/recreational purposes. The probability of this is high.	High
5 6 7	7.01 7.02 7.03	does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules	Yes	aquacultural/recreational purposes. The probability of this is high. No such fact has been described.	High
5 6 7	7.01 7.02 7.03 7.04	does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?	Yes No No	aquacultural/recreational purposes. The probability of this is high. No such fact has been described. Currently this species is not found in the region.	High High Very high
5 6 7 8	7.01 7.02 7.03	does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to	Yes	aquacultural/recreational purposes. The probability of this is high. No such fact has been described.	High
5 6 7 8	7.01 7.02 7.03 7.04	does the taxon require to reach the age-at- first-reproduction? sal mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as	Yes No No	aquacultural/recreational purposes. The probability of this is high. No such fact has been described. Currently this species is not found in the region.	High High Very high
5 6 7 8	7.01 7.02 7.03 7.04	does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA	Yes No No	aquacultural/recreational purposes. The probability of this is high. No such fact has been described. Currently this species is not found in the region.	High High Very high
5 6 7 8 9	7.01 7.02 7.03 7.04 7.05	does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?	Yes No No No	aquacultural/recreational purposes. The probability of this is high. No such fact has been described. Currently this species is not found in the region. Currently this species is not found in the region.	High High Very high Very high
5 6 7 8 9	7.01 7.02 7.03 7.04	does the taxon require to reach the age-at- first-reproduction? all mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to	Yes No No	aquacultural/recreational purposes. The probability of this is high. No such fact has been described. Currently this species is not found in the region.	High High Very high
7. 35 36 37 38 39	7.01 7.02 7.03 7.04 7.05 7.06	does the taxon require to reach the age-at- first-reproduction? sal mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction?	Yes No No No	aquacultural/recreational purposes. The probability of this is high. No such fact has been described. Currently this species is not found in the region. Currently this species is not found in the region. Currently this species is not found in the region.	High High Very high Very high
7. 35 36 37 38 39	7.01 7.02 7.03 7.04 7.05	does the taxon require to reach the age-at- first-reproduction? all mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to	Yes No No No No	aquacultural/recreational purposes. The probability of this is high. No such fact has been described. Currently this species is not found in the region. Currently this species is not found in the region.	High High Very high Very high

40	7.00	To discover of the training share and fill	National Sector	Data deficient	1
42	7.08	Is dispersal of the taxon along any of the	INOT applicable	Data deficient	Low
		vectors/pathways mentioned in the previous			
		seven questions (35–41; i.e. both			
12	7.09	unintentional or intentional) likely to be Is dispersal of the taxon density dependent?	Not applicable	Data deficient	Low
-		ace attributes	INOL applicable		LOW
		Is the taxon able to withstand being out of	No	No such fact has been described.	High
	0.01	water for extended periods (e.g. minimum of			
		one or more hours) at some stage of its life			
		cycle?			
45	8.02	Is the taxon tolerant of a wide range of	Yes	High tolerance of L. gobbosus would allow species to adapt in	Medium
		water quality conditions relevant to that		response to changes in biotic and abiotic conditions and to survive	
		taxon? [In the Justification field, indicate the		control methods as for instance: removing exemplars, draining	
		relevant water quality variable(s) being		the pond.	
46	8.03	Can the taxon be controlled or eradicated in	Yes	Currently there is little experience with pumpkinseed control.	Medium
		the wild with chemical, biological, or other	-	However, options to be explored include: decreasing depth of	
		agents/means?		colonized waters by filling them with soil allowing them to	
				occasionally dry up, introducing native competitors and predators	
				and the use of biodegradable piscicides (Kleef et al. 2008).	
47	8.04	Is the taxon likely to tolerate or benefit from	Yes	This species has spread to many countries with the help of	Very high
		environmental/human disturbance?		humans.	, ,
48	8.05	Is the taxon able to tolerate salinity levels	Yes	In Europe L. gibbosus avoids swift waters and occurs in estuaries	High
		that are higher or lower than those found in		with a salinity up to 18.2 ppt.	-
		its usual environment?			
49	8.06	Are there effective natural enemies	Yes	There are several potential predators distributed in the Caucasus	Very high
		(predators) of the taxon present in the RA		region which can control L. gibbosus populations, e.g. Esox lucius,	
		area?		Sander lucioperca, Perca fluviatilis, Silurus glanis, Salmo spp, etc.	
		e change			
9. (Climate	e change e change			1
9. (Climate	e change e change Under the predicted future climatic	Increase	Own judgement	Medium
9. (Climate	te change e change Under the predicted future climatic conditions, are the risks of entry into the RA	Increase		Medium
9. (Climate	e change e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase,	Increase		Medium
<u>9. (</u> 50	<u>Climate</u> 9.01	e change e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?		Own judgement	
<u>9. (</u> 50	Climate	e change e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic	Increase Increase		Medium
<u>9. (</u> 50	<u>Climate</u> 9.01	e change e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment		Own judgement	
<u>9. (</u> 50	<u>Climate</u> 9.01	te change e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase,		Own judgement	
<u>9. (</u> 50 51	9.01 9.02	e change e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	Increase	Own judgement Own judgement	Medium
<u>9. (</u> 50 51	<u>Climate</u> 9.01	e change e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic		Own judgement	
<u>9. (</u> 50 51	9.01 9.02	te change e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within	Increase	Own judgement Own judgement	Medium
<u>9. (</u> 50 51	9.01 9.02	te change e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to	Increase	Own judgement Own judgement	Medium
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<u>9. (</u> 50 51 52	9.01 9.02	e change e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic	Increase	Own judgement Own judgement	Medium
<u>9. (</u> 50 51 52	9.01 9.02 9.03	te change e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of	Increase Increase	Own judgement Own judgement Own judgement	Medium Medium
<u>9. (</u> 50 51 52	9.01 9.02 9.03	te change e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity	Increase Increase	Own judgement Own judgement Own judgement	Medium Medium
<u>9. (</u> 50 51 52	9.01 9.02 9.03 9.04	e change e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	Increase Increase Higher	Own judgement Own judgement Own judgement Own judgement	Medium Medium Medium
<u>9. (</u> 50 51 52 53	9.01 9.02 9.03	e change e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic	Increase Increase	Own judgement Own judgement Own judgement	Medium Medium
<u>9. (</u> 50 51 52	9.01 9.02 9.03 9.04	te change e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of	Increase Increase Higher	Own judgement Own judgement Own judgement Own judgement	Medium Medium Medium
<u>9. (</u> 50 51 52 53	9.01 9.02 9.03 9.04	e change e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem	Increase Increase Higher	Own judgement Own judgement Own judgement Own judgement	Medium Medium Medium
<u>9. (</u> 50 51 52 53 54	9.01 9.02 9.03 9.04 9.05	e change e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Increase Increase Higher Higher	Own judgement Own judgement Own judgement Own judgement Own judgement	Medium Medium Medium
<u>9. (</u> 50 51 52 53 54	9.01 9.02 9.03 9.04	e change e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? Under the predicted future climatic	Increase Increase Higher	Own judgement Own judgement Own judgement Own judgement	Medium Medium Medium Medium
<u>9. (</u> 50 51 52 53 54	9.01 9.02 9.03 9.04 9.05	e change e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Increase Increase Higher Higher	Own judgement Own judgement Own judgement Own judgement Own judgement	Medium Medium Medium Medium
<u>9. (</u> 50 51 52 53 54	9.01 9.02 9.03 9.04 9.05	e change e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? Under the predicted future climatic	Increase Increase Higher Higher	Own judgement Own judgement Own judgement Own judgement Own judgement	Medium Medium Medium Medium

C+-			C S	
	Ш	51		

Statistics	
BRA	25.5
BRA Outcome	23.5
BRA+CCA	37.5
BRA+CCA Outcome	
Score partition	
A. Biogeography/Historical	11.5
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	0.0
3. Invasive elsewhere	7.5
B. Biology/Ecology	14.0
4. Undesirable (or persistence) traits	8.0
5. Resource exploitation	7.0
6. Reproduction	0.0
7. Dispersal mechanisms	-4.0
8. Tolerance attributes	3.0
C. Climate change	12.0
9. Climate change	12.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3
2. Climate, distribution and introduction risk	3 5 5
3. Invasive elsewhere	5
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2
6. Reproduction	7
7. Dispersal mechanisms	9
8. Tolerance attributes	6

	<i>.</i>
C. Climate change	6
9. Climate change	6
Sectors affected	
Commercial	11
Environmental	13
Species or population nuisance traits	15
Thresholds	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.71
BRA	0.74
CCA	0.50
Date and Time	
10/05/20	022 19:16:55

Taxon and Assessor details				
Category	Fishes and Lampreys (freshwater)			
Taxon name	Lepomis gibbosus			
Common name	pumpkinseed			
Assessor	Tatia Kuljanishvili			
Risk screening context				
Reason and socio-economic benefits	Widly introduced in Europe and Asia			
Risk assessment area	South Caucasus			
Taxonomy	Actinopteri (ray-finned fishes) > Centrarchiformes (Basses) > Centrarchidae			
Native range	The eastern North America			
Introduced range	Europe and Asia Minor			
URL	http://fishbase.org/summary/Lepomis-gibbosus.html			

			Response	Justification (references and/or other information)	Confidence
A. E	Biogeo	ography/Historical			
1. C	omest	tication/Cultivation			
1	1.01	Has the taxon been the subject of	Yes	It has been kept in aquariums	Medium
		domestication (or cultivation) for at least 20			
		generations?			
2	1.02	Is the taxon harvested in the wild and likely	Yes	Yes, this was the way how it got to Europe. They brought it as a	Very high
		to be sold or used in its live form?		sportfishishing or ornamental object	
3	1.03	Does the taxon have invasive races,	Yes	Yes. for example Lepomis macrochirus	Very high
		varieties, sub-taxa or congeners?			
2. C		e, distribution and introduction risk			
4	2.01	How similar are the climatic conditions of the	High	Climate is somehow similar. From 18 stations, 3, 4 and 9 are	Medium
		Risk Assessment (RA) area and the taxon's		above the threshold 7, 8 and 9 respectively	
		native range?			
5	2.02	What is the quality of the climate matching	Medium	The climatch data is medium	High
		data?			
6	2.03	Is the taxon already present outside of	No	No evidence	Very high
		captivity in the RA area?			
7	2.04	How many potential vectors could the taxon	>1	Aquaculture (contaminant), Recreational fisheries, pet trade.	High
		use to enter in the RA area?			
8	2.05	Is the taxon currently found in close	Yes	This species exsist in Turkey and it is likely to appiar in the RA in	High
		proximity to, and likely to enter into, the RA		the near future	
		area in the near future (e.g. unintentional			
		and intentional introductions)?			
3. I		e elsewhere			
9	3.01	Has the taxon become naturalised	Yes	Yes. It has been established in Europe.	Very high
		(established viable populations) outside its			
10	3.02	In the taxon's introduced range, are there	Yes	It has been demonstrated that this species interacts with native	Very high
		known adverse impacts to wild stocks or		species in terms of feeding, since this species is an opportunistic	
		commercial taxa?		omnivor (Rezsu & Specziar 2006) and feeds on any avalable food	
				resource (Copp et al 2017).	
11	3.03	In the taxon's introduced range, are there	Yes	It has impact on pond aquaculture (Copp et al 2017)	High
		known adverse impacts to aquaculture?			
12	3.04	In the taxon's introduced range, are there	Yes	can transmit diseases and not used for recriational fisheries	Medium
		known adverse impacts to ecosystem			
13	3.05	In the taxon's introduced range, are there	No	This subject is not well studied	Low
		known adverse socio-economic impacts?			
		y/Ecology			
		rable (or persistence) traits	1		
14	4.01	Is it likely that the taxon will be poisonous or	No	Not poisonous	Very high
		pose other risks to human health?			
15	4.02	Is it likely that the taxon will smother one or	Yes	It is likely	High
		more native taxa (that are not threatened or			
		protected)?			
16	4.03	Are there any threatened or protected taxa	No	Does not parasite	Very high
		that the non-native taxon would parasitise in			1
17		the RA area?			
- '	4.04	Is the taxon adaptable in terms of climatic	Yes	This species is considered as warm water fish, however the fact	High
- /	4.04	Is the taxon adaptable in terms of climatic and other environmental conditions, thus	Yes	that it has been established into countries with cold climate such	High
	4.04	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has	Yes		High
		Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?		that it has been established into countries with cold climate such as Canada, Norway or Switzerland, we may say that it is adaptable	-
	4.04	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web	Yes	that it has been established into countries with cold climate such as Canada, Norway or Switzerland, we may say that it is adaptable studies have documented that L. gibbosus and native fishes	High High
		Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it		that it has been established into countries with cold climate such as Canada, Norway or Switzerland, we may say that it is adaptable studies have documented that L. gibbosus and native fishes devide (Parrtition) food resources so we can not really say that	-
18	4.05	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA	No	that it has been established into countries with cold climate such as Canada, Norway or Switzerland, we may say that it is adaptable studies have documented that L. gibbosus and native fishes devide (Partition) food resources so we can not really say that they disrupt (Fobert et al 2011).	High
18	4.05	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts		that it has been established into countries with cold climate such as Canada, Norway or Switzerland, we may say that it is adaptable studies have documented that L. gibbosus and native fishes devide (Parrtition) food resources so we can not really say that	-
18 19	4.05 4.06	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No Yes	that it has been established into countries with cold climate such as Canada, Norway or Switzerland, we may say that it is adaptable studies have documented that L. gibbosus and native fishes devide (Parrtition) food resources so we can not really say that they disrupt (Fobert et al 2011). it can transmit deseases and affect the recreational fisheries	High
18 19	4.05	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or	No	that it has been established into countries with cold climate such as Canada, Norway or Switzerland, we may say that it is adaptable studies have documented that L. gibbosus and native fishes devide (Partition) food resources so we can not really say that they disrupt (Fobert et al 2011).	High
18 19	4.05 4.06	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and	No Yes	that it has been established into countries with cold climate such as Canada, Norway or Switzerland, we may say that it is adaptable studies have documented that L. gibbosus and native fishes devide (Parrtition) food resources so we can not really say that they disrupt (Fobert et al 2011). it can transmit deseases and affect the recreational fisheries	High
18 19 20	4.05 4.06 4.07	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA	No Yes No	that it has been established into countries with cold climate such as Canada, Norway or Switzerland, we may say that it is adaptable studies have documented that L. gibbosus and native fishes devide (Partition) food resources so we can not really say that they disrupt (Fobert et al 2011). it can transmit deseases and affect the recreational fisheries no information avalable	High High Low
18 19 20	4.05 4.06	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA Is it likely that the taxon will host, and/or	No Yes	that it has been established into countries with cold climate such as Canada, Norway or Switzerland, we may say that it is adaptable studies have documented that L. gibbosus and native fishes devide (Parrtition) food resources so we can not really say that they disrupt (Fobert et al 2011). it can transmit deseases and affect the recreational fisheries	High
18 19 20	4.05 4.06 4.07	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA Is it likely that the taxon will host, and/or act as a vector for, recognised pests and	No Yes No	that it has been established into countries with cold climate such as Canada, Norway or Switzerland, we may say that it is adaptable studies have documented that L. gibbosus and native fishes devide (Partition) food resources so we can not really say that they disrupt (Fobert et al 2011). it can transmit deseases and affect the recreational fisheries no information avalable	High High Low
18 19 20	4.05 4.06 4.07	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel	No Yes No	that it has been established into countries with cold climate such as Canada, Norway or Switzerland, we may say that it is adaptable studies have documented that L. gibbosus and native fishes devide (Partition) food resources so we can not really say that they disrupt (Fobert et al 2011). it can transmit deseases and affect the recreational fisheries no information avalable	High High Low
18 19 20 21	4.05 4.06 4.07 4.08	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA Is ti likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area?	No Yes No Yes	that it has been established into countries with cold climate such as Canada, Norway or Switzerland, we may say that it is adaptable studies have documented that L. gibbosus and native fishes devide (Parrtition) food resources so we can not really say that they disrupt (Fobert et al 2011). it can transmit deseases and affect the recreational fisheries no information avalable it is likely	High High Low Medium
18 19 20 21	4.05 4.06 4.07	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area? Is it likely that the taxon will achieve a body	No Yes No	that it has been established into countries with cold climate such as Canada, Norway or Switzerland, we may say that it is adaptable studies have documented that L. gibbosus and native fishes devide (Partition) food resources so we can not really say that they disrupt (Fobert et al 2011). it can transmit deseases and affect the recreational fisheries no information avalable it is likely it is a small bodied fish, common length 10 cm, however	High High Low
18 19 20 21	4.05 4.06 4.07 4.08	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area? Is it likely that the taxon will achieve a body size that will make it more likely to be	No Yes No Yes	that it has been established into countries with cold climate such as Canada, Norway or Switzerland, we may say that it is adaptable studies have documented that L. gibbosus and native fishes devide (Parrtition) food resources so we can not really say that they disrupt (Fobert et al 2011). it can transmit deseases and affect the recreational fisheries no information avalable it is likely	High High Low Medium
18 19 20 21 22	4.05 4.06 4.07 4.08 4.09	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area? Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity?	No Yes No Yes Yes	that it has been established into countries with cold climate such as Canada, Norway or Switzerland, we may say that it is adaptable studies have documented that L. gibbosus and native fishes devide (Parrtition) food resources so we can not really say that they disrupt (Fobert et al 2011). it can transmit deseases and affect the recreational fisheries no information avalable it is likely it is a small bodied fish, common length 10 cm, however individuals can reach 40 cm.	High High Low Medium Medium
18 19 20 21 22	4.05 4.06 4.07 4.08	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA Is ti likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area? Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity? Is the taxon capable of sustaining itself in a	No Yes No Yes	that it has been established into countries with cold climate such as Canada, Norway or Switzerland, we may say that it is adaptable studies have documented that L. gibbosus and native fishes devide (Partition) food resources so we can not really say that they disrupt (Fobert et al 2011). it can transmit deseases and affect the recreational fisheries no information avalable it is likely it is a small bodied fish, common length 10 cm, however	High High Low Medium
18 19 20 21 22	4.05 4.06 4.07 4.08 4.09	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area? Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity?	No Yes No Yes Yes	that it has been established into countries with cold climate such as Canada, Norway or Switzerland, we may say that it is adaptable studies have documented that L. gibbosus and native fishes devide (Parrtition) food resources so we can not really say that they disrupt (Fobert et al 2011). it can transmit deseases and affect the recreational fisheries no information avalable it is likely it is a small bodied fish, common length 10 cm, however individuals can reach 40 cm.	High High Low Medium Medium

24	4.11	Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa?	No	No information	Medium
25	4.12	Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions	Yes	Yes it is likely	Medium
		by way of a dormant form)?			
5. R	Resourc	e exploitation			
26	5.01	Is the taxon likely to consume threatened or	Yes	No information avalable	Low
		protected native taxa in the RA area?		AL 1 10 1	
27	5.02	Is the taxon likely to sequester food	No	No. Less likely	High
		resources (including nutrients) to the detriment of native taxa in the RA area?			
6. R	Reprodu				
	6.01	Is the taxon likely to exhibit parental care	Yes	it is known that males build and guard nests which contributes to	Very high
		and/or to reduce age-at-maturity in response		its successful reproduction	
		to environmental conditions?			
29	6.02	Is the taxon likely to produce viable gametes	Yes	It is possible, however, there is no information avalable	Medium
20	6.03	or propagules (in the RA area)? Is the taxon likely to hybridise naturally with	No	No information available	Very high
50	0.05	native taxa?	NO		very nigh
31	6.04	Is the taxon likely to be hermaphroditic or to	No	No. Does not display asexual reproduction	Very high
		display asexual reproduction?			, -
32	6.05	Is the taxon dependent on the presence of	No	No. See:http://fishbase.org/summary/Lepomis-gibbosus.html	Very high
		another taxon (or specific habitat features)			
22	6.06	to complete its life cycle? Is the taxon known (or likely) to produce a	Yes	can produce up to 7000 eggs	Medium
55	0.00	large number of propagules or offspring	105	can produce up to 7000 eggs	
		within a short time span (e.g. < 1 year)?			
34	6.07	How many time units (days, months, years)	3	2-5 years	Medium
		does the taxon require to reach the age-at-			
		first-reproduction?			
		al mechanisms	>1	Aquagulture (contaminant) regrestional ficharias not trade local	Vorthigh
55	7.01	How many potential internal vectors/pathways could the taxon use to	>1	Aquaculture (contaminant), recreational fisheries, pet trade, local hobbysts	Very high
		disperse within the RA area (with suitable		TIODDYSUS	
36	7.02	Will any of these vectors/pathways bring the	Yes	Yes it is likely	High
		taxon in close proximity to one or more		·····,	5
		protected areas (e.g. MCZ, MPA, SSSI)?			
37	7.03	Does the taxon have a means of actively	No	No. Morphologically this species does not have a means of actively	Very high
		attaching itself to hard substrata (e.g. ship		attaching itself to hard substrata	
		hulls, pilings, buoys) such that it enhances the likelihood of dispersal?			
38	7.04	Is natural dispersal of the taxon likely to	No	No. can not be distributed as eggs.	Very high
		occur as eggs (for animals) or as propagules			· · · , · · · j.·
		(for plants: seeds, spores) in the RA area?			
39	7.05	Is natural dispersal of the taxon likely to	Yes	it is possible	High
		occur as larvae/juveniles (for animals) or as			
		fragments/seedlings (for plants) in the RA area?			
10	7.06	Are older life stages of the taxon likely to	No	Does not migrate for reproduction	Very high
		migrate in the RA area for reproduction?			
ŧ1	7.07	Are propagules or eggs of the taxon likely to	No	No. Can not be dispersed by other ananimals	Very high
	7.0-	be dispersed in the RA area by other animals?			
42	7.08	Is dispersal of the taxon along any of the	Not applicable	It has not been recorded into RA yet so this question is not	Very high
		vectors/pathways mentioned in the previous seven questions (35-41; i.e. both		applicable in this case	
		unintentional or intentional) likely to be			
13	7.09	Is dispersal of the taxon density dependent?	No	No information	Low
<i>3.</i> 7	olerand	ce attributes			
4	8.01	Is the taxon able to withstand being out of	No	No information avalable	Very high
		water for extended periods (e.g. minimum of			
		one or more hours) at some stage of its life cvcle?			
15	8.02	Is the taxon tolerant of a wide range of	Yes	temperatures and salinities	Very high
-		water quality conditions relevant to that			,
		taxon? [In the Justification field, indicate the]
		relevant water quality variable(s) being			
6	8.03	Can the taxon be controlled or eradicated in	Yes	Yes, however it is costy and sometimes inefectibve	Medium
		the wild with chemical, biological, or other			
17	8.04	agents/means? Is the taxon likely to tolerate or benefit from	Yes	Yes. it is possible	High
	0.04	environmental/human disturbance?	105		ingii
.,		Is the taxon able to tolerate salinity levels	Yes	Yes. it is possible	Low
	8.05				
	8.05	that are higher or lower than those found in			
8		its usual environment?			
8	8.05	its usual environment? Are there effective natural enemies	No	No No effective natural enemies present in RA area	Very high
8	8.06	its usual environment?	No	No No effective natural enemies present in RA area	Very high

50	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?	Increase	It was hypotheses that climate change might alert the mechanisms of transportation and introduction of non-native species. Commercial and recreational activities will increase, that itself increases the propagule pressure levels of non-native species (Hellmann et al 2008). In additon studies have shown that this species establishment increases with increasing temperatures	Very high
51	9.02	Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	Increase	yes (Zieba et al 2020)	Very high
52	9.03	Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change?	Increase	If Commercial and recreational activities will increase, it increases the chances of its occurance	Very high
53	9.04	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	Higher	Population densities will increase making them on one hand impossible to eradicate and on the other hand, affecting native organisms due to competition, that does not leave much resources for native ones.	High
4	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	No change	NO change	Medium
5	9.06	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	Higher	It will be more difficult to eradicate and economic losses will be nonreversable	High

Statistics	
Scores	
BRA	36.0
BRA Outcome	-
BRA+CCA	46.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	19.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	14.0
B. Biology/Ecology	17.0
4. Undesirable (or persistence) traits	6.0
5. Resource exploitation	5.0
6. Reproduction	2.0
7. Dispersal mechanisms	-1.0
8. Tolerance attributes	5.0
C. Climate change	10.0
9. Climate change	10.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	5
B. Biology/Ecology	3 5 5 36 12 2 7 7 9 6 6
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2
6. Reproduction	7
7. Dispersal mechanisms	9
8. Tolerance attributes	6
C. Climate change	6
9. Climate change	6
Sectors affected	
Commercial	15
Environmental	13
Species or population nuisance traits	21
Thresholds	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.75
BRA	0.74
CCA	0.83

	CCA	0.83
Date and Time		
	21/05/20	022 14:46:55

Taxon and Assessor details	axon and Assessor details						
Category	Fishes and Lampreys (freshwater)						
Taxon name	Micropterus salmoides						
Common name	largemouth bass						
Assessor	Bella Japoshvili						
Risk screening context							
Reason and socio-economic benefits	The species is known as worldwide invasive though important game fish. Not yet reported from RA						
Risk assessment area	South Caucasus						
Taxonomy	Actinopteri (ray-finned fishes) > Centrarchiformes (Basses) > Centrarchidae (Sunfishes)						
Native range	Nort America						
Introduced range	Worldwide						
URL	https://www.fishbase.de/summary/Micropterus-salmoides.html						

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
1. L	Domest	ication/Cultivation			
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	e.g. Bai, J., & Li, S. (2018). Development of largemouth bass (Micropterus salmoides) culture. Aquaculture in China: Success Stories and Modern Trends, 421-429.	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	CABI, 2022. Micropterus salmoides. In: Invasive Species Compendium. Wallingford, UK: CAB International.	High
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	Congeneres, subspecies	Very high
2 (^limate	, distribution and introduction risk			
4			High	Result of climatch algorithm	Medium
5	2.02	What is the quality of the climate matching data?	Low	Due to low accuracy of local climate data	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	No	Species is not detected in RA area	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	>1	Recreation, aquacultural, biocontrol purpose (CABI, 2022. Micropterus salmoides. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc.)	High
8	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)?	No	CABI, 2022. Micropterus salmoides. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc.	High
3.1		e elsewhere	1		
9		Has the taxon become naturalised (established viable populations) outside its	Yes	CABI, 2022. Micropterus salmoides. In: Invasive Species Compendium. Wallingford, UK: CAB International.	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	Summarised in CABI, 2022. Micropterus salmoides. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc.; Pereira, F. W., & Vitule, J. R. S. (2019). The largemouth bass Micropterus salmoides (Lacepède, 1802): impacts of a powerful freshwater fish predator outside of its native range. Reviews in Fish Biology and Fisheries, 29(3), 639-652.	Very high
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	Yes	CABI, 2022. Micropterus salmoides. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc.; Pereira, F. W., & Vitule, J. R. S. (2019). The largemouth bass Micropterus salmoides (Lacepède, 1802): impacts of a powerful freshwater fish predator outside of its native range. Reviews in Fish Biology and Fisheries, 29(3), 639-652.	Low
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	No	Not quantified	Low
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	Not quantified ever	Low
B	Biology	y/Ecology			
		able (or persistence) traits			
		Is it likely that the taxon will be poisonous or pose other risks to human health?	Yes	Large specimens can cause phisical damage to human by a sharp spines	Low
15	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	CABI, 2022. Micropterus salmoides. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc.	High
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	Yes	The species is generally carnovorous praying anything including fishes. CABI, 2022. Micropterus salmoides. In: Invasive Species Compendium. Wallingford, UK: CAB International.	Very high
		Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?	Yes	Mulhollem, J. J., Suski, C. D., & Wahl, D. H. (2015). Response of largemouth bass (Micropterus salmoides) from different thermal environments to increased water temperature. Fish physiology and biochemistry, 41(4), 833-842; Glover, D. C., DeVries, D. R., & Wright, R. A. (2012). Effects of temperature, salinity and body size on routine metabolism of coastal largemouth bass Micropterus salmoides. Journal of Fish Biology, 81(5), 1463-1478.	High
	4.05	Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA	Yes	Although not a documented evidence, this is expected based on professional judgement	Low
	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes	Although not a documented evidence, this is expected based on professional judgement	Low
20	4.07	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA	No	Although not a documented evidence, this is expected based on professional judgement	Low

21	4.08	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area?	Yes	Although not a documented evidence, this is expected based on professional judgement	High
22	4.09	Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity?	Yes	Species can reach alrge size while it can be used in captivity	High
23	4.10	Is the taxon capable of sustaining itself in a Yes CAB: range of water velocity conditions (e.g. Com		CABI, 2022. Micropterus salmoides. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc.	High
24	4.11		No	No such case is documented	Low
25	4.12	Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)?	No	No documented evidence exist	Low
		e exploitation	r		1
26	5.01	Is the taxon likely to consume threatened or protected native taxa in the RA area?	Yes	Species is agresive predator (CABI, 2022. Micropterus salmoides. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc.)	Very high
27	5.02	Is the taxon likely to sequester food resources (including nutrients) to the	Yes	Many speices in RA area are using the same ecological niche	Medium
6. F	Reprodu	detriment of native taxa in the RA area?	I		I
		Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?	Yes	Cooke, S. J., Philipp, D. P., & Weatherhead, P. J. (2002). Parental care patterns and energetics of smallmouth bass (Micropterus dolomieu) and largemouth bass (Micropterus salmoides)	Very high
29	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	No	monitored with activity transmitters. Canadian Journal of Zoology, No documented evidence exist	Low
30	6.03	Is the taxon likely to hybridise naturally with native taxa?	Yes	Morizot, D. C., Calhoun, S. W., Clepper, L. L., Schmidt, M. E., Williamson, J. H., & Carmichael, G. J. (1991). Multispecies hybridization among native and introduced centrarchid basses in central Texas. Transactions of the American Fisheries Society, 120(3), 283-289. Also a review at CABI, 2021. Micropterus salmoides (Large-mouth bass). https://www.cabi.org/isc/datasheet/74846 (accessed October	Medium
31	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	No	No such an evidece exist	High
32	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	No	The species can complete its lifecycel without any other particular species	Very high
	6.06 6.07	Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at-first-reproduction?	Yes	Only few to many thousands of eggs yearly (CABI, 2022. Micropterus salmoides. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc.) Years	High Very high
7. C	Dispersa	al mechanisms	1		4
35	7.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable	>1	Intentional, anintetntional as well as independently	High
36	7.02	Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)?	Yes	Colchis national park is vulnerable to the invasion of the species	High
	7.03	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal?	No	No such a behavoir have observed	Very high
38	7.04	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?	No	No such an evidence exists	Very high
39	7.05	Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?	Yes	Juveniles are dispersing through water currents	Medium
	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	No	Not a migrant species	High
	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No	No such an evidence is known from other areas	Very high
42	7.08	Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be	Yes	Based on professional guess due to high fecundity capabilities	Medium
		Is dispersal of the taxon density dependent?	No	Not expected	High
		ce attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more bourc) at some ctace of it. Ife	No	Not a documented evidence exist	Medium
		one or more hours) at some stage of its life cycle?			

45	8.02	Is the taxon tolerant of a wide range of	No	No documented evidnece exists	Medium
75	0.02	water quality conditions relevant to that	NO		neurum
		taxon? [In the Justification field, indicate the			
		relevant water quality variable(s) being			
46	8.03	Can the taxon be controlled or eradicated in	No	Not a successful case is known	High
-0	0.05	the wild with chemical, biological, or other	NO		ingn
		agents/means?			
47	8.04	Is the taxon likely to tolerate or benefit from	No	Not expected and no evidence exists	Medium
- /	0.04	environmental/human disturbance?	NO		neurum
48	8.05	Is the taxon able to tolerate salinity levels	No	No documented evidence exists	Medium
-0	0.05	that are higher or lower than those found in	NO		neurum
		its usual environment?			
49	8.06	Are there effective natural enemies	No	Based on professional experiance no effective natural enemies	High
15	0.00	(predators) of the taxon present in the RA	110	exist in RA area	i iigii
С. (Climate	e change			
		change			
50	9.01	Under the predicted future climatic	No change	Based on professional judgement	Low
		conditions, are the risks of entry into the RA			
		area posed by the taxon likely to increase,			
		decrease or not change?			
51	9.02	Under the predicted future climatic	No change	Based on professional judgement	Low
		conditions, are the risks of establishment			
		posed by the taxon likely to increase,			
		decrease or not change?			
52	9.03	Under the predicted future climatic	No change	Based on professional judgement	Low
		conditions, are the risks of dispersal within			
		the RA area posed by the taxon likely to			
		increase, decrease or not change?			
53	9.04	Under the predicted future climatic	Higher	Based on professional judgement	Low
		conditions, what is the likely magnitude of			
		future potential impacts on biodiversity			
		and/or ecological integrity/status?			
54	9.05	Under the predicted future climatic	Higher	Based on professional judgement	Low
		conditions, what is the likely magnitude of			
		future potential impacts on ecosystem			
		structure and/or function?			
55	9.06	Under the predicted future climatic	Higher	Based on professional judgement	Low
		conditions, what is the likely magnitude of			
		future potential impacts on ecosystem			
		services/socio-economic factors?			

Statistics

Scores	
BRA	33.0
BRA Outcome	
BRA+CCA	39.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	15.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	10.0
B. Biology/Ecology	18.0
4. Undesirable (or persistence) traits	9.0
5. Resource exploitation	7.0
6. Reproduction	4.0
7. Dispersal mechanisms	0.0
8. Tolerance attributes	-2.0
C. Climate change	6.0
9. Climate change	6.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	5
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2
6. Reproduction	
7. Dispersal mechanisms	9
8. Tolerance attributes	6
C. Climate change	6
9. Climate change	6
Sectors affected	
Commercial	16
Environmental	12
Species or population nuisance traits	15
Threahalda	
Thresholds	
BRA BRA+CCA	-

Confidence

BRA+CCA BRA 0.62 0.67

	CCA	0.25
Date and Time		
	16/05/2022	14:49:32

Taxon and Assessor details			
Category	Fishes and Lampreys (freshwater)		
Taxon name	Micropterus salmoides		
Common name	largemouth bass		
Assessor	Giorgi Epitashvili		
Risk screening context			
Reason and socio-economic benefits	The species is exploited heavily for angling in its native range, and was spread primarily for		
Risk assessment area	South Caucasus		
Taxonomy	Micropterus salmoides (Lacepède, 1802)		
Native range	North America: St. Lawrence - Great Lakes, and Mississippi River basins from southern Quebec to		
Introduced range	M. salmoides has been introduced outside of its native range in North America to other areas of		
URL	https://www.fishbase.de/summary/3385		

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
1. L	Domest	ication/Cultivation			
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	Largemouth bass is native to North America. The species has been introduced widely as a game fish and is now cosmopolitan. It was introduced into Taiwan (China) in the mid 1970s, and following successful artificial propagation in 1983 was introduced into Guangdong in mainland China. This species is now distributed throughout the country and has become a major freshwater product in Chinese aquaculture.	Very high
-	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	Largemouth bass fishing in Florida is an important source of revenue, contributing \$632 million per year to the economy of Florida (U.S. Department of Interior et al. 2006).	Very high
	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	Its establishment, once introduced, was likely assisted by its aggressive feeding strategy, which has caused considerable declines in native prey fishes, where introduced (Scott and Crossman, 1973; Welcomme, 1988).	Very high
. (Climate	, distribution and introduction risk			
1	2.01	How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range?	Medium	World Map of the Köppen-Geiger climate classification	Medium
5	2.02	What is the quality of the climate matching data?	Medium	World Map of the Köppen-Geiger climate classification	Medium
•	2.03	Is the taxon already present outside of captivity in the RA area?	No	This species is not currently found in the Caucasus region.	Very high
;	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	This species may have entered in the region by human for aquacultural purposes.	Very high
	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)?	Yes	Micropterus salmoides have been recorded as introduced into Iran and Iraq including the Tigris-Euphrates.	Very high
. I	nvasive	e elsewhere			
÷	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	The largemouth bass has been introduced into many other regions and countries due to its popularity as a sport fish. It causes the decline, displacement or extinctions of species in its new habitat through predation and competition, for example in Namibia. They are also an invasive species in the Canadian province of New Brunswick, and are on the watch list across much of the far	Very high
.0	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	M. salmoides has been introduced outside of its native range in North America to other areas of North America, South America, Europe, Asia and Pacific islands (i.e. Fiji, Hawaii). The species is exploited heavily for angling in its native range, and was spread primarily for recreational angling opportunities and secondarily for aquaculture. Its establishment, once introduced, was likely assisted by its aggressive feeding strategy, which has caused considerable declines in native prey fishes, where introduced (Scott and Crossman. 1973; Welcomme. 1988).	Very high
	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	Yes	No such study has been conducted	Low
	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	Yes	No such study has been conducted	Low
	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	Yes	No such study has been conducted	Low
		y/Ecology			
	<i>Indesir</i> 4.01	able (or persistence) traits Is it likely that the taxon will be poisonous or	No	This species does not pose a threat to humans.	Very high
5	4.02	pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	Introduced bass usually affect populations of small native fishes through predation, sometimes resulting in the decline or extinction of such species (Minckley 1973, in Fuller, 1999). Studies have shown that largemouth bass are capable of displacing native species, even predatory species such as northern	Very high
6	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	Yes	There are several protected and threatened species in the SC region which would be affected by M. salmoides: e.g. Salmo spp, Acipenser spp, Luciobarbus capito, etc.	Very high

17					
	4.04	Is the taxon adaptable in terms of climatic	Yes	M. salmoides has been introduced outside of its native range in	Very high
		and other environmental conditions, thus		North America to other areas of North America, South America,	, -
		enhancing its potential persistence if it has		Europe, Asia and Pacific islands (i.e. Fiji, Hawaii). Its	
		invaded or could invade the RA area?		establishment, once introduced, was likely assisted by its	
				aggressive feeding strategy, which has caused considerable	
				declines in native prey fishes, where introduced (Scott and	
				Crossman, 1973; Welcomme, 1988). It seems that this species	
				has adapted to new environmental conditions and it is expected	
				that it will be successfully established in the Caucasus region if it	
18	4.05	Is the taxon likely to disrupt food-web	Yes	The probability of this is quite high if this species is distributed in	Very high
10	1.05	structure/function in aquatic ecosystems if it	105	the region.	very mgn
10	4.06	has invaded or is likely to invade the RA	Vac	The probability of this is high if this species distributed in the	High
19	4.06	Is the taxon likely to exert adverse impacts	Yes	The probability of this is high if this species distributed in the	High
20	4.07	on ecosystem services in the RA area?	N. 1. 1. 1.1	region.	
20	4.07	Is it likely that the taxon will host, and/or	Not applicable	Data deficient	Low
		act as a vector for, recognised pests and			
		infectious agents that are endemic in the RA			
21	4.08	Is it likely that the taxon will host, and/or	Not applicable	Data deficient	Low
		act as a vector for, recognised pests and			
		infectious agents that are absent from (novel			
		to) the RA area?			
22	4.09	Is it likely that the taxon will achieve a body	Yes	Max length is 97.0 cm TL male/unsexed; common length : 40.0	Very high
		size that will make it more likely to be		cm TL male/unsexed; max. published weight: 10.1 kg. This	
		released from captivity?		species is a active subject for aquaculture.	
23	4.10	Is the taxon capable of sustaining itself in a	Yes	Inhabit lakes, ponds, swamps, and backwaters and pools of	High
		range of water velocity conditions (e.g.		creeks, and small to large rivers. Usually found over mud or sand	
		versatile in habitat use)?		and common in impoundments. They prefer quiet, clear water and	
24	4.11	Is it likely that the taxon's mode of existence	Yes	No similar study has been conducted	Low
		(e.g. excretion of by-products) or behaviours			
		(e.g. feeding) will reduce habitat quality for			
		native taxa?			
25	4.12	Is the taxon likely to maintain a viable	Yes	No similar study has been conducted	Low
		population even when present in low			
		densities (or persisting in adverse conditions			
		by way of a dormant form)?			
5 A	Resourc	ce exploitation			
	5.01	Is the taxon likely to consume threatened or	Yes	M. salmoides is a predator fish and the probability of that is very	Very high
	5.01	protected native taxa in the RA area?		high. Potential prays includes threathened and protected species	• c. ,g
				e.g.: Acipenser spp, Salmo spp, etc.	
27	5.02	Is the taxon likely to sequester food	Yes	M. salmoides is a predator fish and the probability of that is very	Very high
	5.52				· · · · · · · · · ·
				high	
		resources (including nutrients) to the detriment of native taxa in the BA area?		high.	
	Reprodu	detriment of native taxa in the RA area?		high.	
6. F	Reprodu	detriment of native taxa in the RA area?	Yes		Very high
6. F		detriment of native taxa in the RA area? Inction Is the taxon likely to exhibit parental care	Yes	Male largemouth bass care for their offspring from fertilization	Very high
6. F		detriment of native taxa in the RA area? action Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response	Yes	Male largemouth bass care for their offspring from fertilization until the offspring disperse after becoming capable of avoiding	Very high
6. F 28	6.01	detriment of native taxa in the RA area? <i>iction</i> Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?		Male largemouth bass care for their offspring from fertilization until the offspring disperse after becoming capable of avoiding predators.	
6. F 28		detriment of native taxa in the RA area? <i>iction</i> Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes	Yes	Male largemouth bass care for their offspring from fertilization until the offspring disperse after becoming capable of avoiding	Very high Very high
<u>6.</u> 28 29	6.01 6.02	detriment of native taxa in the RA area? action Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)?	No	Male largemouth bass care for their offspring from fertilization until the offspring disperse after becoming capable of avoiding predators. Currently this species does not occurring in the SC region.	Very high
<u>6.</u> 28 29	6.01	detriment of native taxa in the RA area? action Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with		Male largemouth bass care for their offspring from fertilization until the offspring disperse after becoming capable of avoiding predators.	
6. F 28 29 30	6.01 6.02 6.03	detriment of native taxa in the RA area? <i>iction</i> Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa?	No Yes	Male largemouth bass care for their offspring from fertilization until the offspring disperse after becoming capable of avoiding predators. Currently this species does not occurring in the SC region. Such a fact is not known	Very high
6. F 28 29 30	6.01 6.02	detriment of native taxa in the RA area? <i>iction</i> Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to	No	Male largemouth bass care for their offspring from fertilization until the offspring disperse after becoming capable of avoiding predators. Currently this species does not occurring in the SC region. Such a fact is not known The study details the severity of intersex in a population of	Very high
6. F 28 29 30	6.01 6.02 6.03	detriment of native taxa in the RA area? <i>iction</i> Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa?	No Yes	Male largemouth bass care for their offspring from fertilization until the offspring disperse after becoming capable of avoiding predators. Currently this species does not occurring in the SC region. Such a fact is not known The study details the severity of intersex in a population of largemouth bass near a major metropolitan area, which	Very high
6. F 28 29 30	6.01 6.02 6.03	detriment of native taxa in the RA area? <i>iction</i> Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to	No Yes	Male largemouth bass care for their offspring from fertilization until the offspring disperse after becoming capable of avoiding predators. Currently this species does not occurring in the SC region. Such a fact is not known The study details the severity of intersex in a population of largemouth bass near a major metropolitan area, which represents an important contribution to the understanding of fish	Very high
6. F 28 29 30	6.01 6.02 6.03	detriment of native taxa in the RA area? <i>iction</i> Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to	No Yes	Male largemouth bass care for their offspring from fertilization until the offspring disperse after becoming capable of avoiding predators. Currently this species does not occurring in the SC region. Such a fact is not known The study details the severity of intersex in a population of largemouth bass near a major metropolitan area, which represents an important contribution to the understanding of fish reproductive ecology in ecosystems with a history of	Very high
6. F 28 29 30 31	6.016.026.036.04	detriment of native taxa in the RA area? <i>iction</i> Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction?	No Yes Yes	Male largemouth bass care for their offspring from fertilization until the offspring disperse after becoming capable of avoiding predators. Currently this species does not occurring in the SC region. Such a fact is not known The study details the severity of intersex in a population of largemouth bass near a major metropolitan area, which represents an important contribution to the understanding of fish reproductive ecology in ecosystems with a history of environmental disturbance and recovery such as the Illinois River	Very high Low Medium
6. F 28 29 30 31	6.016.026.036.04	detriment of native taxa in the RA area? <i>iction</i> Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of	No Yes	Male largemouth bass care for their offspring from fertilization until the offspring disperse after becoming capable of avoiding predators. Currently this species does not occurring in the SC region. Such a fact is not known The study details the severity of intersex in a population of largemouth bass near a major metropolitan area, which represents an important contribution to the understanding of fish reproductive ecology in ecosystems with a history of	Very high
6. F 28 29 30 31	6.016.026.036.04	detriment of native taxa in the RA area? <i>iction</i> Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features)	No Yes Yes	Male largemouth bass care for their offspring from fertilization until the offspring disperse after becoming capable of avoiding predators. Currently this species does not occurring in the SC region. Such a fact is not known The study details the severity of intersex in a population of largemouth bass near a major metropolitan area, which represents an important contribution to the understanding of fish reproductive ecology in ecosystems with a history of environmental disturbance and recovery such as the Illinois River	Very high Low Medium
<u>6.</u> 28 29 30 31	6.01 6.02 6.03 6.04 6.05	detriment of native taxa in the RA area? <i>iction</i> Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	No Yes Yes No	Male largemouth bass care for their offspring from fertilization until the offspring disperse after becoming capable of avoiding predators. Currently this species does not occurring in the SC region. Such a fact is not known The study details the severity of intersex in a population of largemouth bass near a major metropolitan area, which represents an important contribution to the understanding of fish reproductive ecology in ecosystems with a history of environmental disturbance and recovery such as the Illinois River No such fact has been described.	Very high Low Medium High
<u>6.</u> 28 29 30 31	6.016.026.036.04	detriment of native taxa in the RA area? <i>iction</i> Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a	No Yes Yes	Male largemouth bass care for their offspring from fertilization until the offspring disperse after becoming capable of avoiding predators. Currently this species does not occurring in the SC region. Such a fact is not known The study details the severity of intersex in a population of largemouth bass near a major metropolitan area, which represents an important contribution to the understanding of fish reproductive ecology in ecosystems with a history of environmental disturbance and recovery such as the Illinois River No such fact has been described. One female can produce anywhere from 3,000-45,000 offspring at	Very high Low Medium
<u>6.</u> 28 29 30 31	6.01 6.02 6.03 6.04 6.05	detriment of native taxa in the RA area? <i>iction</i> Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring	No Yes Yes No	Male largemouth bass care for their offspring from fertilization until the offspring disperse after becoming capable of avoiding predators. Currently this species does not occurring in the SC region. Such a fact is not known The study details the severity of intersex in a population of largemouth bass near a major metropolitan area, which represents an important contribution to the understanding of fish reproductive ecology in ecosystems with a history of environmental disturbance and recovery such as the Illinois River No such fact has been described.	Very high Low Medium High
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6. F 28 29 30 31 32 33 33 34	6.01 6.02 6.03 6.04 6.05 6.06 6.07	detriment of native taxa in the RA area? <i>iction</i> Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	No Yes Yes No Yes	Male largemouth bass care for their offspring from fertilization until the offspring disperse after becoming capable of avoiding predators. Currently this species does not occurring in the SC region. Such a fact is not known The study details the severity of intersex in a population of largemouth bass near a major metropolitan area, which represents an important contribution to the understanding of fish reproductive ecology in ecosystems with a history of environmental disturbance and recovery such as the Illinois River No such fact has been described. One female can produce anywhere from 3,000-45,000 offspring at once but the average is 4,000. Largemouth bass usually reach sexual maturity and begin spawning when they are about a year old.	Very high Low Medium High Medium Very high
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6. F 28 29 30 31 32 33 33 34	6.01 6.02 6.03 6.04 6.05 6.06 6.07	detriment of native taxa in the RA area? <i>iction</i> Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to	No Yes Yes No Yes	Male largemouth bass care for their offspring from fertilization until the offspring disperse after becoming capable of avoiding predators. Currently this species does not occurring in the SC region. Such a fact is not known The study details the severity of intersex in a population of largemouth bass near a major metropolitan area, which represents an important contribution to the understanding of fish reproductive ecology in ecosystems with a history of environmental disturbance and recovery such as the Illinois River No such fact has been described. One female can produce anywhere from 3,000-45,000 offspring at once but the average is 4,000. Largemouth bass usually reach sexual maturity and begin spawning when they are about a year old.	Very high Low Medium High Medium Very high
<u>6.</u> <i>F</i> 28 30 31 31 32 33 34 <i>7. L</i> 35	6.01 6.02 6.03 6.04 6.05 6.06 6.07 7.01	detriment of native taxa in the RA area? <i>iction</i> Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)?	No Yes No Yes 1	Male largemouth bass care for their offspring from fertilization until the offspring disperse after becoming capable of avoiding predators. Currently this species does not occurring in the SC region. Such a fact is not known The study details the severity of intersex in a population of largemouth bass near a major metropolitan area, which represents an important contribution to the understanding of fish reproductive ecology in ecosystems with a history of environmental disturbance and recovery such as the Illinois River No such fact has been described. One female can produce anywhere from 3,000-45,000 offspring at once but the average is 4,000. Largemouth bass usually reach sexual maturity and begin spawning when they are about a year old.	Very high Low Medium High Medium Very high
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6. F 28 29 30 31 31 32 33 34 35 36 37	6.01 6.02 6.03 6.04 6.05 6.06 6.06 7.01 7.02 7.03	detriment of native taxa in the RA area? <i>iction</i> Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pillings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules	No Yes No Yes 1 One Yes No	Male largemouth bass care for their offspring from fertilization until the offspring disperse after becoming capable of avoiding predators. Currently this species does not occurring in the SC region. Such a fact is not known The study details the severity of intersex in a population of largemouth bass near a major metropolitan area, which represents an important contribution to the understanding of fish reproductive ecology in ecosystems with a history of environmental disturbance and recovery such as the Illinois River No such fact has been described. One female can produce anywhere from 3,000-45,000 offspring at once but the average is 4,000. Largemouth bass usually reach sexual maturity and begin spawning when they are about a year old. This species can be spread by artificial introduction by humans into the SC region. If the species spreads in the region, it is likely that it will penetrate protected areas as well. This species does not has such means.	Very high Low Medium High Medium Very high Very high Very high
6. F 28 29 30 31 32 33 34 7. I 35 36 37 38	6.01 6.02 6.03 6.04 6.05 6.06 6.06 6.07 7.01 7.02 7.03 7.04	detriment of native taxa in the RA area? Iction Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)?	No Yes Yes No Yes No No	Male largemouth bass care for their offspring from fertilization until the offspring disperse after becoming capable of avoiding predators. Currently this species does not occurring in the SC region. Such a fact is not known The study details the severity of intersex in a population of largemouth bass near a major metropolitan area, which represents an important contribution to the understanding of fish reproductive ecology in ecosystems with a history of environmental disturbance and recovery such as the Illinois River No such fact has been described. One female can produce anywhere from 3,000-45,000 offspring at once but the average is 4,000. Largemouth bass usually reach sexual maturity and begin spawning when they are about a year old. This species can be spread by artificial introduction by humans into the SC region. If the species spreads in the region, it is likely that it will penetrate protected areas as well. This species does not has such means. Currently, this species is not common in the region.	Very high Low Medium High Medium Very high Very high Very high Very high
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<u>6.</u> <i>F</i> 28 30 31 32 33 33 34 <u>7. <i>I</i></u> 35 36 37 38	6.01 6.02 6.03 6.04 6.05 6.06 6.06 6.07 7.01 7.02 7.03 7.04	detriment of native taxa in the RA area? <i>iction</i> Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA	No Yes Yes No Yes No No	Male largemouth bass care for their offspring from fertilization until the offspring disperse after becoming capable of avoiding predators. Currently this species does not occurring in the SC region. Such a fact is not known The study details the severity of intersex in a population of largemouth bass near a major metropolitan area, which represents an important contribution to the understanding of fish reproductive ecology in ecosystems with a history of environmental disturbance and recovery such as the Illinois River No such fact has been described. One female can produce anywhere from 3,000-45,000 offspring at once but the average is 4,000. Largemouth bass usually reach sexual maturity and begin spawning when they are about a year old. This species can be spread by artificial introduction by humans into the SC region. If the species spreads in the region, it is likely that it will penetrate protected areas as well. This species does not has such means. Currently, this species is not common in the region.	Very high Low Medium High Medium Very high Very high Very high Very high
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	7 0 7	Are propagaled as again of the tay or librate to	No	Currently, this encodes is not common in the region	Vom (high
41	7.07	Are propagules or eggs of the taxon likely to	No	Currently, this species is not common in the region.	Very high
42	7.08	be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the		Data deficient	Low
42	7.00	vectors/pathways mentioned in the previous	not applicable		LOW
		seven questions (35–41; i.e. both			
		unintentional or intentional) likely to be			
12	7.09	Is dispersal of the taxon density dependent?	Not applicable	Data deficient	Low
		ce attributes			LOW
		Is the taxon able to withstand being out of	No	No such fact has been described.	High
44	0.01	water for extended periods (e.g. minimum of	NO	No such fact flas been described.	nign
		one or more hours) at some stage of its life			
		cvcle?			
45	8.02	Is the taxon tolerant of a wide range of	Yes	Largemouth bass are more tolerant of low dissolved oxygen and	Medium
75	0.02	water quality conditions relevant to that	103	pH than are smallmouth bass (Scott and Crossman 1973; Lasenby	inculum
		taxon? [In the Justification field, indicate the		and Kerr 2000).	
		relevant water guality variable(s) being			
46	8.03	Can the taxon be controlled or eradicated in	Yes	Options for M. dolomieu control include biological control,	Medium
		the wild with chemical, biological, or other		chemical control, environmental manipulation, and physical	
1		agents/means?		removal (Loppnow et al. 2013).	
47	8.04	Is the taxon likely to tolerate or benefit from	Yes	This species has spread by humans in many regions of the world.	Very high
		environmental/human disturbance?			- /
48	8.05	Is the taxon able to tolerate salinity levels	Yes	Largemouth bass are generally found in low salinity environments	High
		that are higher or lower than those found in		< 5 ppt, but have also been shown to be tolerant of salinities up	5
		its usual environment?		to 12 ppt (Peer et al., 2006).	
49	8.06	Are there effective natural enemies	Yes	There are several potential predators distributed in the SC region	Very high
		(predators) of the taxon present in the RA		which can controll the M. salmoides populations: Esox lucius,	
		area?		Sander lucioperca, Silurus glanis, Salmo spp, etc.	
		e change		Sander Iucioperca, Silurus glanis, Salmo spp, etc.	
9. (Climate	e change			
9. (Climate	e change e change Under the predicted future climatic	Increase	Sander lucioperca, Silurus glanis, Salmo spp, etc.	Medium
9. (Climate	e change e change Under the predicted future climatic conditions, are the risks of entry into the RA	Increase		Medium
9. (Climate	e change e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase,	Increase		Medium
<u>9. (</u> 50	<u>Climate</u> 9.01	e change change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?		Own judgement	
<u>9. (</u> 50	Climate	e change change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic	Increase Increase		Medium
<u>9. (</u> 50	<u>Climate</u> 9.01	e change change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment		Own judgement	
<i>9. (</i> 50	<u>Climate</u> 9.01	e change change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase,		Own judgement	
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<u>9. (</u> 50 51	9.01 9.02	e change change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to	Increase	Own judgement Own judgement	Medium
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BRA BRA 38. BRA Outcome BRA+CCA 50. BRA+CCA Outcome Score partition 17. A. Biogeography/Historical 17. 1. Domestication/Cultivation 4.0 2. Climate, distribution and introduction risk 0.0 3. Invasive elsewhere 13. B. Biology/Ecology 21. 4. Undesirable (or persistence) traits 9.0 5. Resource exploitation 7.0 6. Reproduction 6.0 7. Dispersal mechanisms -4.0 8. Tolerance attributes 3.0 9. Climate change 12.0 9. Climate change 12.0 9. Climate change 12.0 9. Climate change 12.0 9. Climate change 12.0 9. Climate change 12.0 1. Domestication/Cultivation 3.0 2. Climate, distribution and introduction risk 3.0 3. Invasive elsewhere 3.0 3. Invasive elsewhere 3.0 3. Biology/Ecology 3.0	Statistics	
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A. Biogeography/Historical 17. 1. Domestication/Cultivation 4.0 2. Climate, distribution and introduction risk 0.0 3. Invasive elsewhere 13.3 B. Biology/Ecology 21.0 4. Undesirable (or persistence) traits 9.0 5. Resource exploitation 7.0 6. Reproduction 6.0 7. Dispersal mechanisms -4.0 8. Tolerance attributes 3.0 C. Climate change 12.0 9. Climate change 12.0 9. Climate change 12.0 9. Climate change 12.0 9. Climate change 12.0 9. Climate change 12.0 9. Climate change 12.0 9. Climate change 12.0 10. Domestication/Cultivation 11 1. Domestication/Cultivation 12 2. Climate, distribution and introduction risk 3.0 3. Invasive elsewhere 3.0 B. Biology/Ecology 3	BRA+CCA Outcome	-
1. Domestication/Cultivation 4.1 2. Climate, distribution and introduction risk 0.0 3. Invasive elsewhere 13.1 B. Biology/Ecology 21.1 4. Undesirable (or persistence) traits 9.0 5. Resource exploitation 7.0 6. Reproduction 6.0 7. Dispersal mechanisms -4.0 8. Tolerance attributes 3.0 9. Climate change 12.0 9. Climate change 12.0 9. Climate change 12.0 9. Climate change 12.0 9. Climate change 12.0 9. Climate change 12.0 9. Climate change 12.0 9. Climate change 12.0 9. Climate change 12.0 10. Domestication/Cultivation 11 1. Domestication/Cultivation 12 2. Climate, distribution and introduction risk 13 3. Invasive elsewhere 14 B. Biology/Ecology 33	Score partition	
2. Climate, distribution and introduction risk 0.0 3. Invasive elsewhere 13.1 B. Biology/Ecology 21.0 4. Undesirable (or persistence) traits 9.0 5. Resource exploitation 7.0 6. Reproduction 6.0 7. Dispersal mechanisms -4.0 8. Tolerance attributes 3.0 C. Climate change 12.0 9. Climate change 12.0 9. Climate change 12.0 Answered Questions 52 A. Biogeography/Historical 1.0 1. Domestication/Cultivation 3.0 2. Climate, distribution and introduction risk 32 3. Invasive elsewhere 32 B. Biology/Ecology 33	A. Biogeography/Historical	17.5
3. Invasive elsewhere 13. B. Biology/Ecology 21. 4. Undesirable (or persistence) traits 9.0 5. Resource exploitation 7.0 6. Reproduction 6.0 7. Dispersal mechanisms -4.0 8. Tolerance attributes 3.0 C. Climate change 12.0 9. Climate change 12.0 9. Climate change 12.0 9. Climate change 12.0 9. Climate change 12.0 9. Climate change 12.0 9. Climate change 12.0 9. Climate change 12.0 9. Climate change 12.0 9. Climate change 12.0 9. Climate change 12.0 9. Climate change 12.0 10. Domestication/Cultivation 5.0 2. Climate, distribution and introduction risk 3.0 3. Invasive elsewhere 3.0 8. Biology/Ecology 3.0	1. Domestication/Cultivation	4.0
B. Biology/Ecology 21. 4. Undesirable (or persistence) traits 9.0 5. Resource exploitation 7.0 6. Reproduction 6.0 7. Dispersal mechanisms -4.0 8. Tolerance attributes 3.0 9. Climate change 12.0 9. Climate change 12.1 9. Climate change 12.1 10. Domestication/Cultivation 5.1 2. Climate, distribution and introduction risk 3.1 3. Invasive elsewhere 3.1 B. Biology/Ecology 3.3	2. Climate, distribution and introduction risk	0.0
4. Undesirable (or persistence) traits 9.0 5. Resource exploitation 7.0 6. Reproduction 6.1 7. Dispersal mechanisms -4.0 8. Tolerance attributes 3.1 9. Climate change 12.1 9. Climate change 12.1 9. Climate change 12.1 10. Domestication/Cultivation 11 1. Domestication/Cultivation 3.1 2. Climate, distribution and introduction risk 3.1 3. Invasive elsewhere 3.3 B. Biology/Ecology 3.3	3. Invasive elsewhere	13.5
5. Resource exploitation 7.0 6. Reproduction 6.0 7. Dispersal mechanisms -4.0 8. Tolerance attributes 3.0 C. Climate change 12.0 9. Climate change 12.0 Total Stimate change 1.0 Answered Questions Total Stimate change 1.0 Answered Questions Total Stimate change 1.0 Climate change 1.0 Climate distribution and introduction risk 2. Climate, distribution and introduction risk 3.0 3. Invasive elsewhere 3.0 B. Biology/Ecology	B. Biology/Ecology	21.0
6. Reproduction 6.1 7. Dispersal mechanisms -4.0 8. Tolerance attributes 3.1 C. Climate change 12.1 9. Climate change 12.1 9. Climate change 12.1 9. Climate change 12.1 10. Dimeter change 12.1 11. Domestication/Cultivation 55 2. Climate, distribution and introduction risk 55 3. Invasive elsewhere 55 B. Biology/Ecology 33	4. Undesirable (or persistence) traits	9.0
7. Dispersal mechanisms -4. 8. Tolerance attributes 3.0 C. Climate change 12.0 9. Climate change 12.0 Answered Questions Total 55 55 A. Biogeography/Historical 11 1. Domestication/Cultivation 55 2. Climate, distribution and introduction risk 55 3. Invasive elsewhere 55 B. Biology/Ecology 36	5. Resource exploitation	7.0
8. Tolerance attributes 3.1 C. Climate change 12.1 9. Climate change 12.1 Answered Questions Total 55 55 A. Biogeography/Historical 11 1. Domestication/Cultivation 55 2. Climate, distribution and introduction risk 55 3. Invasive elsewhere 55 B. Biology/Ecology 33	6. Reproduction	6.0
C. Climate change 12. 9. Climate change 12. Answered Questions Total 52 A. Biogeography/Historical 1. 1. Domestication/Cultivation 2. 2. Climate, distribution and introduction risk 3. 3. Invasive elsewhere 3. B. Biology/Ecology 33	7. Dispersal mechanisms	-4.0
9. Climate change 12. Answered Questions Total 55 A. Biogeography/Historical 11 1. Domestication/Cultivation 2 2. Climate, distribution and introduction risk 3. Invasive elsewhere 5 B. Biology/Ecology 33	8. Tolerance attributes	3.0
Answered Questions Total 55 A. Biogeography/Historical 11 1. Domestication/Cultivation 22 2. Climate, distribution and introduction risk 33 3. Invasive elsewhere 34 B. Biology/Ecology 34	C. Climate change	12.0
Total 55 A. Biogeography/Historical 11 1. Domestication/Cultivation 2 2. Climate, distribution and introduction risk 3 3. Invasive elsewhere 3 B. Biology/Ecology 3	9. Climate change	12.0
A. Biogeography/Historical 1: 1. Domestication/Cultivation 2: 2. Climate, distribution and introduction risk 3: 3. Invasive elsewhere 3: B. Biology/Ecology 3:	Answered Questions	
1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology	Total	55
B. Biology/Ecology 3	A. Biogeography/Historical	13
B. Biology/Ecology 3	1. Domestication/Cultivation	3
B. Biology/Ecology 3	2. Climate, distribution and introduction risk	5
	3. Invasive elsewhere	
	B. Biology/Ecology	36
	4. Undesirable (or persistence) traits	12
5. Resource exploitation	5. Resource exploitation	2
	6. Reproduction	
	7. Dispersal mechanisms	9
8. Tolerance attributes	8. Tolerance attributes	6

C. Climate change	6
9. Climate change	6
Sectors affected	
Commercial	14
Environmental	16
Species or population nuisance traits	22
Thresholds	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.73
BRA	0.76
CCA	0.50
Date and Time	
13/05/20	022 13:01:39

Taxon and Assessor details					
Category	Fishes and Lampreys (freshwater)				
Taxon name	Micropterus salmoides				
Common name	largemouth bass				
Assessor	Tatia Kuljanishvili				
Risk screening context					
Reason and socio-economic benefits	Introduced worldwide for angling and aquaculture				
Risk assessment area	South Caucasus				
Taxonomy	Actinopteri (ray-finned fishes) > Centrarchiformes (Basses) > Centrarchidae				
Native range	North America: St. Lawrence - Great Lakes, and Mississippi River basins from southern Quebec to				
Introduced range	has been introduced outside of its native range in North America to other areas of North America,				
URL	https://www.fishbase.se/summary/Micropterus-salmoides.html				

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
		ication/Cultivation			
1	1.01	Has the taxon been the subject of	Yes	It can be farmed in aquaponic systems and fish farms	High
		domestication (or cultivation) for at least 20			
		generations?			
2	1.02	Is the taxon harvested in the wild and likely	Yes	Yes. Taxon is harvested in wild and is sold in its live form	Very high
		to be sold or used in its live form?			
3	1.03	Does the taxon have invasive races,	Yes	for example Micropterus dolomieu	High
		varieties, sub-taxa or congeners?			
2. (Climate	, distribution and introduction risk			
4	2.01	How similar are the climatic conditions of the	High	Very similar. out of 19 stations 15 are similar at the value of 9	High
		Risk Assessment (RA) area and the taxon's			
		native range?			
5	2.02	What is the quality of the climate matching	Low	quality is low	Medium
		data?			
6	2.03	Is the taxon already present outside of	No	No evidence	Very high
		captivity in the RA area?			
7	2.04	How many potential vectors could the taxon	>1	Recreational fisheries, aquaculture	High
		use to enter in the RA area?			
8	2.05	Is the taxon currently found in close	Yes	Iran	High
		proximity to, and likely to enter into, the RA			
		area in the near future (e.g. unintentional			
		and intentional introductions)?			
		e elsewhere			
9	3.01	Has the taxon become naturalised	Yes	has become naturalised in several countries see the list:	Very high
		(established viable populations) outside its		https://www.cabi.org/isc/datasheet/74846	
10	3.02	In the taxon's introduced range, are there	Yes	reduction of pray species	High
		known adverse impacts to wild stocks or			
		commercial taxa?			
11	3.03	In the taxon's introduced range, are there	No	No adverse impacts to aquaculture are known.	Low
		known adverse impacts to aquaculture?			
12	3.04	In the taxon's introduced range, are there	No	transmission of deseases	High
		known adverse impacts to ecosystem			
13	3.05	In the taxon's introduced range, are there	No	NOt assessed	Low
		known adverse socio-economic impacts?			
		y/Ecology			
		able (or persistence) traits	1		1
14	4.01	Is it likely that the taxon will be poisonous or	No	Not poisonous	Very high
		pose other risks to human health?			
15	4.02	Is it likely that the taxon will smother one or	Yes	can cause the reduction of abundance of prey taxa and compete	High
		more native taxa (that are not threatened or		with natives for resources	
		protected)?			
16	4.03	Are there any threatened or protected taxa	No	does not parasite	Very high
		that the non-native taxon would parasitise in			
		the RA area?			

17	4.04	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?	Yes	M. salmoides prefers warm freshwater habitats within lakes, ponds, rivers and streams. Temperatures from 26.6-27.7°C were preferred during a field study in Ontario, Canada (Scott and Crossman, 1973). The species has wide habitat tolerances that allow it to colonize many temperate and sub-tropical freshwaters. However, the species may tolerate ice-cover for up to six months in its native range, suggesting that ice cover within the introduced range may not hinder dispersal success providing that suitably warm temperatures (>15.6°C) exist during spawning season. Within its native range the species frequents relatively shallow waters and is seldom captured from depths greater then 7 m (Scott and Crossman, 1973). Coincident with its introduction for sport and aquaculture, it may inhabit artificial waterbodies (e.g., irrigation ditches; canals) that possess suitably warm water for spawning (>15.6°C; Scott and Crossman, 1973). Survival within ice-covered lakes is possible assuming sufficient dissolved oxygen (> 1.5 mg/L). Relatively clear waters are preferred due to the species' method of visual predation, although the species is known from certain turbid systems where it presumably relies on scent and vibration to obtain prey items. Aquatic vegetation (both emergent and submergent) is usually necessary, as are mud, sand or gravel substrates that provide spawning habitat. The species preferentially occupies the nearshore (littoral) area of lakes due to the abundance of aquatic vegetation and warm temperatures. Feeding is reduced at water temperatures below 10°C, or may cease entirely during winter and spawning periods (Scott and	High
18	4.05	Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA	Yes	it is likely	Medium
19	4.06	Is the taxon likely to exert adverse impacts	Yes	transmission of dieseases	Low
20	4.07	on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and	Yes	No info	Low
21	4.08	infectious agents that are endemic in the RA Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel	Yes	It is possible	High
22	4.09	to) the RA area? Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity?	Yes	yes. See: https://www.fishbase.se/summary/Micropterus- salmoides.html	High
23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)?	No	No information avalable	High
24	4.11		No	No information avalable	High
25	4.12	Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)?	Yes	yes. Most likely	High
_		e exploitation Is the taxon likely to consume threatened or	Voc	it is possible	Medium
		protected native taxa in the RA area? Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?	No	No information available	Medium
	eprodu	iction			
		Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?	Yes	parental care	Very high
29	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	It is likely	High
		Is the taxon likely to hybridise naturally with native taxa?	No	No information available	Very high
31	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	No	No. Does not display asexual reproduction	Very high
32	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	No	No. See: https://www.fishbase.se/summary/Micropterus- salmoides.html	Very high
33	6.06	Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)?	Yes	A nest may produce between 751-11,457 fry, averaging 5000- 7000 individuals https://www.cabi.org/isc/datasheet/74846#tohabitat	High
34	6.07	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	1	1 year	Very high
		al mechanisms	I		·
7. C		How many potential internal	>1	Recreational fisheries, Aquaculture	Very high
35	7.01	vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the	Yes	it is possible	High

37			I		1
	7.03	Does the taxon have a means of actively	No	No. Morphologically this species does not have a means of actively	Very high
		attaching itself to hard substrata (e.g. ship		attaching itself to hard substrata	
		hulls, pilings, buoys) such that it enhances			
		the likelihood of dispersal?			
38	7.04	Is natural dispersal of the taxon likely to	No	No. can not be distributed as eggs.	High
		occur as eggs (for animals) or as propagules			
		(for plants: seeds, spores) in the RA area?			
39	7.05	Is natural dispersal of the taxon likely to	Yes	yes. it could be possible	Very high
		occur as larvae/juveniles (for animals) or as			
		fragments/seedlings (for plants) in the RA			
		area?			
10	7.06	Are older life stages of the taxon likely to	No	does not migrate	High
		migrate in the RA area for reproduction?			
11	7.07	Are propagules or eggs of the taxon likely to	No	no. Can not be dispersed by other ananimals	Very high
		be dispersed in the RA area by other animals?			
2	7.08	Is dispersal of the taxon along any of the	Not applicable	it is not yet introduced	Medium
		vectors/pathways mentioned in the previous			
		seven questions (35-41; i.e. both			
		unintentional or intentional) likely to be			
3	7.09	Is dispersal of the taxon density dependent?	No	No information avalable	Low
3. 1	Toleran	ce attributes			
		Is the taxon able to withstand being out of	No	no	Very high
		water for extended periods (e.g. minimum of			
		one or more hours) at some stage of its life			
		cycle?			
-5	8.02	Is the taxon tolerant of a wide range of	No	Can not tolerate low oxygen environment and is very sensitive to	Medium
		water quality conditions relevant to that	-	temperature and to human-produced chemicals.	
		taxon? [In the Justification field, indicate the		·· · · · · · · · · · · · · · · · · · ·	
		relevant water quality variable(s) being			
6	8.03	Can the taxon be controlled or eradicated in	Yes	yes but it is costy and sometimes ineffective	Low
-		the wild with chemical, biological, or other		,	
		agents/means?			
17	8.04	Is the taxon likely to tolerate or benefit from	No	no information avalable	Medium
	0.0.	environmental/human disturbance?			. iculani
18	8.05	Is the taxon able to tolerate salinity levels	No	No documentation	Very high
	0.00	that are higher or lower than those found in			ter, mgn
	1				
19	8.06	its usual environment?	No	no. No effective natural enemies present in RA area	Very high
19	8.06	Are there effective natural enemies	No	no. No effective natural enemies present in RA area	Very high
		Are there effective natural enemies (predators) of the taxon present in the RA	No	no. No effective natural enemies present in RA area	Very high
; (Climat	Are there effective natural enemies (predators) of the taxon present in the RA e change	No	no. No effective natural enemies present in RA area	Very high
C. (Climat Climate	Are there effective natural enemies (predators) of the taxon present in the RA e change e change			
). (Climat	Are there effective natural enemies (predators) of the taxon present in the RA e change change Under the predicted future climatic	No	no. No effective natural enemies present in RA area	Very high Very high
). (Climat Climate	Are there effective natural enemies (predators) of the taxon present in the RA e change Under the predicted future climatic conditions, are the risks of entry into the RA			
) <u> (</u>	Climat Climate	Are there effective natural enemies (predators) of the taxon present in the RA e change change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase,			
<u>).</u> 0	Climate Climate 9.01	Are there effective natural enemies (predators) of the taxon present in the RA e change change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?	Increase	increases	Very high
<u>). (</u> 0	Climat Climate	Are there effective natural enemies (predators) of the taxon present in the RA e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic			
<u>). (</u> 0	Climate Climate 9.01	Are there effective natural enemies (predators) of the taxon present in the RA e change change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment	Increase	increases	Very high
<u>.</u> (Climate Climate 9.01	Are there effective natural enemies (predators) of the taxon present in the RA e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase,	Increase	increases	Very high
0 1	Climat <i>Climate</i> 9.01 9.02	Are there effective natural enemies (predators) of the taxon present in the RA e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	Increase Increase	increases	Very high High
<u> (</u> 0	Climate Climate 9.01	Are there effective natural enemies (predators) of the taxon present in the RA e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic	Increase	increases	Very high
<u> (</u> 0	Climat <i>Climate</i> 9.01 9.02	Are there effective natural enemies ((predators) of the taxon present in the RA e change change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within	Increase Increase	increases	Very high High
<u> (</u> 0	Climat <i>Climate</i> 9.01 9.02	Are there effective natural enemies ((predators) of the taxon present in the RA e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to	Increase Increase	increases	Very high High
1 2	Climat 2000 9.01 9.02 9.03	Are there effective natural enemies (predators) of the taxon present in the RA e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change?	Increase Increase Increase	increases	Very high High Very high
1 2	Climat <i>Climate</i> 9.01 9.02	Are there effective natural enemies (predators) of the taxon present in the RA e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic	Increase Increase	increases	Very high High
1 2	Climat 2000 9.01 9.02 9.03	Are there effective natural enemies (predators) of the taxon present in the RA e change change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of	Increase Increase Increase	increases	Very high High Very high
1 2	Climat 2000 9.01 9.02 9.03	Are there effective natural enemies ((predators) of the taxon present in the RA e change change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity	Increase Increase Increase	increases	Very high High Very high
1 2 3	Climate 9.01 9.02 9.03 9.04	Are there effective natural enemies (predators) of the taxon present in the RA e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	Increase Increase Increase Higher	increases increases increases	Very high High Very high
1 2 3	Climat 2000 9.01 9.02 9.03	Are there effective natural enemies (predators) of the taxon present in the RA e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic	Increase Increase Increase	increases	Very high High Very high
1 2 3	Climate 9.01 9.02 9.03 9.04	Are there effective natural enemies ((predators) of the taxon present in the RA e change change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of	Increase Increase Increase Higher	increases increases increases	Very high High Very high
1 2 3	Climate 9.01 9.02 9.03 9.04	Are there effective natural enemies ((predators) of the taxon present in the RA e change change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological intearity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem	Increase Increase Increase Higher	increases increases increases	Very high High Very high
1 2 3	Climate 9.01 9.02 9.03 9.04 9.05	Are there effective natural enemies (predators) of the taxon present in the RA e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Increase Increase Higher Higher	increases increases increases higher higher	Very high High Very high Very high
1 2 3	Climate 9.01 9.02 9.03 9.04	Are there effective natural enemies (predators) of the taxon present in the RA e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? Under the predicted future climatic	Increase Increase Increase Higher	increases increases increases	Very high High Very high
1 2 3	Climate 9.01 9.02 9.03 9.04 9.05	Are there effective natural enemies (predators) of the taxon present in the RA e change change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Increase Increase Higher Higher	increases increases increases higher higher	Very high High Very high Very high
1 2 3	Climate 9.01 9.02 9.03 9.04 9.05	Are there effective natural enemies (predators) of the taxon present in the RA e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? Under the predicted future climatic	Increase Increase Higher Higher	increases increases increases higher higher	Very high High Very high Very high

Statistics

Scores	
BRA	22.0
BRA Outcome	-
BRA+CCA	34.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	11.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	6.0
B. Biology/Ecology	11.0
4. Undesirable (or persistence) traits	8.0
5. Resource exploitation	5.0
6. Reproduction	3.0
7. Dispersal mechanisms	-1.0
8. Tolerance attributes	-4.0
C. Climate change	12.0
9. Climate change	12.0

Answered Questions				
Total	55			
A. Biogeography/Historical	13			
1. Domestication/Cultivation	3			
2. Climate, distribution and introduction risk	5			
3. Invasive elsewhere	5			
B. Biology/Ecology	36			
4. Undesirable (or persistence) traits	12			
5. Resource exploitation	2			
6. Reproduction	7			
7. Dispersal mechanisms	9			
8. Tolerance attributes	6			
C. Climate change	6			
9. Climate change	6			
Sectors affected				
Commercial	11			
Environmental	12			
Species or population nuisance traits	14			
species of population hursance traits	14			

Thresholds	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.76
BRA	0.74
CCA	0.92
Date and Time	

21/05/2022 14:52:44

Faxon and Assessor details						
Category	Fishes and Lampreys (freshwater)					
Taxon name	Mugil cephalus					
Common name	flathead grey mullet					
Assessor	Bella Japoshvili					
Risk screening context						
Reason and socio-economic benefits	The species have been translocated to the Caspian Sea and have important economic value for the					
Risk assessment area	South Caucasus					
Taxonomy	Actinopteri (ray-finned fishes) > Mugiliformes (Mullets) > Mugilidae (Mullets)					
Native range	Cosmopolitan					
Introduced range	Caspian Sea					
URL	https://www.fishbase.de/summary/Mugil-cephalus.html					

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
		ication/Cultivation			
1	1.01	Has the taxon been the subject of	No	Not spawning in captivity (within RA area). Yelghi, S., Shirangi, S.	High
		domestication (or cultivation) for at least 20		A., Ghorbani, R., & Khoshbavar Rostami, H. A. (2012). Annual	
		generations?		cycle of ovarian development and sex hormones of grey mullet	
				(Mugil cephalus) in captivity. Iranian Journal of Fisheries	
2	1.00	To the Assess because the disc the social end literation		Sciences, 11(3), 693-703.	Mara a bi a b
2	1.02	Is the taxon harvested in the wild and likely	Yes	Yelghi, S., Shirangi, S. A., Ghorbani, R., & Khoshbavar Rostami,	Very high
		to be sold or used in its live form?		H. A. (2012). Annual cycle of ovarian development and sex	
				hormones of grey mullet (Mugil cephalus) in captivity. Iranian	
2	1.03	Does the taxon have invasive races,	No	Journal of Fisheries Sciences, 11(3), 693-703. No other species within this genus or different races as invasive	Medium
5	1.05	varieties, sub-taxa or congeners?	NO	are known	neulum
2 (limate	, distribution and introduction risk			
<u>4</u>	2.01	How similar are the climatic conditions of the	High	Result of climatch algorithm	Medium
·	2.01	Risk Assessment (RA) area and the taxon's			. icului
		native range?			
5	2.02	What is the quality of the climate matching	Low	Due to low accuracy of local climate data	High
-		data?			
6	2.03	Is the taxon already present outside of	No	Bogutskaya N, Kijashko P, Naseka AM, Orlova MI. 2013.	Low
		captivity in the RA area?		Identification keys for fish and invertebrates of the Caspian Sea.]
				Vol. 1. Fish and molluscs, Tovarishestvo Naucnikh Izdanii KMK.]
				(In Russian) Moscow, p. 443.]
7	2.04	How many potential vectors could the taxon	One	Human mediated translocation	High
		use to enter in the RA area?			-
8	2.05	Is the taxon currently found in close	Yes	Species is historically known from Black Sea coastline while it	High
		proximity to, and likely to enter into, the RA		have been trayed to introduced in Caspian Sea	
		area in the near future (e.g. unintentional			
		and intentional introductions)?			
		e elsewhere			1
9	3.01	Has the taxon become naturalised	Yes	VAZIRZADEH, A., & EZHDEHAKOSHPOUR, A. (2015). The effects	Low
		(established viable populations) outside its		of different hormonal treatments on the oocyte maturation in wild	
		native range?		grey mullet (Mugil cephalus) collected from the Iranian coastal	
				waters of the Oman Sea. Iranian journal of Ichthyology, 1(1), 17-	
10	3.02	In the taxon's introduced range, are there	No	Not a documented evidence is available	Low
		known adverse impacts to wild stocks or			
1.1	2.02	commercial taxa?	NI-		1
11	3.03	In the taxon's introduced range, are there	No	Not evaluated, and in general is generally poorly understood	Low
12	3.04	known adverse impacts to aquaculture? In the taxon's introduced range, are there	No	Not known, understudied	Low
12	3.04	known adverse impacts to ecosystem	NO		LOW
13	3.05	In the taxon's introduced range, are there	No	Not known however less possible	Low
13	5.05	known adverse socio-economic impacts?	NO	Not known nowever less possible	LOW
B. F	Biology	y/Ecology			
		able (or persistence) traits			
		Is it likely that the taxon will be poisonous or	No	The species is harmless	Very high
		pose other risks to human health?			
15	4.02	Is it likely that the taxon will smother one or	No	Not such a species are within RA area	Low
		more native taxa (that are not threatened or]
	i i	more native taxa (that are not threatened of			1
		protected)?			
16	4.03	protected)? Are there any threatened or protected taxa	No	The species is not parasite nor predator (not ocnsider the plancton	Low
16	4.03	protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in	No	The species is not parasite nor predator (not ocnsider the plancton feedenig behavior)	Low
		protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?		feedenig behavior)	
	4.03 4.04	protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic	No Yes	feedenig behavior) M cephalus is known to adopt a wide variety of environmental	Low Very high
		protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus		feedenig behavior) M cephalus is known to adopt a wide variety of environmental conditions. Albaret, J - J., 2003. Mugilidae. p. 601-611 In C.	
		protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has		feedenig behavior) M cephalus is known to adopt a wide variety of environmental conditions. Albaret, J - J., 2003. Mugilidae. p. 601-611 In C. Lévêque, D. Paugy and G.G. Teugels (eds.) Faune des poissons	
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		protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has		feedenig behavior) M cephalus is known to adopt a wide variety of environmental conditions. Albaret, J - J., 2003. Mugilidae. p. 601-611 In C. Lévêque, D. Paugy and G.G. Teugels (eds.) Faune des poissons d'eaux douce et saumâtres de l'Afrique de l'Ouest, Tome 2. Coll. Faune et Flore tropicales 40. Musée Royal de l'Afrique Centrale,	
		protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has		feedenig behavior) M cephalus is known to adopt a wide variety of environmental conditions. Albaret, J - J., 2003. Mugilidae. p. 601-611 In C. Lévêque, D. Paugy and G.G. Teugels (eds.) Faune des poissons d'eaux douce et saumâtres de l'Afrique de l'Ouest, Tome 2. Coll. Faune et Flore tropicales 40. Musée Royal de l'Afrique Centrale, Tervuren, Belgique, Museum National d'Histoire Naturalle, Paris,	
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17		protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web		feedenig behavior) M cephalus is known to adopt a wide variety of environmental conditions. Albaret, J - J., 2003. Mugilidae. p. 601-611 In C. Lévêque, D. Paugy and G.G. Teugels (eds.) Faune des poissons d'eaux douce et saumâtres de l'Afrique de l'Ouest, Tome 2. Coll. Faune et Flore tropicales 40. Musée Royal de l'Afrique Centrale, Tervuren, Belgique, Museum National d'Histoire Naturalle, Paris,	
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17	4.04	protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA	Yes	feedenig behavior) M cephalus is known to adopt a wide variety of environmental conditions. Albaret, J - J., 2003. Mugilidae. p. 601-611 In C. Lévêque, D. Paugy and G.G. Teugels (eds.) Faune des poissons d'eaux douce et saumâtres de l'Afrique de l'Ouest, Tome 2. Coll. Faune et Flore tropicales 40. Musée Royal de l'Afrique Centrale, Tervuren, Belgique, Museum National d'Histoire Naturalle, Paris, France and Institut de Recherche pour le Développement. Paris. No documented evidence exist	Very high
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17	4.04	protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA	Yes	feedenig behavior) M cephalus is known to adopt a wide variety of environmental conditions. Albaret, J - J., 2003. Mugilidae. p. 601-611 In C. Lévêque, D. Paugy and G.G. Teugels (eds.) Faune des poissons d'eaux douce et saumâtres de l'Afrique de l'Ouest, Tome 2. Coll. Faune et Flore tropicales 40. Musée Royal de l'Afrique Centrale, Tervuren, Belgique, Museum National d'Histoire Naturalle, Paris, France and Institut de Recherche pour le Développement. Paris. No documented evidence exist Not expected. Generally this species have important economic value and introduced area it is also thought to bring additional	Very high
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17 18 19	4.04 4.05 4.06	protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes No	feedenig behavior) M cephalus is known to adopt a wide variety of environmental conditions. Albaret, J - J., 2003. Mugilidae. p. 601-611 In C. Lévêque, D. Paugy and G.G. Teugels (eds.) Faune des poissons d'eaux douce et saumâtres de l'Afrique de l'Ouest, Tome 2. Coll. Faune et Flore tropicales 40. Musée Royal de l'Afrique Centrale, Tervuren, Belgique, Museum National d'Histoire Naturalle, Paris, France and Institut de Recherche pour le Développement. Paris. No documented evidence exist Not expected. Generally this species have important economic value and introduced area it is also thought to bring additional economic benefit within RA area	Very high Low

1 1						
Interctions agents that are absent from (now low low low low low low low low low l	21	4.08	Is it likely that the taxon will host, and/or	Yes	Although no documented evidence exists, it can bring such a new	Low
bit bit Bit Bit Bit Bit Bit Bit Bit Bit Bit B					pest/parasite in new areas	
2 1.00 Ext likely that the taxes will active a body 'Yes No occumented evidence exist though species an grow as though species angrow as the species angrow as though species angrow as though species angrow as though species and species angrow as though species and species						
Bits that will make it more likely to be released from captive? Set 100 cm that might triger to make them release space/burial captive? 4 1.10 fm captive? Yes Mapped for the release space/burial captive? Mapped for the release space/burial captive? 4 1.11 fm captive? No Addition No 4 1.11 fm captive? No Addition No 4 1.11 fm captive? No Addition No 5 1.11 fm captive? No Addition No Addition 6 1.11 fm captive? No Addition No Addition 7 0.11 fm captive? No Addition fm captive? No Eased on professional judgment Low 7 0.12 fm captive? Sade dom professional judgment Low Investor fm captive? Low 7 0.12 fm captive? No Sade dom professional judgment Low Investor fm captive? 7 0.21 fm captive? No Sade dom professional judgment Low Investor fm captive? 8 0.21 fm captive? No <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>						
Intersect from captury captury captury 1.1.0 Intersect water value insuring itself in a regiment of the sector secto	22	4.09		Yes		Low
3 1.0 Is the taxon capable of sustaining itself in a reader draw valocity conditions (s.p. matching in habitat uself) Meta Mttps://www.fishbase.de/summary/Mugli-cephalus.html Medium 4 4.11 Construction of by-products) of networks of the habitation (s.p. cecing) will reduce habitat quality for native taxon in value in an intervalue in a value in a product of the product of the habitat quality for native taxon in the present in low density in the present in low density in the present in the density of the densin density of the density of the density of the densin density of					as 100 cm that might triger to make them release aquacultural	
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Averable in habitat usig)? Autor of a state-constant state of a state-constant state of a state-constant state of a state-constant state of a state-constant state of a state-constant state of a state-constant state of a state-constant state of a state-constant state of a state-constant state of a state-constant state of a state-constant sta	23	4.10		Yes	https://www.fishbase.de/summary/Mugil-cephalus.html	Medium
4 1.1.1 IS II likely that the taxon's mode of existence (i.e.g., excertion of by-products) or behaviours (i.e.g., excerting) No Atthough no documented evidence exists Low 5 1.1.2 IS II betanni likely to maintain a viable population even when present in low densities (or presisting) in adverse conditions No Atthough no documented evidence exist we suppose that species is not able to maintain population in low density Low 7 20.1 IS the taxon likely to answrite froat extension likely to achieve a conditions No No No 8 0.10 IS the taxon likely to achieve a conditions No No such behaviour is characteristic for that species Medium 8 0.11 IS the taxon likely to achieve a subscription of the taxon likely to achieve a subscription are subscription are subscription are subscription are subscription are subscription are subscription are subscription are subscription are subscription are subscription and subscription are subscription and subscription are subscription are subscription and subscription are subscription a						
Image: Section of by-products) or behaviours (e.g. excettion of by-products) or behaviours (e.g. excettion of by-products) or behaviours able to maintain public on by-way of a domant form? Although to documented evidence exits we suppose that species is not able to maintain public on the section of an evidence exits we suppose that species is not able to maintain public we service application Low 7 5.0.1 Status taxa No Based on professional judgment Low 7 5.0.2 Status taxa No Based on professional judgment Low 7 5.0.2 Status taxa No Based on professional judgment Low 7 5.0.2 Status taxa It is the taxon likely to schulze taxa No No such behaviour is characteristic for that species in or programmental conditions? Modum 8 6.0.1 Status taxa No No such behaviour is characteristic for that species in or programmental conditions? Medium 9 0.0.2 Is the taxon likely to schulze taxa No No taxic behaviour is characteristic for that species during its lifeccyte in another taxa? Medium 1 0.0.3 Is the taxon likely to schulze taxa? No No taxic behaviour is characteristic for that species is reproducing existsic Medium						
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service taxe? Atthough no documented evidence exist we suppose that species is now have present in low density by available of anomany in the service conditions? Low Researce exploration Solar State Sta						
5 1.12 Is the taxon likely to maintain a viable population in low density Low 6 Composition new when present in low density In solution in low density Low 6 Solution and domains form? In solution in low density Low 7 Solution and domains form? In split the fact that species is mostly feedeng in marine in low density Low 7 Solution is the taxon likely to consume threatened or in exercise can complete to other species while populations are usually large Low 7 Solution likely to consume threatened or in the RA area? No such behaviour is characteristic for that species and other species while populations are usually large Low 7 Solution likely to consumerate constitution? No No such behaviour is characteristic for that species Medium 8 Solution likely to schlute value in the response in or runnage large number of propagates or offspring No such an evidence exist Medium 10 Los that species is independent from any other species during its lifecycle High 11 Species is independent from any other species during its lifecycle High 12 Los is that species in the A area? Medium 14 Low minite in t						
Is not able to maintain population even when present in low density is not able to maintain population in low density 0 0 0.00						
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agents/means?	7. <u>1</u> 35 36 37 38 39 40 41 41 42 43 . <u>7</u> 44	7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 0leran 8.01	does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? Examples of the taxon density dependent? Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in	One No No Yes No No Yes Yes Yes	Human mediated translocation There is not such a protected areas in in the RA area Speices is not capable for such a behavior Naturally it is nearly impossible to attain the RA area Yelghi, S., Shirangi, S. A., Ghorbani, R., & Khoshbavar Rostami, H. A. (2012). Annual cycle of ovarian development and sex hormones of grey mullet (Mugil cephalus) in captivity. Iranian Journal of Fisheries Sciences, 11(3), 693-703. Not expected, no documented evidence exists No such fact has ever been recorded Translocation is usually happens with large amount of propagules Not expected and no documented evidence exists Not expected and no documented evidence exists Oxygen concentration, Salinity, temperature, turbidity	High High Very high High Very high High Very high High Low High
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47	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	No	Not expected	Low
48	8.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	No	Not expected based on professinal judgment	Medium
49	8.06	Are there effective natural enemies (predators) of the taxon present in the RA	No	Not an effective natural enemies are there based on professional experience	Low
C . (Climate	e change			
		change			
		Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?	No change	Based on professional judgement	Low
51	9.02	Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	No change	Based on professional judgement	Low
52	9.03	Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change?	Increase	Based on professional judgement	Low
53	9.04	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	Higher	Based on professional judgement	Low
	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Higher	Based on professional judgement	Low
55	9.06	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	Higher	Based on professional judgement	Low

Statistics	
Scores	
BRA	6.0
BRA Outcome	
BRA+CCA	14.0
BRA+CCA Outcome	
Score partition	2
A. Biogeography/Historical	2. 0.0
1. Domestication/Cultivation 2. Climate, distribution and introduction risk	0.0
2. Climate, distribution and introduction risk 3. Invasive elsewhere	2.0
B. Biology/Ecology	2. 4.
4. Undesirable (or persistence) traits	4.
5. Resource exploitation	4.
6. Reproduction	2.
7. Dispersal mechanisms	-2.
8. Tolerance attributes	-2.
C. Climate change	<u> </u>
9. Climate change	<u> </u>
Answered Questions	0.
Total	5:
A. Biogeography/Historical	1
1. Domestication/Cultivation	
2. Climate, distribution and introduction risk	
<i>3. Invasive elsewhere</i>	
B. Biology/Ecology	3
4. Undesirable (or persistence) traits	1
5. Resource exploitation	
6. Reproduction	
7. Dispersal mechanisms	
8. Tolerance attributes	
C. Climate change	
9. Climate change	
Sectors affected	
Commercial	
	· · · ·

Thresholds	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.51
BRA	0.54
CCA	0.25

Date and Time		
	16/05	/2022 16:35:29

axon and Assessor details					
Category Fishes and Lampreys (freshwater)					
Taxon name	Mugil cephalus				
Common name	flathead grey mullet				
Assessor	Giorgi Epitashvili				
Risk screening context					
Reason and socio-economic benefits	Mugil cephalus is an important food fish species in the mullet family Mugilidae.				
Risk assessment area	South Caucasus				
Taxonomy	Mugil cephalus Linnaeus, 1758				
Native range	Cosmopolitan in coastal waters of the tropical, subtropical and temperate zones of all seas. Eastern				
Introduced range	This species was first introduced to be cultured with carp in Israel in 1957. Also introduced into				
URL	https://www.fishbase.se/summary/Mugil-cephalus.html				

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
		ication/Cultivation			
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	Flathead grey mullet is a very important aquaculture species in Egypt, where its farming has been traditional in the hosha system in the delta region for centuries. Since the early 1960s, flathead grey mullet has also been cultured in semi-intensive ponds with tilapia and carps in Egypt. In the Russian Federation mullet aquaculture has been practised in the Black Sea and Caspian Sea	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	regions since 1930. This species was first introduced to be Trials on the artificial propagation of flathead grey mullet have been carried out, but most of the commercial aquaculture production of flathead grey mullet still depends on fry collected from the wild, which is cheaper.	Very high
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	No	The impacts of this species are currently unknown, as no studies have been done to determine how it has affected ecosystems in the invaded range. The absence of data does not equate to lack of effects. It does, however, mean that research is required to evaluate effects before conclusions can be made.	Medium
2. C	Climate,	, distribution and introduction risk			
	2.01	How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range?	High	This species is naturally distributed in the SC region.	Very high
5	2.02	What is the quality of the climate matching data?	High	This species is naturally distributed in the SC region.	Very high
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	This species is naturally distributed in the SC region.	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	This species is naturally distributed and enters in the SC region.	Very high
8	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)?	Yes	This species is naturally distributed in the SC region and also in the neighbouring countries (Russia, Turkey, Iran).	Very high
3 I	nvasive	e elsewhere			
	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	M. cephalus successfully established in the Caspian Sea basin where it hit from the Black Sea basin via the Don Canal or by accidentally, as a result of aquacultural activities (Kuljanishvili et	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	No	No such study has been conducted	Medium
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	No such study has been conducted	Medium
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	No	No such study has been conducted	Medium
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	No such study has been conducted	Medium
B. E	Biology	//Ecology			
4. L	Indesir	able (or persistence) traits			
14	4.01	Is it likely that the taxon will be poisonous or pose other risks to human health?	No	This species does not pose a threat to humans.	Very high
15	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	There is a probability of that because M. cephalus is a competitor fish to native taxa.	Medium
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	Yes	There is a probability of that because M. cephalus is a common fish in the SC region and it is expected to compete with local threathened/protected species.	High
17	4.04	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?	Yes	M. cephalus is naturally distributed in the SC region.	Very high
18	4.05	Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA	No	M. cephalus is naturally distributed in the SC region and there is no such risk.	Very high
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	M. cephalus is naturally distributed in the SC region and there is no such risk.	Very high
20	4.07	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA	Not applicable	Data deficient	Low

	4.08	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel	Not applicable	Data deficient	Low
22	4.09	to) the RA area? Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity?	Yes	Average length of M. cephalus is 75 cm, weight 5-6 kg, sometimes 12 kg (Ninua et al. 2013). Because of these properties, this fish is widely used in aquaculture.	Very high
23	4.10	Is the taxon capable of sustaining itself in a	No	Adults are found in coastal waters, often entering estuaries and	Medium
		range of water velocity conditions (e.g. versatile in habitat use)?		rivers, sometimes far-up-river, lagoons and hypersaline environments. They are usually in schools over sand or mud	
24	4.11	Is it likely that the taxon's mode of existence	No	No such fact has been detected	Medium
- '		(e.g. excretion of by-products) or behaviours			riculum
		(e.g. feeding) will reduce habitat quality for			
		native taxa?			
25	4.12	Is the taxon likely to maintain a viable	Not applicable	No such study has been conducted	Low
		population even when present in low densities (or persisting in adverse conditions			
		by way of a dormant form)?			
5. F	Resourd	ce exploitation			
26	5.01	Is the taxon likely to consume threatened or	No	No such fact has been documented	High
		protected native taxa in the RA area?			
27	5.02	Is the taxon likely to sequester food	Yes	As a native species to the Caucasus region, M. cephalus should be	High
		resources (including nutrients) to the		competitive to other native species in feeding.	
5 6	Reprodu	detriment of native taxa in the RA area?			
		Is the taxon likely to exhibit parental care	No	Once eggs are laid, adult striped mullet do not provide any further	Very high
		and/or to reduce age-at-maturity in response		parental care (Texas Parks 2005).	- ,
		to environmental conditions?			
29	6.02	Is the taxon likely to produce viable gametes	Yes	M. cephalus is naturally reproduces in the SC region.	Very high
20	6.00	or propagules (in the RA area)?	No	No such study has been and that	Madi
5U	6.03	Is the taxon likely to hybridise naturally with native taxa?	No	No such study has been conducted	Medium
31	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	Yes	The present study documents the occurrence of an intersex condition in a natural population of mullet Mugil cephalus	Very high
22	6 05	In the tayon denoted at the first of the first sector of the first	No	(Dhanasekar et al. 2018).	Madi
52	6.05	Is the taxon dependent on the presence of	No	This species does not have such requirements.	Medium
		another taxon (or specific habitat features) to complete its life cycle?			
33	6.06	Is the taxon known (or likely) to produce a	Yes	Fecundity of M. cephalus is 2-8 million eggs (Ninua et al. 2013).	Very high
	2.50	large number of propagules or offspring			,
		within a short time span (e.g. < 1 year)?			
34	6.07	How many time units (days, months, years)	3	This fish sexually mature at 3 to 4 years.	Very high
	i i	The second second second second second second second second second second second second second second second se	1		1
		does the taxon require to reach the age-at-			
7 -		first-reproduction?			
		first-reproduction? al mechanisms	One	This species is naturally disperse within the SC ration	High
	<i>Dispers</i> 7.01	first-reproduction? al mechanisms How many potential internal	One	This species is naturally disperse within the SC region.	High
		first-reproduction? al mechanisms	One	This species is naturally disperse within the SC region.	High
35		first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the	One Yes	M. cephalus is distributed in the protected areas of the SC region,	High Very high
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35 36 37 38 38 39 40 41 42 43 3.7 44	7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09	first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or intentional) likely to be Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of	Yes No Yes Yes Yes Not applicable Yes	M. cephalus is distributed in the protected areas of the SC region, for instance in the Kolkheti National Park, western Georgia. This fish does not have such means. This species is naturally reproduces in the SC region. This species is naturally reproduces in the SC region. This species is naturally reproduces in the SC region. This species is naturally reproduces in the SC region. There is no data about this but such case is to be expected. Data deficient Own judgement	Very high Very high Very high Very high Very high Medium Low
35 36 37 38 38 39 40 41 42 43 3.7 44	7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 0leran 8.01	first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that	Yes No Yes Yes Yes Not applicable Yes No	M. cephalus is distributed in the protected areas of the SC region, for instance in the Kolkheti National Park, western Georgia. This fish does not have such means. This species is naturally reproduces in the SC region. This species is naturally reproduces in the SC region. This species is naturally reproduces in the SC region. This species is naturally reproduces in the SC region. There is no data about this but such case is to be expected. Data deficient Own judgement This fish cannot exist without water.	Very high Very high Very high Very high Very high Low Medium Very high
35 36 37 38 38 39 40 41 42 43 3.7 44	7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 0leran 8.01	first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juvenites (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? ce attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the	Yes No Yes Yes Yes Not applicable Yes No	M. cephalus is distributed in the protected areas of the SC region, for instance in the Kolkheti National Park, western Georgia. This fish does not have such means. This species is naturally reproduces in the SC region. This species is naturally reproduces in the SC region. This species is naturally reproduces in the SC region. This species is naturally reproduces in the SC region. There is no data about this but such case is to be expected. Data deficient Own judgement This fish cannot exist without water.	Very high Very high Very high Very high Very high Low Medium Very high
35 36 37 38 39 40 41 41 42 43 . 7 44 45	7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 0leran 8.01 8.02	first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being	Yes No Yes Yes Yes Not applicable Yes No Yes	M. cephalus is distributed in the protected areas of the SC region, for instance in the Kolkheti National Park, western Georgia. This fish does not have such means. This species is naturally reproduces in the SC region. This species is naturally reproduces in the SC region. This species is naturally reproduces in the SC region. There is no data about this but such case is to be expected. Data deficient This fish cannot exist without water. Data deficient	Very high Very high Very high Very high Very high Medium Low Very high
35 36 37 38 39 40 41 41 42 43 3.7 44	7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 0leran 8.01	first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juvenites (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? ce attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the	Yes No Yes Yes Yes Not applicable Yes No	M. cephalus is distributed in the protected areas of the SC region, for instance in the Kolkheti National Park, western Georgia. This fish does not have such means. This species is naturally reproduces in the SC region. This species is naturally reproduces in the SC region. This species is naturally reproduces in the SC region. This species is naturally reproduces in the SC region. There is no data about this but such case is to be expected. Data deficient Own judgement This fish cannot exist without water.	Very high Very high Very high Very high Very high Low Medium Very high
35 36 37 38 39 40 41 41 42 43 . 7 44 45	7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 0leran 8.01 8.02	first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in	Yes No Yes Yes Yes Not applicable Yes No Yes	M. cephalus is distributed in the protected areas of the SC region, for instance in the Kolkheti National Park, western Georgia. This fish does not have such means. This species is naturally reproduces in the SC region. This species is naturally reproduces in the SC region. This species is naturally reproduces in the SC region. There is no data about this but such case is to be expected. Data deficient This fish cannot exist without water. Data deficient	Very high Very high Very high Very high Very high Medium Low Very high

48	8.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	Yes	M. cephalus is sea shoal fish, it's easily adopted to the changeability of salt (Ninua et al. 2013).	Very high
49	8.06	Are there effective natural enemies (predators) of the taxon present in the RA area?	Yes	There are several predators distributed in the SC region which can controll the M. cephalus population: Esox lucius, Sander lucioperca, Silurus glanis, Salmo labrax, etc.	Very high
C. (Climate	e change		Therebered Shares glams Same Reserve	
		change			
50	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?	No change	Own judgement	Medium
51	9.02	Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	No change	Own judgement	Medium
52	9.03	Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase. decrease or not change?	No change	Own judgement	Medium
53	9.04	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	No change	Own judgement	Medium
54	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Lower	Own judgement	Medium
55	9.06	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	Lower	Own judgement	Medium

Statistics	
Scores	
BRA	22.0
BRA Outcome	-
BRA+CCA	18.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	5.0
1. Domestication/Cultivation	2.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	2.0
B. Biology/Ecology	17.0
4. Undesirable (or persistence) traits	4.0
5. Resource exploitation	2.0
6. Reproduction	3.0
7. Dispersal mechanisms	5.0
8. Tolerance attributes	3.0
C. Climate change	-4.0
9. Climate change	-4.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3
2. Climate, distribution and introduction risk	5 5
3. Invasive elsewhere	
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2
6. Reproduction	
7. Dispersal mechanisms	9
8. Tolerance attributes	6
C. Climate change	6
9. Climate change	6
Sectors affected	
Commercial	2
Environmental	-1
Species or population nuisance traits	19

Thresholds	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.74
BRA	0.77
CCA	0.50
Date and Time	

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Taxon and Assessor details	Faxon and Assessor details					
Category	Fishes and Lampreys (freshwater)					
Taxon name	Mugil cephalus					
Common name	flathead grey mullet					
Assessor	Tatia Kuljanishvili					
Risk screening context						
Reason and socio-economic benefits	Comercial fisheries importance					
Risk assessment area	South Caucasus					
Taxonomy	Actinopteri (ray-finned fishes) > Mugiliformes (Mullets) > Mugilidae					
Native range	Cosmopolitan in coastal waters of the tropical, subtropical and temperate zones of all seas. Eastern					
Introduced range	Caspian Sea					
URL	https://www.fishbase.se/summary/Mugil-cephalus.html					

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
		ication/Cultivation	N		LU -h
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20	Yes	It has comercial value	High
2	1.02	generations? Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	Yes. Taxon is harvested in wild and is sold in its live form	High
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	Chelon labrosus (Yankova 2016) or Chelon saliens (Medium risk) (Moqhaddas et al 2021)	High
2 (limate	, distribution and introduction risk			
4		How similar are the climatic conditions of the	High	Somehow similar	High
		Risk Assessment (RA) area and the taxon's native range?	5		5
5	2.02	What is the quality of the climate matching data?	Medium	Medium	Medium
6	2.03	Is the taxon already present outside of captivity in the RA area?	No	It was brought together with Chelon auratus and C. saliens, from the Black Sea and released into the Caspian Sea for acclimatization in 1930-34. Unlike Chelon auratus and C. saluens, M. cephalus could not adapt to local environmental conditions in the Caspian Sea and disappeared (Bogutskaya et al. 2013).	Medium
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	Aquaculture	High
8	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)?	No	Probably not.	Low
3.1	nvasivi	e elsewhere			
9		Has the taxon become naturalised (established viable populations) outside its	Yes	Reported as invasive in USA, Iran and Thailand https://www.gbif.org/species/8189568	High
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	No	No adverse impacts to the wild commercial taxa are known.	Low
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	No adverse impacts to aquaculture are known.	Low
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	No	No adverse impacts to ecosystem are known	Low
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	No adverse socio-economic impacts are known	Low
		y/Ecology			
		able (or persistence) traits			N
		Is it likely that the taxon will be poisonous or pose other risks to human health?		Not poisonous	Very high
15	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	No	It is not known	Low
	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	Does not parasite	Very high
17	4.04	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?	Yes	This species can tolerate wide ranges of salinities	Medium
18	4.05	Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA	No	Not documented	Low
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	transmit deseases	Medium
20	4.07	act as a vector for, recognised pests and infectious agents that are endemic in the RA	Yes	no info	Low
	4.08	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area?	Yes	No info	Low
22	4.09	Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity?	Yes	Yes. See: https://www.fishbase.se/summary/Mugil-cephalus.html	High

22	4 + 4		X	N 11 · · · · · · · · · · ·	
23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g.	Yes	Yes. this specie is marine, which sometimes enters freshwaters	High
		versatile in habitat use)?			
24	4.11	Is it likely that the taxon's mode of existence	No	No information avalable	High
		(e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for			
		native taxa?			
25	4.12	Is the taxon likely to maintain a viable	No	Less likely, since all the attempts to breed this species in caspian	Medium
		population even when present in low densities (or persisting in adverse conditions		sea failed,	
		by way of a dormant form)?			
		e exploitation			
26	5.01		No	They are mainly diurnal, feeding on detritus, micro-algae and	Medium
		protected native taxa in the RA area?		benthic organisms (Ref. 56548, 74902, 74760). Juveniles feed on zooplankton until about 3.0 cm SL (Ref. 59043).	
27	5.02	Is the taxon likely to sequester food	No	No. Less likely	High
		resources (including nutrients) to the			
5. R	eprodu	detriment of native taxa in the RA area?			
		Is the taxon likely to exhibit parental care	No	No. Does not exhibit parental care See:	High
		and/or to reduce age-at-maturity in response		https://www.fishbase.se/summary/Mugil-cephalus.html	
29	6.02	to environmental conditions? Is the taxon likely to produce viable gametes	No	No. climate is not suitable	Very high
	0.02	or propagules (in the RA area)?			ver, mgn
30	6.03	, . , ,	No	No information available	Very high
31	6.04	native taxa? Is the taxon likely to be hermaphroditic or to	No	No. Does not display asexual reproduction	Very high
		display asexual reproduction?			,
32	6.05	Is the taxon dependent on the presence of	No	No. See: https://www.fishbase.se/summary/Mugil-cephalus.html	Very high
		another taxon (or specific habitat features) to complete its life cycle?			
33	6.06	Is the taxon known (or likely) to produce a	Yes	0.5-2.0 million eggs per female	Very high
		large number of propagules or offspring			
2/1	6.07	within a short time span (e.g. < 1 year)? How many time units (days, months, years)	3	3-4 years	Very high
54	0.07	does the taxon require to reach the age-at-	5	5-4 years	very nigh
		first-reproduction?			
		al mechanisms How many potential internal	One	Aquaculture	Low
55	7.01	vectors/pathways could the taxon use to	One	Aquaculture	LOW
		disperse within the RA area (with suitable			
36	7.02	, , , ,	No	less likely	High
		taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)?			
37	7.03		No	No. See: https://www.fishbase.se/summary/Mugil-cephalus.html	Very high
		attaching itself to hard substrata (e.g. ship			
		hulls, pilings, buoys) such that it enhances the likelihood of dispersal?			
38		Is natural dispersal of the taxon likely to	No	No. can not be distributed as eggs.	Very high
		occur as eggs (for animals) or as propagules			
39	7.05	(for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to	No	Does not migrate for reproduction	Very high
	,	occur as larvae/juveniles (for animals) or as			,,
		fragments/seedlings (for plants) in the RA			
10	7.06	area? Are older life stages of the taxon likely to	No	No. Can not be dispersed by other ananimals	High
		migrate in the RA area for reproduction?			
¥1	7.07	Are propagules or eggs of the taxon likely to	No	NO information avalable	Very high
17	7.08	be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the	No	No data	Medium
. 2	,	vectors/pathways mentioned in the previous			
		seven questions (35-41; i.e. both			
17	7.09	unintentional or intentional) likely to be Is dispersal of the taxon density dependent?	No	No information avalable	Low
		ce attributes			
		Is the taxon able to withstand being out of	No	No. This is less likely.	High
		water for extended periods (e.g. minimum of one or more hours) at some stage of its life			
_		cycle?			
15	8.02	Is the taxon tolerant of a wide range of	Yes	it can tolerate wide range of temperatures and salinities	High
		water quality conditions relevant to that taxon? [In the Justification field, indicate the			
		relevant water quality variable(s) being			
6	8.03	Can the taxon be controlled or eradicated in	No	No information avalable	High
		the wild with chemical, biological, or other			
17	8.04	agents/means? Is the taxon likely to tolerate or benefit from	No	No information avalable	Very high
		environmental/human disturbance?			
18	8.05	Is the taxon able to tolerate salinity levels	No	No documentation	Very high
-		that are higher or lower than those found in its usual environment?			
-					1
	8.06	Are there effective natural enemies	No	No.No effective natural enemies present in RA area	Very high
9			No	No.No effective natural enemies present in RA area	Very high

50	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase,	Increase	It was hypotheses that climate change might alert the mechanisms of transportation and introduction of non-native species. Commercial and recreational activities will increase, that itself increases are based on the species of the species.	High
51	9.02	decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	Increase	itself increases the propagule pressure levels of non-native It might increase	Medium
52	9.03	Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change?	Increase	Might increase	Low
53	9.04	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	No change	No change	Medium
54	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	No change	NO change	Medium
55	9.06	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	No change	No change	Medium

Statistics

Scores	
BRA	6.0
BRA Outcome	-
BRA+CCA	12.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	6.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	0.0
3. Invasive elsewhere	2.0
B. Biology/Ecology	0.0
4. Undesirable (or persistence) traits	5.0
5. Resource exploitation	0.0
6. Reproduction	0.0
7. Dispersal mechanisms	-5.0
8. Tolerance attributes	0.0
C. Climate change	6.0
9. Climate change	6.0
Answered Questions	1
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3 5 5
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	36
B. Biology/Ecology	
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2
6. Reproduction	9
7. Dispersal mechanisms	9
8. Tolerance attributes	
C. Climate change	6
9. Climate change Sectors affected	6
Sectors affected Commercial	3
	3
	0
Environmental	0
	0

Thresholds	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.66
BRA	0.68
CCA	0.50
Date and Time	
21/05/2	022 14:56:22

Taxon and Assessor details	Faxon and Assessor details						
Category	Fishes and Lampreys (freshwater)						
Taxon name	Mylopharyngodon piceus						
Common name	black carp						
Assessor	Bella Japoshvili						
Risk screening context							
Reason and socio-economic benefits	This species is widely introduced in EU and USA for a number of reasons. It was also introduced in						
Risk assessment area	South Caucasus						
Taxonomy	Actinopteri (ray-finned fishes) > Cypriniformes (Carps) > Xenocyprididae (East Asian minnows)						
Native range	East Asia						
Introduced range	West Eurasia						
URL	https://www.fishbase.de/summary/Mylopharyngodon-piceus.html						

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
1. L	Domest	ication/Cultivation			
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	Kottelat, M., & Freyhof, J. (2007). Handbook of European freshwater fishes. Publications Kottelat.	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	This species usually is harvested for domestic purposes but in most case with other chinse carps accidentally and then transported and sold as such	Very high
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	No	Although there are other chinse carps known "for famous domestic fishes", no other congeners or races as invasive is known	Medium
2. (Climate	, distribution and introduction risk			
4	2.01	How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range?	Medium	Result of climatch algorithm	Medium
5	2.02	What is the quality of the climate matching data?	Low	Due to low accuracy of local climate data	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	CABI, 2022. Mylopharyngodon piceus (Black carp). https://www.cabi.org/isc/datasheet/73511 (accessed October	High
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	>1	For biocontrol and aquaculture	High
8	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)?	No	Not reported in wild or nearby	Medium
3.1		e elsewhere	1		
9		Has the taxon become naturalised (established viable populations) outside its	Yes	CABI, 2022. Mylopharyngodon piceus (Black carp). https://www.cabi.org/isc/datasheet/73511 (accessed October	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	Rothbard S, Rubinshtein I, Shelton WL, 1996. The Black Carp, Mylopharyngodon piceus, as a Biocontrol of Freshwater Molluscs, YAFIT Laboratory, Fish Breeding Center, Israel, University of Oklahoma.	Very high
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	Usually it considered as bearing positive efefct on aquaculture (CABI, 2022. Mylopharyngodon piceus (Black carp). https://www.cabi.org/isc/datasheet/73511 (accessed October	Medium
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem services?	Yes	Nico LG, 2011. Mylopharyngodon piceus. USGS Nonindigenous Aquatic Species Database. Gainesville, Florida, USA: USGS. http://nas.er.usgs.gov/queries/factsheet.aspx?SpeciesID=573	Low
	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	Not reported although expected	Low
B. I	Biology	y/Ecology			
		able (or persistence) traits			
		Is it likely that the taxon will be poisonous or pose other risks to human health?		Not a harmful species for human health	Medium
	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	Rothbard S, Rubinshtein I, Shelton WL, 1996. The Black Carp, Mylopharyngodon piceus, as a Biocontrol of Freshwater Molluscs, YAFIT Laboratory, Fish Breeding Center, Israel, University of Oklahoma.	Very high
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	The species is preadator. And a large number of inverterbates - in particular molluscs and foshes can be decline due to this species. CABI, 2022. Mylopharyngodon piceus (Black carp). https://www.cabi.org/isc/datasheet/73511 (accessed October 2022). However, Currently not a threatened species are known from RA area that might be altered from this fish	Low
		Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?	No	No enough information is available	Low
18	4.05	Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA	Yes	CABI, 2022. Mylopharyngodon piceus (Black carp). https://www.cabi.org/isc/datasheet/73511 (accessed October 2022)	Medium
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes	based on the examples of elsewhere (CABI, 2022. Mylopharyngodon piceus (Black carp). https://www.cabi.org/isc/datasheet/73511 (accessed October	Low
20	4.07	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA	No	Not expected due to absence of endemic parasite/pathogens for RA area	Low

21	4.08	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area?	Yes	CABI, 2022. Mylopharyngodon piceus (Black carp). https://www.cabi.org/isc/datasheet/73511 (accessed October 2022)	Very high
22	4.09	Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity?	Yes	The species can reach large size enough to be unsuitable for smal water reserviors	High
23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)?	Yes	The species is basically attached to a lentic systems but moves for reproduction to upstreams (Nico, L.G., J.D. Williams and H.L. Jelks, 2005. Black carp: biological synopsis and risk assessment of an introduced fish. American Fisheries Society, Bethesda,	High
24	4.11	Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa?	No	Maryland, USA. 337 p) No enough data is available	Low
25	4.12	Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)?	No	No documented evidence exists	Low
		e exploitation			
26	5.01	Is the taxon likely to consume threatened or protected native taxa in the RA area?	Yes	It is strong predator hunting diverse prey	Very high
27	5.02	Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?	Yes	This can be mostly other predator on bentic feeder fishes	Medium
6. R	Reprodu	iction			
	6.01	Is the taxon likely to exhibit parental care	No	No such behavior is known	High
29	6.02	and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)?	No	Kuljanishvili, T., Mumladze, L., Japoshvili, B., Mustafayev, N., Ibrahimov, S., Patoka, J., & Kalous, L. (2021). The first unified inventory of non-native fishes of the South Caucasian countries, Armenia, Azerbaijan, and Georgia. Knowledge & Management of Aquatic Ecosystems. (422). 32.	High
30	6.03	Is the taxon likely to hybridise naturally with	No	Not expected based on professional judgement	High
31	6.04	native taxa? Is the taxon likely to be hermaphroditic or to	No	Species is usually sexually reproducing	High
51	0.04	display asexual reproduction?	NO	species is usually sexually reproducing	light
32	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	No	No such requirement is known for this species	High
33	6.06	Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)?	Yes	Hundreeds of thousands of eggs are produced annually	High
34	6.07		6	Kottelat, M., & Freyhof, J. (2007). Handbook of European freshwater fishes. Publications Kottelat.	High
7. C	Dispersa	al mechanisms			
		How many potential internal vectors/pathways could the taxon use to	>1	Intentional introduction and unintentional introduction along with other chinise carps	High
36	7.02	disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)?	Yes	Colcheti national park along the Black Sea	High
37	7.03	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal?	No	No such a behavoir is recorded for this speices	Very high
38	7.04	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?	Yes	Kottelat, M., & Freyhof, J. (2007). Handbook of European freshwater fishes. Publications Kottelat.	High
39	7.05	Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA	Yes	Eggs are usually transported by a water currents downstream (Nico, L.G., J.D. Williams and H.L. Jelks, 2005. Black carp: biological synopsis and risk assessment of an introduced fish.	Medium
40	7.06	area? Are older life stages of the taxon likely to	No	American Fisheries Society, Bethesda, Maryland, USA. 337 p) Not expected due to absence of intensive transboundary river	High
		migrate in the RA area for reproduction?		system with countries where the species is established	- iigii
41	7.07	, , ,	No	No such fact is ever observed	Very high
42	7.08	be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both	No	Not large number of individuals are introduced for aquacultural puropse, neithe hitchickers are usually dense. However this have never been studied	Medium
42	7.09	unintentional or intentional) likely to be Is dispersal of the taxon density dependent?	No	No documented evidence exists	Medium
		ce attributes			
	1	Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life	No	No documented evidence exists	Medium
45	8.02	cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that	No	No evidence exists that species tolerates wider variation of enivornmental conditions than presented in its natural distribution	Medium
		taxon? [In the Justification field, indicate the relevant water quality variable(s) being		area	

46	8.03	Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	No	No documented evidence exists	Medium
47	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	No	No documented evidence exists	Low
48	8.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	No	No documented evidence exists	Medium
		Are there effective natural enemies (predators) of the taxon present in the RA	No	No documented evidence exists	High
		e change	_		
		change			1.
50	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?	No change	Based on professional judgment	Low
51	9.02	Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	Increase	Based on professional judgment	Low
52	9.03	Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change?	Increase	Based on professional judgment	Low
53	9.04	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	Higher	Based on professional judgment	Low
54	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Higher	Based on professional judgment	Low
55	9.06	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	Higher	Based on professional judgment	Low

Statistics	
Scores	
BRA	24.0
BRA Outcome	-
BRA+CCA	34.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	14.0
1. Domestication/Cultivation	2.0
2. Climate, distribution and introduction risk	2.0
3. Invasive elsewhere	10.0
B. Biology/Ecology	10.0
4. Undesirable (or persistence) traits	5.0
5. Resource exploitation	7.0
6. Reproduction	-1.0
7. Dispersal mechanisms	1.0
8. Tolerance attributes	-2.0
C. Climate change	10.0
9. Climate change	10.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	5
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2
6. Reproduction	7
7. Dispersal mechanisms	9
8. Tolerance attributes	6
C. Climate change	6
9. Climate change	6
Sectors affected	
Commercial	12
Environmental	16
Species or population nuisance traits	10
Thresholds	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.59
BRA	0.63
CCA	0.25

Date and Time

16/05/2022 17:05:32

axon and Assessor details					
Category	Fishes and Lampreys (freshwater)				
Taxon name	Mylopharyngodon piceus				
Common name	black carp				
Assessor Giorgi Epitashvili					
Risk screening context					
Reason and socio-economic benefits	It is widely cultivated for food and Chinese medicine. In China, black carp are the most highly				
Risk assessment area South Caucasus					
Taxonomy Mylopharyngodon piceus (Richardson, 1846).					
Native range Asia: Amur river basin to southern China. Reported from Vietnam. Native stocks in Russia ha					
Introduced range Persists only in Europe by stocking or accidental releases. It was first brought into the USA in					
JRL https://www.fishbase.in/summary/Mylopharyngodon-piceus.html					

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
1. L		ication/Cultivation			
1	1.01	Has the taxon been the subject of	Yes	Black carp, together with bighead carp, silver carp, and grass	Very high
		domestication (or cultivation) for at least 20		carp, make up the culturally important "four famous domestic	
		generations?		fishes" used in polyculture in China for over a thousand years.	
2	1.02	Is the taxon harvested in the wild and likely	Yes	Captures indicate that black carp in the wild are much fewer in	Very high
		to be sold or used in its live form?		number than grass carp, silver carp, or bighead carp. Louisiana	
				commercial fish-ers and fish market operators who are famil-iar	
				with black carp report that the species has been taken	
				consistently from the vicinity of the Red-Atchafalaya River system	
				since the early 1990s (Nico & Jelks, 2011).	
3	1.03	Does the taxon have invasive races,	Yes	The presence of black carp within this enormous river system	Very high
		varieties, sub-taxa or congeners?		means that this highly invasive species has the accessibility to a	
				vast range of bodies of water covering the majority of the	
				Midwestern United States, so could establish populations in a	
2. (Climate,	, distribution and introduction risk			
4	2.01	How similar are the climatic conditions of the	Low	World Map of the Köppen-Geiger climate classification.	Medium
		Risk Assessment (RA) area and the taxon's			
		native range?			
5	2.02	What is the quality of the climate matching	Low	World Map of the Köppen-Geiger climate classification.	Medium
		data?			
6	2.03	Is the taxon already present outside of	No	No such fact has been documented.	Very high
L		captivity in the RA area?			
7	2.04	How many potential vectors could the taxon	One	This species enters the region by humans intentionally.	Very high
		use to enter in the RA area?			
8	2.05	Is the taxon currently found in close	Yes	In October 2000, a fish with body weight of 7500g and total	Very high
Ĩ		proximity to, and likely to enter into, the RA		lenght of 970mm was caught by a beach seine near Bandar Anzali	
		area in the near future (e.g. unintentional		coastal waters in the southern Caspian Sea, then in March 2001, a	
		and intentional introductions)?		similar fish with 4800g weight and 800mm total lenght was	
		· · · · · · · · · · · · · · · · · · ·		caught by another beach seine in this area for the second time.	
				These specimens were distinguished a commercial cyprinid	
1				species, Black carp (Abbasi 2003).	
3.1	nvasive	e elsewhere			
9	3.01	Has the taxon become naturalised	Yes	Froese and Pauly (2019) report that M. piceus is established	Very high
		(established viable populations) outside its		outside its native range in Armenia, Bulgaria, Mexico, Vietnam,	
		native range?		Turkmenistan, Uzbekistan, Romania, Japan, and Cuba, and	
		-		probably established in Serbia and Montenegro (Skadar Lake) and	
10	3.02	In the taxon's introduced range, are there	Yes	"There is high potential that the black carp would negatively	High
		known adverse impacts to wild stocks or		impact native aquatic communities by feeding on, and reducing,	
		commercial taxa?		populations of native mussels and snails, many of which are	
				considered endangered or threatened (Nico et al. 2005).	
11	3.03	In the taxon's introduced range, are there	No	No such study has been conducted	Low
		known adverse impacts to aquaculture?			
12	3.04	In the taxon's introduced range, are there	No	No such study has been conducted	Low
		known adverse impacts to ecosystem		· · ·	
13	3.05	In the taxon's introduced range, are there	No	No such study has been conducted	Low
	1	known adverse socio-economic impacts?			
B. I	Bioloay	//Ecology			
		able (or persistence) traits			
			No	This species does not pose a threat to humans.	Very high
		pose other risks to human health?		. ,	
15	4.02	Is it likely that the taxon will smother one or	Yes	In the taxons introduction range such a fact is to be expected.	High
		more native taxa (that are not threatened or		Black carp presumed to negatively impact native aguatic	5
		protected)?		communities by feeding on, and reducing, populations of native	
16	4.03	Are there any threatened or protected taxa	Yes		Very high
Ĩ		that the non-native taxon would parasitise in		(Acipenser spp, Salmo spp, Luciobarbus capito, etc) and such a	,
		the RA area?		fact is to be expected.	
17	4.04	Is the taxon adaptable in terms of climatic	Yes	This species is already exist in Armenia and presumably it has the	High
Ľ,		and other environmental conditions, thus		ability to adapt to the local climate.	
		enhancing its potential persistence if it has			
		invaded or could invade the RA area?			
1.9	4.05	Is the taxon likely to disrupt food-web	Yes	This is likely to happen if the species is widespread in the region.	Medium
10	4.05	structure/function in aquatic ecosystems if it	165	This is invery to happen in the species is whitespread in the region.	meuluin
		has invaded or is likely to invade the RA			
10	4.06		Voc	This is likely to be non if the species is wideenread in the median	Low
19	4.06	Is the taxon likely to exert adverse impacts	Yes	This is likely to happen if the species is widespread in the region.	Low
20	4.07	on ecosystem services in the RA area?	Not applicate	Data deficient	Law
20	4.07	Is it likely that the taxon will host, and/or	Not applicable	Data deficient	Low
		act as a vector for, recognised pests and			
	1	infectious agents that are endemic in the RA	1		1

21					
	4.08	Is it likely that the taxon will host, and/or	Yes	M. piceus are hosts to parasites, flukes, bacterial and viral	Medium
		act as a vector for, recognised pests and		diseases. It could possibly transfer these to other fish species. It	
		infectious agents that are absent from (novel		serves as intermediate host for human parasites (e.g.	
		to) the RA area?		schistosoma), or parasites relevant to fish culture, such as the	
				vellow and white grubs in channel catfish and stripe bass farming.	
22	4.09	Is it likely that the taxon will achieve a body	Yes	It is widely cultivated for food and Chinese medicine. One of the	Very high
		size that will make it more likely to be		largest cyprinids in the world, the black carp can reach up to 1.9	
		released from captivity?		m in length and 109 kg in weight.	
23	4.10	Is the taxon capable of sustaining itself in a	Yes	Adults inhabit large lowland rivers and lakes, preferably with clear	High
		range of water velocity conditions (e.g.		water and high oxygen concentrations.	
24	4 1 1	versatile in habitat use)? Is it likely that the taxon's mode of existence	¥		Marris Inia In
24	4.11	(e.g. excretion of by-products) or behaviours	Yes	Reduced populations of mussels caused by black carp predation	Very high
		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		could result in degraded water quality, reduced recreational	
		(e.g. feeding) will reduce habitat quality for native taxa?		harvest of fish, and decreased mussel shell revenue.	
25	4.12	Is the taxon likely to maintain a viable	Yes	Data deficient	Medium
25	7.12	population even when present in low	103		nearann
		densities (or persisting in adverse conditions			
		by way of a dormant form)?			
5. I	Resourd	ce exploitation			
26	5.01	Is the taxon likely to consume threatened or	Yes	This is likely to happen if the species is widespread in the region.	Medium
		protected native taxa in the RA area?			
27	5.02	Is the taxon likely to sequester food	Yes	This is likely to happen if the species is widespread in the region.	Medium
		resources (including nutrients) to the			
_		detriment of native taxa in the RA area?			
	Reprod				
28	6.01	Is the taxon likely to exhibit parental care	No	Because black carp produce semipelagic eggs and spawn in open	Very high
		and/or to reduce age-at-maturity in response		rivers, it can be concluded that they do not tend their eggs and	
20	6.02	to environmental conditions? Is the taxon likely to produce viable gametes	No	that there is no parental care (Nico and Williams 1996).	Modium
29	6.02	, , ,	No	No such fact has been detected	Medium
30	6.03	or propagules (in the RA area)? Is the taxon likely to hybridise naturally with	No	Such a fact is not known	Low
20	0.05	native taxa?	NO	Such a ract IS HUL KHUWH	LOW
31	6.04	Is the taxon likely to be hermaphroditic or to	No	Such a fact is not known	Medium
	0.04	display asexual reproduction?			
32	6.05	Is the taxon dependent on the presence of	No	Such a fact is not known	High
		another taxon (or specific habitat features)			
		to complete its life cycle?			
33	6.06	Is the taxon known (or likely) to produce a	Yes	Average fecundity is about 600 000 eggs.	Medium
		large number of propagules or offspring			
		within a short time span (e.g. < 1 year)?			
34	6.07	How many time units (days, months, years)	7	Black carp mature at the age of 7 to 9 years in subtropics (e.g.	Very high
34	6.07	How many time units (days, months, years) does the taxon require to reach the age-at-	7	Black carp mature at the age of 7 to 9 years in subtropics (e.g. Egypt) which is 3 to 5 years earlier than in China.	Very high
		How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	7		Very high
7. [Dispers	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms		Egypt) which is 3 to 5 years earlier than in China.	
7. [How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal	7 One		Very high Very high
7. [Dispers	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to		Egypt) which is 3 to 5 years earlier than in China.	
<i>7. l</i> 35	Dispers 7.01	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable	One	Egypt) which is 3 to 5 years earlier than in China. Most likely this species will be spread by humans.	Very high
<i>7. [</i> 35	Dispers	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the		Egypt) which is 3 to 5 years earlier than in China.	
<i>7. [</i> 35	Dispers 7.01	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more	One	Egypt) which is 3 to 5 years earlier than in China. Most likely this species will be spread by humans.	Very high
<i>7. 1</i> 35 36	Dispers 7.01	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the	One	Egypt) which is 3 to 5 years earlier than in China. Most likely this species will be spread by humans.	Very high
<i>7. 1</i> 35 36	7.01	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)?	One Yes	Egypt) which is 3 to 5 years earlier than in China. Most likely this species will be spread by humans. This is likely if the species is widespread in the region.	Very high Medium
<i>7. 1</i> 35 36	7.01	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively	One Yes	Egypt) which is 3 to 5 years earlier than in China. Most likely this species will be spread by humans. This is likely if the species is widespread in the region.	Very high Medium
<u>7. 1</u> 35 36 37	Dispers 7.01 7.02 7.03	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal?	One Yes	Egypt) which is 3 to 5 years earlier than in China. Most likely this species will be spread by humans. This is likely if the species is widespread in the region.	Very high Medium High
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48	8.05	Is the taxon able to tolerate salinity levels	No	M. piceus is freshwater fish and does not occurs in brackish or	High
10	0.00	that are higher or lower than those found in		marine waters.	
		its usual environment?			
40	8.06	Are there effective natural enemies	Yes	There are several potential predators distributed in the Caucasus	Very high
75	0.00	(predators) of the taxon present in the RA	103	region which can controll the M. piceus populations: Esox lucius,	very mgn
		area?		Sander lucioperca, Silurus glanis, Salmo spp, etc.	
<u> </u>	Climate	e change	1	Sander racioperca, Sharas gianis, Sanno spp, etc.	
		change			
		Under the predicted future climatic	Increase	Own judgement	High
		conditions, are the risks of entry into the RA			5
		area posed by the taxon likely to increase,			
		decrease or not change?			
51	9.02	Under the predicted future climatic	Increase	Own judgement	High
		conditions, are the risks of establishment			-
		posed by the taxon likely to increase,			
		decrease or not change?			
52	9.03	Under the predicted future climatic	Increase	Own judgement	High
		conditions, are the risks of dispersal within			
		the RA area posed by the taxon likely to			
		increase, decrease or not change?			
53	9.04	Under the predicted future climatic	Higher	Own judgement	High
		conditions, what is the likely magnitude of			
		future potential impacts on biodiversity			
		and/or ecological integrity/status?			
54	9.05	Under the predicted future climatic	Higher	Own judgement	Medium
		conditions, what is the likely magnitude of			
		future potential impacts on ecosystem			
		structure and/or function?			
55	9.06	Under the predicted future climatic	Higher	Own judgement	Medium
		conditions, what is the likely magnitude of			
		future potential impacts on ecosystem			
		services/socio-economic factors?			

Statistics	
Scores	
BRA	22.0
BRA Outcome	-
BRA+CCA	34.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	10.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	0.0
3. Invasive elsewhere	6.0
B. Biology/Ecology	12.0
4. Undesirable (or persistence) traits	10.0
5. Resource exploitation	7.0
6. Reproduction	-1.0
7. Dispersal mechanisms	-4.0
8. Tolerance attributes	0.0
C. Climate change	12.0
9. Climate change	12.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2
6. Reproduction	7
7. Dispersal mechanisms	9
8. Tolerance attributes	6
C. Climate change	6
9. Climate change	6
Sectors affected	
Commercial	9
Environmental	13
Species or population nuisance traits	13

Thresholds	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.67
BRA	0.67
CCA	0.67
Date and Time	

13/05/2022 13:16:07

Taxon and Assessor details					
ategory Fishes and Lampreys (freshwater)					
Taxon name	Mylopharyngodon piceus				
Common name	black carp				
Assessor	Tatia Kuljanishvili				
Risk screening context	Risk screening context				
Reason and socio-economic benefits Introduced for aquaculture worldwide					
Risk assessment area	South Caucasus				
Taxonomy Actinopteri (ray-finned fishes) > Cypriniformes (Carps) > Xenocyprididae					
Native range he Amur River basin to southern China					
ntroduced range Worldwide					
RL http://fishbase.org/summary/Mylopharyngodon-piceus.html					

			Response	Justification (references and/or other information)	Confidence		
		ography/Historical					
		rication/Cultivation	Ma a	It has been shown in a supervision for illibiting means these 20	Mara hish		
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	It has been grown in aquaculture facilities more than 20 generations	Very high		
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	Yes. Taxon is harvested in wild and is sold in its live form	Very high		
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	For example Hypophthalmichthys nobilis, H molotrix and Ctenopharyngodon Idella	High		
2. (Climate, distribution and introduction risk						
4	2.01	How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range?	High	The climate is more or less similar out of 19 stations, 15 match at value 9 (out of 10).	Medium		
5	2.02	What is the quality of the climate matching data?	Medium	Climatch data is medium since there are not much station on the RA area	High		
5	2.03	Is the taxon already present outside of captivity in the RA area?	No	It was reported as an acclimatized species by (Pipoyan and Tigranyan, 1998 2002), but without giving any details of the species distribution in the wild (Levin and Rubenyan, 2010). Later, Pipoyan (2012) reported that this species was distributed in the Metsamor River drainage; however, due to discontinuation of artificial reproduction, it disappeared from the inland waters of Armenia (Pipoyan, 2012). Unless there is new evidence of this species being caught in the wild in Armenia, we believe that this species should be taken off the list of non-native species of	Medium		
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	Aquaculture	High		
8	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)?	Yes	It is possible that it would enter the RA again in near future	Very high		
3. I	nvasiv	e elsewhere					
	3.01	Has the taxon become naturalised (established viable populations) outside its	Yes	Yes it has become naturalized outside its native area	High		
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	Negative impact include the predation on mollusc species. Larvae feeds on zooplankton, ostracods and some aquatic insects. therefore it might be in competiton with wildstocks and comercial	Medium		
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	Yes	Negative impact include the predation on mollusc species. Larvae feeds on zooplankton, ostracods and some aquatic insects. therefore it might be in competiton with wildstocks and comercial	Medium		
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	No	No information avalable	Medium		
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	No information avalable	Medium		
B. I	Biolog	y/Ecology					
		able (or persistence) traits					
14	4.01	Is it likely that the taxon will be poisonous or pose other risks to human health?	No	Not poisonous	Very high		
15	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	Since this species is mainly consuming molluscs many native freshwater mussels (order Unionoida) and snails in North America are already critically endaingered (Lysne et al. 2008; Haag 2009; Burkhead 2012), the presence of Black Carp in USA rivers and streams is recognised as a major concern (Nico et al. 2005).	Very high		
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	Does not parasite	Very high		
17	4.04	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?	No	No it is not much adaptable in terms of climtic and other environmental confitions. Thus their potential persistenec if it has invaded is less.	Medium		
18	4.05	Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA	Yes	It is possible	Medium		
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	No it is less likely	Medium		
20	4.07	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA	Yes	Possible, but not documented	Medium		

21	4.08	Is it likely that the taxon will host, and/or	Yes	It is possible. However, it is not documented.	Medium
		act as a vector for, recognised pests and			
		infectious agents that are absent from (novel to) the RA area?			
22	4.09	Is it likely that the taxon will achieve a body	Yes	Yes. See: http://fishbase.org/summary/Mylopharyngodon-	Very high
		size that will make it more likely to be		piceus.html	
23	4.10	released from captivity? Is the taxon capable of sustaining itself in a	Yes	Undertake upriver migration and spawns in open waters. Deposit	High
25	4.10	range of water velocity conditions (e.g.	Tes	pelagic or semipelagic eggs which hatch while drifting	riigii
		versatile in habitat use)?		downstream. Larvae settle into floodplain lakes and channels with	
24	4.11	Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours	Yes	they grow very fast and can form dence populations, they are versatile in terms of feeding and this can often lead to habitat	Medium
		(e.g. feeding) will reduce habitat quality for		alterations and disruption of food webs and nutrient cycles in new	
		native taxa?		invaded ecosystems (Milstein et al. 1988; Cooke et al. 2009;	
25	4.12	Is the taxon likely to maintain a viable	Yes	Gozlan et al. 2010; Ma et al. 2010; Rosemberg et al. 2010)	Medium
25	4.12	population even when present in low	Tes	depending on the water and weather conditions	Medium
		densities (or persisting in adverse conditions			
5 1	Pocouro	by way of a dormant form)? e exploitation			
	1	Is the taxon likely to consume threatened or	Yes	It is possible, but not known	Low
		protected native taxa in the RA area?			-
27	5.02	Is the taxon likely to sequester food	Yes	It is possible howerver not doccumented	Low
		resources (including nutrients) to the detriment of native taxa in the RA area?			
	Reprodu	iction	Ĩ		
28	6.01	Is the taxon likely to exhibit parental care	No	Not known	High
1		and/or to reduce age-at-maturity in response to environmental conditions?			
29	6.02	Is the taxon likely to produce viable gametes	No	No. climate is different.	Very high
20	6.02	or propagules (in the RA area)?	No	No information and labor) (au chiab
30	6.03	Is the taxon likely to hybridise naturally with native taxa?	No	No information available	Very high
31	6.04	Is the taxon likely to be hermaphroditic or to	No	No. Does not display asexual reproduction	High
27	6.05	display asexual reproduction? Is the taxon dependent on the presence of	No	No. See: http://fishbase.org/summary/Mylopharyngodon-	Very high
52	0.05	another taxon (or specific habitat features)	NO	piceus.html	very nigh
		to complete its life cycle?			
33	6.06	Is the taxon known (or likely) to produce a	Yes	Yes See: http://fishbase.org/summary/Mylopharyngodon-	Very high
		large number of propagules or offspring within a short time span (e.g. < 1 year)?		piceus.html	
34	6.07	How many time units (days, months, years)	7	6-11 years for male, and for females even later,	Very high
		does the taxon require to reach the age-at- first-reproduction?			
7. L	Dispersa	al mechanisms			
35				Aguagultura	
	7.01	How many potential internal	One	Aquaculture	Very high
	7.01	vectors/pathways could the taxon use to	One	Aquaculture	Very high
36	7.01		One Yes	Yes it is possible	Very high High
36		vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more			
	7.02	vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)?	Yes	Yes it is possible	High
		vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more			High
	7.02	vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances	Yes	Yes it is possible No. Morphologically this species does not have a means of actively	High
37	7.02	vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal?	Yes	Yes it is possible No. Morphologically this species does not have a means of actively attaching itself to hard substrata	High Very high
37	7.02	vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances	Yes	Yes it is possible No. Morphologically this species does not have a means of actively	High
37 38	7.02 7.03 7.04	vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?	Yes No	Yes it is possible No. Morphologically this species does not have a means of actively attaching itself to hard substrata No. Because does not reproduce in RA	High Very high Very high
37 38	7.02	vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to	Yes	Yes it is possible No. Morphologically this species does not have a means of actively attaching itself to hard substrata No. Because does not reproduce in RA They do not produce viable gametes and therfore can be	High Very high
37 38	7.02 7.03 7.04	vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?	Yes No	Yes it is possible No. Morphologically this species does not have a means of actively attaching itself to hard substrata No. Because does not reproduce in RA	High Very high Very high
37 38 39	7.02 7.03 7.04 7.05	vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?	Yes No No	Yes it is possible No. Morphologically this species does not have a means of actively attaching itself to hard substrata No. Because does not reproduce in RA They do not produce viable gametes and therfore can be distributed by larvae, or juveniles.	High Very high Very high Very high
37 38 39	7.02 7.03 7.04	vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to	Yes No	Yes it is possible No. Morphologically this species does not have a means of actively attaching itself to hard substrata No. Because does not reproduce in RA They do not produce viable gametes and therfore can be	High Very high Very high
37 38 39 40	7.02 7.03 7.04 7.05	vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?	Yes No No	Yes it is possible No. Morphologically this species does not have a means of actively attaching itself to hard substrata No. Because does not reproduce in RA They do not produce viable gametes and therfore can be distributed by larvae, or juveniles.	High Very high Very high Very high
37 38 39 40 41	7.02 7.03 7.04 7.05 7.06 7.07	vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	Yes No No No No	Yes it is possible No. Morphologically this species does not have a means of actively attaching itself to hard substrata No. Because does not reproduce in RA They do not produce viable gametes and therfore can be distributed by larvae, or juveniles. Do not reproduce therefore, does not migrate. No. Can not be dispersed by other ananimals	High Very high Very high Very high Very high
37 38 39 40 41	7.02 7.03 7.04 7.05 7.06	vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the	Yes No No No	Yes it is possible No. Morphologically this species does not have a means of actively attaching itself to hard substrata No. Because does not reproduce in RA They do not produce viable gametes and therfore can be distributed by larvae, or juveniles. Do not reproduce therefore, does not migrate.	High Very high Very high Very high
37 38 39 40 41	7.02 7.03 7.04 7.05 7.06 7.07	vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	Yes No No No No	Yes it is possible No. Morphologically this species does not have a means of actively attaching itself to hard substrata No. Because does not reproduce in RA They do not produce viable gametes and therfore can be distributed by larvae, or juveniles. Do not reproduce therefore, does not migrate. No. Can not be dispersed by other ananimals	High Very high Very high Very high Very high
37 38 39 40 41 42	7.02 7.03 7.04 7.05 7.06 7.07 7.08	vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be	Yes No No No No No	Yes it is possible No. Morphologically this species does not have a means of actively attaching itself to hard substrata No. Because does not reproduce in RA They do not produce viable gametes and therfore can be distributed by larvae, or juveniles. Do not reproduce therefore, does not migrate. No. Can not be dispersed by other ananimals Not rapid	High Very high Very high Very high Very high Very high
37 38 39 40 41 42 43	7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09	vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent?	Yes No No No No	Yes it is possible No. Morphologically this species does not have a means of actively attaching itself to hard substrata No. Because does not reproduce in RA They do not produce viable gametes and therfore can be distributed by larvae, or juveniles. Do not reproduce therefore, does not migrate. No. Can not be dispersed by other ananimals	High Very high Very high Very high Very high
37 38 39 40 41 42 43 8, 7	7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09	vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be	Yes No No No No No	Yes it is possible No. Morphologically this species does not have a means of actively attaching itself to hard substrata No. Because does not reproduce in RA They do not produce viable gametes and therfore can be distributed by larvae, or juveniles. Do not reproduce therefore, does not migrate. No. Can not be dispersed by other ananimals Not rapid	High Very high Very high Very high Very high Very high
37 38 39 40 41 42 43 8, 7	7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09	vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? e attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of	Yes No No No No Yes	Yes it is possible No. Morphologically this species does not have a means of actively attaching itself to hard substrata No. Because does not reproduce in RA They do not produce viable gametes and therfore can be distributed by larvae, or juveniles. Do not reproduce therefore, does not migrate. No. Can not be dispersed by other ananimals Not rapid It is possible	High Very high Very high Very high Very high Very high Very high
37 38 39 40 41 42 43 8, 7	7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09	vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? ce attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life	Yes No No No No Yes	Yes it is possible No. Morphologically this species does not have a means of actively attaching itself to hard substrata No. Because does not reproduce in RA They do not produce viable gametes and therfore can be distributed by larvae, or juveniles. Do not reproduce therefore, does not migrate. No. Can not be dispersed by other ananimals Not rapid It is possible	High Very high Very high Very high Very high Very high Very high
37 38 39 40 41 42 43 8.7 44	7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09	vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? e attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of	Yes No No No No Yes	Yes it is possible No. Morphologically this species does not have a means of actively attaching itself to hard substrata No. Because does not reproduce in RA They do not produce viable gametes and therfore can be distributed by larvae, or juveniles. Do not reproduce therefore, does not migrate. No. Can not be dispersed by other ananimals Not rapid It is possible	High Very high Very high Very high Very high Very high Very high
37 38 39 40 41 42 43 8.7 44	7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 0lerano 8.01	vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that	Yes No No No No Yes No	Yes it is possible No. Morphologically this species does not have a means of actively attaching itself to hard substrata No. Because does not reproduce in RA They do not produce viable gametes and therfore can be distributed by larvae, or juveniles. Do not reproduce therefore, does not migrate. No. Can not be dispersed by other ananimals Not rapid It is possible No info	High Very high Very high Very high Very high Very high Very high Very high Low
37 38 39 40 41 42 43 8.7 44	7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 0lerano 8.01	vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the	Yes No No No No Yes No	Yes it is possible No. Morphologically this species does not have a means of actively attaching itself to hard substrata No. Because does not reproduce in RA They do not produce viable gametes and therfore can be distributed by larvae, or juveniles. Do not reproduce therefore, does not migrate. No. Can not be dispersed by other ananimals Not rapid It is possible No info	High Very high Very high Very high Very high Very high Very high Very high Low
37 38 39 40 41 42 43 8.7 44 44	7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 0lerano 8.01	vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that	Yes No No No No Yes No	Yes it is possible No. Morphologically this species does not have a means of actively attaching itself to hard substrata No. Because does not reproduce in RA They do not produce viable gametes and therfore can be distributed by larvae, or juveniles. Do not reproduce therefore, does not migrate. No. Can not be dispersed by other ananimals Not rapid It is possible No info	High Very high Very high Very high Very high Very high Very high Very high Low
37 38 39 40 41 42 43 8.7 44 44	7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 0lerano 8.01 8.02	vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other	Yes No No No No Yes No	Yes it is possible No. Morphologically this species does not have a means of actively attaching itself to hard substrata No. Because does not reproduce in RA They do not produce viable gametes and therfore can be distributed by larvae, or juveniles. Do not reproduce therefore, does not migrate. No. Can not be dispersed by other ananimals Not rapid It is possible No info No it is not tolerant of a wide range of water quality conditions.	High Very high Very high Very high Very high Very high Very high Low Very high
37 38 39 40 41 42 43 8.7 44 45 46	7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 0lerano 8.01 8.02	vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? Es the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in	Yes No No No No Yes No	Yes it is possible No. Morphologically this species does not have a means of actively attaching itself to hard substrata No. Because does not reproduce in RA They do not produce viable gametes and therfore can be distributed by larvae, or juveniles. Do not reproduce therefore, does not migrate. No. Can not be dispersed by other ananimals Not rapid It is possible No info No it is not tolerant of a wide range of water quality conditions.	High Very high Very high Very high Very high Very high Very high Low Very high

48	8.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	No	No information available	Very high
49	8.06	Are there effective natural enemies (predators) of the taxon present in the RA	No	No information avalable	Very high
С. С	Climat	e change			
9. (Climate	change			
50	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?	Increase	It was hypothesized that climate change might alert the mechanisms of transportation and introduction of non-native species. Commercial and recreational activities will increase, that itself increases the propagule pressure levels of non-native	Very high
51	9.02	Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	Increase	It is possible to increase, however it needs more documentation	Low
52	9.03	Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase. decrease or not change?	Increase	Can increase, but difficult to assume now.	Low
53	9.04	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	Higher	It could be higher	Medium
54	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	No change	No change	Low
55	9.06	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	No change	No change	Low

Statistics	
Statistics	
BRA	20.0
BRA Outcome	-
BRA+CCA	28.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	14.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	0.0
3. Invasive elsewhere	10.0
B. Biology/Ecology	6.0
4. Undesirable (or persistence) traits	7.0
5. Resource exploitation	7.0
6. Reproduction	-1.0
7. Dispersal mechanisms	-3.0
8. Tolerance attributes	-4.0
C. Climate change	8.0
9. Climate change	8.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	3 5 5 36
B. Biology/Ecology	30
4. Undesirable (or persistence) traits	12 12 2 7
5. Resource exploitation	2
6 Depreduction	
6. Reproduction	/
7. Dispersal mechanisms	9
7. Dispersal mechanisms 8. Tolerance attributes	9
7. Dispersal mechanisms 8. Tolerance attributes C. Climate change	9 6 6
7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change	9
7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected	9 6 6 6
7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial	9 6 6 6 11
7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial Environmental	9 6 6 6 11 10
7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial	9 6 6 11
7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial Environmental	9 6 6 6 11 10

Inresholds		
	BRA	-
	BRA+CCA	-
Confidence		
	BRA+CCA	0.72
	BRA	0.76
	CCA	0.42
Date and Time		
	21/05/2	022 15:04:43

Faxon and Assessor details						
Category	Fishes and Lampreys (freshwater)					
Taxon name	Oncorhynchus kisutch					
Common name	coho salmon					
Assessor	Bella Japoshvili					
Risk screening context						
Reason and socio-economic benefits	The species was introduced in Azerbaijan in the past and released in tho Caspian sea. Is an					
Risk assessment area	South Caucasus					
Taxonomy	Actinopteri (ray-finned fishes) > Salmoniformes (Salmons) > Salmonidae (Salmonids)					
Native range	Atlantic					
Introduced range	Europe and Former USSR regions					
URL	https://www.fishbase.de/summary/Oncorhynchus-kisutch.html					

			Response	Justification (references and/or other information)	Confidence
A.	Biogeo	graphy/Historical			
		ication/Cultivation	1		
1	1.01	Has the taxon been the subject of	Yes	Fleming, I. A., & Gross, M. R. (1993). Breeding success of	Very high
		domestication (or cultivation) for at least 20		hatchery and wild coho salmon (Oncorhynchus kisutch) in	
2	1.02	generations? Is the taxon harvested in the wild and likely	No	competition. Ecological applications, 3(2), 230-245.	Medium
2	1.02	to be sold or used in its live form?	NO	Not expected because salmonids are usually sold as life forms from the aquculture	Medium
3	1.03	Does the taxon have invasive races,	Yes	Congeners	High
Ŭ	1.00	varieties, sub-taxa or congeners?			
2. (Climate	, distribution and introduction risk			
4	2.01	How similar are the climatic conditions of the	Medium	Results of climatch algorithm	Medium
		Risk Assessment (RA) area and the taxon's			
_		native range?	-		
5	2.02	What is the quality of the climate matching	Low	Due to low accuracy of local climate data	High
6	2.03	data? Is the taxon already present outside of	No	No documented evidence	Medium
0	2.05	captivity in the RA area?	NO		Medium
7	2.04	How many potential vectors could the taxon	One	Aquacultural purpose	Medium
		use to enter in the RA area?		4 F. F	
8	2.05	Is the taxon currently found in close	No	No records are available	High
1		proximity to, and likely to enter into, the RA			
1		area in the near future (e.g. unintentional			
		and intentional introductions)?	I		
<i>3.</i> 1 0	3.01	e elsewhere Has the taxon become naturalised	Yes	Many areas in US and Europe are reported form various literature	Very high
9	5.01	(established viable populations) outside its	res	Many areas in US and Europe are reported form various interature	very nigh
10	3.02	In the taxon's introduced range, are there	No	Data deficient, no such an evidence exists	High
		known adverse impacts to wild stocks or	-		5
		commercial taxa?			
11	3.03	In the taxon's introduced range, are there	No	Not reported and not expected	High
		known adverse impacts to aquaculture?			
12	3.04	In the taxon's introduced range, are there	No	Not reported and not expected	High
12	3.05	known adverse impacts to ecosystem	No	Not reported and not expected	Medium
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	Not reported and not expected	Medium
в.	Biology	//Ecology			
		able (or persistence) traits			
14	4.01	Is it likely that the taxon will be poisonous or	No	Not a harmful species	Very high
		pose other risks to human health?			
15	4.02	Is it likely that the taxon will smother one or	No	Not expected, based on professional judgement	Low
1		more native taxa (that are not threatened or			
16	4.02	protected)?	No	Although appaies is produtor, it mainly consumes the asy-ti-	Vony high
10	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in	No	Although species is predator, it mainly consumes the aquatic insects from which no threatened species are known from RA area	Very high
1		the RA area?		insects from which no threatened species are known notifi KA dred	
17	4.04	Is the taxon adaptable in terms of climatic	No	Not enough data is available, howver salmonids are generally less	High
1		and other environmental conditions, thus		adaptable to variable climate	-
1		enhancing its potential persistence if it has			
1	L	invaded or could invade the RA area?			
18	4.05	Is the taxon likely to disrupt food-web	No	Based on professional judgement	High
1		structure/function in aquatic ecosystems if it			
10	4.06	has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts	No	Based on professional judgement	High
19	4.00	on ecosystem services in the RA area?	110		ingn
20	4.07	Is it likely that the taxon will host, and/or	No	Based on professional judgement	High
1		act as a vector for, recognised pests and			
		infectious agents that are endemic in the RA			
21	4.08	Is it likely that the taxon will host, and/or	Yes	Based on professional judgement	Medium
1		act as a vector for, recognised pests and			
1		infectious agents that are absent from (novel			
22	4.09	to) the RA area? Is it likely that the taxon will achieve a body	Yes	Based on professional judgement	High
22	4.09	size that will make it more likely to be	165	Based on professional judgement	High
1		released from captivity?			
23	4.10	Is the taxon capable of sustaining itself in a	Yes	Living in a waters of wide ranging velocities	Very high
1	-	range of water velocity conditions (e.g.			, ,
		versatile in habitat use)?			

24	4.11	Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa?	No	Based on professional judgement	Medium
25	4.12	Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions	No	Based on professional judgement	High
		by way of a dormant form)?			
		e exploitation			
26	5.01	Is the taxon likely to consume threatened or	No	Based on professional judgement	Medium
27	5.02	protected native taxa in the RA area?	Vac	Can compate to pative colmonide, supposed based on professional	Madium
27	5.02	Is the taxon likely to sequester food resources (including nutrients) to the	Yes	Can compete to native salmonids, supposed based on professional judgement	Medium
6 P	eprodu	detriment of native taxa in the RA area?			
		Is the taxon likely to exhibit parental care	Yes	Page, L.M. and B.M. Burr, 2011. A field guide to freshwater fishes	Very high
20		and/or to reduce age-at-maturity in response to environmental conditions?		of North America north of Mexico. Boston : Houghton Mifflin Harcourt, 663p.	very nigh
		or propagules (in the RA area)?	No	Not documented evidence exists	Low
		Is the taxon likely to hybridise naturally with native taxa?	Yes	Not documented evidence exists	Low
		Is the taxon likely to be hermaphroditic or to display asexual reproduction?	No	Page, L.M. and B.M. Burr, 2011. A field guide to freshwater fishes of North America north of Mexico. Boston : Houghton Mifflin Harcourt, 663p.	Very high
32	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	No	Page, L.M. and B.M. Burr, 2011. A field guide to freshwater fishes of North America north of Mexico. Boston : Houghton Mifflin Harcourt, 663p.	Very high
33	6.06	Is the taxon known (or likely) to produce a large number of propagules or offspring	No	Page, L.M. and B.M. Burr, 2011. A field guide to freshwater fishes of North America north of Mexico. Boston : Houghton Mifflin	Medium
34	6.07	within a short time span (e.g. < 1 year)? How many time units (days, months, years)	2	Harcourt, 663p. year	Medium
		does the taxon require to reach the age-at- first-reproduction?			
		al mechanisms			
35	7.01	How many potential internal vectors/pathways could the taxon use to	One	Intentional introduction, based on professional judgement	High
36	7.02	disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)?	No	The species is basically expected to inhabit river parts that are not within such a protected areas in RA area	Medium
37		Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal?	No	Page, L.M. and B.M. Burr, 2011. A field guide to freshwater fishes of North America north of Mexico. Boston : Houghton Mifflin Harcourt, 663p.	Very high
38		Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?	No	Not expected, based on professional judgment	Very high
39		Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?	Yes	This includes the escaped juveniles from captivity	Medium
40		Are older life stages of the taxon likely to migrate in the RA area for reproduction?	No	Not expected since no species have recorded from the RA area in wild	High
		Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No	No such fact has ever been reported	Very high
42		Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be	Yes	Based on professional judgement	Medium
		Is dispersal of the taxon density dependent?	No	No such ebservation exists. Page, L.M. and B.M. Burr, 2011. A field guide to freshwater fishes of North America north of Mexico. Boston : Houghton Mifflin Harcourt, 663p.	Very high
		ce attributes	No	Not a documented evidence evicts, but colmonide are committee	Von hich
44		Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle?	No	Not a documented evidence exists, but salmonids are generally less tolerant out of water environment	Very high
45	8.02	Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the	No	-	High
46		relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agent/mage2	Yes	Based on professional judgement	Low
47		agents/means? Is the taxon likely to tolerate or benefit from environmental/human disturbance?	No	Based on professional judgement	High
48		Is the taxon able to tolerate salinity levels that are higher or lower than those found in	No	It naturally lives in marin and freshwaters (Page, L.M. and B.M. Burr, 2011. A field guide to freshwater fishes of North America	Very high
49		its usual environment? Are there effective natural enemies	No	north of Mexico. Boston : Houghton Mifflin Harcourt, 663p.) Not an effective natural enemy exists in RA area	High
	limet	(predators) of the taxon present in the RA	l		L
		change			
ノ. し	mate	chunge			

50	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?	No change	Based on professional judgement	Medium
51	9.02	Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	Increase	Based on professional judgement	Medium
52	9.03	Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change?	Increase	Based on professional judgement	Low
53	9.04	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	No change	Based on professional judgement	Medium
54	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	No change	Based on professional judgement	Medium
55	9.06	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	No change	Based on professional judgement	Medium

Statistics

Scores	
BRA	4.0
BRA Outcome	-
BRA+CCA	8.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	4.0
1. Domestication/Cultivation	2.0
2. Climate, distribution and introduction risk	0.0
3. Invasive elsewhere	2.0
B. Biology/Ecology	0.0
4. Undesirable (or persistence) traits	2.0
5. Resource exploitation	2.0
6. Reproduction	2.0
7. Dispersal mechanisms	-2.0
8. Tolerance attributes	-4.0
C. Climate change	4.0
9. Climate change	4.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3 5 5
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2
6. Reproduction	7
7. Dispersal mechanisms	9
8. Tolerance attributes	6
C. Climate change	6
9. Climate change	6
Sectors affected	
Commercial	2
Environmental	0
Species or population nuisance traits	7

Thresholds		
	BRA	-
	BRA+CCA	-
Confidence		
	BRA+CCA	0.68
	BRA	0.71
	CCA	0.46
Date and Time		
	16/05/20	022 17:24:33

Taxon and Assessor details						
Category	Fishes and Lampreys (freshwater)					
Taxon name	Oncorhynchus kisutch					
Common name	coho salmon					
Assessor	Giorgi Epitashvili					
Risk screening context						
Reason and socio-economic benefits	In North America, coho salmon is a game fish in fresh and salt water from July to December,					
Risk assessment area	South Caucasus					
Taxonomy	Oncorhynchus kisutch (Walbaum, 1792)					
Native range	North Pacific: distributed from the Anadyr River in Russia south towards Hokkaido, Japan, and from					
Introduced range	Introduced into northern rivers of France; in 1973 and 1974, 50,000 yearlings escaped into the					
URL	https://www.fishbase.se/summary/245					

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
1. L		ication/Cultivation	1		
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	The coho salmon stocks presently used in aquaculture were derived from government hatchery programmes in the United States of America and Canada, but most countries now rely on local sources. Self-sustaining stocks have been reported in the Great Lakes of America and in Chile, where they are a major species in a rapidly expanding aquaculture industry.	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	Self-sustaining stocks of O. kisutch have been reported in the Great Lakes of America and in Chile, where they are a major species in a rapidly expanding aquaculture industry.	Very high
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	Within this genus, one of the most widespread and invasive species is 0. mykiss. O. mykiss is listed as one of the world's 100 worst invasive species by the ISSG (2021).	Very high
		, distribution and introduction risk How similar are the climatic conditions of the		WORLD MAD OF THE KÖRDEN OFFICER OF MATE OF ACCEPTION	Ind. If
4	2.01	Risk Assessment (RA) area and the taxon's native range?	Medium	WORLD MAP OF THE KÖPPEN-GEIGER CLIMATE CLASSIFICATION	Medium
5	2.02	What is the quality of the climate matching data?	Medium	WORLD MAP OF THE KÖPPEN-GEIGER CLIMATE CLASSIFICATION	Medium
6	2.03	Is the taxon already present outside of captivity in the RA area?	No	No such fact has been detected	Medium
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	This species enters in the region for aquaculture purposes	Medium
8	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)?	Yes	Oncorhynchus kisutch introduced to Iran and probably established in the wild.	Very high
3. 1	Invasive	e elsewhere			
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	No	Coho salmon, which are native to the coastal area of the North Pacific Basin, have been introduced into many areas of North America, Asia, Europe and Latin America, although most attempts to establish naturalized populations have been unsuccessful.	Medium
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	Coho salmon compete with native lake trout Salvelinus namaycush (Page and Laird 1993). Fausch and White (1986) found that coho salmon may compete with brook trout S. fontinalis and brown trout Salmo trutta for food and space in the Great Lakes if resources become scarce. Coho have an advantage over brook and brown trout because of an earlier emergence and a larger size at emergence (Fausch and White 1986).	Very high
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	Such a fact is not known	Medium
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	No	Such a fact is not known	Medium
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	Such a fact is not known	Low
		//Ecology			
		able (or persistence) traits	1		
		pose other risks to human health?	No	This species does not pose a threat to humans	High
15	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	Own judgement	Medium
	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	Yes	There are several protected and threatened species in the region which will be potential prey for O. kisutch, such as Sturgeons, Luciobarbus capito, Salmo gegarkuni, Salmo labrax, etc.	Very high
	4.04	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?	Yes	Own judgement	Medium
	4.05	Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA	Yes	O. kisutch is a predator fish and can disrupt food web structure in the freshwater ecosystems of the Caucasus region.	High
	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes	If the species is distributed in the region, this is expected to happen	Medium
20	4.07	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA	Not applicable	Data deficient	Low

21					
1	4.08	Is it likely that the taxon will host, and/or	Yes	If the species is distributed in the region, this is expected to	Medium
		act as a vector for, recognised pests and		happen	
		infectious agents that are absent from (novel			
		to) the RA area?			
22	4.09	Is it likely that the taxon will achieve a body	Yes	Max length of O. kisutch is 108 cm; max. published weight: 15.2	Very high
		size that will make it more likely to be		kg, therefore this species has commercial value. The coho salmon	
	1	released from captivity?		stocks presently used in aquaculture were derived from	
	1			government hatchery programmes in the United States of America	
רנ	4.10	Is the taxon equable of quate initial in the lift	Vac	and Canada, but most countries now rely on local sources.	Vonchish
23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g.	Yes	The fish occur in the ocean or in lakes; adults return to the rivers where they were born. The young fish emerge in springtime and	Very high
		versatile in habitat use)?			
		versatile in habitat use)?		they usually live in fresh water for 1-2 years (sometimes up to 4	
24	4.11	Is it likely that the taxon's mode of existence	Not applicable	years; later they migrate at night to freshwater lakes or to the sea. Data deficient	Low
24	4.11	(e.g. excretion of by-products) or behaviours	Not applicable		LOW
	1	(e.g. feeding) will reduce habitat quality for native taxa?			
25	4.12	Is the taxon likely to maintain a viable	Not applicable	Data deficient	Low
		population even when present in low	not applicable		2011
		densities (or persisting in adverse conditions			
		by way of a dormant form)?			
5.	Resourd	ce exploitation			
	5.01	Is the taxon likely to consume threatened or	Yes	O. kisutch is a predator species and can eat native protected	High
_		protected native taxa in the RA area?		species in the SC region such as L. capito, Salmo spp, Acipencer	
7	5.02	Is the taxon likely to sequester food	Yes	Own judgement	Medium
	1	resources (including nutrients) to the			
		detriment of native taxa in the RA area?			
	Reprod		1		1.
28	6.01	Is the taxon likely to exhibit parental care	Not applicable	Data deficient	Low
	1	and/or to reduce age-at-maturity in response			
	C 0-	to environmental conditions?			.,
29	6.02		No	Such fact has not been detected yet	Very high
	6.00	or propagules (in the RA area)?			
30	6.03	Is the taxon likely to hybridise naturally with	No	Data deficient	Low
> 1	6.04	native taxa?	No	Data deficient	Low
τ	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	No	Data deficient	Low
32	6.05	Is the taxon dependent on the presence of	Yes	O. kisutch is a anadromous species and spawns in the rivers	High
2	0.05	another taxon (or specific habitat features)	105	where they were born. Therefore fast flowing and oxygen rich	ingii
	1	to complete its life cycle?		waters are crucial for their reproduction.	
22	6.06	Is the taxon known (or likely) to produce a	No	In the wild, coho salmon usually mature during their third year of	High
55	0.00	large number of propagules or offspring	NO	life, including 4–6 months in incubation, 15 months rearing in	ingii
		within a short time span (e.g. < 1 year)?		freshwater, and 18 months of ocean residence. Mature fish return	
	1	(c.g. < 1 yeal)?		to their rivers of origin during late summer and autumn. Spawning	
	1			occurs between November and January. Female coho produce 2	
34	6.07	How many time units (days, months, years)	3	In the wild, coho salmon usually mature during their third year of	Very high
				life.	
		does the taxon require to reach the age-at-			
		does the taxon require to reach the age-at- first-reproduction? al mechanisms			
		does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal	One	This species may be disperse within the region by human through	Medium
		does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to	One		Medium
35	7.01	does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable		This species may be disperse within the region by human through translocation	
35		does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the	One Yes	This species may be disperse within the region by human through	Medium
35	7.01	does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more		This species may be disperse within the region by human through translocation	
35 36	7.01	does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)?	Yes	This species may be disperse within the region by human through translocation There is a probability of this.	Low
35 36	7.01	does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively		This species may be disperse within the region by human through translocation	
35 36	7.01	does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship	Yes	This species may be disperse within the region by human through translocation There is a probability of this.	Low
35	7.01	does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances	Yes	This species may be disperse within the region by human through translocation There is a probability of this.	Low
35 36 37	7.01 7.02 7.03	does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal?	Yes	This species may be disperse within the region by human through translocation There is a probability of this. This species does not have such means	Low High
35 36 37	7.01	does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to	Yes	This species may be disperse within the region by human through translocation There is a probability of this.	Low
35 36 37	7.01 7.02 7.03	does the taxon require to reach the age-at- first-reproduction? and mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules	Yes	This species may be disperse within the region by human through translocation There is a probability of this. This species does not have such means	Low High
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35 36 37 38 39 40 41 41 42 43 3.	7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 7.09	does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>Ce attributes</i>	Yes No No No No No Yes	This species may be disperse within the region by human through translocation There is a probability of this. This species does not have such means This species does not inhabit the region This species does not inhabit the region This species does not inhabit the region No such fact has been detected Own judgement Such a fact is not known	Low High Medium Medium Medium Medium Medium
35 36 37 38 39 40 41 41 42 43 3.	7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 7.09	does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>cre attributes</i> Is the taxon able to withstand being out of	Yes No No No No No Yes	This species may be disperse within the region by human through translocation There is a probability of this. This species does not have such means This species does not inhabit the region This species does not inhabit the region This species does not inhabit the region No such fact has been detected Own judgement Such a fact is not known	Low High Medium Medium Medium Medium Medium
335 336 337 338 339 40 411 42 433 334	7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 7.09 7.09	does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle?	Yes No No No No No Yes	This species may be disperse within the region by human through translocation There is a probability of this. This species does not have such means This species does not inhabit the region This species does not inhabit the region This species does not inhabit the region No such fact has been detected Own judgement Such a fact is not known	Low High Medium Medium Medium Medium Medium Low
335 336 337 338 339 40 411 42 433 334	7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 7.09	does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? cre attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life	Yes No No No No No Yes	This species may be disperse within the region by human through translocation There is a probability of this. This species does not have such means This species does not inhabit the region This species does not inhabit the region This species does not inhabit the region No such fact has been detected Own judgement Such a fact is not known	Low High Medium Medium Medium Medium Medium
335 336 337 338 339 40 411 42 433 334	7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 7.09 7.09	does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle?	Yes No No No No Yes No	This species may be disperse within the region by human through translocation There is a probability of this. This species does not have such means This species does not inhabit the region This species does not inhabit the region This species does not inhabit the region No such fact has been detected Own judgement Such a fact is not known Such a fact is not known	Low High Medium Medium Medium Medium Medium Low
35 36 37 38 39 40 41 42 43 3.1	7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 7.09 7.09	does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of	Yes No No No No Yes No	This species may be disperse within the region by human through translocation There is a probability of this. This species does not have such means This species does not inhabit the region This species does not inhabit the region This species does not inhabit the region No such fact has been detected Own judgement Such a fact is not known Such a fact is not known	Low High Medium Medium Medium Medium Medium Low

46	8.03	Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	Yes	No studies have been conducted in this direction	Medium
47	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	Yes	This species is distributed through humans	Medium
48	8.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	Yes	The fish occur in the ocean or in lakes; adults return to the rivers where they were born. The young fish emerge in springtime and they usually live in fresh water for 1-2 years, later they migrate at night to freshwater lakes or to the sea.	Very high
	8.06	Are there effective natural enemies (predators) of the taxon present in the RA area?	Yes	There are several potential predators in the Caucasus region which can controll the populations of O. kisutch: Salmo spp, Squalius spp, Sander lucioperca, otters, birds, etc.	Very high
С. С	Climate	e change			
		change			
50	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?	No change	Own judgement	Medium
51	9.02	Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	No change	Own judgement	Medium
52	9.03	Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase. decrease or not change?	Increase	Own judgement	Medium
53	9.04	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	No change	Own judgement	Medium
54	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	No change	Own judgement	Medium
55	9.06	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	No change	Own judgement	Medium

Statistics

BRA+CCA BRA+CCA Confidence BRA+CCA	0.60
BRA+CCA	
Inresnolds	_
Thresholds	
Species or population nuisance traits	4
Environmental Species or population nuisance traits	8
Commercial	6
Sectors affected	_
9. Climate change	6
C. Climate change	6
8. Tolerance attributes	6
7. Dispersal mechanisms	9
6. Reproduction	2 7 9
5. Resource exploitation	2
4. Undesirable (or persistence) traits	12
B. Biology/Ecology	36
3. Invasive elsewhere	5
2. Climate, distribution and introduction risk	3 5 5 36 12
1. Domestication/Cultivation	3
A. Biogeography/Historical	13
Total	55
Answered Questions	2.0
9. Climate change	2.0
C. Climate change	2.0 2.0
<i>7. Dispersal mechanisms</i> <i>8. Tolerance attributes</i>	-3.0
6. Reproduction 7. Dispersal mechanisms	-3.0 -3.0
5. Resource exploitation	7.0
4. Undesirable (or persistence) traits	8.0
B. Biology/Ecology	10.0
3. Invasive elsewhere	1.0
2. Climate, distribution and introduction risk	0.0
1. Domestication/Cultivation	4.0
A. Biogeography/Historical	5.0
Score partition	
BRA+CCA Outcome	-
BRA+CCA	17.0
BRA Outcome	-
BRA	15.0
BRA	

Date and Time

13/05/2022 14:06:24

Taxon and Assessor details						
Category	Fishes and Lampreys (freshwater)					
Taxon name	Oncorhynchus kisutch					
Common name	coho salmon					
Assessor	Tatia Kuljanishvili					
Risk screening context						
Reason and socio-economic benefits	This species was transported from Kamchatka in Russia to Azerbaijan in 1977-83, to the Chaykend					
Risk assessment area	South Caucasus					
Taxonomy	Actinopteri (ray-finned fishes) > Salmoniformes (Salmons) > Salmonidae (Salmonids) >					
Native range	northern Pacific Ocean.					
Introduced range	Caspian Sea basin					
URL	https://www.fishbase.se/summary/Oncorhynchus-kisutch.html					

			Response	Justification (references and/or other information)	Confidence
A. I	Biogeo	graphy/Historical			
1. L	Domesti	ication/Cultivation			
1		Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	Has been farmed in marine environments	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	This kind is traded as fresh fish, dried or salted, smoked, canned, preserved and frozen (Ref. 9988)	Very high
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	Examples: golden trout, brook trout, brown trout (Knapp 1996)	Very high
2. (Climate.	, distribution and introduction risk			
4		How similar are the climatic conditions of the	Medium	Climate is somehow similar	High
		Risk Assessment (RA) area and the taxon's native range?			-
5		What is the quality of the climate matching data?	Medium	Medium	Medium
6	2.03	Is the taxon already present outside of captivity in the RA area?	No	This species was transported from Kamchatka in Russia to Azerbaijan in 1977-83, to the Chaykend fish hatchery in the form of fertilized eggs. After incubation, the hatched fries were released into the Caspian Sea (Musayev et al. 2004). However, there is no data on the results of the acclimatization of this fish and no	Low
7		How many potential vectors could the taxon use to enter in the RA area?	One	Aquaculture	Medium
8		Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional	No	No evidence	Medium
		and intentional introductions)?			
3. I	nvasive	e elsewhere			
9	3.01	Has the taxon become naturalised	Yes	In Great lakes for example	High
		(established viable populations) outside its			
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	Through a meta-analysis of existing data, we show a reduction in survival or abundance of Atlantic salmon; sea trout; and pink, chum, and coho salmon in association with increased production	Very high
				of farmed salmon. https://journals.plos.org/plosbiology/article?id=10.1371/journal.pb io.0060033	
		In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	No data	Medium
		In the taxon's introduced range, are there known adverse impacts to ecosystem	No	No, However it can transmit diseases,	Medium
13		In the taxon's introduced range, are there known adverse socio-economic impacts?	No	Not known	Medium
B. I	Biology	//Ecology			
		able (or persistence) traits	1		1
14	4.01	Is it likely that the taxon will be poisonous or pose other risks to human health?	No	Not poisonous	Very high
		Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	Coho salmon farming was correlating to the mortality of native salmonid species https://journals.plos.org/plosbiology/article?id=10.1371/journal.pb io.0060033	High
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	Does not parasite	Very high
17		Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?	Yes	Coho salmon can tolerate temperatures ranging from 5 to 25 degrees celsius (Brett 1952). Later studies show that it can tolerate temperatures up to 29.5, and this findings were important to assess the potential ecological consecuences of this species if entered environments, that are caracterised with temperatures above their normal tolerance limit (Chen et al 2015).	Medium
18		Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA	No	There is no information available	Low
19		Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes	Can transmit deseases	Low
20		Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA	Yes	It is likely. However no information avaiable about it	Low

21	4.08	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel	Yes	It is likely. However no information avalable about it	High
22	4.09	to) the RA area? Is it likely that the taxon will achieve a body size that will make it more likely to be	Yes	Yes. See: https://www.fishbase.se/summary/Oncorhynchus- kisutch.html	High
23	4.10	released from captivity? Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g.	Yes	It is migratory species that can sustain itself in a range of water velocity conditions	Very high
		versatile in habitat use)?		,	
4	4.11	Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for	No	No data	High
5	4.12	native taxa? Is the taxon likely to maintain a viable population even when present in low	No	No information avalaible	Low
		densities (or persisting in adverse conditions by way of a dormant form)?			
		te exploitation Is the taxon likely to consume threatened or	Yes	It is likely	Medium
		protected native taxa in the RA area?			
7	5.02	Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?	No	No information	Low
	Reprodu				I
8	6.01	Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?	Yes	Female salmon construct and defend nests, whereas male salmon provide no parental care	High
9	6.02		No	No. climate is not suitable	Medium
	6.03	Is the taxon likely to hybridise naturally with native taxa?	Yes	Yes it is possible	Low
81	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	No	No. Does not display asexual reproduction	High
32	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	No	No. See: https://www.fishbase.se/summary/Oncorhynchus- kisutch.html	Very high
3	6.06	Is the taxon known (or likely) to produce a large number of propagules or offspring	No	It can produce 2400-2800 eggs	Medium
84	6.07	within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at-	4	4 years	Very high
7 6	Vienera	first-reproduction?			
		al mechanisms How many potential internal	One	Aquaculture	Medium
		vectors/pathways could the taxon use to disperse within the RA area (with suitable			
6	7.02	Will any of these vectors/pathways bring the taxon in close proximity to one or more	No	Less likely	Low
37	7.03	protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances	No	No. Morphologically this species does not have a means of actively attaching itself to hard substrata	Very high
8	7.04	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules	No	No. can not be distributed as eggs.	Very high
9	7.05	(for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?	Yes	yes. it could be possible	Medium
0	7.06	Are older life stages of the taxon likely to	No	Does not migrate for reproduction	High
		migrate in the RA area for reproduction?			
	7.07	migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No	No. Can not be dispersed by other ananimals	Very high
1	7.07 7.08	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both	No	No. Can not be dispersed by other ananimals Not rapid	Very high High
1	7.08	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be	No	Not rapid	High
1 2 3	7.08	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent?			, 5
-1 -2 -3 	7.08 7.09 Toleran	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of	No	Not rapid	High
-1 -2 -3 -4	7.08 7.09 Toleran	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the	No	Not rapid	High
-1 -2 -3 -4 -5	7.08 7.09 <i>Folerant</i> 8.01	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that	No No	Not rapid No info No information avalable Can not tolerate low oxygen environment and is very sensitive to	High Low Very high

48	8.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	No	No information avalable	Very high
49	8.06	Are there effective natural enemies (predators) of the taxon present in the RA	No	No effective natural enemies present in RA area	High
С. (Climate	e change			
9. (Climate	change			
50	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?	Increase	It was hypotheses that climate change might alert the mechanisms of transportation and introduction of non-native species. Commercial and recreational activities will increase, that itself increases the propagule pressure levels of non-native	High
51	9.02	Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	Decrease	Since this species can not tolerate high temperatures, risks of establishment posed by taxon likely decreaase	Medium
52	9.03	Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change?	Decrease	Decrease	Medium
53	9.04	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	Lower	Lower	Low
	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	No change	No change	Medium
55	9.06	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	No change	No change	High

Statistics	
Scores	
BRA	14.5
BRA Outcome	-
BRA+CCA	10.5
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	8.5
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	0.0
3. Invasive elsewhere	4.5
B. Biology/Ecology	6.0
4. Undesirable (or persistence) traits	7.0
5. Resource exploitation	5.0
6. Reproduction	1.0
7. Dispersal mechanisms	-3.0
8. Tolerance attributes	-4.0
C. Climate change	-4.0
9. Climate change	-4.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	5
B. Biology/Ecology	3 5 36 12 2 7 9 6 6
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2
6. Reproduction	/
7. Dispersal mechanisms 8. Tolerance attributes	9
C. Climate change	0
	6
9. Climate change Sectors affected	0
Sectors affected Commercial	6
Environmental	4
Species or population nuisance traits	4
Species of population nuisance traits	-
Thresholds	
Thesholus	
BRA	-

BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.64
BRA	0.65
CCA	0.54
Date and Time	

21/05/2022 15:13:14

Taxon and Assessor details						
Category	Fishes and Lampreys (freshwater)					
Taxon name	Oncorhynchus mykiss					
Common name	rainbow trout					
Assessor	Bella Japoshvili					
Risk screening context						
Reason and socio-economic benefits	Thsi economically important species were widely introduced in the RA area					
Risk assessment area	South Caucasus					
Taxonomy	Actinopteri (ray-finned fishes) > Salmoniformes (Salmons) > Salmonidae (Salmonids)					
Native range	North Atlantic					
Introduced range	Worldwide					
URL	https://www.fishbase.de/summary/Oncorhynchus-mykiss.html					

			Response	Justification (references and/or other information)	Confidence
Α.	Biogeo	graphy/Historical			
		ication/Cultivation			
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	e.g. Wysocki, L. E., Davidson III, J. W., Smith, M. E., Frankel, A. S., Ellison, W. T., Mazik, P. M., & Bebak, J. (2007). Effects of aquaculture production noise on hearing, growth, and disease resistance of rainbow trout Oncorhynchus mykiss. Aquaculture, 272(1-4), 687-697.	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	Definitely in the past. However, currently the species can be cultured in the farms or collected within the introduced range	Low
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	Other trouts	Very high
2. (^limate	, distribution and introduction risk			
4		How similar are the climatic conditions of the	Medium	Resluts of climatch algorithm	Low
		Risk Assessment (RA) area and the taxon's native range?	neurum		Low
5	2.02	What is the quality of the climate matching data?	Low	Due to low accuracy of local climate data	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	Kottelat, M., & Freyhof, J. (2007). Handbook of European freshwater fishes. Publications Kottelat.	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	>1	Human mediated translocation for aquacultural and recreational purpose	High
8	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)?	Yes	Kuljanishvili, T., Mumladze, L., Japoshvili, B., Mustafayev, N., Ibrahimov, S., Patoka, J., & Kalous, L. (2021). The first unified inventory of non-native fishes of the South Caucasian countries, Armenia, Azerbaijan, and Georgia. Knowledge & Management of Aquatic Ecosystems, (422), 32.	Very high
3. 1	nvasive	e elsewhere			
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	No	Kuljanishvili, T., Mumladze, L., Japoshvili, B., Mustafayev, N., Ibrahimov, S., Patoka, J., & Kalous, L. (2021). The first unified inventory of non-native fishes of the South Caucasian countries, Armenia, Azerbaijan, and Georgia. Knowledge & Management of Aquatic Ecosystems, (422), 32.	Medium
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	Behnke RJ, 2002. Trout and Salmon of North America. New York, USA: The Free Press, 359 pp	High
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	No documented evidence, and not expected	High
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	No	No documented evidence	Low
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	No documented evidence	High
B . I	Biology	//Ecology			
		able (or persistence) traits			
			No	Species is harmles	Very high
	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	No documented evidence, professional judgement but also Behnke RJ, 2002. Trout and Salmon of North America. New York, USA: The Free Press, 359 pp	Medium
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	Not a parasite species	High
17	4.04	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?	No	Based on professional judgement	Medium
18	4.05	Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA	No	No documented evidence exists	Low
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	No documented evidence elsewhere	Low
20	4.07	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA	No	Based on professional judgement	Low

		Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area?	Yes	E.g. Buchmann, K., Bresciani, J., 1997. Parasitic infections in pond-reared rainbow trout Oncorhynchus mykiss in Denmark. Diseases of Aquatic Organisms, 28(2), 125-138. doi: 10.3354/dao028125; Skov, J., Mehrdana, F., Marana, M. H., Bahlool, Q. Z. M., Jaafar, R. M., Sindberg, D., Jensen, H. M., Kania, P. W., Buchmann, K., 2014. Parasite infections of rainbow trout (Oncorhynchus mykiss) from Danish mariculture. Aouaculture, 434. 486-492. doi:	Medium
22	4.09	Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity?	No	This can not be a reson of release. Usually they are intended to be released in wild	High
23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)?	Yes	Mountain rivers as well as marin waters for anadromous populations are known for the species	Very high
24	4.11		No	No documented evidence exist	Low
25	4.12	Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)?	No	Based on professional judgement.	Medium
5. R	esourc	e exploitation			
26	5.01	Is the taxon likely to consume threatened or	Yes	Some invertebrates, or even fishes	Medium
27	5.02	protected native taxa in the RA area? Is the taxon likely to sequester food resources (including nutrients) to the	Yes	Native salmonids	High
		detriment of native taxa in the RA area?			
	eprodu				1
28	6.01	Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?	No	Page, L.M. and B.M. Burr, 2011. A field guide to freshwater fishes of North America north of Mexico. Boston : Houghton Mifflin Harcourt, 663p.	High
29	6.02		No	No documented evidence exist. There are unpulished own data about the escape of O. mykiss from aquaculture with no cases of	Low
30	6.03	Is the taxon likely to hybridise naturally with native taxa?	Yes	juveniles born in the wild. Young, W. P., Ostberg, C. O., Keim, P., & Thorgaard, G. H. (2001). Genetic characterization of hybridization and introgression between anadromous rainbow trout (Oncorhynchus mykiss isidaus) and aparted suthtrost trout (O. clarki sladki). Malagular	Very high
31	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	No	irideus) and coastal cutthroat trout (O. clarki clarki). Molecular No documented evidence of asexuality	High
32	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	No	No such an evidence exists	Very high
33	6.06	Is the taxon known (or likely) to produce a large number of propagules or offspring	Yes	Several thousands of eggs per year	Very high
34	6.07	within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	3	years	Very high
7. D	ispersa	al mechanisms			
		How many potential internal vectors/pathways could the taxon use to	>1	Popular species for aquaculture and recreational fisheris. If established at single point it can disperse naturally as well	High
36	7.02	disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more	Yes	Colchis natural park along the Black Sea coast	High
37	7.03	protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances	No	No such an evidence, nor fish biology morphology support this behavior	Very high
38	7.04	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules	No	Not known from neighbouring areas in the wild	Very high
39	7.05	(for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA	Yes	Juveniles are migrating	Very high
40	7.06	area? Are older life stages of the taxon likely to migrate in the RA area for reproduction?	No	Although there are anadrmous populations known for O. mykiss in its native range there are no such populations in the neghboring	Low
41	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No	seash of RA area No such an evidence exists	Very high
42	7.08	Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both	Yes	Given the large amount of aqucultural units in RA area	Medium
43	7.09	unintentional or intentional) likely to be Is dispersal of the taxon density dependent?	No	No documented evidence exist	High
8. T	olerand	ce attributes			
44	8.01	Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle?	No	No such an evidence, although the salmonids generally can not cope with out of water conditions	High

45	8.02	Is the taxon tolerant of a wide range of water quality conditions relevant to that	No	Based on professional judgement.	Medium
		taxon? [In the Justification field, indicate the			
		relevant water quality variable(s) being			
46	8.03	Can the taxon be controlled or eradicated in	Yes	Based on professional judgement, no documented evidence.	Low
		the wild with chemical, biological, or other			
		agents/means?			
47	8.04	Is the taxon likely to tolerate or benefit from	No	Based on professional judgement	High
		environmental/human disturbance?			
48	8.05	Is the taxon able to tolerate salinity levels	No	No documented evidence	Medium
		that are higher or lower than those found in			
		its usual environment?			
49	8.06	Are there effective natural enemies	No	Not known anu effective natural enemy from the RA area (based	Medium
		(predators) of the taxon present in the RA		on professinal judgement)	
		e change			
		change	1		
50	9.01	Under the predicted future climatic	Increase	Based on professional judgement	Low
		conditions, are the risks of entry into the RA			
		area posed by the taxon likely to increase,			
		decrease or not change?			
51	9.02	Under the predicted future climatic	Decrease	Based on professional judgement	Medium
		conditions, are the risks of establishment			
		posed by the taxon likely to increase,			
_		decrease or not change?			
52	9.03	Under the predicted future climatic	No change	Based on professional judgement	Medium
		conditions, are the risks of dispersal within			
		the RA area posed by the taxon likely to			
-		increase, decrease or not change?			-l.
53	9.04	Under the predicted future climatic	No change	Based on professional judgement	Low
I		conditions, what is the likely magnitude of			
	1	future potential impacts on biodiversity			
F (0.05	and/or ecological integrity/status?			
54	9.05	Under the predicted future climatic	No change	Based on professional judgement	Low
	1	conditions, what is the likely magnitude of			
Í		future potential impacts on ecosystem			
	0.00	structure and/or function?	No. ala ara a	Dened en mufereienel indennent	1
55	9.06	Under the predicted future climatic	No change	Based on professional judgement	Low
Í		conditions, what is the likely magnitude of			
Í		future potential impacts on ecosystem			
	1	services/socio-economic factors?			

Statistics

Scores	
BRA	15.0
BRA Outcome	-
BRA+CCA	15.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	8.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	2.0
3. Invasive elsewhere	2.0
B. Biology/Ecology	7.0
4. Undesirable (or persistence) traits	2.0
5. Resource exploitation	7.0
6. Reproduction	2.0
7. Dispersal mechanisms	0.0
8. Tolerance attributes	-4.0
C. Climate change	0.0
9. Climate change	0.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	5
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2
6. Reproduction	7
7. Dispersal mechanisms	9
8. Tolerance attributes	6
C. Climate change	6
9. Climate change	6
Sectors affected	
Commercial	11
Environmental	6
Species or population nuisance traits	3
Thresholds	
BRA BRA+CCA	-

Confidence

BRA+CCA BRA 0.63 0.67

	CCA	0.33
Date and Time		
	16/05/2022	20:26:08

Taxon and Assessor details					
Category	Fishes and Lampreys (freshwater)				
Taxon name	Oncorhynchus mykiss				
Common name	rainbow trout				
Assessor	Giorgi Epitashvili				
Risk screening context					
Reason and socio-economic benefits	O. mykiss is one of the widspread species in the world and is widely used in aquaculture				
Risk assessment area	South Caucasus				
Taxonomy	Oncorhynchus mykiss (Walbaum 1792)				
Native range	Pacific Slope from Kuskokwim River drainage in Alaska to Otay River drainage in California, USA				
Introduced range	Widely introduced and established in Canada and USA, including Arctic, Atlantic, Great Lakes,				
URL	https://www.fishbase.se/summary/oncorhynchus-mykiss.html				

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
		ication/Cultivation	1		1
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	This fish is important for pond fishery (Ninua et al. 2013)	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	This species is one of the commercial fish and actively used for both aquacultural and recreational fishing.	Very high
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	It has been widely introduced around the word for fisheries and aquaculture. It is an effective competitor which can displace native trout species when introduced into new environments. Several countries report adverse ecological impact after	Very high
2. (Climate.	distribution and introduction risk	1	Several countries report deverse ecological impact after	
	2.01	How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range?	Medium	Köppen-Geiger climate classification system	Medium
5	2.02	What is the quality of the climate matching data?	#N/A	No data	Low
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	This species often escapes from fish farms and occurs in many rivers and lakes of the SC region (Ninua et al. 2013). For instance in Georgia O. mykiss often seen in rivers where fish farms are	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	This species entered in the SC region intentionaly by humans for aquaculture.	High
8	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)?	Yes	Rainbow trout (Oncorhynchus mykiss) has become by far the most frequently farmed freshwater fish species in Turkey, whereas very little is known about its establishment and invasiveness potential (Yoğurtcuoğlu et al. 2021).	Very high
3. I	nvasive	elsewhere			
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	Introductions of rainbow trout in European waters have been encouraged for many years and intentional releases still occur. Our study demonstrated that, in some cases, O. mykiss can constitute self-sustaining, stable populations, able to survive over a long time period and to colonise areas that naturally lack other salmonids. The ability to create naturally reproducing populations may represent a local threat to the rich biological diversity of the	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	In the experiment, to test whether rainbow trout is a vector of the pathogenic freshwater mold Saprolegnia diclina (Oomycetes), eggs of Engystomops petersi were placed with infected and uninfected rainbow trout. There was a high mortality rate in the embryos of E. petersi exposed to trout infected with S. diclina. This represents the first evidence that rainbow trout may have a direct negative effect on Neotropical amphibian populations, and thus should be considered a threat. Management programs should be implemented to eradicate trout from Andean rivers, especially in areas with high number of endangered amphibians (Martín-	High
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	No data	Low
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem services?	No	Several invasives have provided positive recreation and tourism opportunities, especially in the area of fishing. These include large mouth bass (Micropterus salmoides), brown trout (Salmo trutta) and rainbow trout (Oncorhynchus mykiss) (Charles and Dukes	High
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	Several invasives have provided positive recreation and tourism opportunities, especially in the area of fishing. These include large mouth bass (Micropterus salmoides), brown trout (Salmo trutta) and rainbow trout (Oncorhynchus mykiss) (Charles and Dukes	High
B . I	Biology	//Ecology			
		able (or persistence) traits			
	4.01	Is it likely that the taxon will be poisonous or pose other risks to human health?	No	This species does not pose a threat to humans.	Very high
	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	This fish is predator and can affect on native taxa	Medium
	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	Yes	This fish is predator and can eat threatened or protected taxas in the SC region such as Sturgeons, trouts, etc.	High
17	4.04	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?	Yes	This species has been found in the region for a long time and it seems that the climatic and environmental conditions here are acceptable to it.	Medium

18					
	4.05	Is the taxon likely to disrupt food-web	Yes	O. mykiss is an predator fish and can disrupt food web structure in	Medium
		structure/function in aquatic ecosystems if it		the region because it can eat local small sized species. Also this	
		has invaded or is likely to invade the RA		species is competitor to native trout populations (e.g. Salmo	
		area?		caspius, S. ciscaucasicus, S. labrax, S. rizeensis) and	
				consequently negatively affects mountain river ecosystems. Such a fact is known from other regions as well (Juncos et al. 2011).	
19	4.06	Is the taxon likely to exert adverse impacts	No	A similar study has not yet been conducted, although it may have	Medium
		on ecosystem services in the RA area?		some impact.	
20	4.07	Is it likely that the taxon will host, and/or	Not applicable	No data	Low
		act as a vector for, recognised pests and			
	1.00	infectious agents that are endemic in the RA			
21	4.08	Is it likely that the taxon will host, and/or	Not applicable	No data	Low
		act as a vector for, recognised pests and			
		infectious agents that are absent from (novel to) the RA area?			
22	4.09	Is it likely that the taxon will achieve a body	Yes	This fish has been widely introduced around the word for fisheries	Very high
		size that will make it more likely to be		and aquaculture. The rearing of captive rainbow trout for fish	· · · , · · · g· ·
		released from captivity?		farming and stock enhancement programmes mimics the life	
				history of wild Oncorhynchus mykiss and utilises both freshwater	
				and sea water environments as appropriate. Because of the	
				efficiencies of farm husbandry practices, the farming process	
				accelerates the life cycle to 1 year or less in freshwater (smolts	
				typically 40g to 120g) and harvesting is done after 10 to 20	
22	4.10	Is the taxon capable of sustaining itself in a	Yes	months of growth in sea cages at between 2 and 6kg in body This species inhabit clear, cold headwaters, creeks, small to large	High
دے	1.10	range of water velocity conditions (e.g.	103	rivers, lakes, and intertidal areas (Page and Burr 2011)	. ngn
		versatile in habitat use)?			
24	4.11	Is it likely that the taxon's mode of existence	Yes	A similar study has not yet been conducted	Medium
		(e.g. excretion of by-products) or behaviours			
		(e.g. feeding) will reduce habitat quality for			
25	4.12	native taxa?	Net a 11 11		1
25	4.12	Is the taxon likely to maintain a viable	Not applicable		Low
		population even when present in low densities (or persisting in adverse conditions			
		by way of a dormant form)?			
<u>5.</u> I	Resourc	ce exploitation	·		•
	5.01	Is the taxon likely to consume threatened or	Yes	This species is predator and can eat meny native species in the SC	High
		protected native taxa in the RA area?		region, including threathened and protected species.	
27	5.02	Is the taxon likely to sequester food	Yes	O. mykiss is competitor species for native taxa	High
		resources (including nutrients) to the detriment of native taxa in the RA area?			
6. 1	Reprodu		1	1 	1
	6.01	Is the taxon likely to exhibit parental care	Not applicable	No data	Low
		and/or to reduce age-at-maturity in response			
	1		1		
20		to environmental conditions?			
29	6.02	Is the taxon likely to produce viable gametes	No	No such case has been confirmed yet	Low
		Is the taxon likely to produce viable gametes or propagules (in the RA area)?			
	6.02 6.03	Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with	No Yes	Hybridization between native and non-native species has serious	Low Very high
		Is the taxon likely to produce viable gametes or propagules (in the RA area)?		Hybridization between native and non-native species has serious biological consequences, but our understanding of how dispersal	
		Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with		Hybridization between native and non-native species has serious	
		Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with		Hybridization between native and non-native species has serious biological consequences, but our understanding of how dispersal and selection interact to influence invasive hybridization is	
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30 31 32	6.03 6.04 6.05	Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring	Yes No No	Hybridization between native and non-native species has serious biological consequences, but our understanding of how dispersal and selection interact to influence invasive hybridization is limited. Here, we document the spread of genetic introgression between a native (Oncorhynchus clarkii) and invasive (Oncorhynchus mykiss) trout, and identify the mechanisms influencing genetic admixture (Kovach et al. 2015). No data Such data is not available	Very high Low Medium
30 31 32 33	6.03 6.04 6.05 6.06	Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)?	Yes No No No	Hybridization between native and non-native species has serious biological consequences, but our understanding of how dispersal and selection interact to influence invasive hybridization is limited. Here, we document the spread of genetic introgression between a native (Oncorhynchus clarkii) and invasive (Oncorhynchus mykiss) trout, and identify the mechanisms influencing genetic admixture (Kovach et al. 2015). No data Such data is not available The fish becomes sexually mature at the age of 3-4, Fecundity - 500-2500 eggs (Ninua et al. 2013).	Very high Low Medium High
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30 31 32 33	6.03 6.04 6.05 6.06	Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at-	Yes No No No	Hybridization between native and non-native species has serious biological consequences, but our understanding of how dispersal and selection interact to influence invasive hybridization is limited. Here, we document the spread of genetic introgression between a native (Oncorhynchus clarkii) and invasive (Oncorhynchus mykiss) trout, and identify the mechanisms influencing genetic admixture (Kovach et al. 2015). No data Such data is not available The fish becomes sexually mature at the age of 3-4, Fecundity - 500-2500 eggs (Ninua et al. 2013).	Very high Low Medium High
30 31 32 33 34	6.03 6.04 6.05 6.06 6.07	Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	Yes No No No	Hybridization between native and non-native species has serious biological consequences, but our understanding of how dispersal and selection interact to influence invasive hybridization is limited. Here, we document the spread of genetic introgression between a native (Oncorhynchus clarkii) and invasive (Oncorhynchus mykiss) trout, and identify the mechanisms influencing genetic admixture (Kovach et al. 2015). No data Such data is not available The fish becomes sexually mature at the age of 3-4, Fecundity - 500-2500 eggs (Ninua et al. 2013). The fish becomes sexually mature at the age of 3-4 (Ninua et al.	Very high Low Medium High
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	7 0 7	Are propagules or eggs of the taxon likely to	No	No such fact has been revealed	Low
41	7.07		INO	No such fact has been revealed	LOW
42	7.08	be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the	No	No data	Low
42	7.08	· · · · · · · · · · · · · · · · · · ·	NO	NO UALA	LOW
		vectors/pathways mentioned in the previous			
		seven questions (35–41; i.e. both			
42	7.09	unintentional or intentional) likely to be Is dispersal of the taxon density dependent?	No	No data	Low
		the cast of the taxon density dependent?	INO		LOW
_			No	This fish inholite share, success sich and waters, smaller, small to	LUIS
44	8.01	Is the taxon able to withstand being out of water for extended periods (e.g. minimum of	INO	This fish inhabits clear, oxygen rich cold waters, creeks, small to large rivers, lakes, and intertidal areas (Page and Burr 2011)	High
				large rivers, lakes, and intertioal areas (Page and burr 2011)	
		one or more hours) at some stage of its life			
45	8.02	cycle? Is the taxon tolerant of a wide range of	No	Water temperature was an important factor in trout distribution in	High
45	0.02	5	NO		nigii
		water quality conditions relevant to that		the two pools of Southern California. During 1–11 August 1994,	
		taxon? [In the Justification field, indicate the		water temperatures in pool 1 ranged from 21.5) C at the bottom	
		relevant water quality variable(s) being		(4·1 m) to 28·9) C at the surface. After 5 August, trout were no	
		considered.]		longer found in this pool, suggesting that trout had moved out of	
46	8.03	Can the taxon be controlled or eradicated in	Yes	the high temperature water or died (Matthews and Berg 1997). A similar study has not yet been conducted	Low
40	0.05		res	A similar study has not yet been conducted	LOW
		the wild with chemical, biological, or other agents/means?			
47	8.04	Is the taxon likely to tolerate or benefit from	Yes	This species is spread from fishing farms as a result of floods or	High
47	0.04	environmental/human disturbance?	165	other factors.	ingn
48	8.05	Is the taxon able to tolerate salinity levels	Yes	Anadromous forms are living in the coastal streams (Page and	High
40	0.05	that are higher or lower than those found in	103	Burr 1991).	ingn
		its usual environment?		Duit 1991).	
49	8.06	Are there effective natural enemies	Yes	There are several predators which can eat O. mykiss: birds,	High
15	0.00	(predators) of the taxon present in the RA	105	reptilies, fish (Esox lucius, Squalius spp, Salmo spp, etc).	ingn
C. C	limat	e change			
				Teptines, nan (Esox factos, squanto spp, sanno spp, etc).	
9. C		e change	No change	Own judgement	Low
9. C	limate	e change	No change		Low
9. C	limate	e change change Under the predicted future climatic	No change		Low
9. C	limate	e change change Under the predicted future climatic conditions, are the risks of entry into the RA	No change		Low
<i>9. C</i> 50	limate	e change e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase,	No change No change		Low
<i>9. C</i> 50	<u>limate</u> 9.01	e change change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?		Own judgement	
<i>9. C</i> 50	<u>limate</u> 9.01	e change change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic		Own judgement	
<u>9. (</u> 50	9.01	e change change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	No change	Own judgement Own judgement	
<u>9. (</u> 50	<u>limate</u> 9.01	e change change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic		Own judgement	
<u>9. (</u> 50	9.01 9.02	e change change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within	No change	Own judgement Own judgement	Low
<u>9. (</u> 50	9.01 9.02	e change change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic	No change	Own judgement Own judgement	Low
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<u>9. c</u> 50 51 52	9.01 9.02 9.03	e change change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic	No change No change	Own judgement Own judgement Own judgement	Low
<u>9. c</u> 50 51 52	9.01 9.02 9.03 9.04	e change change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of	No change No change No change	Own judgement Own judgement Own judgement Own observation	Low Low
<u>9. c</u> 50 51 52	9.01 9.02 9.03 9.04	e change change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem	No change No change No change	Own judgement Own judgement Own judgement Own observation	Low Low
<u>9. c</u> 50 51 52 53 54	9.02 9.03 9.04 9.05	e change change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	No change No change No change	Own judgement Own judgement Own judgement Own observation Own observation	Low Low Low
<u>9. c</u> 50 51 52 53 54	9.01 9.02 9.03 9.04	e change change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? Under the predicted future climatic	No change No change No change	Own judgement Own judgement Own judgement Own observation	Low Low
<u>9. c</u> 50 51 52 53 54	9.02 9.03 9.04 9.05	e change change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	No change No change No change	Own judgement Own judgement Own judgement Own observation Own observation	Low Low Low
<u>9. c</u> 50 51 52 53 54	9.02 9.03 9.04 9.05	e change change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? Under the predicted future climatic	No change No change No change	Own judgement Own judgement Own judgement Own observation Own observation	Low Low Low

Statistics	
Scores	
BRA	19.0
BRA Outcome	-
BRA+CCA	17.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	5.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	0.0
B. Biology/Ecology	14.0
4. Undesirable (or persistence) traits	7.0
5. Resource exploitation	7.0
6. Reproduction	1.0
7. Dispersal mechanisms	-2.0
8. Tolerance attributes	1.0
C. Climate change	-2.0
9. Climate change	-2.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3 5 5
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2
6. Reproduction	12 2 7 9
7. Dispersal mechanisms	9

8. Tolerance attributes	6			
C. Climate change	6			
9. Climate change	6			
Sectors affected				
Commercial	2			
Environmental	8			
Species or population nuisance traits	9			
Thresholds				
BRA	-			
BRA+CCA	-			
Confidence				
BRA+CCA	0.57			
BRA	0.61			
CCA	0.25			
Date and Time				
13/05/2	022 14:28:27			

Taxon and Assessor details		
Category	Fishes and Lampreys (freshwater)	
Taxon name	Oncorhynchus mykiss	
Common name	rainbow trout	
Assessor	Tatia Kuljanishvili	
Risk screening context		
Reason and socio-economic benefits	Recriational fisheries favourite object	
Risk assessment area	South Caucasus	
Taxonomy	Salmoniformes (Salmons) Salmonidae (Salmonids) Salmoninae	
Native range	native to the North America from Pacific basin to northern Mexico, also native from Kamchatka to	
Introduced range	Canada and USA, including Arctic, Atlantic, Great Lakes, Mississippi River, and Rio Grande basins,	
URL	https://www.fishbase.de/summary/Oncorhynchus-mykiss.html	

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
		ication/Cultivation			
1	1.01	Has the taxon been the subject of	Yes	O. mykiss is a trade important fish that spawns easy, fast growing	Very high
		domestication (or cultivation) for at least 20		and quite adaptable to different environments. it easily adapts to	
		generations?		an artificial diet. can be bread in aquaculture facilities as well as	
				natural water bodies such as lakes. the production of O. mykiss	
				has drasticallygrown since 1950s (More at:	
				http://www.fao.org/fishery/culturedspecies/Oncorhynchus_mykiss/ en).	
2	1.02	Is the taxon harvested in the wild and likely	Yes	Artificially spawned O. mykiss can be sold as fertilized eggs of fry.	Very high
		to be sold or used in its live form?			· • ,
3	1.03	Does the taxon have invasive races,	Yes	Examples: golden trout, brook trout, brown trout (Knapp 1996).	Very high
		varieties, sub-taxa or congeners?			
2. (distribution and introduction risk	r		
4	2.01	How similar are the climatic conditions of the	Medium	After running Climatch between the native range and South	Medium
		Risk Assessment (RA) area and the taxon's		Caucasian countries the software calculates most parts as similar	
-	2.02	native range?	Ma di una	climate, however the maximum similarity is 7 out of 10.	Ma di una
5	2.02	What is the quality of the climate matching data?	Medium	The data is of medium quality.	Medium
6	2.03	Is the taxon already present outside of	Yes	Besides intentional releases from amateur fishermen, O. mykiss is	Very high
Ĩ	2.00	captivity in the RA area?		being stocked in the lakes of high altitude areas.	,
7	2.04	How many potential vectors could the taxon	>1	Recreational fisheries, aquaculture, natural dispersal.	Very high
1		use to enter in the RA area?		,, ., ., ., ., ., ., ., ., ., ., .,	, ,
8	2.05	Is the taxon currently found in close	Yes	This fish is distributed all over RA.	Very high
1		proximity to, and likely to enter into, the RA			
1		area in the near future (e.g. unintentional			
		and intentional introductions)?	l		
		e elsewhere	Vac	In some places this species have became naturalized (for every	Hich
9	3.01	Has the taxon become naturalised (established viable populations) outside its	Yes	In some places this species have become naturalised (for example Quebec Canada Thibault 2010).	nign
10	3.02	In the taxon's introduced range, are there	Yes	Can hybridize with native trouts and compete for resources and	Medium
Ĩ	5.52	known adverse impacts to wild stocks or		spawning rounds.	
1		commercial taxa?			
11	3.03	In the taxon's introduced range, are there	No	No adverse impacts on aquaculture is known.	Medium
		known adverse impacts to aquaculture?			
12	3.04	In the taxon's introduced range, are there	Yes	Can be transmitting the diseases and disrupt nutrient cycle.	Medium
-	a a-	known adverse impacts to ecosystem			
13	3.05	In the taxon's introduced range, are there	No	No dramatic changes are known.	Low
	liology	known adverse socio-economic impacts? //Ecology	l		
		able (or persistence) traits			
		Is it likely that the taxon will be poisonous or	No	Is not poisonous and does not pose risk to human health.	Very high
L		pose other risks to human health?			
15	4.02	Is it likely that the taxon will smother one or	Yes	Introduced trout are affecting the distribution of a wide range of	High
1		more native taxa (that are not threatened or		native aquatic species including native fishes, amphibians,	
1		protected)?		zooplankton, and benthic macroinvertebrates in terms of	
-	4.02			predation, competition.	
16	4.03	Are there any threatened or protected taxa	No	Does not parasite.	Very high
1		that the non-native taxon would parasitise in the RA area?			
17	4.04	Is the taxon adaptable in terms of climatic	No	It can be stocked in rivers and lakes which are rich with oxygen.	Low
Ľ		and other environmental conditions, thus		It may not survive in the places where temperatures are higher	
1		enhancing its potential persistence if it has		than 25 degrees Celsius and low oxygen.	
		invaded or could invade the RA area?			
18	4.05	Is the taxon likely to disrupt food-web	Yes	It can shape native fish community as well as amphibians,	High
1		structure/function in aquatic ecosystems if it		zooplankton and benthic macroinvertebrates.	
		has invaded or is likely to invade the RA			
19	4.06	Is the taxon likely to exert adverse impacts	No	Less likely.	High
20	4.07	on ecosystem services in the RA area?	No	No such information available.	Modium
20	+.07	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and	No		Medium
1		infectious agents that are endemic in the RA			
21	4.08	Is it likely that the taxon will host, and/or	Yes	Likely, yes.	Medium
—		act as a vector for, recognised pests and		- ,, ,	
1		infectious agents that are absent from (novel			
-		to) the RA area?			
22	4.09	Is it likely that the taxon will achieve a body	Yes	Yes. See: https://www.fishbase.de/summary/Oncorhynchus-	High
1		size that will make it more likely to be		mykiss.html	
1		released from captivity?			

.11 .12	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)? Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa? Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions	Yes No No	It can persist in both, standing and flowing rivers and lakes and the anadromous behaviour of the fish facilitates it's dispersal upstreams. No information avalable	High Medium
.12 source	versatile in habitat use)? Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa? Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions		upstreams.	Medium
.12 source	Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa? Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions			Medium
sourc	(e.g. feeding) will reduce habitat quality for native taxa? Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions	No		
sourc	native taxa? Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions	No		
sourc	Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions	No		
sourc	population even when present in low densities (or persisting in adverse conditions	INO	March Illian and	Ma di una
	densities (or persisting in adverse conditions	-	Most likely no.	Medium
	by way of a dormant form)?			
.01	e exploitation	•		• •
	Is the taxon likely to consume threatened or	Yes	Can affect endangered benthic invertebrates and fish fry.	High
0.2	protected native taxa in the RA area?			NA 11
.02	Is the taxon likely to sequester food resources (including nutrients) to the	Yes	Possibly, yes.	Medium
	detriment of native taxa in the RA area?			
produ				1
.01	Is the taxon likely to exhibit parental care	No	Not known https://www.fishbase.de/summary/Oncorhynchus-	High
			mykiss.html	
02		No	Net Diele	L li ala
.02		NO	Not likely.	High
.03	Is the taxon likely to hybridise naturally with	Yes	Yes. for instance with cutthroat trout (Oncorhynchus clarkii)	High
	native taxa?			
.04	Is the taxon likely to be hermaphroditic or to	No	No. Does not display asexual reproduction	High
05		No	No. Cool https://www.fichters.do/www.co	High
.05		NO		High
			ITYKISS.II(III	
.06	Is the taxon known (or likely) to produce a	No	Spawning happens from November until May in the Northern	Medium
ľ	large number of propagules or offspring		hemisphere and from August to November on the Southern	
	within a short time span (e.g. < 1 year)?		hemisphere with female producing 700 to 4000 eggs.	
.07		3	Males mature generally at 2 years and females at 3.	Very high
nersa				
		>1	Stocking in natural waters, Accidental escapes from fish farms,	Very high
	vectors/pathways could the taxon use to		intentional releases (by hobbyists).	-, 5
	disperse within the RA area (with suitable			
.02		Yes		High
.03		No		High
	attaching itself to hard substrata (e.g. ship		attaching itself to hard substrata	5
	hulls, pilings, buoys) such that it enhances			
0.4		No		L li ala
.04		NO		High
			struggles to spawn independently in KA.	
.05	Is natural dispersal of the taxon likely to	Yes	Juveniles of O. mykiss can be released into waters by fishermen,	High
	occur as larvae/juveniles (for animals) or as		and it is mostly the reason of it's dispersal in the RA.	_
ľ	fragments/seedlings (for plants) in the RA			
06	area?	Vaa	This is an anadromous species. Even the web it are reised to 0.1	Low
.06	- ,	res		Low
ľ				
.07	Are propagules or eggs of the taxon likely to	No	No. Can not be dispersed by other ananimals	High
	be dispersed in the RA area by other animals?			-
.08	Is dispersal of the taxon along any of the	Yes	All the above mentioned vectors have rapid character. However it	Low
ľ				
ľ	seven questions (35–41; i.e. both unintentional or intentional) likely to be		pressure, their populations are not established in wild. For this reason the answer will have low confidence.	
.09	Is dispersal of the taxon density dependent?	No	Since this species are not reproducing themselves and they are	Medium
			object for recreational fisheries their population density is always	
			regulated. They are not likely to reach such densities that would	
		l	cause their further dispersal.	
0.05	an attributen	1	No information avalable	High
	<i>ce attributes</i> Is the taxon able to withstand being out of	No		· · · 9 · ·
	e attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of	No		
	Is the taxon able to withstand being out of	No		
.01	Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle?			
.01	Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of	No	Can not tolerate low oxygen environment and is very sensitive to	High
.01	Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that		Can not tolerate low oxygen environment and is very sensitive to temperature and to human-produced chemicals.	High
.01	Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the			High
.01	Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that			High High
.01	Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other	No	temperature and to human-produced chemicals.	-
.01	Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in	No	temperature and to human-produced chemicals. Via rotenone in streams (Lintermans & Raadik 2001) and gill nets	-
	01 02 03 04 05 06 07 02 03 03 04 05 06 07	 and/or to reduce age-at-maturity in response to environmental conditions? 12 Is the taxon likely to produce viable gametes or propagules (in the RA area)? 13 Is the taxon likely to hybridise naturally with native taxa? 14 Is the taxon likely to be hermaphroditic or to display asexual reproduction? 15 Is the taxon low dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? 16 Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? 17 How many time units (days, months, years) does the taxon require to reach the age-at-first-reproduction? 18 How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable) 19 Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? 10 Joes the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersa? 10 Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? 19 Is natural dispersal of the taxon likely to migrate in the RA area for reproduction? 10 Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? 18 dispersal of the taxon likely to be dispersed in the RA area by other animals? 19 Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? 10 Are propagules or eggs of the taxon likely to be dispersed in the RA area poy ther animals? 19 Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? 10 Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? 10 Are propagules or eggs of the	01 Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? No 02 Is the taxon likely to produce viable gametes or propagules (in the RA area)? No 03 Is the taxon likely to hybridise naturally with native taxa? Yes 04 Is the taxon likely to hybridise naturally with native taxa? No 04 Is the taxon likely to be hermaphroditic or to display asexual reproduction? No 05 Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? No 06 Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)?	Display Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? No Not known https://www.fishbase.de/summary/Oncorhynchus- mykiss.html 02 Is the taxon likely to produce viable gametes or propagules (in the RA area)? No Not likely. 03 Is the taxon likely to hybridise naturally with native taxa? Yes. for instance with cutthroat trout (Oncorhynchus clarkii) native taxa? 04 Is the taxon likely to be hermaphroditic or to display asexual reproduction? No No. Does not display asexual reproduction 05 Is the taxon flex to the presence of another taxon (or specific habitat features) to complete its life cycle? No No. See: https://www.fishbase.de/summary/Oncorhynchus- mykiss.html 07 Is the taxon frequire to reach the age-at- first-reproduction? Spawning happens from November until May in the Northern hemisphere with fmale producing 700 to 4000 eags. 07 How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? Stocking in natural waters, Accidental escapes from fish farms, intentional releases (by hobbyists). 03 Dese the taxon have a mean of actively attaching itself to hard substrata (e.g. ship hulls, plings, buoys) such that it enhances the likelihood of dispersa? No 04 Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules

48	8.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	Yes	Life cycle of rainbow trout may be presented in two forms: the anadromous phenotype, with a growth phase in saltwater, or the freshwater resident phenotype. The anadromous phenotype,	High
				however can still into freshwaters, increasing the species' capacity to disperse (Thibault et al 2010).	
49	8.06	Are there effective natural enemies	No	No effective natural enemies present in RA area	High
		(predators) of the taxon present in the RA			5
С. (Climate	e change			
9. (Climate	change			
50	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?	Increase	It was hypotheses that climate change might alert the mechanisms of transportation and introduction of non-native species. Commercial and recreational activities will increase, that itself increases the propagule pressure levels of non-native	Medium
51	9.02	Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	Decrease	In terms of increased temperatures this species will be having troubles to survive in the wild.	Medium
52	9.03	Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change?	Decrease	Increased temperatures will cause stress in O. mykiss populations making their populations weaker.	Low
53	9.04	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	Lower	The environment for them will be unbearable and this species populations will decrease.	Medium
54	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Lower	The magnitude of future potential impact is low.	Medium
55	9.06	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	Lower	The magnitude of future potential impact is low.	Medium

Statistics	
Scores	
BRA	26.5
BRA Outcome	-
BRA+CCA	18.5
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	13.5
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	2.0
3. Invasive elsewhere	7.5
B. Biology/Ecology	13.0
4. Undesirable (or persistence) traits	4.0
5. Resource exploitation	7.0
6. Reproduction	1.0
7. Dispersal mechanisms	2.0
8. Tolerance attributes	-1.0
C. Climate change	-8.0
9. Climate change	-8.0
Answered Questions Total	
	55 13
A. Biogeography/Historical	
1. Domestication/Cultivation	3
2. Climate, distribution and introduction risk	3 5 5
3. Invasive elsewhere	36
B. Biology/Ecology 4. Undesirable (or persistence) traits	12
5. Resource exploitation	
6. Reproduction	2 7 9 6
7. Dispersal mechanisms	/
8. Tolerance attributes	9
C. Climate change	6
9. Climate change	6
Sectors affected	0
Commercial	8
Environmental	6
Species or population nuisance traits	10
	1

Thresholds	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.68
BRA	0.70
CCA	0.46

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Date and Time
21/05/2022 15:17:21
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Taxon and Assessor details						
Category	Fishes and Lampreys (freshwater)					
Taxon name	Oreochromis niloticus					
Common name	Nile tilapia					
Assessor	Bella Japoshvili					
Risk screening context						
Reason and socio-economic benefits	the species is invasive in many countries and it was already documented in RA area once, also in					
Risk assessment area	South Caucasus					
Taxonomy	Actinopteri (ray-finned fishes) > Cichliformes (Cichlids, convict blennies) > Cichlidae (Cichlids)					
Native range	Africa, Nile basin					
Introduced range	South and Noth America, European and Asian countries					
URL	https://www.fishbase.de/summary/Oreochromis-niloticus.html					

			Response	Justification (references and/or other information)	Confidence
A. I	Biogeo	graphy/Historical			
		ication/Cultivation			
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20	Yes	Amal, M. N. A., & Zamri-Saad, M. (2011). Streptococcosis in tilapia (Oreochromis niloticus): a review. Pertanika Journal of	Very high
2	1.02	generations? Is the taxon harvested in the wild and likely	Yes	Tropical Agricultural Science, 34(2), 195-206 Is sold as ornamental and reared in captivity (Trewavas, E., 1983.	Very high
		to be sold or used in its live form?		Tilapiine fishes of the genera Sarotherodon, Oreochromis and Danakilia. British Mus. Nat. Hist., London, UK. 583 p. (Ref. 2))	
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	Global Invasive Species Database (2021) Species profile: Oreochromis. Downloaded from	Very high
2 (limate	distribution and introduction risk		http://www.iucngisd.org/gisd/species.php?sc=813 on 08-11-2021.	
<u>2.</u> (How similar are the climatic conditions of the	Low	Results of Climatch algorithm	Medium
7	2.01	Risk Assessment (RA) area and the taxon's native range?	LOW		heuum
5	2.02	What is the quality of the climate matching data?	Low	No good enough climate data exists for a RA	Medium
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	Kuljanishvili, T., Epitashvili, G., Japoshvili, B., Patoka, J., & Kalous, L. (2021, April). Finding of nile tilapia Oreochromis niloticus (Cichliformes: Cichlidae) in Georgia, the South Caucasus. In IOP Conference Series: Earth and Environmental Science (Vol.	Low
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	744, No. 1, p. 012036). IOP Publishing. Intentional introduction - Global Invasive Species Database (2021) Species profile: Oreochromis. Downloaded from http://www.iucngisd.org/gisd/species.php?sc=813 on 08-11-2021.	Very high
8	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)?	Yes	Kuljanishvili, T., Epitashvili, G., Japoshvili, B., Patoka, J., & Kalous, L. (2021, April). Finding of nile tilapia Oreochromis niloticus (Cichliformes: Cichlidae) in Georgia, the South Caucasus. In IOP Conference Series: Earth and Environmental Science (Vol. 744, No. 1, p. 012036). IOP Publishing.	Very high
3.1	nvasive	elsewhere			
9	3.01	Has the taxon become naturalised (established viable populations) outside its	Yes	CABI, 2022. Oreochromis niloticus. In: Invasive Species Compendium. Wallingford, UK: CAB International.	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	Gu, D. E., Ma, G. M., Zhu, Y. J., Xu, M., Luo, D., Li, Y. Y., & Hu, Y. C. (2015). The impacts of invasive Nile tilapia (Oreochromis niloticus) on the fisheries in the main rivers of Guangdong Province, China. Biochemical Systematics and Ecology, 59, 1-7.	Very high
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	No published data	Low
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem services?	Yes	Deines, A. M. (2013). Environmental change and tradeoffs in freshwater ecosystem services: Nile Tilapia (Oreochromis niloticus) introduction to the Kafue River, Zambia. University of	High
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	Yes	Deines, A. M. (2013). Environmental change and tradeoffs in freshwater ecosystem services: Nile Tilapia (Oreochromis niloticus) introduction to the Kafue River, Zambia. University of	High
В. І	Biology	//Ecology	1		
		able (or persistence) traits			
		Is it likely that the taxon will be poisonous or pose other risks to human health?	No	No such an evidence	Low
	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	Gu, D. E., Ma, G. M., Zhu, Y. J., Xu, M., Luo, D., Li, Y. Y., & Hu, Y. C. (2015). The impacts of invasive Nile tilapia (Oreochromis niloticus) on the fisheries in the main rivers of Guangdong Province, China. Biochemical Systematics and Ecology, 59, 1-7; Nico, L.G., Schofield, P.J., and Neilson, M.E., 2021, Oreochromis niloticus (Linnaeus, 1758): U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, FL, https://nas.er.usgs.gov/queries/factsheet.aspx?SpeciesID=468, Revision Date: 1/8/2020, Peer Review Date: 12/18/2013, Access Date: 11/8/2021	High
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	The species is not parasite	High
17	4.04	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?	Yes	Due to its widespread itroduction	Medium
18	4.05	Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA	Yes	No respective study is known however the species is actively involving in the local ecosystem food web that most probably also introduce changes	Low

19					
	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes	Deines, Marion E. Wittmann, Jillian M. Deines & David M. Lodge (2016) Tradeoffs among Ecosystem Services Associated with Global Tilapia Introductions, Reviews in Fisheries Science & Aquaculture, 24:2, 178-191	High
20	4.07	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA	No	No such research exists	Low
21	4.08	To it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area?	Yes	Dong, H. T., Nguyen, V. V., Le, H. D., Sangsuriya, P., Jitrakorn, S., Saksmerprome, V., & Rodkhum, C. (2015). Naturally concurrent infections of bacterial and viral pathogens in disease outbreaks in cultured Nile tilapia (Oreochromis niloticus) farms. Aquaculture, 448, 427-435.	Very high
22	4.09	Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity?	Yes	Trewavas, E., 1983. Tilapiine fishes of the genera Sarotherodon, Oreochromis and Danakilia. British Mus. Nat. Hist., London, UK.	High
23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)?	Yes	Trewavas, E., 1983. Tilapiine fishes of the genera Sarotherodon, Oreochromis and Danakilia. British Mus. Nat. Hist., London, UK. 583 p.	High
24	4.11	Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for	No	No such an evidence	Low
25	4.12	native taxa? Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions	No	No respective study is available	Low
		by way of a dormant form)?			
		e exploitation			Luc - I-
		Is the taxon likely to consume threatened or protected native taxa in the RA area? Is the taxon likely to sequester food	Yes	https://nas.er.usgs.gov/queries/factsheet.aspx?SpeciesID=468 Expected but no specific research has been done	High Low
		resources (including nutrients) to the			
	Reprodu	detriment of native taxa in the RA area?			L
	6.01	Is the taxon likely to exhibit parental care	Yes	Peterson, M. S., Slack, W. T., Brown-Peterson, N. J., & McDonald,	Very high
		and/or to reduce age-at-maturity in response to environmental conditions?		J. L. (2004). Reproduction in nonnative environments: establishment of Nile tilapia, Oreochromis niloticus, in coastal Mississippi watersheds. Copeia, 2004(4), 842-849.	
	6.02	or propagules (in the RA area)?	No	Expected but not yet documented	Low
	6.03	Is the taxon likely to hybridise naturally with native taxa?	Yes	Nico, L.G.; P.J. Schofield; M.E. Neilson (2019). "Oreochromis niloticus (Linnaeus, 1758)". U.S. Geological Survey, Nonindigenous Aquatic Species Database	Low
31	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	No	Trewavas, E., 1983. Tilapiine fishes of the genera Sarotherodon, Oreochromis and Danakilia. British Mus. Nat. Hist., London, UK.	Medium
32	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	No	Not such an evidence exists.	High
33	6.06	Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)?	Yes	Trewavas, E., 1983. Tilapiine fishes of the genera Sarotherodon, Oreochromis and Danakilia. British Mus. Nat. Hist., London, UK.	High
34	6.07	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	2	Noakes, D.G.L. and E.K. Balon, 1982. Life histories of tilapias: an evolutionary perspective. p. 61-82. In R.S.V. Pullin and R.H. Lowe-	High
· - r				McConnell (eds.) The biology and culture of tilapias. ICLARM Conf. Proc. 7.	
		al mechanisms			
		al mechanisms How many potential internal vectors/pathways could the taxon use to	One		Very high
5		al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more	One Yes	Proc. 7.	Very high Medium
5	7.01	al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances		Proc. 7. Only human mediated dispersal is possible in RA Coclhis national park along the Black Sea is the most vulnerable	
5 6 7	7.01	al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules	Yes	Proc. 7. Only human mediated dispersal is possible in RA Coclhis national park along the Black Sea is the most vulnerable for invasion	Medium
5 6 7 8	7.01 7.02 7.03	al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA	Yes No	Proc. 7. Only human mediated dispersal is possible in RA Coclhis national park along the Black Sea is the most vulnerable for invasion There is no such an evidence exist	Medium High
5 6 7 8 9	7.01 7.02 7.03 7.04	Al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to	Yes No No	Proc. 7. Only human mediated dispersal is possible in RA Coclhis national park along the Black Sea is the most vulnerable for invasion There is no such an evidence exist No such an evidence exist	Medium High Medium
5 6 7 8 9	7.01 7.02 7.03 7.04 7.05	al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to	Yes No No Yes	Proc. 7. Only human mediated dispersal is possible in RA Coclhis national park along the Black Sea is the most vulnerable for invasion There is no such an evidence exist No such an evidence exist Juveniles can be released intentionally/unintentionally	Medium High Medium High
5 6 7 8 9 0 1	7.01 7.02 7.03 7.04 7.05 7.06	al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both	Yes No Yes No	Proc. 7. Only human mediated dispersal is possible in RA Coclhis national park along the Black Sea is the most vulnerable for invasion There is no such an evidence exist No such an evidence exist Juveniles can be released intentionally/unintentionally Not amigration typically occures in the nile talipia populations	Medium High Medium High
5 6 7 8 9 0 1 2	7.01 7.02 7.03 7.04 7.05 7.06 7.07	A mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be	Yes No No Yes No	Proc. 7. Only human mediated dispersal is possible in RA Coclhis national park along the Black Sea is the most vulnerable for invasion There is no such an evidence exist No such an evidence exist Juveniles can be released intentionally/unintentionally Not amigration typically occures in the nile talipia populations No such an evidence exist	Medium High Medium High High Medium

44	8.01	Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle?	No	No such an evidence exists	Medium
45	8.02	Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being	Yes	Kammerer, B. D. (2009). Short-term mechanisms of seawater acclimation in tilapia (Oreochromis mossambicus). University of California, Davis.	Medium
46	8.03	Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	No	No such an evidence exists	Low
47	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	No	No such an evdience exist	Low
48	8.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	Yes	Kammerer, B. D. (2009). Short-term mechanisms of seawater acclimation in tilapia (Oreochromis mossambicus). University of California, Davis.	Medium
49	8.06	Are there effective natural enemies (predators) of the taxon present in the RA	No	Not known based on professional judgement	Low
С. (Climate	e change			
		change			
50	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?	No change	Not expected based on professional judgement	Low
51	9.02	Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	No change	Based on professional judgement	Low
52	9.03	Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change?	No change	Based on professional judgement	Low
53	9.04	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	Higher	Under climate change scenario where increse of temperature is expected, the establishment/distribution risks of tilapia is also expected that most probably will increase the impact on local ecosystems	Low
54	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Higher	Under climate change scenario where increse of temperature is expected, the establishment/distribution risks of tilapia is also expected that most probably will increase the impact on local ecosystems	Low
55	9.06	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	Higher	Under climate change scenario where increse of temperature is expected, the establishment/distribution risks of tilapia is also expected that most probably will increase the impact on local ecosystem services	Low

Statistics	
Scores	
BRA	38.0
BRA Outcome	-
BRA+CCA	44.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	19.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	14.0
B. Biology/Ecology	19.0
4. Undesirable (or persistence) traits	7.0
5. Resource exploitation	7.0
6. Reproduction	3.0
7. Dispersal mechanisms	-1.0
8. Tolerance attributes	3.0
C. Climate change	6.0
9. Climate change	6.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3 5 5
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2 7 9 6
6. Reproduction	7
7. Dispersal mechanisms	9
8. Tolerance attributes	
C. Climate change	6
9. Climate change	6
Sectors affected	
Commercial	15
Environmental	16
Species or population nuisance traits	16
Thresholds	_
BRA	_
DKA	-

B	BRA+CCA	-
Confidence		
В	BRA+CCA	0.57
	BRA	0.61
	CCA	0.25
Date and Time		
	16/05/2022	21:08:42

Taxon and Assessor details	
Category	Fishes and Lampreys (freshwater)
Taxon name	Oreochromis niloticus
Common name	Nile tilapia
Assessor	Giorgi Epitashvili
Risk screening context	
Reason and socio-economic benefits	The culture of Nile tilapia (Oreochromis niloticus) can be traced to ancient Egyptian times as
Risk assessment area	South Caucasus
Taxonomy	Oreochromis niloticus (Linnaeus, 1758)
Native range	Africa: naturally occurring in coastal rivers of Israel, Nile basin (including lake Albert, Edward and
Introduced range	Nile tilapia were introduced to developing countries and cultured on a subsistence level to meet
URL	https://www.fishbase.se/summary/oreochromis-niloticus.html

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
1. L		ication/Cultivation			
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	The Nile tilapia, Oreochromis niloticus, is widely distributed in the world for aquacultural purposes. For instance, this fish is the main species farmed in Brazil, predominantly in net cages within freshwater reservoirs (Roriz et al., 2017).	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	Nile tilapia has been extensively propagated locally by farmers and anglers for recreational and sport fishing into small- and medium-sized reservoirs, often circumventing permitting	Very high
	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	Nile tilapia is well-suited for aquaculture because of its wide range of trophic and ecological adaptations, and its adaptive life history characteristics that enable it to occupy many different tropical and sub-tropical freshwater niches (Trewavas, 1983). These attributes have inherently predisposed it to be a successful invasive species, with established feral populations in most tropical and sub-tropical environments in which it has either been cultured or has otherwise gained access to.	Very high
2. (, distribution and introduction risk	L.		lue i
4	2.01	How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range?	Low	Climate analysis did not confirm the environmental suitability for the Nile tilapia in Georgia, the risk of this species establishment still exists. For example, Nile tilapia was not considered to be established in temperate environments in the US, since it was believed that the species could not survive the winter. However, the study done by Grammer et al. [15] proved its successful establishment in temperate Mississippi (Southeastern Mississippi, the Pascaaoula River) (Kulianishvili et al. 2021).	High
5	2.02	What is the quality of the climate matching data?	Low	Kuljanishvili et al. 2021	Medium
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	In the summer of 2019, a tilapia (Oreochromis sp.) fish appeared in local anglers caught in a small village Mshvidobani (Lagodekhi region) in Eastern Georgia (Kuljanishvili et al. 2021).	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	This species enters in the region for aquacultural purposes.	Very high
8	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)?	Yes	Nile tilapia was found in Turkey by Mert & Cicek, which was supposed to be its maximum northern distribution in the Mediterranean area. Authors, however, emphasized that the confirmation of this species establishment was needed. Later, Nile tilapia was included in the checklist of the freshwater fishes of	Very high
3. I		e elsewhere			
9		Has the taxon become naturalised (established viable populations) outside its native range? In the taxon's introduced range, are there	Yes	Study done by Grammer et al. proved successful establishment of Nile tilapia in temperate Mississippi (Southeastern Mississippi, the Pascagoula River). Although the extended temperatures range for Nile tilapia is 8-42°C, it was found to be well adapting to the outflows of the aquaculture farms, where water is warmer (so- called thermal refugia), which then could have led to survival and establishment of Nile tilapia in temperate regions in the USA Several countries report adverse ecological impact after	Very high Very high
		known adverse impacts to wild stocks or commercial taxa?		introduction of nile tilapia.	
		In the taxon's introduced range, are there known adverse impacts to aquaculture?	Yes	The introduction of Nile tilapia did not increase the total catch-per-unit-of-effort (CPUE), the number of fishers actively fishing or their per capita income. Conversely, a significant reduction in the CPUE of other commercially important species was observed after the introduction of Nile tilapia in the reservoir. Although other factors cannot be rule out as possible explanations of the observed changes in the reservoir fisheries, the results are consistent with the hypothesis that these changes may have been caused, at least partially, by the introduction of the Nile tilapia	Very high
	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem services?	Yes	This review (1) provides a new estimate of the global scale of tilapia introduction and the reported occurrence of impacts to ecosystem services; (2) assesses whether reported changes to ecosystem services differ among species, regions and type of ecological effect reported; and (3) determine how perceptions of tilapia introduction are related to the reported occurrence of ecological effects and/or the contribution of tilapia to countries'	High
		In the taxon's introduced range, are there known adverse socio-economic impacts?	No	Data deficient	Low
B. I	Biology	//Ecology			
4. L	Indesira	able (or persistence) traits			

14	4.01	Is it likely that the taxon will be poisonous or	No	This species does not pose a threat to humans	High
		pose other risks to human health?			5
15	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	It is possible that this will happen if the species enters the new region.	Medium
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	Yes	The chances of this happening are quite high if this species spreads in the region	Medium
17	4.04	Is the taxon adaptable in terms of climatic	Yes	The probability of this is low though it can happen	Low
		and other environmental conditions, thus enhancing its potential persistence if it has			
18	4.05	invaded or could invade the RA area? Is the taxon likely to disrupt food-web	Yes	There is a possibility of that. The study conducted in the Gulf of	Medium
		structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA area?		Mexico showd that proliferation of nile tilapia will have important detrimental effects on the structure of native food webs in shallow, structured coastal habitat (Martin et al. 2010).	
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes	There is a possibility of that	Medium
20	4.07	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA	Not applicable	Data deficient	Low
21	4.08	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area?	Not applicable	Data deficient	Low
22	4.09	Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity?	Yes	Nile tilapia is one of the most widely cultured species in aquaculture and stock enhancements (FAO).	Very high
23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)?	Yes	Occurs in a wide variety of freshwater habitats like rivers, lakes, sewage canals and irrigation channels.	High
24	4.11	Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa?	Yes	No research has been conducted in this direction, however it is expected that this will happen in some places.	Medium
25	4.12	Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions	No	Data deficient	Low
5 D	Pesouro	by way of a dormant form)? e exploitation			
		Is the taxon likely to consume threatened or	Yes	The chances of this happening are quite high if this species	High
27	5.02	protected native taxa in the RA area? Is the taxon likely to sequester food	Yes	spreads in the region The chances of this happening are quite high if this species	Medium
21	5.02	resources (including nutrients) to the	100	spreads in the region	
6. R	Reprodu	detriment of native taxa in the RA area?	l		I
		Is the taxon likely to exhibit parental care	Yes	Parental care is a well-developed reproductive behaviour in the	High
		and/or to reduce age-at-maturity in response to environmental conditions?		family Cichlidae, the family to which the tilapias belong. While all the members of the three genera modify a portion of the substratum in which eggs are laid and fertilized, only the eggs of the genus Tilapia hatch in the nest.	
29	6.02	Is the taxon likely to produce viable gametes	No	Currently this species does not reproduces in the Caucasus region	High
	6.03	or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa?	Yes	The Nile tilapia Oreochromis niloticus has been introduced throughout Africa outside its native range for aquaculture purposes. Hybridisation between escaped O. niloticus and native Oreochromis species is of concern due to potential negative effects on wild genetic resources for conservation, aquaculture and capture fisheries. We document the 2008–2010 extent of O. niloticus established in the Kafue River, Zambia, test for hybridisation with two native species, O. andersonii and O. macrochir, using eight microsatellite loci, and evaluate losses in	Very high
31	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	No	Data deficient	Low
32	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	No	No such a study has been conducted	Medium
		Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)?	No	Nile tilapia are maternal mouthbrooders. A female lays her eggs in a simple nest prepared by the male, the male fertilizes the eggs and then the female picks the eggs up and incubates them in her mouth. Even after eggs hatch, fry will remain in the mother's mouth. Once the fry are free-swimming they will return to her mouth for protection. Females can produce several hundred to	Medium
		How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	1	Sexual maturity in Nile tilapia reached at 3-6 months depending on temperature, reaching about 30 g.	High
		al mechanisms	0.20		High
35	7.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable	One	This species enters in the region for aquacultural purposes.	High
	7.02	Will any of these vectors/pathways bring the	Yes	Nile tilapia caught in a small village Mshvidobani (Lagodekhi	Medium

37	7.03	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances	No	Such fact has not been detected	High
		the likelihood of dispersal?			
38	7.04	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?	No	Such fact has not been detected yet.	Medium
20	7.05	Is natural dispersal of the taxon likely to	No	Such fact has not been detected yet.	Medium
55	7.05	occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?	NO	Such fact has not been detected yet.	headan
40	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	No	Such fact has not been detected.	Medium
41	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No	Such fact has not been detected yet.	Medium
42	7.08	Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be	Not applicable	Data deficient	Low
		Is dispersal of the taxon density dependent?	Not applicable	Data deficient	Low
		ce attributes			
44	8.01	Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cvcle?	No	Such fact has not been detected.	Medium
45	8.02	Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being	Yes	Occurs in a wide variety of freshwater habitats like rivers, lakes, sewage canals and irrigation channels. Does not do well in pure salt water, but is able to survive in brackish water.	Medium
46	8.03	Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	Yes	Among the seven (7) methods in use for the control of tilapia populations in aquaculture the following techniques may be appropriate and could be applied as soon as possible in controlling the Mozambique tilapia in the natural bodies of water in Nauru. (1) periodic harvesting of fry and fingerlings including the parents; (2) biological control; and (3) eradication of tilapia using organic toxicants and/or other chemicals.	High
47	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	Yes	An example of this is the tilapia found in the Lagodekhi region, Georgia, which spread from an artificial lake.	High
48	8.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	Yes	Nile tilapia is able to survive in brackish water (Lamboj 2004).	High
49	8.06	Are there effective natural enemies (predators) of the taxon present in the RA area?	Yes	There are several predators which can controll Nile tilapia in the Caucasus region: Esox lucius, Silurus glanis, Squalius spp, Salmo spp, birds, Snakes, Otters etc.	Very high
с. с	Climate	e change			
		change			
		Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?	Increase	In the view of global climate change the probability of species establishment and spreading is increasing as the fish enter the open waters of the Caucasus region (Kuljanishvili et al. 2021).	Medium
51	9.02	Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	Increase	In the view of global climate change the probability of species establishment and spreading is increasing as the fish enter the open waters of the Caucasus region (Kuljanishvili et al. 2021).	Medium
	9.03	Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change?	Increase	In the view of global climate change the probability of species establishment and spreading is increasing as the fish enter the open waters of the Caucasus region (Kuljanishvili et al. 2021).	Medium
53	9.04	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	Higher	In the view of global climate change the probability of species establishment and spreading is increasing as the fish enter the open waters of the Caucasus region as well as its impact on local biodiversity will be high.	Medium
54	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Higher	In the view of global climate change the probability of species establishment and spreading is increasing as the fish enter the open waters of the Caucasus region as well as its impact on local biodiversity and ecosystem structure will be high.	Medium
55	9.06	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	Higher	In the view of global climate change the probability of species establishment and spreading is increasing as the fish enter the open waters of the Caucasus region as well as its impact on local biodiversity and ecosystem services will be high.	Medium

Statistics	
Scores	
BRA	36.0
BRA Outcome	-
BRA+CCA	48.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	19.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	14.0
B. Biology/Ecology	17.0
4. Undesirable (or persistence) traits	8.0
5. Resource exploitation	7.0

6. Reproduction	3.0
7. Dispersal mechanisms	-4.0
8. Tolerance attributes	3.0
C. Climate change	12.0
9. Climate change	12.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	
2. Climate, distribution and introduction risk	<u> </u>
3. Invasive elsewhere	5
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2
6. Reproduction	2 7 9
7. Dispersal mechanisms	9
8. Tolerance attributes	6 6
C. Climate change	6
9. Climate change	6
Sectors affected	
Commercial	14
Environmental	17
Species or population nuisance traits	19
Threadealda	

BRA	-
RA+CCA	-
RA+CCA	0.63
BRA	0.65
CCA	0.50
3/05/20	022 14:46:49
	RA+CCA RA+CCA BRA CCA

13/05/2022 14:46:49

Faxon and Assessor details					
Category	Fishes and Lampreys (freshwater)				
Taxon name	Oreochromis niloticus				
Common name	Nile tilapia				
Assessor	Tatia Kuljanishvili				
Risk screening context					
Reason and socio-economic benefits	Has been recorded from East Georgian Rivers				
Risk assessment area	South Caucasus				
Taxonomy	Actinopteri (ray-finned fishes) > Cichliformes (Cichlids, convict blennies) > Cichlidae (Cichlids) >				
Native range	Africa, The Nile basin				
Introduced range	East Georgia				
URL	https://www.fishbase.de/summary/Oreochromis-niloticus.html				

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
1. L	Domest	ication/Cultivation			
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	"The culture of Nile tilapia (Oreochromis niloticus) can be traced to ancient Egyptian times as depicted on bas-relief from an Egyptian tomb dating back over 4000 years, which showed the fish held in ornamental ponds. While significant worldwide distribution of tilapias, primarily Oreochromis mossambicus, occurred during the 1940s and 1950s, distribution of the more desirable Nile tilapia occurred during the 1960s up to the 1980s" http://www.fao.org/fishery/culturedspecies/Oreochromis_niloticus/	Very high
2	1.02	Is the taxon harvested in the wild and likely	Yes	en#tcNA003F This is fisheries important species that can be harvested in the	Very high
3	1.03	to be sold or used in its live form? Does the taxon have invasive races,	Yes	wild, ca be sold or used in its live form. For instance, Blue tilapia	High
2 (Cline at a	varieties, sub-taxa or congeners?			
2. (, distribution and introduction risk	1.		1
4	2.01	How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range?		Not much similar	Medium
5	2.02	What is the quality of the climate matching data?	Medium	Quality of Climatch is medium	Medium
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	It has been found in the rivers of eastern Georgia	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	Aquaculture	Very high
8	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)?	Yes	Yes, in Turkey for instance (Mert & Cicek 2010).	High
3. I		e elsewhere			
,	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	Has been become naturalised for instance in India https://india.mongabay.com/2020/10/commentary-tilapia-how-an- invasive-fish-came-to-dominate-our-ecology-food-and-psyche/. their populations are known to exsit at least in 114 countries (Deines 2016) and at least 55% of all countries report established tilapia populations outside aquaculture (Deines 2016)	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	Tilapias can very easily compete the native species by feeding on their resources. "increasing tilapia production may cause a decrease in populations of harvestable native species, a decrease in habitat, or recreational and cultural ecosystem services linked to the native species harmed by tilapia (Canonico et al., 2005)"	Very high
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	Yes	Tilapia have also been implicated in harm to other fisheries such as milkfish aquaculture in Nauru (Ranoemihardjo, 1981), and cyprinid harvests in India (Sugunan, 2000; Sugunan, 1995)"	Very high
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	Yes	Water quality; transmitting diseases.	Medium
	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	Results also illustrate that increasing research efforts leads to increasingly ambivalent perspectives about the net socioeconomic value of tilapia introductions, as undesirable ecological impacts become as apparent as the socioeconomic benefits of tilapia production. In some cases, perspectives are regionally determined. There is not, nor is there likely ever to be, a global consensus on the socioeconomic merits of tilapia introduction. Rather, we recommend that decisions be informed by comparisons of the regional and local economic benefits to the regional and local ecological costs now and in the future. While the ecological effects may be similar over much of the introduced range of tilapia, as results demonstrate, there is no reason to expect uniform socioeconomic benefits. The work of managers, decision and policy makers, and other stakeholders is therefore made all the more relevant in the careful consideration of local context in decisions about tilapia introductions. And there will be ample	Low
		//Ecology			
		able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health?	No	Not poisonous	Very high
15	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	It is possible	High

bit the non-native taxon would parasities in bit with a non-adaptic taxon adaption taxon display interception of the non-native taxon display interception of the non-native taxon display interception of the non-native taxon display interception of the non-native taxon display interception of the non-native taxon display interception of the non-native taxon display interception of the non-native taxon display interception of the non-native taxon display interception of the non-native taxon display interception of the non-native taxon display interception of the non-native taxon display interception of the non-native taxon display interception of the non-native taxon display interception of the non-native taxon display interception of the non-native taxon display interception display interception display interception display interception display interception display interception display interception display interception display interception against the non-native taxon display interception against taxon display interception against taxon display interception against taxon display interception against taxon display interception against taxon display interception against taxon display interception against taxon display interception against taxon display interception against taxon display interception against taxon display interception against taxon display interception against taxon display interceptinte display interception display interception display int			
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structure/function in aquatic ecosystems if it has invested or is likely to invest the RA area? while Creactorial quadratic weeds (Faluese et al., 1977), suggesting these beams? 4.00 Is the taxon likely to ack adverse impacts on ecosystem services in the RA area? Yes More than 80% of public ecosystem services (Capter 2016) High changes in ecosystem services (Capter 2016) High changes in ecosystem services (Capter 2016) High changes in ecosystem services (Capter 2016) High changes in ecosystem services (Capter 2016) High incidence of an existing pathogen or parasite (Dennes 2016) 21 4.00 Is the taxon likely to be traced in the data act as a vector for, recognised petts and interfections gents that are assort more (Dennes 2016) Yes More interfections capable of subating itself in vector for nonindigenous pathogens or parasites. High indicators of the exosystem services caused by tilapla are services of from capatite of subating itself in vector for nonindigenous pathogens or parasites. High indicators in other exosystem services caused by tilapla are services of from capatite of subating itself in vector taxo is the vector for nonindigenous pathogens or parasites. High indicators in the exosystem services caused by tilapla are services of the inverse caused by tilapla are services of the inverse caused by tilapla are services of the inverse caused by tilapla are services of the inverse caused by tilapla are services of the inverse caused by tilapla are services of the inverse caused by tilapla are services of the inverse caused by tilapla are services of the inverse caused by tilapla are services of the inverse caused by tilapla are services of the inve	s the nd of nhan	JS	Medium
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set as a vector for, recognised pets and infections ogenits that are endomic in the RA and a set as vector for, recognised pets and off and the avector for, recognised pets and off and the avector for, recognised pets and off and the avector for, recognised pets and off and the avector for, recognised pets and off and the avector for, recognised pets and off and the avector for, recognised pets and off and the avector for, recognised pets and off and the avector for nonindigenous pathogens or parasites. High released from captivity: High the avector for received from captivity: 22 4.09 15 it likely that the taxon will host, and/or released from captivity: Yes Max length is 60cm High severage canais and irrigation channels 23 4.10 15 it likely that the taxon will host, and/or released from captivity: Yes Accurs in a wide variety of freshwater habitats like rivers, lakes, water works, could by thapia are sociated with the loss of avalue tipons and the habitats they provide to native species (Crutchfield, 1995), as well as undersize libelication (Figureed and Giani, 2005). High sociated with the loss of avalue tipons and the habitat that allow them to be successful invoders Very them to be successful invoders Very them to be successful invoders 25 5.01 Is the taxon likely to consume threatened or not exists as in the RA area? No No No No No No 26 5.01 Is the taxon likely to consume threatened or not orecave asin the RA area? No No <td>n eco</td> <td>changes in ecosystem services (Deines 2016)</td> <td></td>	n eco	changes in ecosystem services (Deines 2016)	
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23 4.0 Is the taxon capable of sustaining itself in a line of water velocity conditions (e.g., versatile in habitat use)? Yes Occurs in a wide variety of freshwater habitats line investigation channels Media 24 4.11 Is linely that the taxon invest or devistence (e.g., excretion of by-products) or behaviours (e.g., edend) will reduce habitat quality for associated with the loss of aquatic plants and the habitat strey provide to native species (Crutchfield, 1995), as well as understable biotic and abiotic changes associated with any or abiotic changes associated with the loss of aquatic plants and the habitat strey provide to norm. Flaueresdo and Gant, 2005). High associated with the loss of aquatic plants and the habitat strey provide to norm. Flaueresdo and Gant, 2005). High associated with the loss of aquatic plants and the habitat strey provide to norm. Flaueresdo and Gant, 2005). High associated with the loss of aquatic plants and the habitat strey provide to norm. Flaueresdo and Gant, 2005). High associated with the loss of aquatic plants and the plant of the plant and the habitat strey provide to norm. High associated with the loss of aquatic plants and the plant of the plant and the habitat strey provide to norm. High associated with the loss of aquatic plants and the plant of the plant and the habitat strey provide to norm. High associated with the loss of aquatic plants and the plant of the plant and the habitat strey plant and the habitat strey plant and the habitat strey plant and the habitat strey plant and the habitat strey plant and the habitat strey plant and the habitat strey plant and the habitat strey plant and the habitat strey plant and the habitat strey plant and the habitat strey plant and the habitat strey plant and the habitat strey plant and the habitat strey plant	s it li ize tl	body Yes Max length is 60cm	High
24 4.1 Is It likely that the taxon's mode of existence (e.g. receing) will reduce habitat quality for native taxa? Reductions in other ecosystem services caused by Hippia are provide to native species (Crutchfiel) quality and the habitats they provide to native species (Crutchfiel) quality and the habitats undesrable biotic and abitotic changes associated with eutrophication (Figuerado and Clain, 2005). Very 25 4.12 Is the taxon likely to maintain a viable population even when present in low densities (or persiting in diverse conditions) Yes Absolutely. The parental care is the one of the traits that allow them to be successful invaders Very 25 5.11 Is the taxon likely to consume threatened or resources (including nutrients) to the detrimment of native taxa in the RA area? No. less likely Very 26 6.01 Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Yes The strict winter conditions will not allow this species has become established in temperatures were higher. In the outflow of parenta taxon likely to be hermaphroditic or to another taxon likely to be hermaphroditic or to another taxon (age, the A area)? No. No. See: https://www.fishbase.de/summary/Oreochromis- native taxa? Very 36 6.03 Is the taxon likely to be hermaphroditic or to another taxon operation to the presence of another taxon operation to the presence of another taxon of expender of theopagales or dispiry assectas reproduction? No.	s the ange		s, Medium
25 4.12 Is the taxon likely to maintain a viable group of a command from? Yes Absolutely. The parental care is the one of the traits that allow densities (or persisting in adverse conditions by way of a dommand from?) Yes Absolutely. The parental care is the one of the traits that allow densities (or persisting in adverse conditions by way of a dommand from?) Yes No No. less lkely Hilph 5 5.01 Is the taxon likely to consume threatened or protected native taxa in the RA area? Yes It is possible. However, the impact does not seem to be high Iow 6 6.01 Is the taxon likely to exhibit parental care indivious and the RA area? Yes They are mouth breaders Very indivious and the RA area? 26 6.02 Is the taxon likely to produce viable gametes to environmental conditions? Yes The strict winter conditions will not allow this species to produce of fishery fams, where the temperatures were higher during winter. Yes 27 6.03 Is the taxon likely to hybridise naturally with display assual reproduction? Yes Yes this species can hybridise with native taxa in Africa Yes 21 6.04 Is the taxon likely to hybridise naturally with display assual reproduction? Yes Yes this species can hybridise with native taxa in Africa Yes 22 6.05 Is the taxon nikely to produce a large number of progagiles or offspring with a short time specific habitat features) inside their mouths (apsroximately for	s it li e.g. (e.g. f	viours associated with the loss of aquatic plants and the habitats they provide to native species (Crutchfield, 1995), as well as undesirable biotic and abiotic changes associated with	-
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detriment of native taxa in the RA area? 28 Reproduction 28 6.01 Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Yes They are mouth breaders Very and/or to reduce age-at-maturity in response to environmental conditions. Yes The strict winter conditions will not allow this species to produce viable gametes. However, It is known that this species has become established in temperate MIssispip. In the outflow of fishery farms, where the temperaters were higher during winter. High 20 6.02 Is the taxon likely to hybridise naturally with Yes Yes this species can hybridise with native taxa in Africa Very of splay asseual reproduction Very of splay asseual reproduction Very niloticus.html 21 6.05 Is the taxon likely to be hermaphroditic or to No No. See: https://www.fishbase.de/summary/Oreochromis- niloticus.html Very niloticus.html 23 6.05 Is the taxon from (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)?	s the	Yes It is possible. However, the impact does not seem to be high	Low
28 6.01 Is the taxon likely to exhibit parental care to environmental conditions? Yes They are mouth breaders Very 29 6.02 Is the taxon likely to produce viable gametes or propagules (in the RA area)? No The strict winter conditions will not allow this species to produce viable gametes. However, It is known that this species has become established in temperate Missispipi. In the outflow of fishery farms, where the temperatures were higher during winter. Yes 30 6.03 Is the taxon likely to hybridise naturally with native taxa? Yes Yes this species can hybridise with native taxa in Africa Yery 31 6.04 Is the taxon likely to be hermaphroditic or to display assual reproduction? No No. Dees not display assual reproduction Yery niloticus.html 32 6.05 Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)?	etrin	?	
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30 6.03 Is the taxon likely to hybridise naturally with native taxa? Yes Yes this species can hybridise with native taxa in Africa Very 31 6.04 Is the taxon likely to be hermaphroditic or to display asexual reproduction? No No. Does not display asexual reproduction Very 32 6.05 Is the taxon (are pendent on the presence of another taxon (or specific habitat features) to complete its life cycle? No No. See: https://www.fishbase.de/summary/Oreochromis- niloticus.html Very 33 6.06 Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 yen)?		viable gametes. However, It is known that this species has become established in temperate MIssisippi. in the outflow of	
31 6.04 Is the taxon likely to be hermaphroditic or to display asexual reproduction? No No. Does not display asexual reproduction? Very 22 6.05 Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? No No. See: https://www.fishbase.de/summary/Oreochromis-niloticus.html Very 33 6.06 Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)?			Very high
another taxon (or specific habitat features) to complete its life cycle? niloticus.html niloticus.html 33 6.06 Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)?	s the	or to No. Does not display asexual reproduction	Very high
33 6.06 Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)?	noth		Very high
34 6.07 How many time units (days, months, years) does the taxon require to reach the age-at-first-reproduction? 3 3-6 months Very 7. Dispersal mechanisms 7.01 How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable >1 Aquaculture, Self-spreading High 36 7.02 Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Yes It is possible. Media 37 7.03 Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? No No. Morphologically this species does not have a means of actively attaching itself to hard substrata (e.g. ship hulls, rights) are aggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Yes Yes Yes. Yes. it is possible. 38 7.05 Is natural dispersal of the taxon likely to occur as eggs (for plants) in the RA area? Yes Yes. it is possible. High 40 7.06 Are older life stages of the taxon likely to migrate in the RA area for reproduction? No Does not migrate Very	s the arge	inside their mouths (approximately for a week) overall it can b	, 5
7. Dispersal mechanisms Aquaculture, Self-spreading High 35 7.01 How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable >1 Aquaculture, Self-spreading High 36 7.02 Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Yes It is possible. Media 37 7.03 Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? No No. Morphologically this species does not have a means of actively attaching itself to hard substrata Very 38 7.04 Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Yes Yes. it is possible. High 39 7.05 Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Yes. it is possible. High 40 7.06 Are older life stages of the taxon likely to migrate in the RA area for reproduction? No Does not migrate Very	low r oes t	ears) 3 3-6 months	Very high
35 7.01 How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable disperse within the RA area (with suitable disperse within the RA area (with suitable disperse within the RA area (with suitable disperse within the RA area (with suitable disperse within the RA area (with suitable disperse within the RA area (with suitable disperse within the RA area (with suitable disperse within the RA area (with suitable disperse within the RA area (with suitable disperse within the RA area (with suitable disperse within the RA area (with suitable disperse within the RA area (with suitable disperse disperse within the RA area (with suitable disperse disperse within the RA area (with suitable disperse disp			
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37 7.03 Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? No No. Morphologically this species does not have a means of actively attaching itself to hard substrata Very attaching itself to hard substrata 38 7.04 Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? No No No Very attaching itself. Very attaching itself to hard substrata	Vill a	g the Yes It is possible.	Medium
the likelihood of dispersal? No 38 7.04 Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? No 39 7.05 Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Yes 40 7.06 Are older life stages of the taxon likely to migrate in the RA area for reproduction? No	oes ttach	y No No. Morphologically this species does not have a means of activities attaching itself to hard substrata	vely Very high
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occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? neolder life stages of the taxon likely to migrate in the RA area for reproduction? No Does not migrate Very	ccur for pl	gules ea?	
40 7.06 Are older life stages of the taxon likely to migrate in the RA area for reproduction? No Does not migrate Very	ccur agm	or as	High
	re ol	-	Very high
be dispersed in the RA area by other animals?	re pr	ely to No. Can not be dispersed by other ananimals	Very high

42	7.08	Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be	Yes	Yes they seem to be rapid	Very high
43	7.09		No	No (Osofero et al 2009)	Medium
_		ce attributes			Tricularit
		Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle?	No	No	High
45	8.02	Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being	No	Can not tolerate temperature changes, or high salinities	Medium
46	8.03	Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	No	NO	High
47	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	No	No information avalable	Low
48	8.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	No	They can not tolerate high salinities	High
49	8.06	Are there effective natural enemies (predators) of the taxon present in the RA	No	No information avalable	Low
С. (Climate	e change			
		change			
		Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?	Increase	It was hypotheses that climate change might alert the mechanisms of transportation and introduction of non-native species. Commercial and recreational activities will increase, that itself increases the propagule pressure levels of non-native	Very high
51	9.02	Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	Increase	Increased temperatures will cause this species establishment in RA	Very high
52	9.03	Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change?	Increase	Population densities will increase making them on one hand impossible to eradicate and on the other hand, affecting native organisms due to competition, that does not leave much resources for native ones.	Very high
		Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	No change	Difficult to judge	Low
54	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Higher	Higher	Medium
55	9.06	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	Higher	Under the predicted future climatic conditions, this species will disperse even wider, that will itself create the problem for native aquatic organisms. The widespread and abundance of this fish which is quite adaptive and plastic to different environmental conditions, will increase its impact on ecosystem services and	Medium

Statistics	
Scores	
BRA	24.0
BRA Outcome	-
BRA+CCA	34.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	12.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	7.0
B. Biology/Ecology	12.0
4. Undesirable (or persistence) traits	9.0
5. Resource exploitation	2.0
6. Reproduction	3.0
7. Dispersal mechanisms	0.0
8. Tolerance attributes	-2.0
C. Climate change	10.0
9. Climate change	10.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3 5 5
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	5
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2
6. Reproduction	12 2 7 9
7. Dispersal mechanisms	9
8. Tolerance attributes	6
C. Climate change	6
9. Climate change	6

Sectors affected				
Commercial	12			
Environmental	7			
Species or population nuisance traits	19			
Thresholds				
BRA				
BRA+CCA	-			
Confidence				
BRA+CCA	0.76			
BRA	0.77			
CCA	0.71			
Date and Time				
21/05/2022 15:21:23				

Taxon and Assessor details			
Category	Fishes and Lampreys (freshwater)		
Taxon name	Perca fluviatilis		
Common name	Eurasian perch		
Assessor	Bella Japoshvili		
Risk screening context			
Reason and socio-economic benefits	This is locally translocated, predatory species from west to the east South Caucasus. Now it is		
Risk assessment area	South Caucasus		
Taxonomy	Actinopteri (ray-finned fishes) > Perciformes/Percoidei (Perchs) > Percidae (Perches)		
Native range	Europe		
Introduced range	Worldwide		
URL	https://www.fishbase.de/summary/Perca-fluviatilis.html		

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
1. L		ication/Cultivation			lue i
T	1.01	Has the taxon been the subject of	Yes	Douxfils, J., Mandiki, S. N. M., Marotte, G., Wang, N., Silvestre, F.,	High
		domestication (or cultivation) for at least 20		Milla, S., & Kestemont, P. (2011). Does domestication process	
		generations?		affect stress response in juvenile Eurasian perch Perca fluviatilis?.	
				Comparative Biochemistry and Physiology Part A: Molecular &	
				Integrative Physiology, 159(1), 92-99.	
2	1.02	Is the taxon harvested in the wild and likely	Yes	e.g. Rundberg, H. (1977). Trends in harvests of pikeperch	Very high
		to be sold or used in its live form?		(Stizostedion lucioperca), eurasian perch (Perca fluviatilis), and	
				northern pike (Esox lucius) and associated environmental changes	
				in lakes Mälaren and Hjälmaren, 1914-74. Journal of the Fisheries	
				Board of Canada, 34(10), 1720-1724.	
3	1.03	Does the taxon have invasive races,	No	No other congeners or specific race is known as invasive	Medium
		varieties, sub-taxa or congeners?	-		
2. (Climate	, distribution and introduction risk			
4	2.01	How similar are the climatic conditions of the	High	Result of climatch algorithm	Medium
		Risk Assessment (RA) area and the taxon's	5		
		native range?			
5	2.02	What is the quality of the climate matching	Low	Due to low accuracy of local climate data	High
5	2.02	data?	2011		ingii
6	2.03	Is the taxon already present outside of	Yes	e.g. Kuljanishvili, T., Mumladze, L., Japoshvili, B., Mustafayev, N.,	Very high
0	2.05		165		very nigh
		captivity in the RA area?		Ibrahimov, S., Patoka, J., & Kalous, L. (2021). The first unified	
				inventory of non-native fishes of the South Caucasian countries,	
				Armenia, Azerbaijan, and Georgia. Knowledge & Management of	
_				Aquatic Ecosystems, (422), 32.	
/	2.04	How many potential vectors could the taxon	One	Human mediated dispersal for recreational fisheires	High
		use to enter in the RA area?			
В	2.05	Is the taxon currently found in close	Yes	Kuljanishvili, T., Mumladze, L., Japoshvili, B., Mustafayev, N.,	Very high
		proximity to, and likely to enter into, the RA		Ibrahimov, S., Patoka, J., & Kalous, L. (2021). The first unified	
		area in the near future (e.g. unintentional		inventory of non-native fishes of the South Caucasian countries,	
		and intentional introductions)?		Armenia, Azerbaijan, and Georgia. Knowledge & Management of	
				Aquatic Ecosystems, (422), 32.	
3. 1	nvasive	e elsewhere			
9	3.01	Has the taxon become naturalised	Yes	E.g. Morgan, D. L., Hambleton, S. J., Gill, H. S., & Beatty, S. J.	Very high
		(established viable populations) outside its		(2002). Distribution, biology and likely impacts of the introduced	
		native range?		redfin perch (Perca fluviatilis)(Percidae) in Western Australia.	
		5		Marine and Freshwater Research, 53(8), 1211-1221.	
10	3.02	In the taxon's introduced range, are there	No	Not documented evidence exist	Low
		known adverse impacts to wild stocks or			
		commercial taxa?			
11	3.03	In the taxon's introduced range, are there	Yes	e.g. Closs, G. P., Ludgate, B., & Goldsmith, R. J. (2001, May).	Medium
	5.05	known adverse impacts to aquaculture?	103	Controlling European perch (Perca fluviatilis): lessons from an	inculum
		known adverse impacts to aquaculture:			
				experimental removal. In Proceedings of the workshop: Managing	
17	2.04	In the tayon's introduced was a set th	No	invasive freshwater fish in New Zealand (pp. 10-12).	Low
12	3.04	In the taxon's introduced range, are there	No	No documented evidence exist	Low
		known adverse impacts to ecosystem			l
13	3.05	In the taxon's introduced range, are there	No	No documented evidence exist	Low
_		known adverse socio-economic impacts?			<u> </u>
		y/Ecology			
		able (or persistence) traits	1		1.
14	4.01	Is it likely that the taxon will be poisonous or	No	No documented evidence exist	Low
		pose other risks to human health?			
15	4.02	Is it likely that the taxon will smother one or	Yes	e.g. No documented evidence exist	Low
		more native taxa (that are not threatened or			
		protected)?			
16	4.03	Are there any threatened or protected taxa	Yes	Species is predator and thus can affect a number of fish and	Low
		that the non-native taxon would parasitise in		inverebrates in RA area	
		the RA area?			
17	4.04	Is the taxon adaptable in terms of climatic	Yes	Morgan, D. L., Hambleton, S. J., Gill, H. S., & Beatty, S. J. (2002).	Medium
_ /		and other environmental conditions, thus		Distribution, biology and likely impacts of the introduced redfin	
				, , ,	
		enhancing its potential persistence if it has		perch (Perca fluviatilis)(Percidae) in Western Australia. Marine and	
	4.05	invaded or could invade the RA area?	NI-	Freshwater Research, 53(8), 1211-1221.	1
10	4.05	Is the taxon likely to disrupt food-web	No	No documented evidence exist	Low
18	1.05				1
18	1.05	structure/function in aquatic ecosystems if it			
		has invaded or is likely to invade the RA			
	4.06		No	No documented evidence exist	Low

20				-	
	4.07	Is it likely that the taxon will host, and/or	No	No documented evidence exist	Low
		act as a vector for, recognised pests and infectious agents that are endemic in the RA			
21	4.08	Is it likely that the taxon will host, and/or	No	No documented evidence exist. Furthermore, the species is	Low
		act as a vector for, recognised pests and		translocated and hosting parasites or infections that are not new	
		infectious agents that are absent from (novel		for the RA area	
2	4.09	to) the RA area?	Vaa	Evented bread on preferrientlindeement through no decumented	Low
2	4.09	Is it likely that the taxon will achieve a body size that will make it more likely to be	Yes	Expected based on professional judgement though no documented evidence exist	Low
		released from captivity?			
3	4.10	Is the taxon capable of sustaining itself in a	No	Usually lives in lotic systems or slow mooving water	Medium
		range of water velocity conditions (e.g.			
1	4.11	versatile in habitat use)? Is it likely that the taxon's mode of existence	No	No such an evidence exist	Low
4	4.11	(e.g. excretion of by-products) or behaviours	NO		LOW
		(e.g. feeding) will reduce habitat quality for			
		native taxa?			
5	4.12	Is the taxon likely to maintain a viable	No	No documented evidence exist	Low
		population even when present in low			
		densities (or persisting in adverse conditions by way of a dormant form)?			
. R	Resourc	ce exploitation			
		Is the taxon likely to consume threatened or	Yes	It can consume juveniles of any other species including	Medium
_	F 05	protected native taxa in the RA area?		threatened fishes	
/	5.02	Is the taxon likely to sequester food resources (including nutrients) to the	No	No documented evidence exist	Low
		detriment of native taxa in the RA area?			
	Reprodu	uction			
		Is the taxon likely to exhibit parental care	No	No sucha behavior is registered	Medium
		and/or to reduce age-at-maturity in response			
9	6.02	to environmental conditions? Is the taxon likely to produce viable gametes	Yes	Species is currently a common one in many water bodies in East	Very high
,	0.02	or propagules (in the RA area)?	103	Georgia. Kuljanishvili, T., Mumladze, L., Japoshvili, B.,	very mgn
				Mustafayev, N., Ibrahimov, S., Patoka, J., & Kalous, L. (2021).	
				The first unified inventory of non-native fishes of the South	
				Caucasian countries, Armenia, Azerbaijan, and Georgia.	
0	6.03	Is the taxon likely to hybridise naturally with	Yes	Knowledge & Management of Aquatic Ecosystems, (422), 32.	High
U	0.05	native taxa?	res	Kahilainen KK; Teacher AGF; Kahkonen K; Vinni M; Lehtonen H; Merila J, 2010. First record of natural hybridization and	High
				intogression between pikeperch (Sander lucioperca) and perch	
				(Perca fluviatilis). Ann. Zool. Fenn, 48:39-44.	
1	6.04		No	The species is sexually reproducing	High
2	6.05	display asexual reproduction? Is the taxon dependent on the presence of	No	No such dependency is ever recorded	High
Z	0.05	another taxon (or specific habitat features)	NO	No such dependancy is ever recorded	High
		to complete its life cycle?			
3	6.06	Is the taxon known (or likely) to produce a	Yes	Craig, J. F. (2008). Percid fishes: systematics, ecology and	Very high
		large number of propagules or offspring		exploitation. John Wiley & Sons.	
1	6.07	within a short time span (e.g. < 1 year)?	2	Vears	Very high
4	6.07	How many time units (days, months, years)	2	years	Very high
4	6.07		2	years	Very high
. <i>E</i>	Dispers	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms			
. <i>E</i>	Dispers	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal	2	Human mediated translocation for recreational or aquacultural	Very high High
. <i>E</i>	Dispers	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to			
. <i>L</i> 5	Disperso 7.01	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable		Human mediated translocation for recreational or aquacultural purpose, but also independently	
. <i>L</i> 5	Dispers	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable	>1	Human mediated translocation for recreational or aquacultural	High
5 6	7.01	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)?	>1 No	Human mediated translocation for recreational or aquacultural purpose, but also independently In the areas where such protectead areas are established, species is native	High
5 6	Disperso 7.01	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively	>1	Human mediated translocation for recreational or aquacultural purpose, but also independently In the areas where such protectead areas are established, species	High
5 6	7.01	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship	>1 No	Human mediated translocation for recreational or aquacultural purpose, but also independently In the areas where such protectead areas are established, species is native	High
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. <u></u> 5 6	7.01	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship	>1 No	Human mediated translocation for recreational or aquacultural purpose, but also independently In the areas where such protectead areas are established, species is native	High
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. <u> </u>	Dispers. 7.01 7.02 7.03 7.04 7.05	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to	>1 No No Yes	Human mediated translocation for recreational or aquacultural purpose, but also independently In the areas where such protectead areas are established, species is native No such an evidence is available Not expected The larval perch usualy dispersing actively through currents. E.g. Craig, J. F. (2008). Percid fishes: systematics, ecology and exploitation. John Wiley & Sons.	High Medium Very high High
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<u> </u>	7.02 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent?	>1 No No Yes No	Human mediated translocation for recreational or aquacultural purpose, but also independently In the areas where such protectead areas are established, species is native No such an evidence is available Not expected The larval perch usualy dispersing actively through currents. E.g. Craig, J. F. (2008). Percid fishes: systematics, ecology and exploitation. John Wiley & Sons. Not expected based on professional judgment No such an evidence exists	High Medium Very high High High High
<u> </u>	7.02 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? Al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent?	>1 No No Yes No No	Human mediated translocation for recreational or aquacultural purpose, but also independently In the areas where such protectead areas are established, species is native No such an evidence is available Not expected The larval perch usualy dispersing actively through currents. E.g. Craig, J. F. (2008). Percid fishes: systematics, ecology and exploitation. John Wiley & Sons. Not expected based on professional judgment No such an evidence exists	High Medium Very high High High High Low
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4.5	0.02	To the true to lower to for which you for	NI-	No desumented suidenes suists	1
45	8.02	Is the taxon tolerant of a wide range of	No	No documented evidence exists	Low
		water quality conditions relevant to that			
		taxon? [In the Justification field, indicate the			
		relevant water quality variable(s) being			
46	8.03	Can the taxon be controlled or eradicated in	No	No documented evidence exists	Low
		the wild with chemical, biological, or other			
		agents/means?			
47	8.04	Is the taxon likely to tolerate or benefit from	No	No such fact have been reported	Low
		environmental/human disturbance?			
48	8.05	Is the taxon able to tolerate salinity levels	No	No such an evidnece exists	Medium
		that are higher or lower than those found in			
		its usual environment?			
49	8.06	Are there effective natural enemies	No	Based on professional judgement	High
		(predators) of the taxon present in the RA			
		e change			
		change	T.		1
50	9.01	Under the predicted future climatic	No change	Based on professional judgement	Medium
		conditions, are the risks of entry into the RA			
		area posed by the taxon likely to increase,			
		decrease or not change?			
51	9.02	Under the predicted future climatic	Increase	Based on professional judgement	Medium
		conditions, are the risks of establishment			
		posed by the taxon likely to increase,			
		decrease or not change?			
52	9.03	Under the predicted future climatic	No change	Based on professional judgement	Low
		conditions, are the risks of dispersal within			
		the RA area posed by the taxon likely to			
		increase, decrease or not change?			
53	9.04	Under the predicted future climatic	Higher	Based on professional judgement	Low
		conditions, what is the likely magnitude of			
		future potential impacts on biodiversity			
		and/or ecological integrity/status?			
54	9.05	Under the predicted future climatic	Higher	Based on professional judgement	Low
		conditions, what is the likely magnitude of			
		future potential impacts on ecosystem			
		structure and/or function?			
55	9.06	Under the predicted future climatic	No change	Based on professional judgement	Low
		conditions, what is the likely magnitude of	-		
		future potential impacts on ecosystem			
		services/socio-economic factors?			

Statistics	
BRA	17.0
BRA Outcome	-
BRA+CCA	23.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	9.0
1. Domestication/Cultivation	2.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	6.0
B. Biology/Ecology	8.0
4. Undesirable (or persistence) traits	4.0
5. Resource exploitation	5.0
6. Reproduction	3.0
7. Dispersal mechanisms	-2.0
8. Tolerance attributes	-2.0
C. Climate change	6.0
9. Climate change	6.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	36
B. Biology/Ecology	12
4. Undesirable (or persistence) traits 5. Resource exploitation	
6. Reproduction	2
7. Dispersal mechanisms	9
8. Tolerance attributes	6
C. Climate change	6
9. Climate change	6
Sectors affected	0
Commercial	9
Environmental	9
Species or population nuisance traits	7
Species of population medulice date	
Thresholds	
BRA	-
DINA	

Thresholds	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.52
BRA	0.55

	CCA	0.33
Date and Time		
	16/05/2022	21:32:03

Taxon and Assessor details			
Category	Fishes and Lampreys (freshwater)		
Taxon name	Perca fluviatilis		
Common name	Eurasian perch		
Assessor	Giorgi Epitashvili		
Risk screening context			
Reason and socio-economic benefits	The Eurasian perch Perca fluviatilis is an important fish species in both commercial and		
Risk assessment area	South Caucasus		
Taxonomy	Perca fluviatilis Linnaeus, 1758		
Native range	Eurasia: throughout Europe to northernmost extremity of Scandinavia, except Iberian Peninsula,		
Introduced range	Widely introduced. Several countries report adverse ecological impact after introduction.		
URL	https://www.fishbase.se/summary/perca-fluviatilis.html		

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
1. L 1		ication/Cultivation Has the taxon been the subject of	Yes	The farming of percids (Eurasian perch Perca fluviatilis, pikeperch	Von/ high
T	1.01	domestication (or cultivation) for at least 20	Tes	Sander lucioperca) has progressively become a diversification path	Very high
		generations?		of European inland aquaculture in the past 25 years. This required	
		generations:		the domestication of wild or pseudowild (coming from polyculture	
				ponds) populations (Fontaine and Teletchea 2019).	
2	1.02	Is the taxon harvested in the wild and likely	Yes	For instance total farmed perch production in 2005 was 315	Very high
-	1.02	to be sold or used in its live form?	105	tonnes (FAO 2007 stats).	very night
3	1.03	Does the taxon have invasive races,	Yes	Several countries have reported adverse ecological impacts after	Very high
		varieties, sub-taxa or congeners?		the introduction of P. fluviatilis (Froese and Pauly, 2011). One	· • · / · · · 5··
		, ,		such example is in the Murray-Darling Basin, South Australia,	
				where it is considered a threat to native fish species.	
2. (Climate	, distribution and introduction risk			
4	2.01	How similar are the climatic conditions of the	High	P. fluviatilis is naturally distributed in the South Caucasus Region	Very high
		Risk Assessment (RA) area and the taxon's		(Kuljanishvili et al. 2020; Epitashvili et al. 2020) and actively	
		native range?		translocated within the region by fishermans. Therefore climatic	
				conditions for this species within the region is more or less	
5	2.02	What is the quality of the climate matching	High	Köppen-Geiger climate classification map	High
		data?			L
6	2.03	Is the taxon already present outside of	Yes	P. fluviatilis is naturally distributed in the South Caucasus Region	Very high
		captivity in the RA area?		(Kuljanishvili et al. 2020; Epitashvili et al. 2020) and actively	
				translocated within the region by fishermans.	
/	2.04	How many potential vectors could the taxon	One	P. fluviatilis is actively translocated within the Caucasus Region by	High
	2.05	use to enter in the RA area?	¥	fishermans	Marris Int. 1
8	2.05	Is the taxon currently found in close	Yes	There are three species, Perca fluviatilis, Sander lucioperca and S.	Very high
		proximity to, and likely to enter into, the RA		marinus, found naturally in the Caspian Sea basin of Iran (Coad	
		area in the near future (e.g. unintentional		2016)	
2 1	'ny aciw	and intentional introductions)?			
<u>э. 1</u> а	3.01	Has the taxon become naturalised	Yes	There is a long history of intentional introductions of this species	Very high
9	5.01	(established viable populations) outside its	165	for sustenance and sport fishing. Many of those introductions have	very mgn
		native range?		resulted in established wild populations.	
10	3.02	In the taxon's introduced range, are there	Yes	One such example is in the Murray-Darling Basin, South Australia,	Very high
10	5.02	known adverse impacts to wild stocks or	105	where P. fluviatilis considered as threat to native fish species.	very mgn
		commercial taxa?			
11	3.03	In the taxon's introduced range, are there	No	No data	Low
		known adverse impacts to aquaculture?			
12	3.04	In the taxon's introduced range, are there	Yes	P. fluviatilis has negative impact on the local biodiversity and	Very high
		known adverse impacts to ecosystem		therefore ecosystem services. Example of this are Tbilisi Reservoir	
		services?		where P. fluviatilis was released by fishermans and currently this	
				fish become dominant species in the reservoir. This has a negative	
				impact on recreational fishing as other species are currently less	
				available because of this species (Own observation).	
13	3.05	In the taxon's introduced range, are there	Yes	Perca fluviatilis has the potential for moderate socio-economic	High
		known adverse socio-economic impacts?		impact if introduced to the Great Lakes. P. fluviatilis may prey on	1
				native species and trout, negatively affecting recreational	1
				fisheries. Within a 72-hour period, P. fluviatilis eliminated 20,000	1
				newly released rainbow trout fry from a reservoir in south-western	1
_				Australia (NSW DPI 2012).	
		y/Ecology			
		able (or persistence) traits	N-		11 U ala
14	4.01	Is it likely that the taxon will be poisonous or	INO	This species does not pose a threat to humans	High
1 Г	4.02	pose other risks to human health?	Vec	D. fluviatilia is a produtor species and harman land and it.	Van bi-b
тЭ	4.02		Yes	P. fluviatilis is a predator species and harms local species.	Very high
		more native taxa (that are not threatened or			
16	4.03	protected)?	Voc	D. fluviatilia is a prodator species and harms local threast and	Von bish
10	4.03	Are there any threatened or protected taxa	Yes	P. fluviatilis is a predator species and harms local threarened and	Very high
		that the non-native taxon would parasitise in the RA area?		protected species in the Caucasus region such as Salmo spp;	
17	4.04		Voc	Acipenser spp, Luciobarbus capito, etc (Own observation). P. fluviatilis is naturally distributed in the South Caucasus Region	Veny bich
L/	4.04	Is the taxon adaptable in terms of climatic	Yes	, 5	Very high
		and other environmental conditions, thus		(Kuljanishvili et al. 2020; Epitashvili et al. 2020) and actively	
		enhancing its potential persistence if it has		translocated within the region by fishermans. Therefore climatic	
0	4.05	invaded or could invade the RA area?	Vec	conditions for this species within the region is more or less	Van (hi-h
18	4.05	Is the taxon likely to disrupt food-web	Yes	Such example is in the Murray-Darling Basin, South Australia,	Very high
	1	structure/function in aquatic ecosystems if it		where P. fluviatilis considered as threat to native fish species.	
		has invaded or is likely to invade the RA		Such a fact is already noticeable in the Tbilisi Reservoir (Own	

19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes	P. fluviatilis has negative impact on the local biodiversity and therefore ecosystem services. Example of this are Tbilisi Reservoir where P. fluviatilis was translocated and released by fishermans and currently this fish become dominant species in the reservoir. This has a negative impact on recreational fishing as other species	High
20	4.07	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA	Not applicable	are currently less available because of this species (Own Data deficiencies	Low
21		Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area?	Not applicable	Data deficiencies	Low
22	4.09	Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity?	Yes	Maximum length of P. fluviatilis is 60 cm, weight 5 kg. Therefore this species is one of the main object to aquaculture.	Very high
23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)?	Yes	Inhabits a very wide range of habitats from estuarine lagoons, lakes of all types to medium-sized streams. Feeding larvae occur in open water.	Medium
24		Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa?	Not applicable	Data deficiencies	Low
25	4.12	Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)?	Yes	In the Tbilisi reservoir P. fluviatilis were released in low numbers and it was able to reproduced itself and today it is one of the most numerous species in this reservoir.	High
	lesourc	e exploitation	1		I
26	5.01	Is the taxon likely to consume threatened or protected native taxa in the RA area?	Yes	This species is predator and can consume local endemic species such as Salmo spp, Acipenser spp and etc. (Own observation).	Very high
27		Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?	Yes	This fish is a predator and competitor species for native taxa within its introduced/translocated ranges of the South Caucasus Region.	High
	Reprodu	iction			I
28		Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?	Not applicable	Data deficiencies	Low
29		Is the taxon likely to produce viable gametes	Yes	This species naturally breeds in the Southern Caucasus Region	Very high
30	6.03	or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa?	Yes	(Ninua et al. 2013; Kuljanishvili et al. 2020) A case of natural hybridization between pikeperch (Sander lucioperca) and perch (Perca fluviatilis) was confirmed in Finland based on the intermediate morphological, anatomical and genetic	High
31	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	Yes	characteristics of the hybrid. Micro satellite analyses ruled out the possibility that the focal individual was of either pure species, and indicated it was a S. lucioperca backcross (Kahilainen et al. 2011). Chevey (1922) recorded a specimen of P. fluviatilis which had undergone a sex reversal from male to female (Jellyman 1976).	High
32		Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	No	No such a study has been conducted	Medium
33		Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)?	Yes	Fecundity of P. fluviatilis varies from 12000 to 900 000 eggs (Ninua et al. 2013)	High
34		How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	2	The species becomes mature at the age of 2-3 years.	High
7. C		al mechanisms			
35	7.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable	>1	This species is distributed naturally and artificially through translocation in the Caucasus region.	Very high
36	7.02	Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)?	Yes	P. fluviatilis is naturally distributed within the protected areas in the Caucasus region (e.g. Kolkheti National Park; Kobuleti Managed Reserve etc.) and may spread to other protected areas that are not in its natural range.	High
37		Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances	No	This species does not has such means.	High
38	7.04	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?	Yes	This species naturally reproduces in the SC region (Ninua et al. 2013; Kuljanishvili et al. 2020).	High
39	7.05	Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?	Yes	This species naturally reproduces in the SC region (Ninua et al. 2013; Kuljanishvili et al. 2020).	High
40	7.06	Are older life stages of the taxon likely to	Yes	This species reproduces naturally within the Caucasus region	High
41	7.07	migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to	Yes	(Kuljanishvili et al. 2020). This species is mostly distributed by humans in the region	High
42	7.08	be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous	Yes	although it is expected that various animals will also disperse its Sometimes this species is kept on fish farms and then released to a new location.	Medium
		seven questions (35-41; i.e. both			

44	8.01	Is the taxon able to withstand being out of	No	No such fact is known	Medium
44	0.01	water for extended periods (e.g. minimum of	NU		neuluiti
		one or more hours) at some stage of its life			
1		, 5			
45	8.02	cycle? Is the taxon tolerant of a wide range of	Yes	P. fluviatilis inhabits a very wide range of habitats from estuarine	Hiah
45	0.02	water quality conditions relevant to that	res	lagoons, lakes of all types to medium-sized streams. Feeding	підп
		taxon? [In the Justification field, indicate the		larvae occur in open water.	
16	8.03	relevant water quality variable(s) being Can the taxon be controlled or eradicated in	No	Perch are particularly susceptible to the epizootic haematopoietic	Medium
40	0.05		NO	necrosisvirus (EHN) (Bucke et al. 1979). However, this virus is	Medium
		the wild with chemical, biological, or other		unlikely to prove usefulin the control of perch (Closs et al. 2001).	
47	8.04	agents/means? Is the taxon likely to tolerate or benefit from	Yes	Often this species is spread by humans	High
47	8.04		res	Often this species is spread by numans	High
18	8.05	environmental/human disturbance? Is the taxon able to tolerate salinity levels	Yes	Inhabits a very wide range of habitats from estuarine lagoons,	Very high
40	0.05	that are higher or lower than those found in	165	lakes of all types to medium-sized streams. Feeding larvae occur	very mgn
				,	
40	8.06	its usual environment? Are there effective natural enemies	Yes	in open water. There are several predators in the SC region which can eat this	High
49	0.00		165		ingli
		(predators) of the taxon present in the RA		fish : Salmo spp; Esox lucius, Silurus glanis, Sander lucioperca,	
<u> </u>	Climate	area? e change	L	etc (Kuljanishvili et al. 2020).	
		change change			
		Under the predicted future climatic	Increase	This species has potential to increase its range within the	Medium
50	9.01	conditions, are the risks of entry into the RA	Increase	Caucasus region.	medium
		area posed by the taxon likely to increase,			
51	9.02	decrease or not change? Under the predicted future climatic	Increase	This species has potential to increase its range within the	Medium
51	9.02	conditions, are the risks of establishment	Inclease	Caucasus region.	neuluiti
		posed by the taxon likely to increase,			
52	9.03	decrease or not change? Under the predicted future climatic	Increase	This species has potential to increase its range within the	Medium
52	5.05	conditions, are the risks of dispersal within	Inci ease	Caucasus region.	nculum
		the RA area posed by the taxon likely to			
		increase, decrease or not change?			
53	9.04	Under the predicted future climatic	Higher	Own judgement	High
55	2.04	conditions, what is the likely magnitude of	ingliei		ingli
		future potential impacts on biodiversity			
		and/or ecological integrity/status?			
54	9.05	Under the predicted future climatic	Higher	Own judgement	Medium
54	5.05	conditions, what is the likely magnitude of	ingliei		nculum
		future potential impacts on ecosystem			
		structure and/or function?			
55	9.06	Under the predicted future climatic	Higher	Own judgement	Medium
55	5.00	conditions, what is the likely magnitude of	ingliei		nculum
		future potential impacts on ecosystem			
		services/socio-economic factors?			
L	1	services/socio-economic ractors?	1		

Statistics	
Scores	
BRA	51.0
BRA Outcome	-
BRA+CCA	63.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	19.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	14.0
B. Biology/Ecology	32.0
4. Undesirable (or persistence) traits	8.0
5. Resource exploitation	7.0
6. Reproduction	5.0
7. Dispersal mechanisms	7.0
8. Tolerance attributes	5.0
C. Climate change	12.0
9. Climate change	12.0
Answered Questions	
Total	55
Total A. Biogeography/Historical	13
Total A. Biogeography/Historical 1. Domestication/Cultivation	13
Total A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk	13
Total A. Biogeography/Historical 1. Domestication/Cultivation	13 3 5 5
Total A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology	13 3 5 5 36
Total A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits	13 3 5 5 36 12
Total A. Biogeography/Historical I. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation	13 3 5 5 36 12
Total A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction	13 3 5 5 36 12 2 7
Total A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms	13 3 5 5 36 12 2 7 7 9
Total A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes	13 3 5 5 36 12 2 7 9 6
Total A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change	13 3 5 5 36 12 2 7 9 9 6 6
Total A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change	13 3 5 5 36 12 2 7 9 6
Total A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. C.Climate change Sectors affected	13 3 5 5 36 12 2 7 7 9 6 6 6 6
Total A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial	13 3 5 5 36 12 2 7 9 6 6 6 6 6 6 6 16
Total A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial Environmental	13 3 5 5 36 12 2 7 9 6 6 6 6 6 6 6 16
Total A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change 9. Climate change Sectors affected Commercial	13 3 5 5 36 12 2 7 7 9 6 6 6 6 6 6 16
Total A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial Environmental	13 3 5 5 36 12 2 7 9 6 6 6 6 16 16

	BRA	-
	BRA+CCA	-
Confidence		
	BRA+CCA	0.74
	BRA	0.76
	CCA	0.54
Date and Time		
	13/05/202	2 14:54:56

Taxon and Assessor details	
Category	Fishes and Lampreys (freshwater)
Taxon name	Perca fluviatilis
Common name	Eurasian perch
Assessor	Tatia Kuljanishvili
Risk screening context	
Reason and socio-economic benefits	Translocated from the west Georgia to the east.
Risk assessment area	South Caucasus
Taxonomy	Actinopteri (ray-finned fishes) > Perciformes/Percoidei () > Percidae (Perches) >
Native range	The Black Sea basin
Introduced range	The Kura River Basin
URL	https://fishbase.mnhn.fr/summary/Perca-fluviatilis.html

A. Biogeography/Hitsorial 1.10.1 Has the taxon beam the subject of generations. Yes It has fisheries value Medium 2 1.0.1 Has the taxon beam the subject of generations. Yes. It has value for commercial, aquacuture and recreational to be seed or used in its life form? Yes. It has value for commercial, aquacuture and recreational to be seed or used in its life form? Yes. It has value for commercial, aquacuture and recreational to be seed or used in its life form? Yes. It has value for commercial, aquacuture and recreational to be seed or used in its life form? 2 1.0.2 Does the taxon have invasive races. The quark seed or used in its life form? Yes. Risk Assessment (M) area and the taxon's instruct range? Hedium 2 2.0 Was the quarky of the dimate matching data? Low There are odimatic stations in climatch to make this analysis. Medium Medium 2 2.0 Was the quarky of the dimate matching use to order in the A area? Yes The commonly distributed in many eastern Georgian water bodies. Yes is the taxon area for yound in close provinity (n, and likely to enter into). Yes The commonly distributed in many eastern Georgian water bodies. Yes is the taxon the distributed in taxis eastern decargian the taxis and light distributed in taxis eastern decargian taxis. Yery high 3.0.1 Has the taxon back to analysis. The cond matris t				Response	Justification (references and/or other information)	Confidence
1 10.1 Has the taxon beam the subject of dementions (or cultivation) for at least 30 entertains? Yes It has finiteries value Medium 1 202 Its beam harvested in the wild and likey operations? Yes Yes at has value for commercial, aquaculture and recreational wight Very high 1 20.0 Its beam harvested in the wild and likey variaties, bub tays of compensity? Yes	Α. Ι	Biogeo	graphy/Historical	-		
Image: Second	1. L	Domest	ication/Cultivation			
Image: second	1	1.01	-	Yes	It has fisheries value	Medium
2 1.02 Is the taxon harvested in the wild and likely Yes. It has value for commercial, aquaculture and recreational Yery high 3 1.03 Does the taxon harve invasive nease, variables, sub-taxa or comparent? Yes Rule Cymmocephalus cernua High 4 20.0 How similar due to elimatic conductors of the rative range? Medium Medium 5 2.02 What the quality of the climate matching data? Low There are no climatic stations in climate is another and the taxon's rative range? Medium 6 2.03 Is the taxon already present outside of captivity in the 8A area? Yes There are no climatic stations in climate is such as the Algett and Tbillis Reservoirs, Bareti, Baraleti, Usi, Turtis, and other lakes. Yery high 7 2.04 How many potential vectors could the taxon proximity to, and likery to the run into, Rea area? Yer Taits commonly distributed in many eastern Georgian water hodies was as het Algett and Tbillis Reservoirs, Bareti, Baraleti, Usi, Turtis, and other lakes. Yery high 8 2.05 Is the taxon's introduced range, are there hon on devine impact to all socks or hon devine impact tange. No No No 10 30.20 In the taxon's introduced range, are there hon on devine was bis docks or hon on dev						
be be sold or used in its live form? Instances Instances 1.03 Does takan have invester acces, your services have on the taxon in the taxon is invester and invester and the taxon is invester and invester and the taxon is invester and invester and taxing is invester and the taxon is invester and invester and taxing is invester and the taxon is invester and taxing is invester and the taxon is involuted range, are there is invested in the taxon is involuted range, are there is invester and taxing is involuted range, are there is invester and the taxon is involuted range, are there is invester and invester and the taxon is involuted range, are there is invested is involuted range, are there is is not known but we may assume that it has great impact since is invester involuted range, are there is is involuted range, are there is is involuted range, are there is is involuted range, are there is is involuted range, are there is is involuted range, are there is is invo	2	1.00				
3 1.1.3 Dest the taxon have invasive neces, variables, sub-tax or comparents? Yes Ruffe Gymnocophelus cernus High 2.Conset: 2.2.11 How similar are the dimate conditions of the native range? High It is somehow similar Medium 2.2.11 How similar are the dimate conditions of the native range? High It is somehow similar Medium 2.2.11 How similar are the dimate matching data? Low There are no climatic stations in climatch to make this analysis. However, according to Koppen-Geiger map the climate is somehow similar. Medium 2.2.20 What the quality of the climate matching data? Low There are no climatic stations in climatch to make this analysis. However, according to Koppen-Geiger map the climate is somehow similar. Medium 2.2.20 Visa the data yith on an integration of the captorium to, and likely of the climate matching are in the near future (e.g. unitention) Yes It is commonly distributed in many cestern Gorgian water bodies to ache the hypein data and the climate maturalised (established valable populations) outside its free recent waters integrate on the data introduced range, are there known wateres impacts to will stock or recent wateres introduced range, are there known wateres induced to consistent integration wateres induced to consistent integration wateres induced to consistent integrate wateres induced to consistent known wateres induced to produced there integrate wateres induced conditions will be poisonous in recent wateres induced conditions will be poisonous in recent wateres induced conditions will be poisonous in reconset wateres induced c	2	1.02		Yes		Very high
Varieties, sub-taxa or congeners? Varieties, sub-taxa or congeners? Medium 4 2.0.1 How similar are the clinatic conditions of the High Nisk Assessment (RA) area and the taxors of the High Nisk Assessment (RA) area and the taxors of the High Nisk Assessment (RA) area and the taxors of the High Nisk Assessment (RA) area and the taxors of the High Nisk Assessment (RA) area and the taxors of the Area? New York Nisk Assessment (RA) area and the taxors of the Area? New York Nisk Assessment (RA) area and the taxors of the Area? New York Nisk Assessment (RA) area and York Assessment (RA) area and York Assessment (RA) area and York Area? New York Nisk Assessment (RA) area and York Area? New York Nisk Assessment (RA) area and York Nisk Assessment (RA) area and York Nisk Assessment (RA) area and Interactional Introductions? Yes Yes Yes Yes Yes Yes it has been naturalized outside its native area Very high Yer high Yer high Area? 3.0.2 In the taxon's introductions? Yes Yes it has been naturalized outside its native area Very high Yer high Yer high Yer high Yer high Yer have have assume that it has great impact since Invove and Area? Yer Yingh Yer high Yer high Yer High Yer High Yer High Yer High Yer High Yer High Yer High Yer High Yer High Yer High Yer High Yer High Yer High Yer High Yer Yer High Yer High Yer Yer High Yer Yer High Yer High Yer Yer High Yer Yer High Yer Yer High Yer Yer Yer High Yer Yer Yer Yer Yer Yer Yer Yer Yer Yer	2	1 0 2		Voc		High
2. Climeter description 2.0.1 How similar are the climatic condition of the Risk Assessment (RA) area and the taxon's native range? It is somehow similar Medium 5 2.0.2 What is the quality of the climate matching (dsh) Low There are no climatic stations in climatch to make this analysis. How were scored light (sopper-Gelger map the climate) Medium 6 2.0.2 Is the taxon already present outside of captivity in the RA area? Yes It is commonly distributed in many eastern Georgian water bodies us to enter in the RA area? Very high 2 2.04 How many potential vectors could the taxon area of internonal introductions? Yes It is commonly distributed in many eastern Georgian water bodies us to enter in the RA area? Very high 2.05 Is the taxon currently frough inclusion area of internonal introductions? Yes It is commonly distributed in many eastern Georgian water bodies us the Rajet and Tbills Reservoirs, Bareti, Bazaleti, Lisi, Turtity, and other takes Very high 3.01 Has the taxon's introduction and part there No No It is not known but we may assume that it has great impact since transmissing deseases. Low 3.01 Has the taxon's introduction area, are there No No thornw Redium 3.02	5	1.05		Tes		riigii
4 2.0.1 How similar are the climate conditions of the High It is somehow similar Medium 0 Risk Assessment (RA) seasessmen	2 (^limate				
Risk Assessment (RA) area and the taxon's antiver range? Notestimate Notestimat Notestimate Notesti				Hiah	It is somehow similar	Medium
Institute range? Institute range? Medium 2.02 What is the quality of the climate matching Low Medium 2.02 What is the quality of the climate matching Low Medium 2.02 What is the quality of the climate is analysis. How ever, according to Koppen-Celger map the climate is analysis. Medium 2.02 What is the quality of the climate matching Ver It is commonly distributed in many eastern Georgian water bodies. Very high 2.04 How many potential vectors could the taxon >1 Fisheries; Recreational fisheries Very high 3.01 Fast the taxon currently found in close provide and thalls Reservoirs, Bareti, Bazaleti, Lisi, Turtle, and other lakes Very high 3.01 Fast the taxon's introduced range, are there the removal distributed in many eastern Georgian water bodies to well explore the soluble to positions? Very high 3.01 Tase the taxon's introduced range, are there the removal averse impacts to qualculure? Very high 3.03 In the taxon's introduced range, are there the removal averse impacts to qualculure? No It is not known but we may assume that it has great impact since the removal averse impacts to qualculure? Low 13.03 In the taxon's introduced range,						
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23 4.10 Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. Yes Inhabits a very wide range of habitats from estuarine lagoons, lakes of all types to medium-sized streams. Very high	1					
range of water velocity conditions (e.g. lakes of all types to medium-sized streams.	23	4.10		Yes	Inhabits a very wide range of habitats from estuarine lagoons.	Verv hiah
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 water for extended periods (e.g. minimum of one or more hours) at some stage of its life cvcle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Is the taxon likely to tolerate or benefit from environmental/human disturbance? Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment? Are there effective natural enemies (predators) of the taxon present in the RA ate change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, 	Yes Yes No Yes No	Temperatures; salinities Temperatures; salinities Yes it is possible No data Yes No effective natural enemies present in RA area It was hypotheses that climate change might alert the mechanisms of transportation and introduction of non-native species. Commercial and recreational activities will increase, that	High Low High Very high
 one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Is the taxon able to tolerate or benefit from environmental/human disturbance? Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment? Are there effective natural enemies (predators) of the taxon present in the RA ate change Under the predicted future climatic 	Yes Yes No Yes No	Temperatures; salinities Yes it is possible No data Yes No effective natural enemies present in RA area It was hypotheses that climate change might alert the	Low High High Very high
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 one or more hours) at some stage of its life cycle? 2 Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being 3 Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? 4 Is the taxon likely to tolerate or benefit from environmental/human disturbance? 5 Is the taxon able to tolerate salinity levels 	Yes Yes No	Temperatures; salinities Yes it is possible No data	Low High
 one or more hours) at some stage of its life cycle? 2 Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being 3 Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? 4 Is the taxon likely to tolerate or benefit from environmental/human disturbance? 	Yes Yes No	Temperatures; salinities Yes it is possible No data	Low High
 one or more hours) at some stage of its life cycle? 2 Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being 3 Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? 	Yes	Temperatures; salinities Yes it is possible	Low
 one or more hours) at some stage of its life cvcle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other 	Yes	Temperatures; salinities	
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 one or more hours) at some stage of its life cycle? 2 Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being 		Temperatures; salinities	High
one or more hours) at some stage of its life cycle? 2 Is the taxon tolerant of a wide range of water quality conditions relevant to that			High
one or more hours) at some stage of its life cvcle? 2 Is the taxon tolerant of a wide range of			High
one or more hours) at some stage of its life cycle?			11:
one or more hours) at some stage of its life	NO		
water for extended periods (e.g. minimum of	NO		
1 Is the taxon able to withstand being out of	No	No data	High
Is dispersal of the taxon density dependent? ance attributes	No	No data	High
unintentional or intentional) likely to be	N-		1.15 1-
seven questions (35-41; i.e. both			
vectors/pathways mentioned in the previous			,
be dispersed in the RA area by other animals Is dispersal of the taxon along any of the	Yes	No. Can not be dispersed by other ananimals	Very high
7 Are propagules or eggs of the taxon likely to	No	No. Can not be dispersed by other ananimals	Very high
migrate in the RA area for reproduction?	No	No. Con not be discovered by other survive !	Vandela
Are older life stages of the taxon likely to	Yes	Does not migrate for reproduction	Very high
area?			
occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA			
5 Is natural dispersal of the taxon likely to	Yes	No. can not be distributed as eggs.	High
(for plants: seeds, spores) in the RA area?			
occur as eggs (for animals) or as propagules			
Is natural dispersal of the taxon likely to	No	No. can not be distributed as eggs.	High
the likelihood of dispersal?			
hulls, pilings, buoys) such that it enhances		<u> </u>	
attaching itself to hard substrata (e.g. ship		attaching itself to hard substrata	very night
protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively	No	No. Morphologically this species does not have a means of actively	Very high
taxon in close proximity to one or more			
2 Will any of these vectors/pathways bring the	Yes	Yesm it is possible	Very high
disperse within the RA area (with suitable	X		
vectors/pathways could the taxon use to			
1 How many potential internal	>1	Aquaculture; Recriational fisheries	High
ersal mechanisms	·		
first-reproduction?			
does the taxon require to reach the age-at-		,	
7 How many time units (days, months, years)	1	males at 1-2; Females at 2-4.	Medium
within a short time span (e.g. < 1 year)?	1		
large number of propagules or offspring	103	les see. https://honoase.hhmmin/Summary/reica-huvidUllS.hUlli	ingii
5 Is the taxon known (or likely) to produce a	Yes	Yes See: https://fishbase.mnhn.fr/summary/Perca-fluviatilis.html	High
another taxon (or specific habitat features) to complete its life cycle?			
5 Is the taxon dependent on the presence of	No	No. See: https://fishbase.mnhn.fr/summary/Perca-fluviatilis.html	Very high
display asexual reproduction?	No		
Is the taxon likely to be hermaphroditic or to	No	No. Does not display asexual reproduction	Very high
native taxa?	-		, -
3 Is the taxon likely to hybridise naturally with	No	NO	Very high
Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	Yes, Climate is quite similar.	Very high
to environmental conditions?	X		
and/or to reduce age-at-maturity in response		https://fishbase.mnhn.fr/summary/Perca-fluviatilis.html	
Is the taxon likely to exhibit parental care	No	Does not exhibit parental care See:	Medium
oduction			
detriment of native taxa in the RA area?			
2 Is the taxon likely to sequester food resources (including nutrients) to the	INU	Not known	Medium
protected native taxa in the RA area?	No	Not known	Modium
1 Is the taxon likely to consume threatened or	Yes	Yes. could be possible	Very high
urce exploitation	T		I
by way of a dormant form)?			
densities (or persisting in adverse conditions			
population even when present in low	165	attaching itself to hard substrata	riigii
native taxa? 2 Is the taxon likely to maintain a viable	Yes	No. Morphologically this species does not have a means of actively	High
	No	No info	Low
1	(e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for	(e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for	(e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for

51	9.02	Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	Increase	Increase	High
52	9.03	Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change?	Increase	Increase	High
53	9.04	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	Higher	Higher	Medium
54	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Higher	Higher	Medium
55	9.06	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	No change	no change	Low

	Statistics
28.0	BRA
-	BRA Outcome
38.0	BRA+CCA
-	BRA+CCA Outcome
	Score partition
12.0	A. Biogeography/Historical
4.0	1. Domestication/Cultivation
2.0	2. Climate, distribution and introduction risk
6.0	3. Invasive elsewhere
16.0	B. Biology/Ecology
6.0	4. Undesirable (or persistence) traits
5.0	5. Resource exploitation
2.0	6. Reproduction
2.0	7. Dispersal mechanisms
1.0	8. Tolerance attributes
10.0	C. Climate change
10.0	9. Climate change
	Answered Questions
55	Total
13	A. Biogeography/Historical
<u>3</u> 5 5	1. Domestication/Cultivation
5	2. Climate, distribution and introduction risk
5	3. Invasive elsewhere
36	B. Biology/Ecology
12	4. Undesirable (or persistence) traits
2	5. Resource exploitation
7	6. Reproduction
9	7. Dispersal mechanisms
6	8. Tolerance attributes
6	C. Climate change
6	9. Climate change
	Sectors affected
7	Commercial
14	Environmental
22	Species or population nuisance traits
	Thresholds
-	BRA
-	BRA+CCA

BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.73
BRA	0.74
CCA	0.63
Date and Time	
21/05/2	022 15:27:42

Taxon and Assessor details	
Category	Fishes and Lampreys (freshwater)
Taxon name	Pseudorasbora parva
Common name	topmouth gudgeon
Assessor	Bella Japoshvili
Risk screening context	
Reason and socio-economic benefits	This species is already widespread in the whole South Caucasus and is considered one of the most
Risk assessment area	South Caucasus
Taxonomy	Actinopteri (ray-finned fishes) > Cypriniformes (Carps) > Gobionidae (Gudgeons)
Native range	Asia
Introduced range	Eurasia
URL	https://www.fishbase.de/summary/Pseudorasbora-parva.html

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
		ication/Cultivation			N
1	1.01	Has the taxon been the subject of	No	Not a species with any aquacultural, recreational or ather	Very high
		domestication (or cultivation) for at least 20		importance	
2	1.00	generations? Is the taxon harvested in the wild and likely	NIE	No such fact has such have upsouted	Marris Interne
2	1.02		No	No such fact has ever been reported	Very high
3	1.02	to be sold or used in its live form?	No		Mara biab
3	1.03	Does the taxon have invasive races,	NO	No such taxa is known	Very high
2 (limato	varieties, sub-taxa or congeners? , distribution and introduction risk			
2. U 1	2.01	How similar are the climatic conditions of the	Low	Result of climatch algorithm	Medium
-	2.01	Risk Assessment (RA) area and the taxon's	LOW		neurum
		native range?			
5	2.02	What is the quality of the climate matching	Low	Due to low resolution of RA climate data	High
-	2.02	data?	2011		
6	2.03	Is the taxon already present outside of	Yes	Kuljanishvili, T., Mumladze, L., Japoshvili, B., Mustafayev, N.,	Very high
-		captivity in the RA area?		Ibrahimov, S., Patoka, J., & Kalous, L. (2021). The first unified	· · · / · · · j · ·
				inventory of non-native fishes of the South Caucasian countries,	
				Armenia, Azerbaijan, and Georgia. Knowledge & Management of	
				Aquatic Ecosystems, (422), 32.	
7	2.04	How many potential vectors could the taxon	>1	Human mediated and natural dispersal	Very high
		use to enter in the RA area?		р. т. т.	, ,
8	2.05	Is the taxon currently found in close	Yes	Kuljanishvili, T., Mumladze, L., Japoshvili, B., Mustafayev, N.,	Very high
		proximity to, and likely to enter into, the RA		Ibrahimov, S., Patoka, J., & Kalous, L. (2021). The first unified	
		area in the near future (e.g. unintentional		inventory of non-native fishes of the South Caucasian countries,	
		and intentional introductions)?		Armenia, Azerbaijan, and Georgia. Knowledge & Management of	
				Aquatic Ecosystems, (422), 32.	
		e elsewhere	1		
9	3.01	Has the taxon become naturalised	Yes	Kuljanishvili, T., Mumladze, L., Japoshvili, B., Mustafayev, N.,	Very high
		(established viable populations) outside its		Ibrahimov, S., Patoka, J., & Kalous, L. (2021). The first unified	
		native range?		inventory of non-native fishes of the South Caucasian countries,	
				Armenia, Azerbaijan, and Georgia. Knowledge & Management of	
				Aquatic Ecosystems, (422), 32.	
10	3.02	In the taxon's introduced range, are there	Yes	e.g. Gozlan, R. E., St-Hilaire, S., Feist, S. W., Martin, P., & Kent,	High
		known adverse impacts to wild stocks or		M. L. (2005). Disease threat to European fish. Nature, 435(7045),	
	2.02	commercial taxa?	×	1046-1046.	112 1
11	3.03	In the taxon's introduced range, are there	Yes	e.g. Gozlan, R. E., St-Hilaire, S., Feist, S. W., Martin, P., & Kent,	High
		known adverse impacts to aquaculture?		M. L. (2005). Disease threat to European fish. Nature, 435(7045),	
17	2.04	In the tayon's introduced range, are there	Vec	1046-1046.	Low
12	3.04	In the taxon's introduced range, are there	Yes	Have a strong effect on ecosystems however not well evaluated	Low
13	3.05	known adverse impacts to ecosystem In the taxon's introduced range, are there	Yes	the impact on services Gozlan, R. E., Andreou, D., Asaeda, T., Beyer, K., Bouhadad, R.,	High
13	3.05		Tes	Burnard, D., & Robert Britton, J. (2010). Pan-continental	nign
		known adverse socio-economic impacts?		invasion of Pseudorasbora parva: towards a better understanding	
B. I	Biology	y/Ecology		of freshwater fish invasions. Fish and Fisheries, 11(4), 315-340.	
		able (or persistence) traits			
		Is it likely that the taxon will be poisonous or	No	Species is harmless	Very high
		pose other risks to human health?			
15	4.02	Is it likely that the taxon will smother one or	Yes	Gozlan, R. E., Andreou, D., Asaeda, T., Beyer, K., Bouhadad, R.,	Very high
		more native taxa (that are not threatened or		Burnard, D., & Robert Britton, J. (2010). Pan-continental	
		protected)?		invasion of Pseudorasbora parva: towards a better understanding	
				of freshwater fish invasions. Fish and Fisheries, 11(4), 315-340.	
16	4.03	Are there any threatened or protected taxa	Yes	Can parasite on any fish eggs	High
		that the non-native taxon would parasitise in			
		the RA area?			
17	4.04	Is the taxon adaptable in terms of climatic	Yes	Although not well documented, its widespread invasion indicates	Medium
		and other environmental conditions, thus		the ability of the species to adopt the variable environment.	
		enhancing its potential persistence if it has			
		invaded or could invade the RA area?			
18	4.05	Is the taxon likely to disrupt food-web	Yes	Britton, J. R., Davies, G. D., & Harrod, C. (2010). Trophic	High
		structure/function in aquatic ecosystems if it		interactions and consequent impacts of the invasive fish	
		has invaded or is likely to invade the RA		Pseudorasbora parva in a native aquatic foodweb: a field	
		area?		investigation in the UK. Biological Invasions, 12(6), 1533-1542.	
19	4.06	Is the taxon likely to exert adverse impacts	Yes	Gozlan, R. E., Andreou, D., Asaeda, T., Beyer, K., Bouhadad, R.,	High
		on ecosystem services in the RA area?	1	Burnard, D., & Robert Britton, J. (2010). Pan-continental	1
		on ecosystem services in the KA area?			
		on ecosystem services in the KA area?		invasion of Pseudorasbora parva: towards a better understanding of freshwater fish invasions. Fish and Fisheries, 11(4), 315-340.	

20	4.07	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA	No	No such an expectation exists	Low
	4.08	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area?	Yes	Gozlan, R. E., Andreou, D., Asaeda, T., Beyer, K., Bouhadad, R., Burnard, D., & Robert Britton, J. (2010). Pan-continental invasion of Pseudorasbora parva: towards a better understanding of freshwater fish invasions. Fish and Fisheries, 11(4), 315-340.	High
22	4.09	Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity?	No	This is small bodied species not exceeds 15 cm in length	Very high
23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)?	Yes	Occures in all kind of stagnant and flowing waterbodies	Very high
24	4.11	Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa?	Yes	Gozlan, R. E., Andreou, D., Asaeda, T., Beyer, K., Bouhadad, R., Burnard, D., & Robert Britton, J. (2010). Pan-continental invasion of Pseudorasbora parva: towards a better understanding of freshwater fish invasions. Fish and Fisheries, 11(4), 315-340.	High
25	4.12	Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)?	Yes	No documented evidence exists	Low
5. I	Resourc	e exploitation			
	5.01	Is the taxon likely to consume threatened or protected native taxa in the RA area?	Yes	Gozlan, R. E., Andreou, D., Asaeda, T., Beyer, K., Bouhadad, R., Burnard, D., & Robert Britton, J. (2010). Pan-continental invasion of Pseudorasbora parva: towards a better understanding of freshwater fish invasions. Fish and Fisheries, 11(4), 315-340.	High
27	5.02	Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?	Yes	Gozlan, R. E., Andreou, D., Asaeda, T., Beyer, K., Bouhadad, R., Burnard, D., & Robert Britton, J. (2010). Pan-continental invasion of Pseudorasbora parva: towards a better understanding	Very high
6 1	Donrodi	untion .		of freshwater fish invasions. Fish and Fisheries, 11(4), 315-340.	
	R <i>eprodu</i> 6.01	Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?	Yes	Gozlan, R. E., Andreou, D., Asaeda, T., Beyer, K., Bouhadad, R., Burnard, D., & Robert Britton, J. (2010). Pan-continental invasion of Pseudorasbora parva: towards a better understanding of freshwater fish invasions. Fish and Fisheries, 11(4), 315-340.	Very high
29	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	Kuljanishvili, T., Mumladze, L., Japoshvili, B., Mustafayev, N., Ibrahimov, S., Patoka, J., & Kalous, L. (2021). The first unified inventory of non-native fishes of the South Caucasian countries, Armenia, Azerbaijan, and Georgia. Knowledge & Management of Aquatic Ecosystems, (422), 32.	Very high
30	6.03	Is the taxon likely to hybridise naturally with native taxa?	Yes	Gozlan, R. E., Andreou, D., Asaeda, T., Beyer, K., Bouhadad, R., Burnard, D., & Robert Britton, J. (2010). Pan-continental invasion of Pseudorasbora parva: towards a better understanding of freshwater fish invasions. Fish and Fisheries, 11(4), 315-340.	Very high
	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	No	The species is reproducing sexually	High
32	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	No	No such dependancy have ever been observed	Very high
33	6.06	Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)?	Yes	Gozlan, R. E., Andreou, D., Asaeda, T., Beyer, K., Bouhadad, R., Burnard, D., & Robert Britton, J. (2010). Pan-continental invasion of Pseudorasbora parva: towards a better understanding of freshwater fish invasions. Fish and Fisheries, 11(4), 315-340.	Very high
34	6.07	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	9	Month	Very high
	-	al mechanisms			
	7.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable habitats nearby)?	>1	Gozlan, R. E., Andreou, D., Asaeda, T., Beyer, K., Bouhadad, R., Burnard, D., & Robert Britton, J. (2010). Pan-continental invasion of Pseudorasbora parva: towards a better understanding of freshwater fish invasions. Fish and Fisheries, 11(4), 315-340.	Very high
36	7.02	Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)?	Yes	Kuljanishvili, T., Mumladze, L., Japoshvili, B., Mustafayev, N., Ibrahimov, S., Patoka, J., & Kalous, L. (2021). The first unified inventory of non-native fishes of the South Caucasian countries, Armenia, Azerbaijan, and Georgia. Knowledge & Management of Aquatic Ecosystems, (422), 32.	Very high
37	7.03	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal?	No	No such an evidence exists	Very high
38	7.04	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?	No	No documented evidence exists	Low
39	7.05	Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?	Yes	Gozlan, R. E., Andreou, D., Asaeda, T., Beyer, K., Bouhadad, R., Burnard, D., & Robert Britton, J. (2010). Pan-continental invasion of Pseudorasbora parva: towards a better understanding of freshwater fish invasions. Fish and Fisheries, 11(4), 315-340.	Very high
40	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	Yes	Gozlan, R. E., Andreou, D., Asaeda, T., Beyer, K., Bouhadad, R., Burnard, D., & Robert Britton, J. (2010). Pan-continental invasion of Pseudorasbora parva: towards a better understanding of freshwater fish invasions. Fish and Fisheries, 11(4), 315-340.	Very high
41	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No	No such an evidence exists	Medium

12	7.08	Is dispersal of the taxon along any of the	Yes	Gozlan, R. E., Andreou, D., Asaeda, T., Beyer, K., Bouhadad, R.,	Very high
42	7.08	vectors/pathways mentioned in the previous	res	Burnard, D., & Robert Britton, J. (2010). Pan-continental	very nign
		seven questions (35–41; i.e. both		invasion of Pseudorasbora parva: towards a better understanding	
42	7.09	unintentional or intentional) likely to be Is dispersal of the taxon density dependent?	No	of freshwater fish invasions. Fish and Fisheries, 11(4), 315-340. No such an evidence exists	Medium
		ce attributes			Medium
		Is the taxon able to withstand being out of	No	Own unpublished data	High
	0.01	water for extended periods (e.g. minimum of	140		riigii
		one or more hours) at some stage of its life			
		cycle?			
45	8.02	Is the taxon tolerant of a wide range of	Yes	Oxygen, turbidity, wastewaters, temperature etc.	Very high
		water quality conditions relevant to that			· · · , · · · j · ·
		taxon? [In the Justification field, indicate the			
		relevant water quality variable(s) being			
46	8.03	Can the taxon be controlled or eradicated in	Yes	Britton, J. R., Davies, G. D., & Brazier, M. (2010). Towards the	High
		the wild with chemical, biological, or other		successful control of the invasive Pseudorasbora parva in the UK.	5
		agents/means?		Biological Invasions, 12(1), 125-131.	
47	8.04	Is the taxon likely to tolerate or benefit from	Yes	No documented evidence exists, based on professional judgement	Medium
		environmental/human disturbance?			
48	8.05	Is the taxon able to tolerate salinity levels	No	Own unpublished data. It usually can not tollerate marine or even	Medium
		that are higher or lower than those found in		brackish waters.	
		its usual environment?			
49	8.06	Are there effective natural enemies	No	Based on professional judgement	High
		(predators) of the taxon present in the RA			
		e change			
	Climate	e change			
			1		1
50		Under the predicted future climatic	No change	Its already in all drainages of RA ara	Very high
50		Under the predicted future climatic conditions, are the risks of entry into the RA	No change	Its already in all drainages of RA ara	Very high
50		Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase,	No change	Its already in all drainages of RA ara	Very high
	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?			
		Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic	No change No change	Its already in all drainages of RA ara Established populations everywhere in RA area	Very high Very high
	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment			
	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase,			
51	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	No change	Established populations everywhere in RA area	Very high
51	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic			
51	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within	No change	Established populations everywhere in RA area	Very high
51	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to	No change	Established populations everywhere in RA area	Very high
51	9.01 9.02 9.03	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change?	No change	Established populations everywhere in RA area Based on professional judgement	Very high
51	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic	No change	Established populations everywhere in RA area Based on professional judgement Due to adding effect of different threats, based on professional	Very high
51	9.01 9.02 9.03	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of	No change	Established populations everywhere in RA area Based on professional judgement	Very high
51	9.01 9.02 9.03	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity	No change	Established populations everywhere in RA area Based on professional judgement Due to adding effect of different threats, based on professional	Very high
51	9.01 9.02 9.03 9.04	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	No change No change Higher	Established populations everywhere in RA area Based on professional judgement Due to adding effect of different threats, based on professional judgement	Very high Very high Medium
51	9.01 9.02 9.03	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic	No change	Established populations everywhere in RA area Based on professional judgement Due to adding effect of different threats, based on professional	Very high Very high
51 52 53	9.01 9.02 9.03 9.04	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of	No change No change Higher	Established populations everywhere in RA area Based on professional judgement Due to adding effect of different threats, based on professional judgement	Very high Very high Medium
51 52 53	9.01 9.02 9.03 9.04	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem	No change No change Higher	Established populations everywhere in RA area Based on professional judgement Due to adding effect of different threats, based on professional judgement	Very high Very high Medium
51 52 53	9.01 9.02 9.03 9.04 9.05	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	No change No change Higher	Established populations everywhere in RA area Based on professional judgement Due to adding effect of different threats, based on professional judgement Based on professional judgement	Very high Very high Medium
51 52 53	9.01 9.02 9.03 9.04	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? Under the predicted future climatic	No change No change Higher	Established populations everywhere in RA area Based on professional judgement Due to adding effect of different threats, based on professional judgement	Very high Very high Medium
51 52 53	9.01 9.02 9.03 9.04 9.05	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	No change No change Higher	Established populations everywhere in RA area Based on professional judgement Due to adding effect of different threats, based on professional judgement Based on professional judgement	Very high Very high Medium
51 52 53	9.01 9.02 9.03 9.04 9.05	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? Under the predicted future climatic	No change No change Higher	Established populations everywhere in RA area Based on professional judgement Due to adding effect of different threats, based on professional judgement Based on professional judgement	Very high Very high Medium

Statistics	
Scores	
BRA	41.0
BRA Outcome	-
BRA+CCA	47.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	18.0
1. Domestication/Cultivation	-2.0
2. Climate, distribution and introduction risk	2.0
3. Invasive elsewhere	18.0
B. Biology/Ecology	23.0
4. Undesirable (or persistence) traits	9.0
5. Resource exploitation	7.0
6. Reproduction	3.0
7. Dispersal mechanisms	2.0
8. Tolerance attributes	2.0
C. Climate change	6.0
9. Climate change	6.0
Answered Questions	
Total	55
A. Biogeography/Historical	
	13
1. Domestication/Cultivation	
1. Domestication/Cultivation 2. Climate, distribution and introduction risk	
1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere	3 5 5
1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology	3 5 5 36
1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits	3 5 5 36
1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation	3 5 5 36
1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology / Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction	3 5 5 36 12 2 7
1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology / Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms	3 5 36 12 2 7 9
1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes	3 5 5 12 2 7 7 9 6
1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change	3 5 5 36 12 2 7 7 9 6 6
1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes	3 5 5 36 12 2 7 7 9 6

Commercial	17
Environmental	17
Species or population nuisance traits	18
Thresholds	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.80
BRA	0.81
CCA	0.75
Date and Time	
16/05/20	022 21:38:48

Taxon and Assessor details					
Category	Fishes and Lampreys (freshwater)				
Taxon name	Pseudorasbora parva				
Common name	topmouth gudgeon				
Assessor	Giorgi Epitashvili				
Risk screening context					
Reason and socio-economic benefits	Native range of Pseudorasbora parva is Asia: Amur to Zhujiang [Pearl River] drainages in Siberia,				
Risk assessment area	South Caucasus				
Taxonomy	Pseudorasbora parva (Temminck & Schlegel 1846)				
Native range	Asia: Amur to Zhujiang [Pearl River] drainages in Siberia, Korea and China				
Introduced range	Introduced to various areas in Europe and Asia				
URL	https://www.fishbase.se/summary/4691				

			Response	Justification (references and/or other information)	Confidence
		ography/Historical			
1. L		tication/Cultivation	1		1
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	No	This fish is a weed, harms other species and is not used in aquaculture	High
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	This fish is caught randomly while fishing for other species. It has low quality meat and is less used for food.	High
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	P. parva is considered as one of the most invasive species in Europe (FAO 1988, Britton et al. 2009).	Very high
2 (limate	, distribution and introduction risk			
4	2.01		High	In some areas of the Caucasus region, like the native range of this	Hiah
		Risk Assessment (RA) area and the taxon's native range?		species, the climatic conditions are more or less similar (Climate Change in the South Caucasus (2012); Tishchenko et al. 2019).	
5	2.02	What is the quality of the climate matching data?	Medium	Köppen-Geiger climate classification map	Medium
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	This fish is widely distributed in the SC region (own data, Ninua et al. 2013; Epitashvili et al. 2020; Kuljanishvili et al. 2020).	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	>1	This species is translocated within the region by anglers or other persons unintentional but probably animals also can transport the eggs of P. parva (Karabanov et al. 2013).	High
8	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)?	Yes	This species is widely spread around the Caucasus region	Very high
3. I	nvasiv	e elsewhere			
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	This species has viable populations around the Caucasus region (Ninua et al. 2013; Karabanov et al. 2013; Pipoyan and Arakelyan 2015; Kuljanishvili et al. 2020).	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	P. parva is considered to be a major threat to native fish communities and listed as an invasive alien species of European Union concern (Spikmans et al. 2020).	Very high
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	Yes	P. parva is known as the spreader of the parasite - Sphaerothecum destruens which became known for causing mortality in salmonid fishes in aquaculture (Spikmans et al. 2020).	Medium
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem services?	Yes	The study in Czech Republic described harmful competitive effect of huge populations of P. parva and its surprising economic consequences (Musil et al. 2015).	Very high
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	Yes	The study in Czech Republic described harmful competitive effect of huge populations of P. parva and its surprising economic consequences (Musil et al. 2015).	Very high
B. I	Biology	y/Ecology			
		able (or persistence) traits			
14	4.01	Is it likely that the taxon will be poisonous or pose other risks to human health?	No	Such a fact is not known	Very high
15	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	This species is invasive in the Caucasus region and reduces the spread and reproduction of local fish (Kuljanishvili et al. 2020).	Very high
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	Yes	P. parva as an invasive species eats eggs of local fish and prevents their reproduction.	Very high
17	4.04	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?	Yes	This species has long been established in the SC region and accordingly, the local environmental conditions were acceptable to it.	Very high
18	4.05	Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA	Yes	No research has been conducted in this regard although a similar fact is likely to have occurred in many reservoirs of the SC region where local fish populations have been depleted by P. parva	Medium
	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes	No research has been conducted in this regard however, a similar fact probably occurred in many reservoirs where local species were declining which in turn affects angling or other ecosystem services in the SC region.	Medium
20	4.07	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA	No	No research has been conducted in this regard.	Medium
21	4.08	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area?	No	No research has been conducted in this regard.	Low

22	4.09	Is it likely that the taxon will achieve a body size that will make it more likely to be	No	Max length of this species is 12.5 cm TL (Verreycken et al. 2011)	Very high
23	4.10	released from captivity? Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)?	Yes	P. parva found in a wide variety of habitats, most abundantly in well vegetated small channels, ponds and small lakes (Kottelat and Freyhof, 2007).	High
24	4.11	Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for	Yes	No research has been conducted in this regard although it is expected that P. parva has a negative impact on habitat quality (Own judgement).	Very high
25	4.12	native taxa? Is the taxon likely to maintain a viable population even when present in low	Yes	No research has been conducted in this regard.	Very high
		densities (or persisting in adverse conditions by way of a dormant form)?			
5. F	esourc	e exploitation			
	5.01	Is the taxon likely to consume threatened or protected native taxa in the RA area?	Yes	No research has been conducted in this regard however, the probability of this is very high.	Very high
27	5.02	Is the taxon likely to sequester food	Yes	This fish is a competitor to local species.	High
		resources (including nutrients) to the detriment of native taxa in the RA area?			
	C 01		Net englissible	81	Madium
28	6.01	Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?	Not applicable	NO GATA	Medium
29	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	This species is naturally reproduces in the SC region (Kuljanishvili et al. 2020).	High
30	6.03		No	Such a fact is not known.	High
31	6.04		No	Such a fact is not known.	Medium
32	6.05	aispiay asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	No	Such a fact is not known.	Medium
3	6.06	Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)?	Yes	Females spawn 3-4 times in a season (Kottelat and Freyhof, 2007; Ninua et al. 2013).	Very high
4	6.07	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	2	The species sexually maturate at the age of 2 (Ninua et al. 2013).	Very high
7. E	Dispersa	al mechanisms			
	7.01	How many potential internal vectors/pathways could the taxon use to	>1	This species may disperse within the SC region by itself, other animals or by humans unintentionally.	Very high
36	7.02	disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more	Yes	This species is distributed in the protected areas of the SC region (own data).	High
37	7.03	protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal?	No	No such fact is known.	Medium
38	7.04	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?	Yes	No such fact is known however, P. parva can be spread by animals (e.g. birds).	Medium
39	7.05	Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?	Yes	This species is naturally reproduces in the region and accordingly, both juvenile and adult individuals are found here.	Medium
0	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	Yes	This species is actively spawns in the South Caucasus region	High
1	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	Yes	No such fact is described however, P. parva can be spread by animals (e.g. birds) within the SC region.	Medium
42	7.08	Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both	Yes	There is a possibility of that.	High
43	7.09	unintentional or intentional) likely to be Is dispersal of the taxon density dependent?	Yes	Populations of this species are growing rapidly in many countries which in turn leads to the expansion of its range.	High
<u>8.</u> 7	olerand	ce attributes			
		Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life	No	No such fact has been revealed	High
45	8.02	cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the	Yes	P. parva demonstrates great adaptability and tolerance of poor habitat quality (Gozlan et al. 2002; Beyer et al. 2007).	High
16	8.03	relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other	No	This species is one of the most widespread invasive fish in the Europe, Caucasus and etc. There is no method by which this	High
		agents/means?		species could be removed from the environment. This species has become widespread due to human activities.	High
17	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	Yes	This species has become widespread due to human activities.	

49	8.06	Are there effective natural enemies (predators) of the taxon present in the RA area?	Yes	There are several species in the Caucasus region which can eat P. parva: Silurus glanis, Esox lucius, Squalius spp, Sander lucioperca, etc. see checklist of the South Caucasian freshwater fish (Kuljanishvili et al. 2020).	Very high
С.	Climate	e change			
9. (Climate	change			
50	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?	Increase	The area of this species is constantly growing in the Caucasus region.	Very high
51	9.02	Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	Increase	The area of this species is constantly growing in the Caucasus	High
52	9.03	Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change?	Increase	The area of this species is constantly growing in the Caucasus	High
53	9.04	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	Higher	Potential impacts on the local biodiversity caused by P. parva will be increased in the future.	High
54	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Higher	Potential impacts on the local biodiversity caused by P. parva will be increased in the future.	High
55	9.06	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	No change	Future potential impacts on the ecosystem services/socio economic development caused by P. parva is unclear for the Caucasus region.	Medium

Statistics	
Scores	
BRA	47.0
BRA Outcome	-
BRA+CCA	57.0
BRA+CCA Outcome	-
Score partition	22.0
A. Biogeography/Historical	22.0
1. Domestication/Cultivation 2. Climate, distribution and introduction risk	2.0
3. Invasive elsewhere	2.0
B. Biology/Ecology	18.0 25.0
4. Undesirable (or persistence) traits	25.0 8.0
4. Ondesirable (of persistence) traits 5. Resource exploitation	7.0
5. Resource exploration 6. Reproduction	1.0
7. Dispersal mechanisms	7.0
8. Tolerance attributes	2.0
C. Climate change	10.0
9. Climate change	10.0
Answered Questions	10.0
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	
2. Climate, distribution and introduction risk	3 5 5 36 12 2 7 7 9 6
3. Invasive elsewhere	5
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2
6. Reproduction	7
7. Dispersal mechanisms	9
8. Tolerance attributes	6
C. Climate change	6
9. Climate change	6
Sectors affected	
Commercial	17
Environmental	17
Species or population nuisance traits	28
Thresholds	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.77
BRA	0.78

	BRA+CCA	0.77
	BRA	0.78
	CCA	0.75
-		
Date and Time		
	13/05/2022	2 17:16:59

Taxon and Assessor details			
Category	Fishes and Lampreys (freshwater)		
Taxon name	Pseudorasbora parva		
Common name	topmouth gudgeon		
Assessor	Tatia Kuljanishvili		
Risk screening context			
Reason and socio-economic benefits	Stone moroko, Pseudorasbora parva (Temminck & Schlegel, 1846), has been distributed outside		
Risk assessment area	South Caucasus		
Taxonomy	Actinopterygii (ray-finned fishes) Cypriniformes (Carps) Cyprinidae (Minnows or carps) Gobioninae		
Native range	Asia: Amur to Zhujiang [Pearl River] drainages in Siberia, Korea and China		
Introduced range	Introduced to various areas in Europe and Asia.		
URL	https://www.fishbase.de/summary/Pseudorasbora-parva.html		

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
1. L		ication/Cultivation			
1	1.01	Has the taxon been the subject of	No	No trade value	High
		domestication (or cultivation) for at least 20			
		generations?			
2	1.02	Is the taxon harvested in the wild and likely	No	It is not harvested or sold deliberately, however it is often the	Low
_		to be sold or used in its live form?		contaminant of aquaculture parcels, can be transported in live	
3	1.03	Does the taxon have invasive races,	No	Other species of genus Pseudorasbora are harmless	Very high
		varieties, sub-taxa or congeners?			
2. (, distribution and introduction risk	NA 11		Luc 1
4	2.01	How similar are the climatic conditions of the	Medium	According to the Koppen-Geiger climate classification system	High
		Risk Assessment (RA) area and the taxon's		Source (Amur basin, Korea, central and southern Japan, northern	
		native range?		and central China and Taiwan) and Target area (Southern Caucasus) climates are not quite similar.	
5	2.02	What is the quality of the climate matching	High	I run climatch and the all the lowland areas are matching (8 out	High
5	2.02	data?	nign	of 10) and only one mountanous area is 7,	riigii
6	2.03	Is the taxon already present outside of	Yes	P. parva is widely distributed in the RA area (Elanidze 1983;	Very high
0	2.05	captivity in the RA area?	165	Pipoyan 2012; Ninua et al. 2013; Pipoyan & amp; Kh.Arakelyan	very nigh
				2015; Karabanov et al. 2013; Pipoyan 2012; Ninua et al. 2013;	
7	2.04	How many potential vectors could the taxon	>1	aquaculture, recreational fishing, ornamental fish trade and	Very high
Ĺ	2.54	use to enter in the RA area?	- -	natural dispersal.	. cr, mgn
8	2.05	Is the taxon currently found in close	Yes	P. parva is already established throughout the RA area	Very high
Ĭ	2.00	proximity to, and likely to enter into, the RA		(Kuljanishvili et al, 2020)	. cr, mgn
		area in the near future (e.g. unintentional			
		and intentional introductions)?			
3. I	nvasiv	e elsewhere	1		
9	3.01	Has the taxon become naturalised	Yes	Introduction of P. parva (sexual maturity occurs when they are	Very high
		(established viable populations) outside its		1yo) in the territory of Georgia and Armenia was introduced in	, 5
		native range?		1960s (Elanidze 1983; Pipoyan 2012; Ninua et al. 2013; Pipoyan	
		5		& Kh.Arakelyan 2015), almost 6 decades this species exist,	
				they naturalize and established their populations.	
10	3.02	In the taxon's introduced range, are there	Yes	When established, P. parva creates dense populations, that	Very high
		known adverse impacts to wild stocks or		increases the competition with native species for resources	
		commercial taxa?		(Britton et al, 2007). It can be a host of a novel fish pathogen to	
				Europe Sphaerothecum destruens (Gozlan et al. 2005).	
11	3.03	In the taxon's introduced range, are there	No	It can affect the pond aquaculture trough the competition for the	Medium
		known adverse impacts to aquaculture?		resources and pathogen transfer.	
12	3.04	In the taxon's introduced range, are there	Yes	1) can affect pond aquaculture food production; 2)can transmit	Medium
10	2.05	known adverse impacts to ecosystem		diseases; 3) does not have recrieational value	
13	3.05	In the taxon's introduced range, are there	No	No information avalable	High
		known adverse socio-economic impacts?			
		able (or persistence) traits			
		Is it likely that the taxon will be poisonous or	No	Not poisonous	High
		pose other risks to human health?			
15	4.02	Is it likely that the taxon will smother one or	Yes	In an introduced area P. parva quickly becomes dominant species	Very high
		more native taxa (that are not threatened or		and competes with native species for resources (Britton 2010). It	, ,
		protected)?		is also known to be feeding on other native species eggs or larvae	
				(Pinder et al 2005)	
16	4.03	Are there any threatened or protected taxa	No	Does not parasite	High
l l		that the non-native taxon would parasitise in			-
		the RA area?			
17	4.04	Is the taxon adaptable in terms of climatic	Yes	P. parva has been found in a transboundary lake (Lake Kartsakhi)	Very high
		and other environmental conditions, thus		between Georgia and Turkey, which is around 2000 m a.s.l.	
		enhancing its potential persistence if it has		(Kuljanishvili et al, 2020)	
		invaded or could invade the RA area?			
18	4.05	Is the taxon likely to disrupt food-web	Yes	in a pond where P. parva was invaded they conducted Stable	Medium
		structure/function in aquatic ecosystems if it		isotope analysis and found out = apparent trophic position shift	
		has invaded or is likely to invade the RA		for several fishes (See: Britton et al 2010)	
19	4.06	Is the taxon likely to exert adverse impacts	Yes	impacts recreational fisheries can affect pond aquaculture	Medium
		on ecosystem services in the RA area?			
20	4.07	Is it likely that the taxon will host, and/or	Yes	No information about endemic pests and infectious agents in the	Low
		act as a vector for, recognised pests and		region.	
		infectious agents that are endemic in the RA			
21	4.08	Is it likely that the taxon will host, and/or	Yes	P. parva is healthy host of a novel fish pathogen to Europe	High
i i		act as a vector for, recognised pests and		Sphaerothecum destruens (Gozlan et al. 2005).	
			1		1
		infectious agents that are absent from (novel to) the RA area?			

22	4.09	Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity?	No	This is a small sized fish max length 12.5 cm.	High
23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g.	Yes	This species is fast-running water dwelling.	Medium
24	4.11	versatile in habitat use)? Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa?	Yes	Can be the reason of decreasing some native fish populations	Medium
25	4.12	Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)?	Yes	phenotype plasticity, fast growth, early maturity, fecundity, reproductive behaviour and resistance to pathogens makes this species able to have sustainable populations even at low densities.	High
5. F	Resourc	e exploitation			
26	5.01	Is the taxon likely to consume threatened or protected native taxa in the RA area?	Yes	During the IUCN Red List assessment of Southern Caucasian native species, a few native species have been identified to be alerted by P. parva. It may consume their eggs or larvae.	Medium
	5.02	Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?	Yes	They conducted the Stable Isotopic Analysis on the species in a pond where P. was introduced and they found out significantly depressed somatic growth in R. rutilus, in comparison to the P. parva free pond (Britton et al 2010).	High
	Reprodu				
28	6.01	Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?	Yes	P. parva exhibits parental care (Gozlan et al 2010)	Very high
	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	Yes. Established in RA since 1960s.	Very high
30	6.03	Is the taxon likely to hybridise naturally with native taxa?	Yes	In introduced range can hybridize with sun bleak Leucaspius delineatus, which is throughout most part of Europe. In Native range natural cross-hybridization happened due to shared resources between species P. parva and P. pumila (an endangered species for of Japan), and caused extirpation of P. pumila in some places (Gozlan et al. 2005).	Very high
31	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	No	No. Does not display asexual reproduction	Very high
32	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	No	No. See: https://www.fishbase.de/summary/Pseudorasbora- parva.html	Very high
33	6.06	Is the taxon known (or likely) to produce a large number of propagules or offspring	Yes	In introduced areas it can spawn eve earlier than in native range. They are quite plastic about duration and timing of their	High
34	6.07	within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at-	1	reproduction, which makes them such successful invaders (Gozlan 1 YO	Very high
		first-reproduction?			
	7.01	al mechanisms How many potential internal	>1	Contaminant of the Aquaculture goods; Intentional translocations	High
55	7.01	vectors/pathways could the taxon use to disperse within the RA area (with suitable	~1	by locals as a bait or curiosity	lingii
36	7.02	Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)?	Yes	This species is already spread in areas that are protected	Very high
37	7.03	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal?	No	Although it does not have adaptation of morphological structure that facilitates its attachment to some surfaces, P. parva can spawn on different substrate: rocks, the surfaces of shells, plants and some artificial materials (plastic pipes), thus dispersal via eqgs attached to the boats is likely (Pinder and Gozlan 2003)	High
38	7.04	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?	Yes	"Eggs laid on floating macrophytes or even the flat surfaces of boats could enable dispersal through connected waterbodies (Pinder and Gozlan 2003)"	High
39	7.05	Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?	Yes	Yes. it is possible.	High
	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	No	This species do not migrate for spawning	Very high
	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	Yes	possible with some mollusc species	Low
42	7.08	Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be	Yes	In introduced areas it disperses rapidly (one calendar year).	Very high
	7.09	Is dispersal of the taxon density dependent?	No	No data	Medium
		ce attributes			
44	8.01	Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life	No	No data	High
45	8.02	cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in	Yes	are plastic to withstand different environmental conditions	High
	8.03		Yes	In some lakes of UK they applied rotenon, de-watering and	High

47	8.04	Is the taxon likely to tolerate or benefit from	Yes	Yes. Does not mind environmental or human disturbance	High
		environmental/human disturbance?			5
48	8.05	Is the taxon able to tolerate salinity levels	No	P. parva can not tolerance brackish waters. Estuaries are more of	High
		that are higher or lower than those found in		barriers for it's dispersal (Scott et al 2007)	-
		its usual environment?			
49	8.06	Are there effective natural enemies	No	No effective natural enemies present in RA area	Medium
		(predators) of the taxon present in the RA			
С. С	Climate	e change			
		change			
50	9.01	Under the predicted future climatic	Increase	It was hypotheses that climate change might alert the	High
		conditions, are the risks of entry into the RA		mechanisms of transportation and introduction of non-native	
		area posed by the taxon likely to increase,		species. Commercial and recreational activities will increase, that	
		decrease or not change?		itself increases the propagule pressure levels of non-native	
51	9.02	Under the predicted future climatic	Increase	In terms of increased temperatures, the climate of the RA will	High
		conditions, are the risks of establishment		become more similar to its native area, and P. parva will definitely	
		posed by the taxon likely to increase,		benefit by this change	
		decrease or not change?			
52	9.03	Under the predicted future climatic	Increase	They already are distributed everywhere. Increased temperatures	Medium
		conditions, are the risks of dispersal within		might allow them to spread to upper altitudes.	
		the RA area posed by the taxon likely to			
		increase, decrease or not change?			
53	9.04	Under the predicted future climatic	Higher	This species will reach higher densities and it will affect native fish	Medium
		conditions, what is the likely magnitude of		species in terms of competition, distribution of pathogens.	
		future potential impacts on biodiversity			
		and/or ecological integrity/status?			
54	9.05	Under the predicted future climatic	Higher	It can affect native organisms and cause their decrease.	Medium
		conditions, what is the likely magnitude of			
		future potential impacts on ecosystem			
		structure and/or function?			
55	9.06	Under the predicted future climatic	Higher	It can affect recreational fisheries (since this specie is considered	High
		conditions, what is the likely magnitude of		as weed within locals); and it can affect pond aquaculture	
		future potential impacts on ecosystem		production.	
		services/socio-economic factors?			

Statistics	
Scores	
BRA	32.0
BRA Outcome	-
BRA+CCA	44.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	5.0
1. Domestication/Cultivation	-2.0
2. Climate, distribution and introduction risk	2.0
3. Invasive elsewhere	5.0
B. Biology/Ecology	27.0
4. Undesirable (or persistence) traits	9.0
5. Resource exploitation	7.0
6. Reproduction	5.0
7. Dispersal mechanisms	4.0
8. Tolerance attributes	2.0
C. Climate change	12.0
9. Climate change	12.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	5
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2
	/
6. Reproduction	
6. Reproduction 7. Dispersal mechanisms	9
<i>6. Reproduction</i> <i>7. Dispersal mechanisms</i> <i>8. Tolerance attributes</i>	12 2 7 9 6
6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change	6
6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change	9 6 6
6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected	6
6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial	6 6 7
6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected	6

Thresholds	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.75
BRA	0.76
CCA	0.63

Date and Time	
	21/05/2022 15:09:13

Taxon and Assessor details				
Category	Fishes and Lampreys (freshwater)			
Taxon name	Rhinogobius lindbergi			
Common name	Lin's goby			
Assessor	Bella Japoshvili			
Risk screening context				
Reason and socio-economic benefits	Newly introduced species in the RA area			
Risk assessment area	South Caucasus			
Taxonomy	Actinopteri (ray-finned fishes) > Gobiiformes (Gobies) > Gobiidae (Gobies)			
Native range	Amur River			
Introduced range	Asia			
URL	https://www.fishbase.de/summary/Rhinogobius-lindbergi.html			

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
		ication/Cultivation	1		1
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20	No	Species does not have any economic or ornamental value	Very high
2	1.02	generations? Is the taxon harvested in the wild and likely	No	No documented evidence though the species does not have any	High
3	1.03	to be sold or used in its live form? Does the taxon have invasive races,	Yes	economic or ornamental values thus no reason behind Congeners	High
2. (Climate	varieties, sub-taxa or congeners? , distribution and introduction risk			
4		How similar are the climatic conditions of the	Low	Result of climatch algorithm	Medium
		Risk Assessment (RA) area and the taxon's native range?			
5	2.02	What is the quality of the climate matching data?	Low	Due to low accuracy of clocal limate data	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	Japoshvili B, Lipinskaya T, Gajduchenko H, Sinchuk A, Bikashvili A, Mumladze L. 2020. First DNA-based records of new alien freshwater species in the Republic of Georgia. Acta Zool Bulgar 72: 545–551; Epitashvili G, Geiger MF, Astrin JJ, Herder F, Japoshvili B, Mumladze L. 2020. Towards retrieving the Promethean treasure: a first molecular assessment of the freshwater fish diversity of Georgia. Biodivers Data J 8: e57862.	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	>1	Human mediated translocation; natural dispersal	Medium
8	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)?	Yes	Sadeghi R, Esmaeili HR, Zarei F, Esmaeili A, Abbasi K. 2019. The taxonomic status of an introduced freshwater goby of the genus Rhinogobius to Iran (Teleostei: Gobiidae). Zool Middle East 65: 51–58.	Very high
3. I	nvasive	e elsewhere			
9	3.01	Has the taxon become naturalised	Yes	Sadeghi R, Esmaeili HR, Zarei F, Esmaeili A, Abbasi K. 2019. The	Very high
		(established viable populations) outside its native range?		taxonomic status of an introduced freshwater goby of the genus Rhinogobius to Iran (Teleostei: Gobiidae). Zool Middle East 65: 51–58; Japoshvili B, Lipinskaya T, Gajduchenko H, Sinchuk A, Bikashvili A, Mumladze L. 2020. First DNA-based records of new alien freshwater species in the Republic of Georgia. Acta Zool Bulaar 72: 545–551	
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	No	No documented evidence	Low
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	No documented evidence	Low
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	No	No documented evidence	Low
13	3.05	In the taxon's introduced range, are there	No	No documented evidence	Low
B	Biology	known adverse socio-economic impacts? //Ecology	1		I
		able (or persistence) traits			
		Is it likely that the taxon will be poisonous or pose other risks to human health?	No	Not a harmful species	Very high
15	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	No documented evidence exists	Low
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	Species is not parasite nor pronounced predator	Very high
17	4.04	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?	No	No documented evidence exists	Low
18	4.05	Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA	Yes	No documented evidence exists	Low
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes	No documented evidence exists	Low
20	4.07	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA	No	No such an endmeic pests/infectious deseazes are known from the RA area	Low

ר ז					
21	4.08	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area?	Yes	Expected but no documented evidence exists	Low
22	4.09	Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity?	No	Small bodied fish generally not exceeds 10 cm in length	Low
23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)?	Yes	Although no documented evidence exists	Low
24	4.11		No	No documented evidence exists	Low
25	4.12	native taxa? Is the taxon likely to maintain a viable	Yes	Based on professional judgment but no documented evidence	Low
		population even when present in low densities (or persisting in adverse conditions		exists	
		by way of a dormant form)?			
		Is the taxon likely to consume threatened or	Yes	Some inverterbates although not documented evidences exists	Low
27	5.02	protected native taxa in the RA area? Is the taxon likely to sequester food	Yes	Similar species of the same family	Medium
		resources (including nutrients) to the detriment of native taxa in the RA area?			
6. R	Reprodu				-
		Is the taxon likely to exhibit parental care	Yes	Guarding eggs and nest	High
		and/or to reduce age-at-maturity in response to environmental conditions?			-
29	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	Already recorded in a number of areas in the RA area Kuljanishvili et al., 2021 and own unpublished data	Very high
30	6.03	Is the taxon likely to hybridise naturally with	No	No documented evidence exists	Medium
31	6.04	native taxa? Is the taxon likely to be hermaphroditic or to	No	No such an evidence exists	High
32	6.05	display asexual reproduction? Is the taxon dependent on the presence of	No	No such an evidence exists	High
		another taxon (or specific habitat features) to complete its life cycle?			5
33	6.06	Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)?	No	No such an evidence exists	Low
34	6.07	How many time units (days, months, years) does the taxon require to reach the age-at-	1	Years	High
		first-reproduction?			
7 1					
		al mechanisms	L 1		Madium
		al mechanisms How many potential internal vectors/pathways could the taxon use to	>1	Human mediated unintentional translocation, natural dispersal	Medium
35		al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more	>1 Yes	Human mediated unintentional translocation, natural dispersal Colchis national park along the Black Sea	Medium Medium
35 36	7.01	al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances			
35 36 37	7.01	al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules	Yes	Colchis national park along the Black Sea	Medium
35 36 37 38	7.01 7.02 7.03	al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to	Yes	Colchis national park along the Black Sea No such an evidence exists	Medium High
35 36 37 38 39	7.01 7.02 7.03 7.04	al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA	Yes No No	Colchis national park along the Black Sea No such an evidence exists No such an evidence exists Naturally occuring in part of the RA area most probably already	Medium High High
35 36 37 38 39 40	7.01 7.02 7.03 7.04 7.05	Al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to	Yes No Yes No	Colchis national park along the Black Sea No such an evidence exists No such an evidence exists Naturally occuring in part of the RA area most probably already dispersng through water currenets	Medium High High Medium
 35 36 37 38 39 40 41 	7.01 7.02 7.03 7.04 7.05 7.06	al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both	Yes No Yes No	Colchis national park along the Black Sea No such an evidence exists No such an evidence exists Naturally occuring in part of the RA area most probably already dispersng through water currenets No documented evidence eixsts	Medium High High Medium Low
35 36 37 38 39 40 41 42	7.01 7.02 7.03 7.04 7.05 7.06 7.07	Al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be	Yes No Yes No No	Colchis national park along the Black Sea No such an evidence exists No such an evidence exists Naturally occuring in part of the RA area most probably already dispersng through water currenets No documented evidence eixsts No such an evidence exists Due to interconnectivity the species can be spread actively within the Ra area	Medium High High Medium Low
35 36 37 38 39 40 41 42 42	7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08	Al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be	Yes No Yes No Yes	Colchis national park along the Black Sea No such an evidence exists No such an evidence exists Naturally occuring in part of the RA area most probably already dispersng through water currenets No documented evidence eixsts No such an evidence exists Due to interconnectivity the species can be spread actively within	Medium High High Medium Low Low
35 36 37 38 39 40 41 42 42 43 8.7	7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09	Al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? ce attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life	Yes No Yes No Yes	Colchis national park along the Black Sea No such an evidence exists No such an evidence exists Naturally occuring in part of the RA area most probably already dispersng through water currenets No documented evidence eixsts No such an evidence exists Due to interconnectivity the species can be spread actively within the Ra area	Medium High High Medium Low Low
35 36 37 38 39 40 41 42 42 43 8. 7 44	7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09	Al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? ce attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that	Yes No Yes No Yes No	Colchis national park along the Black Sea No such an evidence exists No such an evidence exists Naturally occuring in part of the RA area most probably already dispersng through water currenets No documented evidence eixsts No such an evidence exists Due to interconnectivity the species can be spread actively within the Ra area No such an evidence exists	Medium High High Medium Low Low
35 36 37 38 39 40 41 42 42 42 44 45	7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 0leran 8.01	Al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? Ce attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of	Yes No Yes No Yes No No	Colchis national park along the Black Sea No such an evidence exists No such an evidence exists Naturally occuring in part of the RA area most probably already dispersng through water currenets No documented evidence eixsts No such an evidence exists Due to interconnectivity the species can be spread actively within the Ra area No such an evidence exists No such an evidence exists No such an evidence exists No such an evidence exists	Medium High High Medium Low Low Low Low

1
Low
Low
Low
Low
Low
Low
Low
Low

Statistics	
Scores	
BRA	16.0
BRA Outcome	-
BRA+CCA	26.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	4.0
1. Domestication/Cultivation	0.0
2. Climate, distribution and introduction risk	2.0
3. Invasive elsewhere	2.0
B. Biology/Ecology	12.0
4. Undesirable (or persistence) traits	5.0
5. Resource exploitation	7.0
6. Reproduction	2.0
7. Dispersal mechanisms	0.0
8. Tolerance attributes	-2.0
C. Climate change	10.0
9. Climate change	10.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	5
3. Invasive elsewhere B. Biology/Ecology	36
<i>3. Invasive elsewhere</i> B. Biology/Ecology <i>4. Undesirable (or persistence) traits</i>	36 12
3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation	36 12
3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction	36 12 2 7
3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms	36 12 2 7
3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes	36 12 2 7 9 6
3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change	36 12 2 7 9 6 6
3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change	36 12 2 7 9 6
3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected	36 12 2 7 9 6 6 6 6
3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial	36 12 2 7 9 6 6 6 6 5
3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change 9. Climate change Commercial Environmental	36 12 2 7 9 6 6 6 6
3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial	36 12 2 7 9 6 6 6 6 5
3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change 9. Climate change 1. Commercial 1. Commercial 1. Environmental	36 12 2 7 9 6 6 6 6 5

Thresholds		
	BRA	-
	BRA+CCA	-
Confidence		
	BRA+CCA	0.46
	BRA	0.49
	CCA	0.25
Date and Time		
	16/05/20	022 21:56:59

Taxon and Assessor details					
Category	Fishes and Lampreys (freshwater)				
Taxon name	Rhinogobius lindbergi				
Common name	Lin's goby				
Assessor	Giorgi Epitashvili				
Risk screening context					
Reason and socio-economic benefits	Rhinogobius lindbergi is described species from Amur and Ussuri rivers, Russia (Eagderi et al.				
Risk assessment area	South Caucasus				
Taxonomy	Rhinogobius lindbergi Berg 1933				
Native range	Amur and Ussuri river basins, far eastern part of Russia				
Introduced range	Introduced in freshwater systems of Mongolia (Neely et al. 2008), Kazakhstan (Kopylets &				
URL	https://www.fishbase.in/summary/Rhinogobius-lindbergi.html				

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
1. D		ication/Cultivation			
1	1.01	Has the taxon been the subject of	No	There are no data on the cultivation of this species because it is a	Medium
		domestication (or cultivation) for at least 20		very small fish and has no economical or recreational importance.	
		generations?			
2	1.02	Is the taxon harvested in the wild and likely	No	This species is a very small sized fish and has no economical or	Medium
		to be sold or used in its live form?		recreational importance.	
3	1.03	Does the taxon have invasive races,	Yes	This fish is occurring in Iran, North-eastern Anatolia and South	Very high
		varieties, sub-taxa or congeners?		Caucasus region and considered as invasive species for the above	
				mentioned regions (biodiversity-georgia.net).	
		, distribution and introduction risk	1		1
4	2.01	How similar are the climatic conditions of the	Medium	Köppen-Geiger climate classification map.	Medium
		Risk Assessment (RA) area and the taxon's			
		native range?			
5	2.02	What is the quality of the climate matching	Medium	Köppen-Geiger climate classification map.	Medium
	data?				
6	2.03	Is the taxon already present outside of	Yes	R. lindbergi found in some reservoirs of the SC region (Japoshvili	Very high
		captivity in the RA area?		et al. 2020; Kuljanishvili et al. 2020; Epitashvili et al. 2020).	
7	2.04	How many potential vectors could the taxon	One	Rhinogobius lindbergi spread unintentionally in the southern	Medium
		use to enter in the RA area?		Caucasus region as well as throughout its area of invasion.	
8	2.05	Is the taxon currently found in close	Yes	This species is occuring in Iran (Eagderi et al. 2018).	Very high
		proximity to, and likely to enter into, the RA			
		area in the near future (e.g. unintentional			
		and intentional introductions)?			
		e elsewhere	1		I
9	3.01	Has the taxon become naturalised	Yes	R. lindbergi has stable/viable populations in Iran (Eagderi et al.	Very high
		(established viable populations) outside its		2018).	
10	3.02	In the taxon's introduced range, are there	Yes	There are some warnings with regard to the potential effect of R.	High
		known adverse impacts to wild stocks or		lindbergi on the native fish fauna (Neely et al. 2008)	
		commercial taxa?			
11	3.03	In the taxon's introduced range, are there	Yes	No data	Medium
		known adverse impacts to aquaculture?			
12	3.04	In the taxon's introduced range, are there	No	No data	Low
		known adverse impacts to ecosystem			
13	3.05	In the taxon's introduced range, are there	Not applicable	No data	Low
		known adverse socio-economic impacts?			
	Biology				
		y/Ecology			
		able (or persistence) traits	1		
14		able (or persistence) traits Is it likely that the taxon will be poisonous or	No	Such a fact is not known.	Very high
	4.01	able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health?			
		able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or	No Yes	There are some warnings with regard to the potential effect of R.	Very high High
	4.01	able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or		There are some warnings with regard to the potential effect of R. lindbergi on the native fish fauna but still no published evidence	
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15	4.01	able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa		There are some warnings with regard to the potential effect of R. lindbergi on the native fish fauna but still no published evidence exists about its negative impact (Japoshvili et al. 2020) There are many threatened and protected species in the SC region	
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15 16 17 18 19 20 21	4.01 4.02 4.03 4.04 4.05 4.06 4.07 4.08	able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area? Is it likely that the taxon will achieve a body size that will make it more likely to be	Yes Yes Yes Yes No No	There are some warnings with regard to the potential effect of R. lindbergi on the native fish fauna but still no published evidence exists about its negative impact (Japoshvili et al. 2020) There are many threatened and protected species in the SC region which are likely to be under the influence of R. lindbergi: e.g. Salmo spp; Acipenser spp; Luciobarbus capito, etc. (Kuljanishvili et al. 2020; Epitashvili et al. 2020). It seems that this species has a high ability to adapt new environmental conditions because it has been successfully established in the Caucasus region. Still no published evidence exists about its negative impact on the food web structure in ecosystems No research has been conducted in this direction. No data	High Very high Medium Medium Low Low
15 16 17 18 19 20 21 22	4.01 4.02 4.03 4.04 4.05 4.06 4.07 4.08 4.09	able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area? Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity?	Yes Yes Yes Yes No No	There are some warnings with regard to the potential effect of R. lindbergi on the native fish fauna but still no published evidence exists about its negative impact (Japoshvili et al. 2020) There are many threatened and protected species in the SC region which are likely to be under the influence of R. lindbergi: e.g. Salmo spp; Acipenser spp; Luciobarbus capito, etc. (Kuljanishvili et al. 2020; Epitashvili et al. 2020). It seems that this species has a high ability to adapt new environmental conditions because it has been successfully established in the Caucasus region. Still no published evidence exists about its negative impact on the food web structure in ecosystems No research has been conducted in this direction. No data R. lindbergi is small sized fish. Economic value of this species is not evaluated.	High Very high Medium Medium Low Low Low
15 16 17 18 19 20 21 22	4.01 4.02 4.03 4.04 4.05 4.06 4.07 4.08	able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA Is ti likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area? Is ti likely that the taxon will achieve a body size that will make it more likely to be released from captivity? Is the taxon capable of sustaining itself in a	Yes Yes Yes Yes No No	There are some warnings with regard to the potential effect of R. lindbergi on the native fish fauna but still no published evidence exists about its negative impact (Japoshvili et al. 2020) There are many threatened and protected species in the SC region which are likely to be under the influence of R. lindbergi: e.g. Salmo spp; Acipenser spp; Luciobarbus capito, etc. (Kuljanishvili et al. 2020; Epitashvili et al. 2020). It seems that this species has a high ability to adapt new environmental conditions because it has been successfully established in the Caucasus region. Still no published evidence exists about its negative impact on the food web structure in ecosystems No research has been conducted in this direction. No data R. lindbergi is small sized fish. Economic value of this species is not evaluated. R. lindbergi is distributed in rivers and lakes of the Caucasus	High Very high Medium Medium Low Low
15 16 17 18 19 20 21 22	4.01 4.02 4.03 4.04 4.05 4.06 4.07 4.08 4.09	able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area? Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity?	Yes Yes Yes Yes No No	There are some warnings with regard to the potential effect of R. lindbergi on the native fish fauna but still no published evidence exists about its negative impact (Japoshvili et al. 2020) There are many threatened and protected species in the SC region which are likely to be under the influence of R. lindbergi: e.g. Salmo spp; Acipenser spp; Luciobarbus capito, etc. (Kuljanishvili et al. 2020; Epitashvili et al. 2020). It seems that this species has a high ability to adapt new environmental conditions because it has been successfully established in the Caucasus region. Still no published evidence exists about its negative impact on the food web structure in ecosystems No research has been conducted in this direction. No data R. lindbergi is small sized fish. Economic value of this species is not evaluated.	High Very high Medium Medium Low Low Low

24 4					
1		Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa?	Yes	R. lindbergi should be considered as new invasive species for the Caucasus region and adverse negative impacts on the local habitats and ecosystems are expected.	Medium
25 4	1.12	Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions	Yes	No research has been conducted in this direction.	Medium
		by way of a dormant form)?			
5. Re		e exploitation			• •
26 5		Is the taxon likely to consume threatened or	Yes	Such data is not available right now	Low
27 5	5.02	protected native taxa in the RA area? Is the taxon likely to sequester food resources (including nutrients) to the	Not applicable	No research has been conducted in this direction.	Low
		detriment of native taxa in the RA area?			
5. Re	produ				1
28 6	5.01	Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response	Not applicable	No research has been conducted in this direction.	Low
29 6	5.02	to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Not applicable	Most likely this species is breeding in the region but currently we have no evidence.	Low
30 6		Is the taxon likely to hybridise naturally with native taxa?	No	No such fact has been detected	Medium
31 6		Is the taxon likely to be hermaphroditic or to display asexual reproduction?	No	No research has been conducted in this direction.	Low
32 6		Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	No	Such a fact is not known.	Medium
33 6		Is the taxon known (or likely) to produce a large number of propagules or offspring	No	No data	Low
34 6		within a short time span (e.g. < 1 year)? How many time units (days, months, years)	1	No data	Medium
7 5		does the taxon require to reach the age-at- first-reproduction?			
7 <u>. Dis</u> 35 7	7.01	al mechanisms How many potential internal	One	Unintentional distribution by humans	High
		vectors/pathways could the taxon use to disperse within the RA area (with suitable			
36 7		Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)?	Yes This species found in the Chachuna Managed Reserve, eastern Georgia (Own unpublished data).		Medium
37 7	7.03	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances	No	No data	Medium
38 7	7.04	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?	No	The eggs of this species may be spread by animals but there is no evidence.	Low
39 7	7.05	Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA	No	No such data available	Low
10 7	7.06	area? Are older life stages of the taxon likely to migrate in the RA area for reproduction?	No	This species is small sized and does not migrate in the long distances.	Very high
11 7	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No	No such data available for this time	Low
12 7	7.08	Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be	Yes	Own observation	Low
13 7		Is dispersal of the taxon density dependent?	Yes	No data	Low
3. To	leranc	ce attributes			
14 8	3.01	Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life	No	Such a fact is not known.	Medium
15 8	3.02	cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being	No	Data deficient	Low
16 8	3.03	Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	Yes	Data deficient	Low
17 8	3.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	Yes	Data deficient	Low
+	3.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	No	This fish is a typical freshwater species	Medium
3 84	l		Yes	There are several taxas which should be considered as natural	High
19 8	3.06	Are there effective natural enemies (predators) of the taxon present in the RA area?		predators for R. lindbergi. This taxons are birds (kingfisher, herons, gulls, etc.), fish (Squalius spp; Perca fluviatilis, Silurus glanis, etc.) reptilies and etc.	

ΓO	0.01	I load any the assure directed for the one address the	Transmission and a	The Dhim enclose and investigation in the Consist Con-	L D anha
50	9.01	Under the predicted future climatic	Increase	The Rhinogobius species, considered invasive in the Caspian Sea	High
		conditions, are the risks of entry into the RA		basin, seems to be now widespread also in the Caspian part of the	
		area posed by the taxon likely to increase,		study area (Japoshvili et al., 2020) and is expected to enter the	
		decrease or not change?		Black Sea basin soon (Kuljanishvili et al. 2020)	
51	9.02	Under the predicted future climatic	Increase	The Rhinogobius species, considered invasive in the Caspian Sea	High
		conditions, are the risks of establishment		basin, seems to be now widespread also in the Caspian part of the	
		posed by the taxon likely to increase,		study area (Japoshvili et al., 2020) and is expected to enter the	
		decrease or not change?		Black Sea basin soon (Kuljanishvili et al. 2020)	
52	9.03	Under the predicted future climatic	Increase	The Rhinogobius species, considered invasive in the Caspian Sea	High
		conditions, are the risks of dispersal within		basin, seems to be now widespread also in the Caspian part of the	
		the RA area posed by the taxon likely to		study area (Japoshvili et al., 2020) and is expected to enter the	
		increase, decrease or not change?		Black Sea basin soon (Kuljanishvili et al. 2020)	
53	9.04	Under the predicted future climatic	Higher	Own observation	Medium
		conditions, what is the likely magnitude of			
		future potential impacts on biodiversity			
		and/or ecological integrity/status?			
54	9.05	Under the predicted future climatic	Higher	Own observation	Medium
	1	conditions, what is the likely magnitude of			
	1	future potential impacts on ecosystem			
		structure and/or function?			
55	9.06	Under the predicted future climatic	No change	Own observation	Medium
	1	conditions, what is the likely magnitude of			
	1	future potential impacts on ecosystem			
	1	services/socio-economic factors?			

Scores	
BRA	17.5
BRA Outcome	-
BRA+CCA	27.5
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	8.5
1. Domestication/Cultivation	0.0
2. Climate, distribution and introduction risk	1.0
<i>3. Invasive elsewhere</i>	7.5
B. Biology/Ecology	9.0
4. Undesirable (or persistence) traits	8.0
5. Resource exploitation	5.0
6. Reproduction	0.0
7. Dispersal mechanisms	-2.0
8. Tolerance attributes	-2.0
C. Climate change	10.0
9. Climate change	10.0
Answered Questions	
Total	55
A. Biogeography/Historical	
A. Biogeography/Historical 1. Domestication/Cultivation	
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk	
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere	13 3 5 5
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology	13 3 5 5 36
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits	13 3 5 5 36 12
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation	13 3 5 5 36 12
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction	13 3 5 5 36 12 2 7
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms	13 3 5 5 36 12 2 7 7 9
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes	13 3 5 5 36 12 2 7 7 9 6
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change	13 3 5 5 36 12 2 7 7 9
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes	13 3 5 5 36 12 2 7 9 9 6 6
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change	13 3 5 5 36 12 2 7 9 9 6 6
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change	13 3 5 5 36 12 2 7 9 9 6 6
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change 9. Climate change 9. Climate change 9. Climate change	13 3 5 5 36 12 2 7 9 6 6
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Environmental	13 3 5 5 36 12 2 7 9 9 6 6

Thresholds		
	BRA	-
	BRA+CCA	-
Confidence		
	BRA+CCA	0.52
	BRA	0.51
	CCA	0.63
Date and Time		
	12/05/20	22 17 10.27

13/05/2022 17:59:37

Taxon and Assessor details					
Category	Fishes and Lampreys (freshwater)				
Taxon name	Rhinogobius lindbergi				
Common name	Lin's goby				
Assessor	Tatia Kuljanishvili				
Risk screening context					
Reason and socio-economic benefits	Most probabbly accidentally introduced through aquaculture				
Risk assessment area	South Caucasus				
Taxonomy	Actinopteri (ray-finned fishes) > Gobiiformes (Gobies) > Oxudercidae				
Native range	The Amur River drainage				
Introduced range The Caspian Sea basin					
URL	https://fishbase.mnhn.fr/summary/Rhinogobius-lindbergi.html				

			Response	Justification (references and/or other information)	Confidence
Α.Ι	Biogeo	graphy/Historical			
1. L	Domest	ication/Cultivation			
1	1.01	Has the taxon been the subject of	No	No trade value	Very high
		domestication (or cultivation) for at least 20			
		generations?			
2	1.02	Is the taxon harvested in the wild and likely	No	It is not harvested or sold	Very high
		to be sold or used in its live form?			
3	1.03	Does the taxon have invasive races,	Yes	Rhinogobius giurinus and R. cliffordpopei (Actinopterygii,	Medium
		varieties, sub-taxa or congeners?		Gobiidae) in a plateau lake, southwestern China, However there is	
				not assessment done if they are invasive (Guo et al 2016).	
2. (-	, distribution and introduction risk			
4	2.01	How similar are the climatic conditions of the	High	Somehow similar	Medium
		Risk Assessment (RA) area and the taxon's			
-	2.02	native range?	Madium	These are as aligned a station in aligned to be seen to this evolution	Madium
5	2.02	What is the quality of the climate matching	Medium	There are no climatic stations in climatch to make this analysis.	Medium
		data?		However, according to Koppen-Geiger map the climate is	
c	2.02	To the tayon already present outside of	Vac	somehow similar.	Vorschigh
6	2.03	Is the taxon already present outside of	Yes	today the species is distributed only in the eastern part of Georgia	Very high
7	2.04	captivity in the RA area? How many potential vectors could the taxon	>1	and Azerbaijan Aquaculture; Natural dispersal	Very high
ľ	2.04	use to enter in the RA area?	~ 1	קימכטונטוב, ואמנטומו טופאבוסמו	very night
8	2.05	Is the taxon currently found in close	Yes	today the species is distributed only in the eastern part of Georgia	Very high
Ĭ	2.00	proximity to, and likely to enter into, the RA		and Azerbaijan	,
		area in the near future (e.g. unintentional			
		and intentional introductions)?			
3. I	nvasive	e elsewhere			
9	3.01	Has the taxon become naturalised	Yes	Yes it has become naturalized outside its native area	Very high
-		(established viable populations) outside its			· · · / · · · 5··
10	3.02	In the taxon's introduced range, are there	No	Not known	Low
		known adverse impacts to wild stocks or			
		commercial taxa?			
11	3.03	In the taxon's introduced range, are there	No	Not known	Low
		known adverse impacts to aquaculture?			
12	3.04	In the taxon's introduced range, are there	No	Not known	Low
		known adverse impacts to ecosystem			
13	3.05	In the taxon's introduced range, are there	No	Not known	Low
		known adverse socio-economic impacts?			
		//Ecology			
		able (or persistence) traits			
14	4.01	· ·	No	Not poisonous	Very high
4.5	4.00	pose other risks to human health?			M P
15	4.02	Is it likely that the taxon will smother one or	No	No information avalableNo information avalable	Medium
		more native taxa (that are not threatened or			
16	4.03	protected)? Are there any threatened or protected taxa	No	No. does not parasite	Very high
10	-1.05	that the non-native taxon would parasitise in	110		very night
		the RA area?			
17	4.04	Is the taxon adaptable in terms of climatic	Yes	It is not known	Low
1	1.04	and other environmental conditions, thus	103		2000
		enhancing its potential persistence if it has			
		invaded or could invade the RA area?			
18	4.05	Is the taxon likely to disrupt food-web	No	Less likely	Low
	-	structure/function in aquatic ecosystems if it			
L		has invaded or is likely to invade the RA			
19	4.06	Is the taxon likely to exert adverse impacts	No	No adverse impacts on ecosystem services in the RA area is known	Low
		on ecosystem services in the RA area?			
20	4.07	Is it likely that the taxon will host, and/or	No	Noinformation avalable	Low
		act as a vector for, recognised pests and			
		infectious agents that are endemic in the RA			
21	4.08	Is it likely that the taxon will host, and/or	Yes	No information avalable	Low
	I	act as a vector for, recognised pests and			
			1		
		infectious agents that are absent from (novel			
		to) the RA area?			
22	4.09	to) the RA area? Is it likely that the taxon will achieve a body	No	Does not achive big sizes	High
22	4.09	to) the RA area? Is it likely that the taxon will achieve a body size that will make it more likely to be	No	Does not achive big sizes	High
		to) the RA area? Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity?		-	
	4.09 4.10	to) the RA area? Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity? Is the taxon capable of sustaining itself in a	No	Does not achive big sizes No information avalable	High Medium
		to) the RA area? Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity?		-	

24	4.11	Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa?	No	No information avalable	Medium
5	4.12	Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)?	Yes	Yes. as it has already established in RA after 'accidental' introduction	High
5 R	Resourc	e exploitation			1
		Is the taxon likely to consume threatened or	Yes	Can pray on native fish larvae	High
		protected native taxa in the RA area?			
27	5.02	Is the taxon likely to sequester food resources (including nutrients) to the	No	No	Medium
5 0	Reprodu	detriment of native taxa in the RA area?			
		Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?	Yes	in introduced environment they can change their reporoductive biology Guo et al 2013	Medium
9	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	Yes Climate is quite similar.	High
80	6.03	Is the taxon likely to hybridise naturally with native taxa?	No	No information available	Low
	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	No	No. Does not display asexual reproduction	High
32	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	No	No. See: https://fishbase.mnhn.fr/summary/Rhinogobius- lindbergi.html	Very high
3	6.06	Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)?	No	No information available	Low
34	6.07	How many time units (days, months, years) does the taxon require to reach the age-at-	1	1	Very high
7 Γ	Disnerci	first-reproduction? al mechanisms	I		
	7.01	How many potential internal vectors/pathways could the taxon use to	>1	Aquaculture; natural spread	Very high
6	7.02	disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more	Yes	It is possible	High
37	7.03	protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively	Yes	No. Morphologically this species does not have a means of actively	Very high
		attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal?		attaching itself to hard substrata	
38	7.04	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?	Yes	Yes. it is possible	High
39	7.05	Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?	Yes	Yes. it is possible	High
	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	No	Does not migrate	High
	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No	No. Can not be dispersed by other ananimals	High
12	7.08	Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both	Yes	Yes they seem to be rapid	Medium
13	7.09	unintentional or intentional) likely to be Is dispersal of the taxon density dependent?	No	No information avalable	High
		ce attributes			
_	8.01	Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life	No	No	Low
5	8.02	cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that	No	No info	Low
6	8.03	taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other	No	No. This is less likely.	High
17	8.04	agents/means? Is the taxon likely to tolerate or benefit from	No	No information avaiable	Medium
1	5.54	environmental/human disturbance?			
8	8.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	No	No info	Low
9	8.06	Are there effective natural enemies (predators) of the taxon present in the RA	No	No effective natural enemies present in RA area	Low
. c	Climate	e change			
		change			
		Under the predicted future climatic conditions, are the risks of entry into the RA	Increase	It was hypotheses that climate change might alert the mechanisms of transportation and introduction of non-native	Very high
		area posed by the taxon likely to increase,		species. Commercial and recreational activities will increase, that	

51	9.02	Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	Increase	Since this species is originally from the Amur River drainage, where the temperatures are higher than in RA under the predicted climatic conditions risk of establishment will increase	Very high
52	9.03	Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change?	Increase	It will distribute more widely	Very high
53	9.04	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	Higher	Since their number will increase it will increase potential impact on biodiversity	Very high
54	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Higher	Higher	Very high
55	9.06	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	Higher	Higher	Very high

Scores	
BRA	16.0
BRA Outcome	-
BRA+CCA	28.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	4.0
1. Domestication/Cultivation	0.0
2. Climate, distribution and introduction risk	2.0
3. Invasive elsewhere	2.0
B. Biology/Ecology	12.0
4. Undesirable (or persistence) traits	3.0
5. Resource exploitation	5.0
6. Reproduction	2.0
7. Dispersal mechanisms	4.0
8. Tolerance attributes	-2.0
C. Climate change	12.0
9. Climate change	12.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3 5 5
2. Climate, distribution and introduction risk	5
<i>3. Invasive elsewhere</i>	5
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2
6. Reproduction	
7. Dispersal mechanisms	9
8. Tolerance attributes	6
C. Climate change	6
9. Climate change	6
Sectors affected	
Commercial	5
Environmental	10
Species or population nuisance traits	18
Thresholds	
BRA	-

	BRA	-
	BRA+CCA	-
Confidence		
	BRA+CCA	0.65
	BRA	0.61
	CCA	1.00
Date and Time		
	22/05/20	22 15:41:17

Taxon and Assessor details	Faxon and Assessor details					
Category	Fishes and Lampreys (freshwater)					
Taxon name	Salmo ischchan					
Common name	Sevan trout					
Assessor	Bella Japoshvili					
Risk screening context						
Reason and socio-economic benefits	The species is endemic to Sevan lake in Armenia. However it was introduced to several					
Risk assessment area	South Caucasus					
Taxonomy	Actinopteri (ray-finned fishes) > Salmoniformes (Salmons) > Salmonidae (Salmonids)					
Native range	Sevan Lake					
Introduced range	South Caucasus					
URL	https://www.fishbase.de/summary/Salmo-ischchan.html					

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
1. L		ication/Cultivation	P		
1	1.01	Has the taxon been the subject of	Yes	Musayev MA, Quliyev ZM, Rehimov DB, et al. 2004. Vertebrates,	Very high
		domestication (or cultivation) for at least 20		volume III. In: Musayev MA, ed. The AnimalWorld ofAzerbaijan:	
		generations?		Elm (in Azeri) Baku. 3–316.; Elanidze R. 1983. Ichthyofauna of	
				the rivers and lakes of Georgia, Metsniereba (in Russian) Tbilisi,	
2	1.02	Is the taxon harvested in the wild and likely	Yes	Supposed though not a recent documented evidence	Low
_		to be sold or used in its live form?			
3	1.03	Does the taxon have invasive races,	Yes	Congeneric S. trutta	High
		varieties, sub-taxa or congeners?			
2. (, distribution and introduction risk			1.
4	2.01	How similar are the climatic conditions of the	Low	Results of climatch algorithm	Low
		Risk Assessment (RA) area and the taxon's			
5	2.02	native range? What is the guality of the climate matching	Low	Due to low accuracy of local climate data	High
5	2.02	. , , , , , , , , , , , , , , , , , , ,	Low	Due to low accuracy of local climate data	High
6	2.03	data? Is the taxon already present outside of	Yes	Kulianishvili T. Mumladzo I. Janoshvili B. Mustafavov N	Von/ high
0	2.05		res	Kuljanishvili, T., Mumladze, L., Japoshvili, B., Mustafayev, N.,	Very high
		captivity in the RA area?		Ibrahimov, S., Patoka, J., & Kalous, L. (2021). The first unified	
				inventory of non-native fishes of the South Caucasian countries,	
				Armenia, Azerbaijan, and Georgia. Knowledge & Management of	
7	2.04	How many potential vectors could the taxon	One	Aquatic Ecosystems, (422), 32. Human mediated dispersal for aquacultural purpose	High
ľ	2.04		One		ingii
8	2.05	use to enter in the RA area?	Voc	Kulianishvili T. Mumladze I. Janoshvili P. Mustafavev M	High
0	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA	Yes	Kuljanishvili, T., Mumladze, L., Japoshvili, B., Mustafayev, N., Ibrahimov, S., Patoka, J., & Kalous, L. (2021). The first unified	High
		area in the near future (e.g. unintentional		inventory of non-native fishes of the South Caucasian countries,	
		and intentional introductions)?		Armenia, Azerbaijan, and Georgia. Knowledge & Management of Aquatic Ecosystems, (422), 32.	
2 1	'ny aciw	e elsewhere		Aduatic Ecosystems, (422), 32.	
<i>3.1</i> 0		Has the taxon become naturalised	Yes	Kuljanishvili, T., Mumladze, L., Japoshvili, B., Mustafayev, N.,	High
9	5.01	(established viable populations) outside its	Tes	Ibrahimov, S., Patoka, J., & Kalous, L. (2021). The first unified	nign
		native range?		inventory of non-native fishes of the South Caucasian countries,	
				Armenia, Azerbaijan, and Georgia. Knowledge & Management of	
				Aquatic Ecosystems, (422), 32; Bogdanowicz, W., Rutkowski, R.,	
				Gabrielyan, B. K., Ryspaev, A., Asatryan, A. N., Mkrtchyan, J. A.,	
				& Bujalska, B. M. (2017). Fish introductions in the former Soviet	
				Union: The Sevan trout (Salmo ischchan)—80 years later. PloS	
10	3.02	In the taxon's introduced range, are there	No	one. 12(7), e0180605. No relevan information exists	Medium
10	5.02	known adverse impacts to wild stocks or	NO		riculum
		commercial taxa?			
11	3.03	In the taxon's introduced range, are there	No	No documented evidence	Medium
11	5.05	known adverse impacts to aquaculture?	NO	No documented evidence	Medium
12	3.04	In the taxon's introduced range, are there	No	No documented evidence	Low
12	5.04	known adverse impacts to ecosystem	110		LOW
13	3.05	In the taxon's introduced range, are there	No	No documented evidence	Low
1.5	5.05	known adverse socio-economic impacts?			2000
B	Biology	//Ecology			
		able (or persistence) traits			
			No	Not harmful speceis	Very high
1-7		pose other risks to human health?			· · · · · · · · · · ·
15	4.02	Is it likely that the taxon will smother one or	Yes	Native salmonids	Medium
1	1.52	more native taxa (that are not threatened or			
		protected)?			
16	4.03	Are there any threatened or protected taxa	No	Species is not parasite	Very high
ľ		that the non-native taxon would parasitise in			,
		the RA area?			
17	4.04	Is the taxon adaptable in terms of climatic	No	Not known	Low
Ľ		and other environmental conditions, thus			
1		enhancing its potential persistence if it has			
1		invaded or could invade the RA area?			
18	4.05	Is the taxon likely to disrupt food-web	No	No relevan information available	Low
10	7.05	structure/function in aquatic ecosystems if it			2000
		has invaded or is likely to invade the RA			
19	4.06	Is the taxon likely to exert adverse impacts	No	No relevant information	Low
19	7.00	on ecosystem services in the RA area?			2000
	1		No	No such pest/infectious agents are known	Low
20	4 07	Is it likely that the tayon will bost and/or			
20	4.07	Is it likely that the taxon will host, and/or	NO	No such pest/infectious agents are known	2011
20	4.07	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA	NO	No such pest/metilous agents are known	2011

21	4.08	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area?	No	Less likely because of the species is a local endemic within the RA area	Medium
22	4.09	Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity?	Yes	It can grow as large as 1 m	Low
23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)?	Yes	Species can cope with standing and flowing waters	High
24	4.11	Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa?	No	Not expected	Low
	4.12	Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)?	No	No such an evidence exists	Medium
		e exploitation Is the taxon likely to consume threatened or	Yes	Some invertebrate larvas (e.g. threatened dragonflies)	Low
	5.02	protected native taxa in the RA area? Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?	Yes	Only based on professional judgement, it is expected to consume the same food used by a native river salmon	Low
	Reprodu 6.01	Is the taxon likely to exhibit parental care	Yes	Lavrovsky VV. On trout husbandry management in the U.S.S.R.	High
29	6.02	and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	First and Second Group Fellowship Study Tours on Inland Fisheries Research, Management and Fish Culture in the Union of Soviet Socialist Republics, 15 July–15 August 1965 and 31 May–2 July 1966, Lectures. Repository FAO/UNDP(TA) 2547. Rome: Food and Agriculture Organization of the United Nations; 1968. http://www.fao.org/docrep/005/77678e/77678E04.htm. Accessed 10 April 2016. Kuljanishvili, T., Mumladze, L., Japoshvili, B., Mustafayev, N., Ibrahimov, S., Patoka, J., & Kalous, L. (2021). The first unified inventory of non-native fishes of the South Caucasian countries, Armenia, Azerbaijan, and Georgia. Knowledge & Management of Aquatic Ecosystems, (422), 32; Bogdanowicz, W., Rutkowski, R., Gabrielyan, B. K., Ryspaev, A., Asatryan, A. N., Mkrtchyan, J. A., & Bujalska, B. M. (2017). Fish introductions in the former Soviet Union: The Sevan trout (Salmo ischchan)–80 years later. PloS one, 12(7), e0180605.	High
30	6.03	Is the taxon likely to hybridise naturally with native taxa?	Yes	Not well documented	Low
31	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	No	No evidence of asexual reproduction	Medium
32	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	No	Completes its life cycle without any other species	Very high
33	6.06	large number of propagules or offspring within a short time span (e.g. < 1 year)?	No	Several thousands only. Lavrovsky VV. On trout husbandry management in the U.S.S.R. First and Second Group Fellowship Study Tours on Inland Fisheries Research, Management and Fish Culture in the Union of Soviet Socialist Republics, 15 July–15 August 1965 and 31 May–2 July 1966, Lectures. Repository FAO/UNDP(TA) 2547. Rome: Food and Agriculture Organization of the United Nations; 1968. http://www.fao.org/docrep/005/77678e/77678E04.htm. Accessed	High
34	6.07	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	2	years	High
		al mechanisms			Tao 11
35	7.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable	>1	Human mediated transocation, natiral dispersal	Medium
36	7.02	Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)?	Yes	Such teritories are in Javakheti highland and along the Black Sea coast. The later is most probably unsuitable area while the former can be a suitable for the species	Low
37	7.03	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal?	No	No such an evidence exists	Very high
38	7.04	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?	No	Not expected because its native area is landlocked	Very high
39	7.05	Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?	Yes	No documented evidence	Medium
40	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	No	The species is soawing in lakes	High
41	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No	Not expected, not recorded	Very high

	7.08	Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be rapid?	Yes	For a aquaculture purpose, milions of frys/eggs are released usually Lavrovsky VV. On trout husbandry management in the U.S.S.R. First and Second Group Fellowship Study Tours on Inland Fisheries Research, Management and Fish Culture in the Union of Soviet Socialist Republics, 15 July–15 August 1965 and 31 May–2 July 1966, Lectures. Repository FAO/UNDP(TA) 2547. Rome: Food and Agriculture Organization of the United Nations; 1968. http://www.fao.org/docrep/005/77678e/77678E04.htm. Accessed 10 April 2016.	Very high
		Is dispersal of the taxon density dependent?	No	No documented evidence	Low
		ce attributes	1		
	8.01	Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle?	No	Professional judgement	High
45	8.02	Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being	No	Professional judgement	Low
	8.03	Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	No	No such a case is known	Low
47	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	No	Professional judgement. Its abundance declained in the native area most probably due to human disturbance	Medium
48	8.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	Yes	In the areas of its introduction where established populations exist (e.g. Issyk kul) there are different salinity level compared to Svan lake	Low
49	8.06	Are there effective natural enemies (predators) of the taxon present in the RA	No	No such natural enemies are known	Medium
С. (Climat	e change			
9. (Climate	change			
50	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?	No change	Based on professional judgement	Low
	9.02	Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	No change	Based on professional judgement	Low
	9.03	Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change?	No change	Based on professional judgement	Low
	9.04	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	No change	Based on professional judgement	Low
	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	No change	Based on professional judgement	Low
55	9.06	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	No change	Based on professional judgement	Low

Statistics	
Scores	
BRA	20.0
BRA Outcome	-
BRA+CCA	20.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	7.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	1.0
<i>3. Invasive elsewhere</i>	2.0
B. Biology/Ecology	13.0
4. Undesirable (or persistence) traits	2.0
5. Resource exploitation	7.0
6. Reproduction	3.0
7. Dispersal mechanisms	0.0
8. Tolerance attributes	1.0
C. Climate change	0.0
9. Climate change	0.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	<u>3</u> 5
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	5
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2
6. Reproduction	7
6. Reproduction	/

7. Dispersal mechanisms	9					
8. Tolerance attributes	6					
C. Climate change	6					
9. Climate change	6					
Sectors affected						
Commercial	6					
Environmental	6					
Species or population nuisance traits	12					
Thresholds						
BRA	-					
BRA+CCA	-					
Confidence						
BRA+CCA	0.53					
BRA	0.56					
CCA	0.25					
Date and Time						
16/05/2022 22:29:52						

Taxon and Assessor details					
Category	Fishes and Lampreys (freshwater)				
Taxon name	Salmo ischchan				
Common name	Sevan trout				
Assessor	Giorgi Epitashvili				
Risk screening context					
Reason and socio-economic benefits	The trouts of the Salmo ischchan complex are endemic to Lake Sevan (Armenia). Four "forms" of				
Risk assessment area	South Caucasus				
Taxonomy	Salmo ischchan subsp. gegarkuni Kessler, 1877				
Native range	Lake Sevan				
Introduced range	Georgia, Azerbaijan				
URL	https://www.fishbase.se/summary/4792				

			Response	Justification (references and/or other information)	Confidence
A. I	Biogeo	graphy/Historical	-		
1. L	Domesti	ication/Cultivation			
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	At present, 17-18 tonnes of commercial fish are produced in Armenia, the bulk of which is the golden trout—Salmo ischchan.	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	Poaching takes a substantial blame for the reduction in the stocks of Sevan trout. It has become so serious that it threatens the very existence of the species (Savvaitova and Petr).	Very high
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	No	No such fact has been detected yet	High
2. (limate	, distribution and introduction risk			
4		How similar are the climatic conditions of the	Hiah	S. gegarkuni is naturally distributed in Lake Sevan which is one of	Very high
		Risk Assessment (RA) area and the taxon's native range?	5	the main reservoir in the South Caucasus Region.	
5	2.02	What is the quality of the climate matching data?	High	Climatic conditions in some regions of the South Caucasus are similar to lake Sevan, for instance in Javakheti region, Southern	Very high
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	This fish is naturally distributed in Lake Sevan Armenia and also found in artificial reservoir "Tbilisi Sea" in Georgia (own data).	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	This species is translocated within the SC region by human intentionally.	High
8	2.05	Is the taxon currently found in close	Yes	This fish is already exist in the SC region.	Very high
_		proximity to, and likely to enter into, the RA		······································	· • · / · · · g· ·
1		area in the near future (e.g. unintentional			
		and intentional introductions)?			
	1	e elsewhere			
9	3.01	Has the taxon become naturalised	No	This species has been translocated to other regions of the South	Very high
		(established viable populations) outside its native range?		Caucasus however, viable populations could not be formed there (Kuljanishvili et al. 2020).	
10	3.02	In the taxon's introduced range, are there	No	Such facts has not been detected yet	High
		known adverse impacts to wild stocks or commercial taxa?			
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	Such facts has not been detected yet	High
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	No	Such facts has not been detected yet	High
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	Such facts has not been detected yet	High
B F	Biology	//Ecology			
		able (or persistence) traits			
		Is it likely that the taxon will be poisonous or pose other risks to human health?	No	This species does not pose a threat to humans	Very high
15	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or	No	Such facts has not been detected yet	High
16	4.03	protected)? Are there any threatened or protected taxa	No	Such facts has not been detected yet	High
10	05	that the non-native taxon would parasitise in		Such facts has not been deletted yet	i ngit
17	4.04	the RA area? Is the taxon adaptable in terms of climatic	Yes	Climatic conditions in some regions of the South Caucasus are	Very high
1		and other environmental conditions, thus enhancing its potential persistence if it has		similar to lake Sevan, for instance in Javakheti region, Southern Georgia	
1		invaded or could invade the RA area?			
18	4.05	Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it	No	Such facts has not been detected yet	Medium
L		has invaded or is likely to invade the RA			
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	Due to the scarcity of species such a fact is not expected	High
20	4.07	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and	Yes	Data Deficiencies	Low
		infectious agents that are endemic in the RA			
21	4.08	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and	Yes	Data Deficiencies	Low
1		infectious agents that are absent from (novel to) the RA area?			
22	4.09	Is it likely that the taxon will achieve a body	Yes	Max length of S. ischchan is 104 cm TL, max. published weight:	High
~~		size that will make it more likely to be released from captivity?		17.0 kg (Berg, 1962), therefore this species is being actively released from captivity.	
23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g.	Yes	This fish can live in both standing and flowing waters.	Very high
1		versatile in habitat use)?			

24					
	4.11	Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa?	No	Such fact is not known	Low
25	4.12	Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)?	No	This fish is critically endangered and largely or completely dependent on artificial reproduction and stocking (Kuljanishvili et al. 2020).	High
5. R	esourc	e exploitation			
		Is the taxon likely to consume threatened or	Yes	S. gegarkuni is a predator fish and can eat threatened or	High
		protected native taxa in the RA area?		protected native species in the SC region.	-
27	5.02	Is the taxon likely to sequester food	Yes	S. gegarkuni is a predator fish and can be as a competitor for	Medium
		resources (including nutrients) to the detriment of native taxa in the RA area?		native taxa.	
6 R	eprodu				
	6.01	Is the taxon likely to exhibit parental care	No	No data	Low
_0	0.01	and/or to reduce age-at-maturity in response to environmental conditions?			
29	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	The adult specimens of S. gegarkuni spawn in the lake Sevan proper at a depth range of 0.5 to 3 m, over fine gravel. Two spawning stocks are known: one spawns in the northwestern corner of the lake from the beginning of November till the end of December; the other spawns at the southeastern corner, from the middle or the end of January till the end of March.	Very high
30	6.03	Is the taxon likely to hybridise naturally with native taxa?	No	Such fact has not been detected	Medium
31	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	No	Such fact has not been described	Medium
32	6.05	to complete its life cycle?	Yes	The adult specimens of S. gegarkuni spawn in the lake Sevan proper at a depth range of 0.5 to 3 m, over fine gravel. Two spawning stocks are known: one spawns in the northwestern corner of the lake from the beginning of November till the end of December; the other spawns at the southeastern corner, from the middle or the end of January till the end of March.	High
33	6.06	Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)?	No	Data deficiency	Medium
34	6.07	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	3	Data deficiency	Low
7. D	ispersa	al mechanisms			
35	7.01	How many potential internal	One	This species can be dispersed only by restocking.	High
		vectors/pathways could the taxon use to			
		disperse within the RA area (with suitable			
36	7.02	Will any of these vectors/pathways bring the taxon in close proximity to one or more	No	Currently this species is not found in protected areas of the SC region.	Low
		protected areas (e.g. MCZ, MPA, SSSI)?			
37	7.03	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal?	No	This fish does not has such means.	Very high
38	7.04	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?	No	This taxon spreads within the region only by human	High
39	7.05	Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?	No	This taxon spreads within the region only by human	High
40	7.06	Are older life stages of the taxon likely to	Yes	This species migrates from Lake Sevan to its tributaries for	High
41	7.07	migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to	No	reproduction. No such fact has been described yet	Low
42	7.08	be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the	Yes	Data deficiencies	Low
-		vectors/pathways mentioned in the previous seven questions (35–41; i.e. both			
42	7.00	unintentional or intentional) likely to be	No	No data	Low
		Is dispersal of the taxon density dependent?	No	No data	Low
		Is the taxon able to withstand being out of	No	This species cannot live without water and dies quickly	Very high
		water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle?			
45	8.02	Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the	No	This species as well as meny other species from this genus is sensitive to water quality	High
46	8.03	relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agente/mease2	No	Currently there is no need for that.	High
		Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	No	Currently there is no need for that. Data deficient	High

С.	Climate	Are there effective natural enemies (predators) of the taxon present in the RA area? e change change	Yes	There are some species in the SC region which can eat S. ischchan: e.g. Esox lucius, Salmo spp and etc (Ninua et al. 2013; Kuljanishvili et al. 2020).	High
50	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?	Decrease	Global warming will cause a change in the level of Lake Sevan which will negatively affect this species (Own judgement)	High
51	9.02	Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	Decrease	Global warming will cause a change in the level of Lake Sevan which will negatively affect this species (Own judgement)	High
52	9.03	Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change?	Decrease	Global warming will cause a change in the level of Lake Sevan which will negatively affect this species (Own judgement)	High
53	9.04	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	Lower	Global warming will cause a change in the level of Lake Sevan which will negatively affect this species (Own judgement)	High
54	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Lower	Global warming will cause a change in the level of Lake Sevan which will negatively affect this species (Own judgement)	High
55	9.06	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	Lower	Global warming will cause a change in the level of Lake Sevan which will negatively affect this species (Own judgement)	High

Statistics	
Scores	
BRA	5.0
BRA Outcome	-
BRA+CCA	-7.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	1.0
1. Domestication/Cultivation	2.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	-2.0
B. Biology/Ecology	4.0
4. Undesirable (or persistence) traits	5.0
5. Resource exploitation	7.0
6. Reproduction	-2.0
7. Dispersal mechanisms	-2.0
8. Tolerance attributes	-4.0
C. Climate change	-12.0
9. Climate change	-12.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	13
	13
1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere	13
1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology	13
1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits	13
1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation	13
1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology / Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction	13
1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B.Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms	13 3 5 5 36 12 2 7 7 9
1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes	13 3 5 36 12 2 7 9 6
1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change	13 3 5 5 36 12 2 7 9 9 6 6
1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change	13 3 5 36 12 2 7 9 6
1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change	13 3 5 5 36 12 2 2 7 7 9 6 6 6 6
1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial	13 3 5 5 36 12 2 7 9 6 6 6 6 3 3
1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial Environmental	13 3 5 5 36 12 2 7 9 6 6 6 6 6 3 1
1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial	13 3 5 5 36 12 2 7 9 6 6 6 6 3 3
1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial Environmental Species or population nuisance traits	13 3 5 5 36 12 2 7 9 6 6 6 6 6 3 1
1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial Environmental	13 3 5 5 36 12 2 7 9 6 6 6 6 6 3 1

BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.70
BRA	0.70
CCA	0.75
Date and Time	

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13/05/2022 18:10:26
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Taxon and Assessor details	
Category	Fishes and Lampreys (freshwater)
Taxon name	Salmo ischchan
Common name	Sevan trout
Assessor	Tatia Kuljanishvili
Risk screening context	
Reason and socio-economic benefits	This species was introduced into Georgia in the 1930s, first to Tabatskuri Lake in 1930-35, then in
Risk assessment area	South Caucasus
Taxonomy	This species was introduced into Georgia in the 1930s, first to Tabatskuri Lake in 1930-35, then in
Native range	Armenia (Sevan Lake)
Introduced range	Azerbaija, Georgia.
URL	https://fishbase.mnhn.fr/summary/Salmo-ischchan.html

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
1. L		ication/Cultivation			
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	S. gegarkui has been commercial species and it has been bred in Armenia more than 20 generations	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	Since the species is the commercially valuable, it is being harvested from the wild, and it can also be sold in its live form, for commercial purposes.	Very high
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	Salmonid fishes are widly introduced throughout the world due to their commercial value. Some salmonid species are considered as invasive, for instance Salmo salar	High
2. (Climate,	, distribution and introduction risk			
4	2.01		High	The number of climtic stations are not sufficient for climatch	High
		Risk Assessment (RA) area and the taxon's native range?		analysis. However according to Koppen Geiger climate map they are similar	
5	2.02	What is the quality of the climate matching data?	High	I would say it is high	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	This species was introduced into Georgia in the 1930s, first to Tabatskuri Lake in 1930-35, then in Paravani Lake in 1970, and in Tbilisi Reservoir around the 1980s. It was released into the Azerbaijani reservoirs and lakes in the 1970s (e.g., Maralgel Lake in 1977) for aquaculture (Elanidze, 1983; Musayev et al., 2004; Kulianishvili et al., 2020)	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	>1	Aquaculture, recriational fisheries.	Very high
8	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)?	Yes	This species presents in Tbilisi Reservoir, and possibly also in mountain lakes of the Kalbajar region of Azerbaijan. However, nobody has confirmed if this species is truly S. gegarkuni	Medium
3. I	nvasive	e elsewhere			
9	3.01	Has the taxon become naturalised	Yes	It is believed that this species has been naturalised in Georgian	Medium
		(established viable populations) outside its native range?		and Azerbaijani water bodies, however there is only records from fishermen, it needs scientific proof	
	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	Yusifov et al., 2017 reported that after the introduction of S. gegarkuni (named as S. ischchan) in the Kalbajar region, the native trout species populations decreased in abundance to the point where they were included on the Red List of Endangered Species in Azerbaijan.	High
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	Yes	Yusifov et al., 2017 reported that after the introduction of S. gegarkuni (named as S. ischchan) in the Kalbajar region, the native trout species populations decreased in abundance to the point where they were included on the Red List of Endangered Species in Azerbaijan.	High
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	Yes	It can only be transmitting parasites and deseases, however the introductions are not rapid and this information needs evidence.	Low
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	In Azerbaijan it might have affected commercial fishing on native trouts, but it is not documented.	Low
		y/Ecology			
		able (or persistence) traits			
		Is it likely that the taxon will be poisonous or pose other risks to human health?		Not poisonous	Very high
	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	It is possible that it might be in competition with native Salmo caspius. and Actually Yusifov et al., 2017 reported that after the introduction of S. gegarkuni (named as S. ischchan) in the Kalbajar region, the native trout species populations decreased in abundance to the point where they were included on the Red List of Endangered Species in Azerbaijan.	Medium
	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	Does not parasite	Very high
17	4.04	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?	No	This are very sensitive species and can not tolerate variable environmental condidtions.	High
18	4.05	Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA	Yes	It is possible, however it is not documented.	Low
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	No adverse impacts on ecosystem services havebeen documented	High

20	4.07	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and	Yes	It is possible. however there is no evidence	Medium
		infectious agents that are endemic in the RA			
21	4.08	Is it likely that the taxon will host, and/or	Yes	It is possible. however there is no evidence	Medium
		act as a vector for, recognised pests and			
		infectious agents that are absent from (novel			
22	4.09	to) the RA area? Is it likely that the taxon will achieve a body	Yes	Yes. See: https://fishbase.mnhn.fr/summary/Salmo-ischchan.html	Vony high
22	4.09	size that will make it more likely to be	Tes	res. see. https://iisibase.iiiiiii.ii/suninary/saino-ischenar.iitiii	very nigh
		released from captivity?			
23	4.10	Is the taxon capable of sustaining itself in a	Yes	This species can sustain in a range of water velocity conditions	Very high
		range of water velocity conditions (e.g.			, -
		versatile in habitat use)?			
24	4.11	· · · · · · · · · · · · · · · · · · ·	No	No	Medium
		(e.g. excretion of by-products) or behaviours			
		(e.g. feeding) will reduce habitat quality for native taxa?			
25	4.12	Is the taxon likely to maintain a viable	No	Has not been documented	Low
		population even when present in low			
		densities (or persisting in adverse conditions			
		by way of a dormant form)?			
		ce exploitation	V		L li ala
26	5.01	Is the taxon likely to consume threatened or	Yes	Adults might consume small fish of native species	High
27	5.02	protected native taxa in the RA area? Is the taxon likely to sequester food	No	No information about it	Low
		resources (including nutrients) to the	-		
		detriment of native taxa in the RA area?			<u> </u>
	Reprodu		••		
28	6.01	<i>i i</i>	No	Does not exhibit parental care See:	High
		and/or to reduce age-at-maturity in response		https://fishbase.mnhn.fr/summary/Salmo-ischchan.html	
29	6.02	to environmental conditions? Is the taxon likely to produce viable gametes	Yes	Yes. since the conditions are avalable. However, more research is	Medium
	5.52	or propagules (in the RA area)?		needed to proove this point.	
30	6.03		No	It is possible however it needs evidence	Low
		native taxa?			
31	6.04	, .	No	No. Does not display asexual reproduction	High
27	6 05	display asexual reproduction?	No	No. Sooi https://fichbaco.maha.fr/oumman/Calaasia-ta-	Von hich
∠د	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features)	NU	No. See: https://fishbase.mnhn.fr/summary/Salmo-ischchan.html	Very high
		to complete its life cycle?			
33	6.06	Is the taxon known (or likely) to produce a	No	Fecundity can be something between 1300-7460 (Bogdanowicz et	High
		large number of propagules or offspring			5
		large number of propagules of onspring		al 2017)	
		within a short time span (e.g. < 1 year)?		al 2017)	
34	6.07	within a short time span (e.g. < 1 year)? How many time units (days, months, years)	3	al 2017) adults spawn around 3-4 age	High
34	6.07	within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at-	3		High
		within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	3		High
7. E	Dispers	within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms		adults spawn around 3-4 age	
7. E	Dispers	within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	3		High
<u>7. [</u> 35	Dispers 7.01	within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? <i>al mechanisms</i> How many potential internal		adults spawn around 3-4 age Aquaculture, Recriational fisheries	High
<u>7. [</u> 35	Dispers	within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the		adults spawn around 3-4 age	
<u>7. [</u> 35	Dispers 7.01	within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more	>1	adults spawn around 3-4 age Aquaculture, Recriational fisheries	High
<u>7. D</u> 35 36	7.01 7.02	within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)?	>1 Yes	adults spawn around 3-4 age Aquaculture, Recriational fisheries It is possible	High Medium
<u>7. D</u> 35 36	Dispers 7.01	within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively	>1	adults spawn around 3-4 age Aquaculture, Recriational fisheries It is possible No. Morphologically this species does not have a means of actively	High Medium
<u>7. D</u> 35 36	7.01 7.02	within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship	>1 Yes	adults spawn around 3-4 age Aquaculture, Recriational fisheries It is possible	High Medium
<u>7. D</u> 35 36	7.01 7.02	within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively	>1 Yes	adults spawn around 3-4 age Aquaculture, Recriational fisheries It is possible No. Morphologically this species does not have a means of actively	High Medium
<u>7. [</u> 35 36 37	7.01 7.02	within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to	>1 Yes	adults spawn around 3-4 age Aquaculture, Recriational fisheries It is possible No. Morphologically this species does not have a means of actively	High Medium
<u>7. [</u> 35 36 37	7.01 7.02 7.03	within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules	>1 Yes No	adults spawn around 3-4 age Aquaculture, Recriational fisheries It is possible No. Morphologically this species does not have a means of actively attaching itself to hard substrata	High Medium Very high
7. <u>[</u> 35 35 36 37 38	7.01 7.02 7.03 7.04	within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?	>1 Yes No	adults spawn around 3-4 age Aquaculture, Recriational fisheries It is possible No. Morphologically this species does not have a means of actively attaching itself to hard substrata No. can not be distributed as eggs.	High Medium Very high High
7. <u>[</u> 35 35 36 37 38	7.01 7.02 7.03	within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to	>1 Yes No	adults spawn around 3-4 age Aquaculture, Recriational fisheries It is possible No. Morphologically this species does not have a means of actively attaching itself to hard substrata	High Medium Very high
7. <u>[</u> 35 35 36 37 38	7.01 7.02 7.03 7.04	within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as	>1 Yes No	adults spawn around 3-4 age Aquaculture, Recriational fisheries It is possible No. Morphologically this species does not have a means of actively attaching itself to hard substrata No. can not be distributed as eggs.	High Medium Very high High
7. <u>[</u> 35 35 36 37 38	7.01 7.02 7.03 7.04	within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to	>1 Yes No	adults spawn around 3-4 age Aquaculture, Recriational fisheries It is possible No. Morphologically this species does not have a means of actively attaching itself to hard substrata No. can not be distributed as eggs.	High Medium Very high High
7. [35 36 37 38 38	7.01 7.02 7.03 7.04	within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA	>1 Yes No	adults spawn around 3-4 age Aquaculture, Recriational fisheries It is possible No. Morphologically this species does not have a means of actively attaching itself to hard substrata No. can not be distributed as eggs.	High Medium Very high High
7. [] 35 36 37 38 38 39	7.01 7.02 7.03 7.04 7.05 7.06	within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction?	>1 Yes No Yes	adults spawn around 3-4 age Aquaculture, Recriational fisheries It is possible No. Morphologically this species does not have a means of actively attaching itself to hard substrata No. can not be distributed as eggs. It is possible Does not migrate for reproduction	High Medium Very high High Medium
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7. [] 35 36 37 37 38 39 40 40	7.01 7.02 7.03 7.04 7.05 7.06	within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the	>1 Yes No Yes	adults spawn around 3-4 age Aquaculture, Recriational fisheries It is possible No. Morphologically this species does not have a means of actively attaching itself to hard substrata No. can not be distributed as eggs. It is possible Does not migrate for reproduction	High Medium Very high High Medium
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7. <u></u> 35 36 37 38 38 39 40 41 42 42	7.03 7.04 7.05 7.06 7.07 7.08 7.09	within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent?	>1 Yes No Yes No No	adults spawn around 3-4 age Aquaculture, Recriational fisheries It is possible No. Morphologically this species does not have a means of actively attaching itself to hard substrata No. can not be distributed as eggs. It is possible Does not migrate for reproduction No.Can not be dispersed by other ananimals	High Medium Very high High Medium Medium Very high
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7. <u>[</u> 35 36 37 38 38 39 40 41 42 42 43 8. 7	7.02 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 0leran	within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? ce attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life	>1 Yes No No Yes No No No	adults spawn around 3-4 age Aquaculture, Recriational fisheries It is possible No. Morphologically this species does not have a means of actively attaching itself to hard substrata No. can not be distributed as eggs. It is possible Does not migrate for reproduction No.Can not be dispersed by other ananimals No information avalable	High Medium Very high High Medium Very high High
7. [35 36 37 38 38 39 40 41 42 44 44	7.02 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 0leran	within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? Ce attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of	>1 Yes No No Yes No No No	adults spawn around 3-4 age Aquaculture, Recriational fisheries It is possible No. Morphologically this species does not have a means of actively attaching itself to hard substrata No. can not be distributed as eggs. It is possible Does not migrate for reproduction No.Can not be dispersed by other ananimals No information avalable	High Medium Very high High Medium Very high High
7. [35 36 37 38 38 39 40 41 42 44 44	7.03 7.03 7.04 7.05 7.06 7.07 7.08 7.09 <u>oleran</u> 8.01	within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? ce attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle?	>1 Yes No No Yes No No No	adults spawn around 3-4 age Aquaculture, Recriational fisheries It is possible No. Morphologically this species does not have a means of actively attaching itself to hard substrata No. can not be distributed as eggs. It is possible Does not migrate for reproduction No.Can not be dispersed by other ananimals No information avalable No information avalable	High Medium Very high High Medium Very high High Low
7. [35 36 37 38 38 39 40 41 42 44 44	7.03 7.03 7.04 7.05 7.06 7.07 7.08 7.09 <u>oleran</u> 8.01	within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to be dispersed in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? ce attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the	>1 Yes No No Yes No No No	adults spawn around 3-4 age Aquaculture, Recriational fisheries It is possible No. Morphologically this species does not have a means of actively attaching itself to hard substrata No. can not be distributed as eggs. It is possible Does not migrate for reproduction No.Can not be dispersed by other ananimals No information avalable No information about it No information avalable Can not tolerate low oxygen environment and is very sensitive to	High Medium Very high High Medium Very high High Low
7. [335 36 37 38 37 38 39 40 41 42 42 43 44 45	7.03 7.03 7.04 7.05 7.06 7.07 7.08 7.09 <i>oleran</i> 8.01 8.02	within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon tolerant of a wide range of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being	>1 Yes No No Yes No No No No	adults spawn around 3-4 age Aquaculture, Recriational fisheries It is possible No. Morphologically this species does not have a means of actively attaching itself to hard substrata No. can not be distributed as eggs. It is possible Does not migrate for reproduction No.Can not be dispersed by other ananimals No information avalable No information avalable Can not tolerate low oxygen environment and is very sensitive to temperature and to human-produced chemicals.	High Medium Very high High Medium Very high High Low High
7. [335 36 37 38 37 38 39 40 41 42 42 43 44 45	7.03 7.03 7.04 7.05 7.06 7.07 7.08 7.09 <u>oleran</u> 8.01	within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to be dispersed in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? ce attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the	>1 Yes No No Yes No No No	adults spawn around 3-4 age Aquaculture, Recriational fisheries It is possible No. Morphologically this species does not have a means of actively attaching itself to hard substrata No. can not be distributed as eggs. It is possible Does not migrate for reproduction No.Can not be dispersed by other ananimals No information avalable No information about it No information avalable Can not tolerate low oxygen environment and is very sensitive to	High Medium Very high High Medium Very high High Low

47	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	No	Very sensitive species and can not tolerate human disturbance.	Very high
48	8.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	No	No information avalable	Low
49	8.06	Are there effective natural enemies (predators) of the taxon present in the RA	No	No effective natural enemies present in RA area	Very high
C	Climate	e change			
		change			
		Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?	Increase	It was hypotheses that climate change might alert the mechanisms of transportation and introduction of non-native species. Commercial and recreational activities will increase, that itself increases the propagule pressure levels of non-native	Very high
51	9.02	Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	Decrease	In terms of increased temperatures this species will be having troubles to survive in the wild	Medium
52	9.03	Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase. decrease or not change?	Decrease	Increased temperatures will cause stress in their populations making their populations weaker.	High
53	9.04	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	Lower	The environment for them will be unbearable and this species populations will decrease, reducing the impact on biodiversity	High
54	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Lower	The magnitude of future potential impact is low.	High
55	9.06	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	Lower	The magnitude of future potential impact is low.	High

Statistics	
Scores	
BRA	25.0
BRA Outcome	-
BRA+CCA	17.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	20.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	2.0
3. Invasive elsewhere	14.0
B. Biology/Ecology	5.0
4. Undesirable (or persistence) traits	5.0
5. Resource exploitation	5.0
6. Reproduction	0.0
7. Dispersal mechanisms	-1.0
8. Tolerance attributes	-4.0
C. Climate change	-8.0
9. Climate change	-8.0
Answered Questions	
Total	55
Total A. Biogeography/Historical	13
Total A. Biogeography/Historical 1. Domestication/Cultivation	13
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk	13
Total A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere	13 3 5 5
Total A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology	13 3 5 5 36
Total A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits	13 3 5 5 36
Total A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation	13 3 5 5 36
Total A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction	13 3 5 5 36
Total A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms	13 3 5 5 36
Total A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes	13 3 5 5 36 12 2 7 7 9 6
Total A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change	13 3 5 36 12 2 7 9 9 6 6
Total A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change	13 3 5 5 36 12 2 7 7 9 6
Total A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected	13 3 5 5 36 12 2 7 7 9 6 6 6 6
Total A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial	13 3 5 5 36 12 2 7 9 6 6 6 12 12 12 12 12 12 12 12 12 12
Total A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial Environmental	13 3 5 5 36 12 2 7 7 9 6 6 6 6
Total A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial	13 3 5 5 36 12 2 7 9 6 6 6 6 6 6 12

Thresholds	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.69
BRA	0.68
CCA	0.75

Date and Time	
	22/05/2022 15:44:31

Taxon and Assessor details	
Category	Fishes and Lampreys (freshwater)
Taxon name	Salmo trutta
Common name	brown trout
Assessor	Bella Japoshvili
Risk screening context	
Reason and socio-economic benefits	The species was introduced in the South Caucasus region and still is considered as having
Risk assessment area	South Caucasus
Taxonomy	Actinopteri (ray-finned fishes) > Salmoniformes (Salmons) > Salmonidae (Salmonids)
Native range	North Atlantic basin
Introduced range	Many european Countries
URL	https://www.fishbase.de/summary/Salmo-trutta.html

			Response	Justification (references and/or other information)	Confidence
		ography/Historical			
1.		tication/Cultivation	1		1
1	1.01	Has the taxon been the subject of	Yes	Krieg, F., Quillet, E., & Chevassus, B. (1992). Brown trout, Salmo	Medium
		domestication (or cultivation) for at least 20		trutta L.: a new species for intensive marine aquaculture.	
_		generations?		Aquaculture Research, 23(5), 557-566.	
2	1.02	Is the taxon harvested in the wild and likely	Yes	Not well documented, but mostly farmed individuals/propagules	Low
_	1.00	to be sold or used in its live form?		are distributed	
3	1.03	Does the taxon have invasive races,	Yes	Other salmonids	High
2		varieties, sub-taxa or congeners?			
2.		<i>e, distribution and introduction risk</i> How similar are the climatic conditions of the	High	Desults of slimatch algorithm	Low
4	2.01		High	Results of climatch algorithm	Low
		Risk Assessment (RA) area and the taxon's			
5	2.02	native range? What is the quality of the climate matching	Low	Due to low accuracy of Ical climate data	High
5	2.02	data?	LOW	Due to low accuracy of Ical chinate data	iligii
6	2.03	Is the taxon already present outside of	Yes	Ryan, C. 2014. "Salmo trutta" (On-line), Animal Diversity Web.	Very high
Ŭ	2.05	captivity in the RA area?	103	Accessed November 12, 2021 at	very nigh
		captivity in the KA area:		https://animaldiversity.org/accounts/Salmo_trutta/	
7	2.04	How many potential vectors could the taxon	>1	Human mediated dispersal	High
Ĺ	2.01	use to enter in the RA area?	~ 1		ingn
8	2.05	Is the taxon currently found in close	Yes	Kottelat, M., & Freyhof, J. (2007). Handbook of European	High
ĭ	2.00	proximity to, and likely to enter into, the RA		freshwater fishes. Publications Kottelat.	
		area in the near future (e.g. unintentional			
		and intentional introductions)?			
3.	Invasiv	e elsewhere			
9	1	Has the taxon become naturalised	Yes	Ryan, C. 2014. "Salmo trutta" (On-line), Animal Diversity Web.	High
		(established viable populations) outside its		Accessed November 12, 2021 at	
		native range?		https://animaldiversity.org/accounts/Salmo_trutta/	
10	3.02	In the taxon's introduced range, are there	Yes	Ryan, C. 2014. "Salmo trutta" (On-line), Animal Diversity Web.	Medium
		known adverse impacts to wild stocks or		Accessed November 12, 2021 at	
		commercial taxa?		https://animaldiversity.org/accounts/Salmo_trutta/	
11	3.03	In the taxon's introduced range, are there	No	Not documented evidence exists	Medium
		known adverse impacts to aquaculture?			
12	3.04	In the taxon's introduced range, are there	Yes	Ryan, C. 2014. "Salmo trutta" (On-line), Animal Diversity Web.	Low
		known adverse impacts to ecosystem		Accessed November 12, 2021 at	
10	2.05	services?		https://animaldiversity.org/accounts/Salmo_trutta/	
13	3.05	In the taxon's introduced range, are there	Yes	Ryan, C. 2014. "Salmo trutta" (On-line), Animal Diversity Web.	Low
		known adverse socio-economic impacts?		Accessed November 12, 2021 at	
D	Pielea	y/Ecology		https://animaldiversity.org/accounts/Salmo_trutta/	
		rable (or persistence) traits			
		Is it likely that the taxon will be poisonous or	No	Not a harmful species	Very high
		pose other risks to human health?	-		-, 5
15	4.02	Is it likely that the taxon will smother one or	Yes	Ryan, C. 2014. "Salmo trutta" (On-line), Animal Diversity Web.	Medium
		more native taxa (that are not threatened or		Accessed November 12, 2021 at	
		protected)?		https://animaldiversity.org/accounts/Salmo_trutta/	
16	4.03	Are there any threatened or protected taxa	No	The species is a predator mostly consuming arthropod larvae.	Very high
		that the non-native taxon would parasitise in		Thus there are number of species that can be destroied by this	
I		the RA area?		species such as larvae of Gomphidae	
17	4.04	Is the taxon adaptable in terms of climatic	No	Not known	Low
i i	1	and other environmental conditions, thus			
		enhancing its potential persistence if it has			
10	4.05	invaded or could invade the RA area?	Vac		Low
18	4.05	invaded or could invade the RA area? Is the taxon likely to disrupt food-web	Yes	Ryan, C. 2014. "Salmo trutta" (On-line), Animal Diversity Web.	Low
18	4.05	invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it	Yes	Accessed November 12, 2021 at	Low
		invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA		Accessed November 12, 2021 at https://animaldiversity.org/accounts/Salmo_trutta/	
	4.05	invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts	Yes	Accessed November 12, 2021 at	Low
19	4.06	invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes	Accessed November 12, 2021 at https://animaldiversity.org/accounts/Salmo_trutta/ If established it may reduce native trout	Medium
19		invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or		Accessed November 12, 2021 at https://animaldiversity.org/accounts/Salmo_trutta/	
19	4.06	invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and	Yes	Accessed November 12, 2021 at https://animaldiversity.org/accounts/Salmo_trutta/ If established it may reduce native trout	Medium
19 20	4.06	invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and linfectious agents that are endemic in the RA	Yes	Accessed November 12, 2021 at https://animaldiversity.org/accounts/Salmo_trutta/ If established it may reduce native trout no such parasites/infectious agents are known	Medium
19 20	4.06	invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA Is it likely that the taxon will host, and/or	Yes	Accessed November 12, 2021 at https://animaldiversity.org/accounts/Salmo_trutta/ If established it may reduce native trout no such parasites/infectious agents are known Ryan, C. 2014. "Salmo trutta" (On-line), Animal Diversity Web.	Medium
19 20	4.06	invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA Is it likely that the taxon will host, and/or act as a vector for, recognised pests and	Yes	Accessed November 12, 2021 at https://animaldiversity.org/accounts/Salmo_trutta/ If established it may reduce native trout no such parasites/infectious agents are known Ryan, C. 2014. "Salmo trutta" (On-line), Animal Diversity Web. Accessed November 12, 2021 at	Medium
19 20	4.06	invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA Is it likely that the taxon will host, and/or	Yes	Accessed November 12, 2021 at https://animaldiversity.org/accounts/Salmo_trutta/ If established it may reduce native trout no such parasites/infectious agents are known Ryan, C. 2014. "Salmo trutta" (On-line), Animal Diversity Web.	Medium
19 20 21	4.06	invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel	Yes	Accessed November 12, 2021 at https://animaldiversity.org/accounts/Salmo_trutta/ If established it may reduce native trout no such parasites/infectious agents are known Ryan, C. 2014. "Salmo trutta" (On-line), Animal Diversity Web. Accessed November 12, 2021 at	Medium
19 20 21	4.06 4.07 4.08	invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area?	Yes No Yes	Accessed November 12, 2021 at https://animaldiversity.org/accounts/Salmo_trutta/ If established it may reduce native trout no such parasites/infectious agents are known Ryan, C. 2014. "Salmo trutta" (On-line), Animal Diversity Web. Accessed November 12, 2021 at https://animaldiversity.org/accounts/Salmo_trutta/	Medium Low High

23	4.10	Is the taxon capable of sustaining itself in a	Yes	Ryan, C. 2014. "Salmo trutta" (On-line), Animal Diversity Web.	Very high
		range of water velocity conditions (e.g.		Accessed November 12, 2021 at	
		versatile in habitat use)?		https://animaldiversity.org/accounts/Salmo_trutta/	
24	4.11	Is it likely that the taxon's mode of existence	Yes	Ryan, C. 2014. "Salmo trutta" (On-line), Animal Diversity Web.	Low
		(e.g. excretion of by-products) or behaviours		Accessed November 12, 2021 at	
		(e.g. feeding) will reduce habitat quality for		https://animaldiversity.org/accounts/Salmo_trutta/	
		native taxa?			
25	4.12	Is the taxon likely to maintain a viable	No	No documented evidence	Low
		population even when present in low			
		densities (or persisting in adverse conditions			
		by way of a dormant form)?			
-		ce exploitation			
26	5.01	Is the taxon likely to consume threatened or	Yes	Invertebrates	Low
		protected native taxa in the RA area?			
27	5.02	Is the taxon likely to sequester food	No	For a native trout	High
		resources (including nutrients) to the			
		detriment of native taxa in the RA area?			
	Reprod				
28	6.01	Is the taxon likely to exhibit parental care	Yes	The female display provisional parental care on egges and can	Medium
		and/or to reduce age-at-maturity in response		also change the age-at-maturity in response to environmental	
		to environmental conditions?		conditions - Ryan, C. 2014. "Salmo trutta" (On-line), Animal	
				Diversity Web. Accessed November 12, 2021 at	
				https://animaldiversity.org/accounts/Salmo trutta/	
29	6.02	Is the taxon likely to produce viable gametes	No	No documented evidence	Medium
		or propagules (in the RA area)?			
30	6.03	Is the taxon likely to hybridise naturally with	Yes	Expected, not well documented	Low
		native taxa?			
31	6.04	Is the taxon likely to be hermaphroditic or to	No	no such an evidence exists	High
		display asexual reproduction?			
32	6.05	Is the taxon dependent on the presence of	No	No such an evidence exists	High
		another taxon (or specific habitat features)			
		to complete its life cycle?			
33	6.06	Is the taxon known (or likely) to produce a	No	Ryan, C. 2014. "Salmo trutta" (On-line), Animal Diversity Web.	High
		large number of propagules or offspring		Accessed November 12, 2021 at	
_		within a short time span (e.g. < 1 year)?		https://animaldiversity.org/accounts/Salmo_trutta/	
34	6.07	How many time units (days, months, years)	1	years	Very high
		does the taxon require to reach the age-at-			
		first-reproduction?			
_					
		al mechanisms			
	<i>Dispers</i> 7.01	How many potential internal	>1	Recreational and aqucultural purpose	High
			>1	Recreational and aqucultural purpose	High
35	7.01	How many potential internal	>1	Recreational and aqucultural purpose	High
35		How many potential internal vectors/pathways could the taxon use to	>1 Yes	Recreational and aqucultural purpose Colchis protected areas along the Black Sea	High
35	7.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable			
35	7.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the			
35 36	7.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more			
35 36	7.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)?	Yes	Colchis protected areas along the Black Sea	High
35 36	7.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively	Yes	Colchis protected areas along the Black Sea	High
35 36 37	7.01 7.02 7.03	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal?	Yes	Colchis protected areas along the Black Sea	High Very high
35 36 37	7.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to	Yes	Colchis protected areas along the Black Sea	High
35 36 37	7.01 7.02 7.03	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal?	Yes	Colchis protected areas along the Black Sea	High Very high
35 36 37	7.01 7.02 7.03 7.04	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to	Yes	Colchis protected areas along the Black Sea	High Very high Very high
35 36 37	7.01 7.02 7.03	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules	Yes	Colchis protected areas along the Black Sea	High Very high
35 36 37	7.01 7.02 7.03 7.04	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as	Yes	Colchis protected areas along the Black Sea No such an evidence exists Not expected	High Very high Very high
35 36 37	7.01 7.02 7.03 7.04	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to	Yes	Colchis protected areas along the Black Sea No such an evidence exists Not expected	High Very high Very high
35 36 37 38	7.01 7.02 7.03 7.04 7.05	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?	Yes	Colchis protected areas along the Black Sea No such an evidence exists Not expected Species is anadromous	High Very high Very high
35 36 37 38	7.01 7.02 7.03 7.04	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA	Yes	Colchis protected areas along the Black Sea No such an evidence exists Not expected	High Very high Very high
35 36 37 38	7.01 7.02 7.03 7.04 7.05	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?	Yes No Yes	Colchis protected areas along the Black Sea No such an evidence exists Not expected Species is anadromous	High Very high Very high Medium
35 36 37 38 39	7.01 7.02 7.03 7.04 7.05 7.06	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to	Yes No Yes	Colchis protected areas along the Black Sea No such an evidence exists Not expected Species is anadromous Ryan, C. 2014. "Salmo trutta" (On-line), Animal Diversity Web.	High Very high Very high Medium Low
35 36 37 38 39	7.01 7.02 7.03 7.04 7.05	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to	Yes No Yes	Colchis protected areas along the Black Sea No such an evidence exists Not expected Species is anadromous Ryan, C. 2014. "Salmo trutta" (On-line), Animal Diversity Web. Accessed November 12, 2021 at	High Very high Very high Medium
35 36 37 38 39 40 41	7.01 7.02 7.03 7.04 7.05 7.06 7.07	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction?	Yes No Yes Yes	Colchis protected areas along the Black Sea No such an evidence exists Not expected Species is anadromous Ryan, C. 2014. "Salmo trutta" (On-line), Animal Diversity Web. Accessed November 12, 2021 at https://animaldiversity.org/accounts/Salmo_trutta/ No such an evidence exists	High Very high Very high Medium Low
35 36 37 38 39 40 41	7.01 7.02 7.03 7.04 7.05 7.06	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction?	Yes No Yes Yes	Colchis protected areas along the Black Sea No such an evidence exists Not expected Species is anadromous Ryan, C. 2014. "Salmo trutta" (On-line), Animal Diversity Web. Accessed November 12, 2021 at https://animaldiversity.org/accounts/Salmo_trutta/	High Very high Very high Medium Low
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35 36 37 38 39 40 41 42	7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous	Yes No Yes Yes	Colchis protected areas along the Black Sea No such an evidence exists Not expected Species is anadromous Ryan, C. 2014. "Salmo trutta" (On-line), Animal Diversity Web. Accessed November 12, 2021 at https://animaldiversity.org/accounts/Salmo_trutta/ No such an evidence exists	High Very high Very high Medium Low Very high
35 36 37 38 39 40 41 42 43	7.01 7.02 7.03 7.04 7.05 7.05 7.06 7.07 7.08	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent?	Yes No Yes Yes	Colchis protected areas along the Black Sea No such an evidence exists Not expected Species is anadromous Ryan, C. 2014. "Salmo trutta" (On-line), Animal Diversity Web. Accessed November 12, 2021 at https://animaldiversity.org/accounts/Salmo_trutta/ No such an evidence exists	High Very high Very high Medium Low Very high
35 36 37 38 39 40 41 42 43 8.	7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 Tolerant	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed or the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent?	Yes No Yes Yes No Yes	Colchis protected areas along the Black Sea No such an evidence exists Not expected Species is anadromous Ryan, C. 2014. "Salmo trutta" (On-line), Animal Diversity Web. Accessed November 12, 2021 at https://animaldiversity.org/accounts/Salmo_trutta/ No such an evidence exists Can be released intentionally or unintentioally with large quantity No evidence for that	High Very high Very high Medium Low Very high Very high
35 36 37 38 39 40 41 42 43 8.	7.01 7.02 7.03 7.04 7.05 7.05 7.06 7.07 7.08	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? Ce attributes Is the taxon able to withstand being out of	Yes No Yes Yes Yes	Colchis protected areas along the Black Sea No such an evidence exists Not expected Species is anadromous Ryan, C. 2014. "Salmo trutta" (On-line), Animal Diversity Web. Accessed November 12, 2021 at https://animaldiversity.org/accounts/Salmo_trutta/ No such an evidence exists Can be released intentionally or unintentioally with large quantity	High Very high Very high Medium Low Very high Very high
35 36 37 38 39 40 41 42 43 3.	7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 Tolerant	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of	Yes No Yes Yes No Yes	Colchis protected areas along the Black Sea No such an evidence exists Not expected Species is anadromous Ryan, C. 2014. "Salmo trutta" (On-line), Animal Diversity Web. Accessed November 12, 2021 at https://animaldiversity.org/accounts/Salmo_trutta/ No such an evidence exists Can be released intentionally or unintentioally with large quantity No evidence for that	High Very high Very high Medium Low Very high Very high
35 36 37 38 39 40 41 42 43 8.	7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 Tolerant	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? ce attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life	Yes No Yes Yes No Yes	Colchis protected areas along the Black Sea No such an evidence exists Not expected Species is anadromous Ryan, C. 2014. "Salmo trutta" (On-line), Animal Diversity Web. Accessed November 12, 2021 at https://animaldiversity.org/accounts/Salmo_trutta/ No such an evidence exists Can be released intentionally or unintentioally with large quantity No evidence for that	High Very high Very high Medium Low Very high Very high
335 36 37 38 38 39 40 41 42 43 33 44	7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 Toleran 8.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle?	Yes No Yes No Yes No No No No	Colchis protected areas along the Black Sea No such an evidence exists Not expected Species is anadromous Ryan, C. 2014. "Salmo trutta" (On-line), Animal Diversity Web. Accessed November 12, 2021 at https://animaldiversity.org/accounts/Salmo_trutta/ No such an evidence exists Can be released intentionally or unintentioally with large quantity No evidence for that Not expected as with other salmonids	High Very high Very high Medium Low Very high Very high Very high High
35 36 37 38 39 40 41 12 133 14	7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 Tolerant	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed or the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cvcle? Is the taxon tolerant of a wide range of	Yes No Yes Yes No Yes	Colchis protected areas along the Black Sea No such an evidence exists Not expected Species is anadromous Ryan, C. 2014. "Salmo trutta" (On-line), Animal Diversity Web. Accessed November 12, 2021 at https://animaldiversity.org/accounts/Salmo_trutta/ No such an evidence exists Can be released intentionally or unintentioally with large quantity No evidence for that Not expected as with other salmonids Ryan, C. 2014. "Salmo trutta" (On-line), Animal Diversity Web.	High Very high Very high Medium Low Very high Very high
35 36 37 38 39 40 41 42 43 8. 44	7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 Toleran 8.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that	Yes No Yes No Yes No No No No	Colchis protected areas along the Black Sea No such an evidence exists Not expected Species is anadromous Ryan, C. 2014. "Salmo trutta" (On-line), Animal Diversity Web. Accessed November 12, 2021 at https://animaldiversity.org/accounts/Salmo_trutta/ No such an evidence exists Can be released intentionally or unintentioally with large quantity No evidence for that Not expected as with other salmonids Ryan, C. 2014. "Salmo trutta" (On-line), Animal Diversity Web. Accessed November 12, 2021 at	High Very high Very high Medium Low Very high Very high Very high High
335 36 37 38 38 39 40 41 42 43 33 44	7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 Toleran 8.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? ce attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the	Yes No Yes No Yes No No No No	Colchis protected areas along the Black Sea No such an evidence exists Not expected Species is anadromous Ryan, C. 2014. "Salmo trutta" (On-line), Animal Diversity Web. Accessed November 12, 2021 at https://animaldiversity.org/accounts/Salmo_trutta/ No such an evidence exists Can be released intentionally or unintentioally with large quantity No evidence for that Not expected as with other salmonids Ryan, C. 2014. "Salmo trutta" (On-line), Animal Diversity Web.	High Very high Very high Medium Low Very high Very high Very high High
35 36 37 38 39 40 11 12 133 14 15	7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 Tolerant 8.01 8.02	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being	Yes No Yes No Yes No No No No No	Colchis protected areas along the Black Sea No such an evidence exists Not expected Species is anadromous Ryan, C. 2014. "Salmo trutta" (On-line), Animal Diversity Web. Accessed November 12, 2021 at https://animaldiversity.org/accounts/Salmo_trutta/ No such an evidence exists Can be released intentionally or unintentioally with large quantity No evidence for that Not expected as with other salmonids Ryan, C. 2014. "Salmo trutta" (On-line), Animal Diversity Web. Accessed November 12, 2021 at https://animaldiversity.org/accounts/Salmo_trutta/	High Very high Very high Medium Low Very high Very high Very high High
335 36 37 38 39 40 41 42 43 3. 444 45	7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 Toleran 8.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon bole or eradicated in	Yes No Yes No Yes No No No No	Colchis protected areas along the Black Sea No such an evidence exists Not expected Species is anadromous Ryan, C. 2014. "Salmo trutta" (On-line), Animal Diversity Web. Accessed November 12, 2021 at https://animaldiversity.org/accounts/Salmo_trutta/ No such an evidence exists Can be released intentionally or unintentioally with large quantity No evidence for that Not expected as with other salmonids Ryan, C. 2014. "Salmo trutta" (On-line), Animal Diversity Web. Accessed November 12, 2021 at	High Very high Very high Medium Low Very high Very high Very high High
335 336 337 338 339 40 411 42 433 8. 444 445	7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 Tolerant 8.01 8.02	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being	Yes No Yes No Yes No No No No No	Colchis protected areas along the Black Sea No such an evidence exists Not expected Species is anadromous Ryan, C. 2014. "Salmo trutta" (On-line), Animal Diversity Web. Accessed November 12, 2021 at https://animaldiversity.org/accounts/Salmo_trutta/ No such an evidence exists Can be released intentionally or unintentioally with large quantity No evidence for that Not expected as with other salmonids Ryan, C. 2014. "Salmo trutta" (On-line), Animal Diversity Web. Accessed November 12, 2021 at https://animaldiversity.org/accounts/Salmo_trutta/	High Very high Very high Medium Low Very high Very high Very high High
335 336 337 338 339 40 411 42 433 8. 444 445	7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 Tolerant 8.01 8.02	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? ce attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	Yes No Yes No Yes No No No No No	Colchis protected areas along the Black Sea No such an evidence exists Not expected Species is anadromous Ryan, C. 2014. "Salmo trutta" (On-line), Animal Diversity Web. Accessed November 12, 2021 at https://animaldiversity.org/accounts/Salmo_trutta/ No such an evidence exists Can be released intentionally or unintentioally with large quantity Not expected as with other salmonids Ryan, C. 2014. "Salmo trutta" (On-line), Animal Diversity Web. Accessed November 12, 2021 at https://animaldiversity.org/accounts/Salmo_trutta/ Not expected as with other salmonids Ryan, C. 2014. "Salmo trutta" (On-line), Animal Diversity Web. Accessed November 12, 2021 at https://animaldiversity.org/accounts/Salmo_trutta/ Not a documented evdience	High Very high Very high Medium Low Very high Very high Very high High
335 336 337 338 339 40 41 42 43 8. 444 445 446	7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 Tolerant 8.01 8.02	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other	Yes No Yes No Yes No No No No No	Colchis protected areas along the Black Sea No such an evidence exists Not expected Species is anadromous Ryan, C. 2014. "Salmo trutta" (On-line), Animal Diversity Web. Accessed November 12, 2021 at https://animaldiversity.org/accounts/Salmo_trutta/ No such an evidence exists Can be released intentionally or unintentioally with large quantity No evidence for that Not expected as with other salmonids Ryan, C. 2014. "Salmo trutta" (On-line), Animal Diversity Web. Accessed November 12, 2021 at https://animaldiversity.org/accounts/Salmo_trutta/	High Very high Very high Medium Low Very high Very high Very high High
35 36 37 38 39 10 11 12 133 14 15 16	7.01 7.02 7.03 7.04 7.05 7.05 7.06 7.07 7.08 7.09 7.09 7.09 8.01 8.02 8.03	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? ce attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	Yes No Yes Yes No Yes No No	Colchis protected areas along the Black Sea No such an evidence exists Not expected Species is anadromous Ryan, C. 2014. "Salmo trutta" (On-line), Animal Diversity Web. Accessed November 12, 2021 at https://animaldiversity.org/accounts/Salmo_trutta/ No such an evidence exists Can be released intentionally or unintentioally with large quantity Not expected as with other salmonids Ryan, C. 2014. "Salmo trutta" (On-line), Animal Diversity Web. Accessed November 12, 2021 at https://animaldiversity.org/accounts/Salmo_trutta/ Not expected as with other salmonids Ryan, C. 2014. "Salmo trutta" (On-line), Animal Diversity Web. Accessed November 12, 2021 at https://animaldiversity.org/accounts/Salmo_trutta/ Not a documented evdience	High Very high Very high Medium Low Very high Very high Very high High High
35 36 37 38 39 40 41 42 43 44 45 46	7.01 7.02 7.03 7.04 7.05 7.05 7.06 7.07 7.08 7.09 7.09 7.09 8.01 8.02 8.03	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? ce attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Is the taxon likely to tolerate or benefit from	Yes No Yes Yes No Yes No No	Colchis protected areas along the Black Sea No such an evidence exists Not expected Species is anadromous Ryan, C. 2014. "Salmo trutta" (On-line), Animal Diversity Web. Accessed November 12, 2021 at https://animaldiversity.org/accounts/Salmo_trutta/ No such an evidence exists Can be released intentionally or unintentioally with large quantity No evidence for that Not expected as with other salmonids Ryan, C. 2014. "Salmo trutta" (On-line), Animal Diversity Web. Accessed November 12, 2021 at https://animaldiversity.org/accounts/Salmo_trutta/ Not a documented evdience Ryan, C. 2014. "Salmo trutta" (On-line), Animal Diversity Web.	High Very high Very high Medium Low Very high Very high Very high High High
335 336 336 337 338 339 400 411 41 42 438 444 445 446 447	7.01 7.02 7.03 7.04 7.05 7.05 7.06 7.07 7.08 7.09 7.09 7.09 8.01 8.02 8.03	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? ce attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Is the taxon likely to tolerate or benefit from	Yes No Yes No Yes No No No No No No	Colchis protected areas along the Black Sea No such an evidence exists Not expected Species is anadromous Ryan, C. 2014. "Salmo trutta" (On-line), Animal Diversity Web. Accessed November 12, 2021 at https://animaldiversity.org/accounts/Salmo_trutta/ No such an evidence exists Can be released intentionally or unintentioally with large quantity No evidence for that Not expected as with other salmonids Ryan, C. 2014. "Salmo trutta" (On-line), Animal Diversity Web. Accessed November 12, 2021 at https://animaldiversity.org/accounts/Salmo_trutta/ Not expected as with other salmonids Ryan, C. 2014. "Salmo trutta" (On-line), Animal Diversity Web. Accessed November 12, 2021 at https://animaldiversity.org/accounts/Salmo_trutta/ Not a documented evdience Ryan, C. 2014. "Salmo trutta" (On-line), Animal Diversity Web. Accessed November 12, 2021 at	High Very high Very high Medium Low Very high Very high Very high High High
35 36 37 38 39 40 41 12 133 141 12 133 141 142 133 144 15 146 147	7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 7.09 7.09 7.09 8.01 8.02 8.03 8.04	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cvcle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Is the taxon likely to tolerate or benefit from environmental/human disturbance?	Yes No Yes Yes No Yes No No No No No No No	Colchis protected areas along the Black Sea No such an evidence exists Not expected Species is anadromous Ryan, C. 2014. "Salmo trutta" (On-line), Animal Diversity Web. Accessed November 12, 2021 at https://animaldiversity.org/accounts/Salmo_trutta/ No such an evidence exists Can be released intentionally or unintentioally with large quantity No evidence for that Not expected as with other salmonids Ryan, C. 2014. "Salmo trutta" (On-line), Animal Diversity Web. Accessed November 12, 2021 at https://animaldiversity.org/accounts/Salmo_trutta/ Not a documented evdience Ryan, C. 2014. "Salmo trutta" (On-line), Animal Diversity Web. Accessed November 12, 2021 at https://animaldiversity.org/accounts/Salmo_trutta/ Not a documented evdience Ryan, C. 2014. "Salmo trutta" (On-line), Animal Diversity Web. Accessed November 12, 2021 at https://animaldiversity.org/accounts/Salmo_trutta/	High Very high Very high Medium Low Very high Very high Very high High High Low High

40	0.00		NI-		LIC - In
49	8.06	Are there effective natural enemies	No	Not known any species that can act as an effective natural enemy	High
-		(predators) of the taxon present in the RA			
		e change	_		
		change			T
50		Under the predicted future climatic	No change	Not enough information, based on professional judgment	Low
		conditions, are the risks of entry into the RA			
		area posed by the taxon likely to increase,			
		decrease or not change?			
51	9.02	Under the predicted future climatic	No change	Based on professional judgment	Low
		conditions, are the risks of establishment			
		posed by the taxon likely to increase,			
		decrease or not change?			
52	9.03	Under the predicted future climatic	No change	Based on professional judgment	Low
		conditions, are the risks of dispersal within			
		the RA area posed by the taxon likely to			
		increase, decrease or not change?			
53	9.04	Under the predicted future climatic	Higher	Based on professional judgment	Medium
		conditions, what is the likely magnitude of			
		future potential impacts on biodiversity			
		and/or ecological integrity/status?			
54	9.05	Under the predicted future climatic	Higher	Based on professional judgment	Medium
		conditions, what is the likely magnitude of			
		future potential impacts on ecosystem			
I		structure and/or function?			
55	9.06	Under the predicted future climatic	Higher	Based on professional judgment	Medium
		conditions, what is the likely magnitude of			
		future potential impacts on ecosystem			
		services/socio-economic factors?			

Statistics	
Scores	
BRA	34.0
BRA Outcome	-
BRA+CCA	40.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	20.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	2.0
3. Invasive elsewhere	14.0
B. Biology/Ecology	14.0
4. Undesirable (or persistence) traits	6.0
5. Resource exploitation	5.0
6. Reproduction	3.0
7. Dispersal mechanisms	2.0
8. Tolerance attributes	-2.0
C. Climate change	6.0
9. Climate change	6.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
A. Biogeography/Historical 1. Domestication/Cultivation	13
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk	13
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere	13 3 5 5
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology	13 3 5 5 36
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits	13 3 5 5 36 12
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation	13 3 5 5 36 12
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction	13 3 5 5 36 12 2 7
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms	13 3 5 5 36 12 2 7 7 9
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes	13 3 5 5 36 12 2 7 7 9 6
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change	13 3 5 5 36 12 2 7 9 6 6 6
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change	13 3 5 5 36 12 2 7 7 9 6
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected	13 3 5 5 36 12 2 2 7 7 9 6 6 6 6
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial	13 3 5 5 36 12 2 7 9 6 6 6 6 7 7 9 7 7 9 6 7 7 9 7 7 7 9 7 7 7 7
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial Environmental	13 3 5 5 36 12 2 7 9 6 6 6 6 6 7 7 7 7 7 7 7 7 7 7 7 7 7
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial	13 3 5 5 36 12 2 7 9 6 6 6 6 6 7 7 9
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change 9. Climate change Sectors affected Commercial Environmental Species or population nuisance traits	13 3 5 5 36 12 2 7 9 6 6 6 6 6 7 7 7 7 7 7 7 7 7 7 7 7 7
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial Environmental	13 3 5 5 36 12 2 7 9 6 6 6 6 6 7 7 7 7 7 7 7 7 7 7 7 7 7

Thresholds	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.58
BRA	0.61
CCA	0.38
Data and Time	

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axon and Assessor details						
Category	Fishes and Lampreys (freshwater)					
Taxon name	Salmo trutta					
Common name	brown trout					
Assessor	Giorgi Epitashvili					
Risk screening context						
Reason and socio-economic benefits	Brown trout have been widely introduced into suitable environments around the world, including					
Risk assessment area	South Caucasus					
Taxonomy	Salmo trutta Linnaeus 1758					
Native range	Europe and Asia: Atlantic, North, White and Baltic Sea basins, from Spain to Chosha Bay (Russia).					
Introduced range	Brown trout have been widely introduced into suitable environments around the world, including					
URL	https://www.fishbase.se/summary/Salmo-trutta.html					

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
1. L	1	ication/Cultivation	1		1
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	According to FAO aquaculture production statistics (which amalgamate the production of all morphs of Salmo trutta under the statistical category of 'sea trout'), the main producers (>100 tonnes/year) of Salmo trutta in sea water or freshwater in 2010 were the Russian Federation (80 percent of the global total, almost all in freshwater), Italy, Romania, France, the United Kingdom, Germany, Denmark and Bosnia and Herzegovina	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	Sea trout are almost exclusively produced in intersive monoculture systems. The only variations are linked to broodstock supply (wild or farmed) and the age at which the product is sold (eggs, swim-up fry, fingerlings, pan-size fish). Seed supply is an important component of sea trout culture because an important part of the production output is sold as eggs, fry or fingerlings. Broodstock may be domesticated (originating from cultured fish)	Very high
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	In North America Brown trout is considered as invasive in many places as it can out-compete local species like brook trout (Salvelinus fontinalis).	Very high
2.0	Climate	, distribution and introduction risk		Touromas forenais).	1
4	2.01		High	Köppen-Geiger climate classification map	High
5	2.02	What is the quality of the climate matching data?	High	Köppen-Geiger climate classification map	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	European brown trout is found in some rivers of the Caspian and the Black Sea basins (Ninua et al. 20218).	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	This species enters the region for aquaculture purposes	High
8	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)?	No	Data deficient	Low
3 1	Invasiv	e elsewhere			
9	3.01	Has the taxon become naturalised (established viable populations) outside its	Yes	Introduced brown trout have established self-sustaining, wild populations in many introduced countries.	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	Brown trout have had serious negative impacts on upland native fish species in some of the countries where they have been introduced, particularly Australia.	Very high
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	Data deficient	Low
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	Yes	Acoording to cabi.org: Impact Summary of S. trutta: Impact on Fisheries / aquaculture - Positive; impact on Tourism - Positive	Low
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	Yes	Acoording to cabi.org: Impact Summary of S. trutta: Impact on Fisheries / aquaculture - Positive; impact on Tourism - Positive	Low
		y/Ecology			
		able (or persistence) traits			T
		Is it likely that the taxon will be poisonous or pose other risks to human health?		This species does not pose a threat to humans.	High
-	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	Brown trout Salmo trutta were introduced to New Zealand in 1867. Successful establishment was broadly predictable in terms both of the characteristics of brown trout and of the receiving community. There is evidence of impacts of brown trout on the abundance of some native fish and invertebrates, and brown trout have been responsible for the local extinction and fragmentation of certain species (Townsend 1996).	Very high
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	Yes	There are meny protected and threatened species in the SC region which can be hunted by S. trutta: Salmo labrax, Salmo caspius, Salmo ischchan, Acipenser spp, etc.	Very high
17	4.04	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?	Yes	Own judgement	High

18					
	4.05	Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA area?	Yes	This is to be expected. For instance in New Zealand Brown trout may profoundly affect the functioning of stream communities, reducing the abundance of grazing invertebrates and altering their grazing behaviour so that algal biomass increases. A trophic cascade was predictable on the basis of the attributes of the invader and of the stream community. Brown trout seem to have	Very high
				been responsible for the evolution among invertebrates of novel	
	4.00			anti-predator behaviours with far-reaching community	M P
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes	This is to be expected if the species is distributed in the region.	Medium
20	4.07	Is it likely that the taxon will host, and/or	Yes	This is to be expected if the species is distributed in the region.	Medium
		act as a vector for, recognised pests and			
		infectious agents that are endemic in the RA			-
21	4.08	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and	Yes	Data deficient	Low
		infectious agents that are absent from (novel			
		to) the RA area?			
22	4.09	Is it likely that the taxon will achieve a body	Yes	Max length of S. trutta is 140 cm SL male/unsexed; common	Very high
		size that will make it more likely to be		length : 72.0 cm TL male/unsexed; max. published weight: 50.0	
23	4.10	released from captivity? Is the taxon capable of sustaining itself in a	Yes	kg. Therefore, S. trutta is one of the most widely used species in S. trutta found in streams, ponds, rivers and lakes (Scott & Scott,	Very high
		range of water velocity conditions (e.g.		1988). Individuals spend 1 to 5 years in fresh water and 6 months	· · · , · · · j · ·
		versatile in habitat use)?		to 5 years in salt water.	
24	4.11	Is it likely that the taxon's mode of existence	No	Data deficient	Low
		(e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for			
		native taxa?			
25	4.12	Is the taxon likely to maintain a viable	No	Data deficient	Low
		population even when present in low			
		densities (or persisting in adverse conditions by way of a dormant form)?			
5. F	Resourc	ce exploitation		·	
26	5.01	Is the taxon likely to consume threatened or	Yes	S. trutta is a predator fish and probability of this is high if the	High
		protected native taxa in the RA area?		species is distributed in the SC region. Local threatened/protected species such as Salmo spp, Acipenser spp, Luciobarbus capito, etc. will be in danger.	
27	5.02	Is the taxon likely to sequester food	Yes	S. trutta is a predator fish and probability of this is high if the	High
		resources (including nutrients) to the		species is distributed in the SC region.	5
_		detriment of native taxa in the RA area?			
	Reprodu 6.01	Is the taxon likely to exhibit parental care	Yes	The fact that brown trout eggs can be cannibalised by peripheral	High
20	0.01	and/or to reduce age-at-maturity in response to environmental conditions?	165	individuals just after spawning suggests that dominant males would benefit from protecting their offspring by keeping cannibals away from the nest (Tentelier et al. 2011).	lign
29	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	No	Such a fact is not documented	Low
30	6.03	Is the taxon likely to hybridise naturally with native taxa?	Yes	Hybrids between native white-spotted charr Salvelinus leucomaenis and non-native brown trout Salmo trutta were	Very high
31	6.04	Is the taxon likely to be hermanhroditic or to	No	identified in streams of Hokkaido, Japan, using both appearance and genetic characters. The DNA analyses indicated that the specimens were hybrids between female S. leucomaenis and male S. trutta. Occurrence of such hybrids implies increased mating opportunities between these species in wild streams (Kitano et al. Data deficient	Low
31	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	No	and genetic characters. The DNA analyses indicated that the specimens were hybrids between female S. leucomaenis and male S. trutta. Occurrence of such hybrids implies increased mating	Low
	6.04	display asexual reproduction? Is the taxon dependent on the presence of	No Yes	and genetic characters. The DNA analyses indicated that the specimens were hybrids between female S. leucomaenis and male S. trutta. Occurrence of such hybrids implies increased mating opportunities between these species in wild streams (Kitano et al. Data deficient Lacustrine populations of S. trutta undertake migration to	Low Medium
		display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features)	-	and genetic characters. The DNA analyses indicated that the specimens were hybrids between female S. leucomaenis and male S. trutta. Occurrence of such hybrids implies increased mating opportunities between these species in wild streams (Kitano et al. Data deficient Lacustrine populations of S. trutta undertake migration to tributaries and lake outlets to spawn, rarely spawning on stone,	
		display asexual reproduction? Is the taxon dependent on the presence of	-	and genetic characters. The DNA analyses indicated that the specimens were hybrids between female S. leucomaenis and male S. trutta. Occurrence of such hybrids implies increased mating opportunities between these species in wild streams (Kitano et al. Data deficient Lacustrine populations of S. trutta undertake migration to tributaries and lake outlets to spawn, rarely spawning on stone, wave-washed lake shores. Spawns in rivers and streams with swift	
32		display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features)	-	and genetic characters. The DNA analyses indicated that the specimens were hybrids between female S. leucomaenis and male S. trutta. Occurrence of such hybrids implies increased mating opportunities between these species in wild streams (Kitano et al. Data deficient Lacustrine populations of S. trutta undertake migration to tributaries and lake outlets to spawn, rarely spawning on stone,	
32	6.05	display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring	Yes	and genetic characters. The DNA analyses indicated that the specimens were hybrids between female S. leucomaenis and male S. trutta. Occurrence of such hybrids implies increased mating opportunities between these species in wild streams (Kitano et al. Data deficient Lacustrine populations of S. trutta undertake migration to tributaries and lake outlets to spawn, rarely spawning on stone, wave-washed lake shores. Spawns in rivers and streams with swift current, usually characterized by downward movement of water	Medium
32 33	6.05	display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)?	Yes	and genetic characters. The DNA analyses indicated that the specimens were hybrids between female S. leucomaenis and male S. trutta. Occurrence of such hybrids implies increased mating opportunities between these species in wild streams (Kitano et al. Data deficient Lacustrine populations of S. trutta undertake migration to tributaries and lake outlets to spawn, rarely spawning on stone, wave-washed lake shores. Spawns in rivers and streams with swift current, usually characterized by downward movement of water Juveniles mature in 3-4 years and each female produces about 10.000 eggs.	Medium Medium
32	6.05	display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring	Yes	and genetic characters. The DNA analyses indicated that the specimens were hybrids between female S. leucomaenis and male S. trutta. Occurrence of such hybrids implies increased mating opportunities between these species in wild streams (Kitano et al. Data deficient Lacustrine populations of S. trutta undertake migration to tributaries and lake outlets to spawn, rarely spawning on stone, wave-washed lake shores. Spawns in rivers and streams with swift current, usually characterized by downward movement of water Juveniles mature in 3-4 years and each female produces about	Medium
32 33 34	6.05 6.06 6.07	display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	Yes	and genetic characters. The DNA analyses indicated that the specimens were hybrids between female S. leucomaenis and male S. trutta. Occurrence of such hybrids implies increased mating opportunities between these species in wild streams (Kitano et al. Data deficient Lacustrine populations of S. trutta undertake migration to tributaries and lake outlets to spawn, rarely spawning on stone, wave-washed lake shores. Spawns in rivers and streams with swift current, usually characterized by downward movement of water Juveniles mature in 3-4 years and each female produces about 10.000 eggs.	Medium Medium
32 33 34 7. [6.05 6.06 6.07 Dispers	display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms	Yes No 3	and genetic characters. The DNA analyses indicated that the specimens were hybrids between female S. leucomaenis and male S. trutta. Occurrence of such hybrids implies increased mating opportunities between these species in wild streams (Kitano et al. Data deficient Lacustrine populations of S. trutta undertake migration to tributaries and lake outlets to spawn, rarely spawning on stone, wave-washed lake shores. Spawns in rivers and streams with swift current, usually characterized by downward movement of water Juveniles mature in 3-4 years and each female produces about 10.000 eggs. S. trutta mature in 3-4 years (Hart, 1973).	Medium Medium Very high
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32 33 34 35 36	6.05 6.06 6.07 7.01 7.02	display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)?	Yes No 3 One Yes	and genetic characters. The DNA analyses indicated that the specimens were hybrids between female S. leucomaenis and male S. trutta. Occurrence of such hybrids implies increased mating opportunities between these species in wild streams (Kitano et al. Data deficient Lacustrine populations of S. trutta undertake migration to tributaries and lake outlets to spawn, rarely spawning on stone, wave-washed lake shores. Spawns in rivers and streams with swift current, usually characterized by downward movement of water Juveniles mature in 3-4 years and each female produces about 10.000 eggs. S. trutta mature in 3-4 years (Hart, 1973). This species may be distributed in the region through translocation.	Medium Medium Very high High
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41	7.07	Are propagules or eggs of the taxon likely to	No	No such fact has been documented	Medium
		be dispersed in the RA area by other animals?	-		
42	7.08	Is dispersal of the taxon along any of the	Yes	Data deficient	Low
		vectors/pathways mentioned in the previous			
		seven questions (35–41; i.e. both			
43	7.09	unintentional or intentional) likely to be Is dispersal of the taxon density dependent?	No	Data deficient	Medium
		ce attributes	NO		Ineuturn
		Is the taxon able to withstand being out of	No	No such fact has been detected	Very high
		water for extended periods (e.g. minimum of			, 5
		one or more hours) at some stage of its life			
		cycle?			
45	8.02	Is the taxon tolerant of a wide range of	Yes	Found in streams, ponds, rivers and lakes. Individuals spend 1 to	Very high
		water quality conditions relevant to that taxon? [In the Justification field, indicate the		5 years in fresh water and 6 months to 5 years in salt water. Juveniles mature in 3-4 years. Lacustrine populations undertake	
		relevant water quality variable(s) being		migration to tributaries and lake outlets to spawn, rarely spawning	
		considered.]		on stone, wave-washed lake shores. Spawns in rivers and streams	
		consideredij		with swift current, usually characterized by downward movement	
				of water intro gravel. Spawning takes place normally more than	
				one time. They prefer cold, well-oxygenated upland waters	
1				although their tolerance limits are lower than those of rainbow	
				trout and favors large streams in the mountainous areas with	
16	8.03	Can the taxon be controlled or eradicated in	Vac	adequate cover in the form of submerged rocks, undercut banks. No research has been conducted in this direction.	Medium
40	0.05	the wild with chemical, biological, or other	Yes		meuluin
1		agents/means?			
47	8.04	Is the taxon likely to tolerate or benefit from	Yes	In meny countries and areas this species distribuited through	High
		environmental/human disturbance?		humans	-
48	8.05	Is the taxon able to tolerate salinity levels	Yes	S. trutta individuals spend 1 to 5 years in fresh water and 6	Very high
		that are higher or lower than those found in		months to 5 years in salt water.	
10	0.00	its usual environment?			
49	8.06	Are there effective natural enemies (predators) of the taxon present in the RA	Yes	There are several predators in the SC region which can controll the populations of S. trutta, e.g. Salmo spp, Squalius spp, Esox	High
		area?		lucius, Sander lucioperca, etc.	
с. с	Climate	e change			
9. (Climate	change			
50	9.01	Under the predicted future climatic	Increase	The entry of this species into the region depends on the human	Low
1		conditions, are the risks of entry into the RA			
		area posed by the taxon likely to increase,			
51	9.02	decrease or not change? Under the predicted future climatic	Increase	The establishment of this species into the region will probably	Low
1	9.02	conditions, are the risks of establishment	Inci case	growth	2000
1		posed by the taxon likely to increase,		3.0	
		decrease or not change?			
52	9.03	Under the predicted future climatic	Increase	The disperse of this species in the South Caucasus depends on the	Low
1		conditions, are the risks of dispersal within		human and further development of the aquaculture in the region.	
		the RA area posed by the taxon likely to			
52	9.04	increase, decrease or not change? Under the predicted future climatic	No change	Own judgement	Low
55	9.04	conditions, what is the likely magnitude of	No change		LUW
		future potential impacts on biodiversity			
1		and/or ecological integrity/status?			
54	9.05	Under the predicted future climatic	No change	Own judgement	Low
		conditions, what is the likely magnitude of			
1		future potential impacts on ecosystem			
.	0.07	structure and/or function?	Lawar	Own judgement	Low
55	9.06	Under the predicted future climatic conditions, what is the likely magnitude of	Lower	Own judgement	Low
		future potential impacts on ecosystem			
		services/socio-economic factors?			
	1		1	1	1

Statistics	
Scores	
BRA	35.0
BRA Outcome	-
BRA+CCA	39.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	19.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	14.0
B. Biology/Ecology	16.0
4. Undesirable (or persistence) traits	9.0
5. Resource exploitation	7.0
6. Reproduction	0.0
7. Dispersal mechanisms	-3.0
8. Tolerance attributes	3.0
C. Climate change	4.0
9. Climate change	4.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3
2. Climate, distribution and introduction risk	5

3. Invasive elsewhere	5
B. Biology/Ecology	36
ble (or persistence) traits	12
5. Resource exploitation	2
6. Reproduction	7
7. Dispersal mechanisms	9
8. Tolerance attributes	6
C. Climate change	6
9. Climate change	6
's affected	
Commercial	11
Environmental	12
ulation nuisance traits	19
esholds	
BD A	

BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.64
BRA	0.68
CCA	0.25

Date and Time 13/05/2022 18:12:22

Taxon and Assessor details	
Category	Fishes and Lampreys (freshwater)
Taxon name	Salmo trutta
Common name	brown trout
Assessor	Tatia Kuljanishvili
Risk screening context	
Reason and socio-economic benefits	Aquaculture important species introduced worldwide
Risk assessment area	South Caucasus
Taxonomy	Actinopteri (ray-finned fishes) > Salmoniformes (Salmons) > Salmonidae (Salmonids) >
Native range	Europe and Asia: Atlantic, North, White and Baltic Sea basins, from Spain to Chosha Bay
Introduced range	Widly introduced
URL	https://www.fishbase.de/summary/Salmo-trutta.html

4			Response	Justification (references and/or other information)	Confidence
		ography/Historical			
1. l		tication/Cultivation			
1	1.01	Has the taxon been the subject of	Yes	Sea trout is probably the first species of fish for which artificial	Very high
		domestication (or cultivation) for at least 20		reproduction was performed. This probably occurred in Germany	
		generations?		around 1739 and the first sea trout hatchery was established in	
				1841 in the UK. The technique of artificial fertilization was	
				optimized in the 1850s. Since then, sea trout has been produced	
				extensively in Europe and introduced to all continents as a sport	
				fish	
_	1.00		X	http://www.fao.org/fisherv/culturedspecies/Salmo_trutta/en#tcNA	1.12 1
2	1.02	Is the taxon harvested in the wild and likely	Yes	Artificially spawned sea trout can be sold as fertilized eggs of fry.	High
		to be sold or used in its live form?			
3	1.03	Does the taxon have invasive races,	Yes	Examples: golden trout, brook trout, brown trout (Knapp 1996)	High
		varieties, sub-taxa or congeners?			
2. (Climate	e, distribution and introduction risk			
4	2.01	How similar are the climatic conditions of the	Medium	The climate is somehow similar	Medium
		Risk Assessment (RA) area and the taxon's			
		native range?			
5	2.02	What is the quality of the climate matching	Low	Quality of clilmate matching data is low	High
J	2.02		LOW	Quality of chilliate matching data is low	riigii
_	2.65	data?			
6	2.03	Is the taxon already present outside of	Yes	Recorded from Armenian freshwaters	High
		captivity in the RA area?			
7	2.04	How many potential vectors could the taxon	>1	Aquaculture, intentional releases by local fishermnen	High
		use to enter in the RA area?			
8	2.05	Is the taxon currently found in close	Yes	It is already found in Armenia and has been introduced in Georgia	High
		proximity to, and likely to enter into, the RA		in the past	5
		area in the near future (e.g. unintentional		in the pase	
2	T	and intentional introductions)?			
5.1			24		her i
J	3.01	Has the taxon become naturalised	Yes	Yes. For example North America	High
		(established viable populations) outside its			
10	3.02	In the taxon's introduced range, are there	Yes	They usually sellected native prey for example in Trinity River	Very high
		known adverse impacts to wild stocks or		(California).	
		commercial taxa?			
11	3.03	In the taxon's introduced range, are there	Yes	They have been praying on aquaculture important fish	High
		known adverse impacts to aquaculture?		·, · · · · · · · · · · · · · · · · ·	5
12	3.04	In the taxon's introduced range, are there	Yes	Can be transmitting the diseases	Low
12	5.01	known adverse impacts to ecosystem	105		2011
1 2	2.05		NIE	The law week house week	1
13	3.05	In the taxon's introduced range, are there	No	It is not known	Low
_		known adverse socio-economic impacts?			
		y/Ecology			
		rable (or persistence) traits			
14	4.01	Is it likely that the taxon will be poisonous or	No	Not poisonous	
	1	is it likely that the taxon will be poisonous of	110	Not poisonous	Very high
		pose other risks to human health?	110		Very high
	4.02		Yes		Very high High
	4.02	pose other risks to human health? Is it likely that the taxon will smother one or		introduced brown trout may negatively affect populations of native	
	4.02	pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or		introduced brown trout may negatively affect populations of native fishes in 39 areas where they have been introduced (Townsend,	
	4.02	pose other risks to human health? Is it likely that the taxon will smother one or		introduced brown trout may negatively affect populations of native fishes in 39 areas where they have been introduced (Townsend, 1996; McHugh & Budy, 2006; Belk 40 et al., 2016; Hoxmeier &	
15		pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	introduced brown trout may negatively affect populations of native fishes in 39 areas where they have been introduced (Townsend, 1996; McHugh & Budy, 2006; Belk 40 et al., 2016; Hoxmeier & Dieterman, 2016)	High
15	4.02	pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa		introduced brown trout may negatively affect populations of native fishes in 39 areas where they have been introduced (Townsend, 1996; McHugh & Budy, 2006; Belk 40 et al., 2016; Hoxmeier &	
15		pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in	Yes	introduced brown trout may negatively affect populations of native fishes in 39 areas where they have been introduced (Townsend, 1996; McHugh & Budy, 2006; Belk 40 et al., 2016; Hoxmeier & Dieterman, 2016)	High
15		pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa	Yes	introduced brown trout may negatively affect populations of native fishes in 39 areas where they have been introduced (Townsend, 1996; McHugh & Budy, 2006; Belk 40 et al., 2016; Hoxmeier & Dieterman, 2016)	High
15		pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in	Yes	introduced brown trout may negatively affect populations of native fishes in 39 areas where they have been introduced (Townsend, 1996; McHugh & Budy, 2006; Belk 40 et al., 2016; Hoxmeier & Dieterman, 2016)	High
15	4.03	pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	Yes	introduced brown trout may negatively affect populations of native fishes in 39 areas where they have been introduced (Townsend, 1996; McHugh & Budy, 2006; Belk 40 et al., 2016; Hoxmeier & Dieterman, 2016) Does not parasite	High High
15	4.03	pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus	Yes	introduced brown trout may negatively affect populations of native fishes in 39 areas where they have been introduced (Townsend, 1996; McHugh & Budy, 2006; Belk 40 et al., 2016; Hoxmeier & Dieterman, 2016) Does not parasite Found in streams, ponds, rivers and lakes (Ref. 5951). Individuals spend 1 to 5 years in fresh water and 6 months to 5 years in salt	High High
15	4.03	pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has	Yes	introduced brown trout may negatively affect populations of native fishes in 39 areas where they have been introduced (Townsend, 1996; McHugh & Budy, 2006; Belk 40 et al., 2016; Hoxmeier & Dieterman, 2016) Does not parasite Found in streams, ponds, rivers and lakes (Ref. 5951). Individuals	High High
L5 L6	4.03	pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?	Yes No Yes	introduced brown trout may negatively affect populations of native fishes in 39 areas where they have been introduced (Townsend, 1996; McHugh & Budy, 2006; Belk 40 et al., 2016; Hoxmeier & Dieterman, 2016) Does not parasite Found in streams, ponds, rivers and lakes (Ref. 5951). Individuals spend 1 to 5 years in fresh water and 6 months to 5 years in salt water (Ref. 51442).	High High High
L5 L6	4.03	pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web	Yes	introduced brown trout may negatively affect populations of native fishes in 39 areas where they have been introduced (Townsend, 1996; McHugh & Budy, 2006; Belk 40 et al., 2016; Hoxmeier & Dieterman, 2016) Does not parasite Found in streams, ponds, rivers and lakes (Ref. 5951). Individuals spend 1 to 5 years in fresh water and 6 months to 5 years in salt water (Ref. 51442). It can shape native fish community as well as amphibians,	High High
15 16 17	4.03	pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it	Yes No Yes	introduced brown trout may negatively affect populations of native fishes in 39 areas where they have been introduced (Townsend, 1996; McHugh & Budy, 2006; Belk 40 et al., 2016; Hoxmeier & Dieterman, 2016) Does not parasite Found in streams, ponds, rivers and lakes (Ref. 5951). Individuals spend 1 to 5 years in fresh water and 6 months to 5 years in salt water (Ref. 51442).	High High High
15 16 17	4.03 4.04 4.05	pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA	Yes No Yes Yes	introduced brown trout may negatively affect populations of native fishes in 39 areas where they have been introduced (Townsend, 1996; McHugh & Budy, 2006; Belk 40 et al., 2016; Hoxmeier & Dieterman, 2016) Does not parasite Found in streams, ponds, rivers and lakes (Ref. 5951). Individuals spend 1 to 5 years in fresh water and 6 months to 5 years in salt water (Ref. 51442). It can shape native fish community as well as amphibians, zooplankton and benthic macroinvertebrates.	High High High
15 16 17	4.03	pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts	Yes No Yes	introduced brown trout may negatively affect populations of native fishes in 39 areas where they have been introduced (Townsend, 1996; McHugh & Budy, 2006; Belk 40 et al., 2016; Hoxmeier & Dieterman, 2016) Does not parasite Found in streams, ponds, rivers and lakes (Ref. 5951). Individuals spend 1 to 5 years in fresh water and 6 months to 5 years in salt water (Ref. 51442). It can shape native fish community as well as amphibians,	High High High
15 16 17 18	4.03 4.04 4.05 4.06	pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes No Yes Yes	introduced brown trout may negatively affect populations of native fishes in 39 areas where they have been introduced (Townsend, 1996; McHugh & Budy, 2006; Belk 40 et al., 2016; Hoxmeier & Dieterman, 2016) Does not parasite Found in streams, ponds, rivers and lakes (Ref. 5951). Individuals spend 1 to 5 years in fresh water and 6 months to 5 years in salt water (Ref. 51442). It can shape native fish community as well as amphibians, zooplankton and benthic macroinvertebrates.	High High High
15 16 17 18	4.03 4.04 4.05	pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts	Yes No Yes Yes	introduced brown trout may negatively affect populations of native fishes in 39 areas where they have been introduced (Townsend, 1996; McHugh & Budy, 2006; Belk 40 et al., 2016; Hoxmeier & Dieterman, 2016) Does not parasite Found in streams, ponds, rivers and lakes (Ref. 5951). Individuals spend 1 to 5 years in fresh water and 6 months to 5 years in salt water (Ref. 51442). It can shape native fish community as well as amphibians, zooplankton and benthic macroinvertebrates.	High High High
L5 L6 L7 L8	4.03 4.04 4.05 4.06	pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or	Yes No Yes Yes	introduced brown trout may negatively affect populations of native fishes in 39 areas where they have been introduced (Townsend, 1996; McHugh & Budy, 2006; Belk 40 et al., 2016; Hoxmeier & Dieterman, 2016) Does not parasite Found in streams, ponds, rivers and lakes (Ref. 5951). Individuals spend 1 to 5 years in fresh water and 6 months to 5 years in salt water (Ref. 51442). It can shape native fish community as well as amphibians, zooplankton and benthic macroinvertebrates.	High High High High Low
L5 L6 L7 L8	4.03 4.04 4.05 4.06	pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and	Yes No Yes Yes	introduced brown trout may negatively affect populations of native fishes in 39 areas where they have been introduced (Townsend, 1996; McHugh & Budy, 2006; Belk 40 et al., 2016; Hoxmeier & Dieterman, 2016) Does not parasite Found in streams, ponds, rivers and lakes (Ref. 5951). Individuals spend 1 to 5 years in fresh water and 6 months to 5 years in salt water (Ref. 51442). It can shape native fish community as well as amphibians, zooplankton and benthic macroinvertebrates.	High High High High Low
L5 L6 L7 L8 L9	4.03 4.04 4.05 4.06 4.07	pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA	Yes No Yes Yes No	introduced brown trout may negatively affect populations of native fishes in 39 areas where they have been introduced (Townsend, 1996; McHugh & Budy, 2006; Belk 40 et al., 2016; Hoxmeier & Dieterman, 2016) Does not parasite Found in streams, ponds, rivers and lakes (Ref. 5951). Individuals spend 1 to 5 years in fresh water and 6 months to 5 years in salt water (Ref. 51442). It can shape native fish community as well as amphibians, zooplankton and benthic macroinvertebrates. can be transmitting deseases No such information available.	High High High Low Low
L5 L6 L7 L8 L9	4.03 4.04 4.05 4.06	pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to exert adverse impacts on ecosystem services in the RA area? Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA Is it likely that the taxon will host, and/or	Yes No Yes Yes	introduced brown trout may negatively affect populations of native fishes in 39 areas where they have been introduced (Townsend, 1996; McHugh & Budy, 2006; Belk 40 et al., 2016; Hoxmeier & Dieterman, 2016) Does not parasite Found in streams, ponds, rivers and lakes (Ref. 5951). Individuals spend 1 to 5 years in fresh water and 6 months to 5 years in salt water (Ref. 51442). It can shape native fish community as well as amphibians, zooplankton and benthic macroinvertebrates.	High High High High Low
L5 L6 L7 L8 L9	4.03 4.04 4.05 4.06 4.07	pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA	Yes No Yes Yes No	introduced brown trout may negatively affect populations of native fishes in 39 areas where they have been introduced (Townsend, 1996; McHugh & Budy, 2006; Belk 40 et al., 2016; Hoxmeier & Dieterman, 2016) Does not parasite Found in streams, ponds, rivers and lakes (Ref. 5951). Individuals spend 1 to 5 years in fresh water and 6 months to 5 years in salt water (Ref. 51442). It can shape native fish community as well as amphibians, zooplankton and benthic macroinvertebrates. can be transmitting deseases No such information available.	High High High Low Low
.5	4.03 4.04 4.05 4.06 4.07	pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to exert adverse impacts on ecosystem services in the RA area? Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA Is it likely that the taxon will host, and/or	Yes No Yes Yes No	introduced brown trout may negatively affect populations of native fishes in 39 areas where they have been introduced (Townsend, 1996; McHugh & Budy, 2006; Belk 40 et al., 2016; Hoxmeier & Dieterman, 2016) Does not parasite Found in streams, ponds, rivers and lakes (Ref. 5951). Individuals spend 1 to 5 years in fresh water and 6 months to 5 years in salt water (Ref. 51442). It can shape native fish community as well as amphibians, zooplankton and benthic macroinvertebrates. can be transmitting deseases No such information available.	High High High Low Low

22	4.09	Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity?	Yes	Can grow up to 70 cm	High
23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)?	Yes	It can persist in both, standing and flowing rivers and lakes and the anadromous behaviour of the fish facilitates it's dispersal upstreams.	Very high
24	4.11	Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for	No	No information avalable	High
25	4.12	native taxa? Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions	No	Probably no	Low
		by way of a dormant form)?			
-		e exploitation			
		Is the taxon likely to consume threatened or protected native taxa in the RA area?	Yes	Can affect endangered benthic invertebrates and fish fry.	High
27	5.02	Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?	Yes	Possibly yes	Low
	Reprodu	iction			
28	6.01	Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?	No	Does not exhibit parental care See: https://www.fishbase.de/summary/Salmo-trutta.html	High
		Is the taxon likely to produce viable gametes or propagules (in the RA area)?	No	Kuljanishvili et al 2021 proposed that there are no conditions for this species to produce viable gametes	Low
	6.03	Is the taxon likely to hybridise naturally with native taxa?	Yes	It is possible	Low
-	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	No	No. Does not display asexual reproduction	Very high
32	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	No	No. See: https://www.fishbase.de/summary/Salmo-trutta.html	Very high
33	6.06	Is the taxon known (or likely) to produce a large number of propagules or offspring	Yes	Can spawn 2-3 times during season	High
34	6.07	within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at-	2	2-3 years	High
7 5	lianara	first-reproduction?			
	7.01	al mechanisms How many potential internal	>1	Aquaculture, Recreational fisheries, Self Dispersal	High
	,	vectors/pathways could the taxon use to disperse within the RA area (with suitable			
36	7.02	Will any of these vectors/pathways bring the taxon in close proximity to one or more	Yes	it can reach there via self-spreaading	Medium
37	7.03	protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances	No	No. Morphologically this species does not have a means of actively attaching itself to hard substrata	Very high
38	7.04	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?	No	No. can not be distributed as eggs.	High
39	7.05	Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA	Yes	Yes. it is possible.	High
40	7.06	area? Are older life stages of the taxon likely to	Yes	It is possible, however, it is not documented	Medium
41	7.07	migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No	No. Can not be dispersed by other ananimals	Very high
42	7.08	Is dispersed in the two along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both	Yes	It could be, however not documented	Medium
	7.09	unintentional or intentional) likely to be Is dispersal of the taxon density dependent?	Yes	SInce this species is very territorial, it could be that they will further spread as population density increases	Medium
	<i>olerano</i> 8.01	<i>ce attributes</i> Is the taxon able to withstand being out of	No	No information avalable	High
44	0.01	Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle?	No	וייט ווויטרווומנוטור מימומטופ	High
45	8.02	Cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the	No	Can not tolerate low oxygen environment and is very sensitive to temperature and to human-produced chemicals.	Medium
46	8.03	relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other	No	No. This is less likely.	High
47	8.04	agents/means? Is the taxon likely to tolerate or benefit from environmental/human disturbance?	No	No information avalable	Very high
47					1

49		Are there effective natural enemies	No	No effective natural enemies present in RA area	Very high
-		(predators) of the taxon present in the RA			
		e change	_		
		change	T		1 .
50		Under the predicted future climatic	Increase	It was hypotheses that climate change might alert the	High
		conditions, are the risks of entry into the RA		mechanisms of transportation and introduction of non-native	
		area posed by the taxon likely to increase,		species. Commercial and recreational activities will increase, that	
		decrease or not change?		itself increases the propagule pressure levels of non-native	
51		Under the predicted future climatic	Decrease	In terms of increased temperatures this species will be having	High
		conditions, are the risks of establishment		troubles to survive in the wild	
		posed by the taxon likely to increase,			
		decrease or not change?			
52		Under the predicted future climatic	Decrease	Increased temperatures will cause stress in O. mykiss populations	High
		conditions, are the risks of dispersal within		making their populations weaker.	
		the RA area posed by the taxon likely to			
		increase, decrease or not change?			
53		Under the predicted future climatic	Lower	The environment for them will be unbearable and this species	High
		conditions, what is the likely magnitude of		populations will decrease.	
		future potential impacts on biodiversity			
		and/or ecological integrity/status?			
54	9.05	Under the predicted future climatic	Lower	the magnitude of future potential impact is low.	High
		conditions, what is the likely magnitude of			
		future potential impacts on ecosystem			
		structure and/or function?			
55	9.06	Under the predicted future climatic	Lower	the magnitude of future potential impact is low.	High
		conditions, what is the likely magnitude of			
		future potential impacts on ecosystem			
		services/socio-economic factors?			

Statistics	
Scores	
BRA	39.0
BRA Outcome	-
BRA+CCA	31.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	20.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	2.0
3. Invasive elsewhere	14.0
B. Biology/Ecology	19.0
4. Undesirable (or persistence) traits	6.0
5. Resource exploitation	7.0
6. Reproduction	2.0
7. Dispersal mechanisms	3.0
8. Tolerance attributes	1.0
C. Climate change	-8.0
9. Climate change	-8.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
A. Biogeography/Historical 1. Domestication/Cultivation	13
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk	13
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere	13 3 5 5
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology	13 3 5 5 36
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits	13 3 5 5 36 12
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation	13 3 5 5 36 12 2
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction	13 3 5 5 36 12 2
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms	13 3 5 5 36 12 2 7 7 9
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes	13 3 5 5 36 12 2 7 7 9 6
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change	13 3 5 5 36 12 2 7 9 6 6 6
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change	13 3 5 5 36 12 2 7 7 9 6
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected	13 3 5 5 36 12 2 2 7 7 9 6 6 6
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial	13 3 5 5 36 12 2 7 9 6 6 6 6 13
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Environmental Environmental	13 3 5 5 36 12 2 7 9 6 6 6 6 6 6 7 7
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial	13 3 5 5 36 12 2 7 9 6 6 6 6 6 13
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial Environmental Species or population nuisance traits	13 3 5 5 36 12 2 7 9 6 6 6 6 6 6 7 7
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Environmental Environmental	13 3 5 5 36 12 2 7 9 6 6 6 6 6 6 7 7

BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.69
BRA	0.68
CCA	0.75
Date and Time	

22/05/2022 15:47:39

Taxon and Assessor details					
Category	Fishes and Lampreys (freshwater)				
Taxon name	Salvelinus fontinalis				
Common name	brook trout				
Assessor	Bella Japoshvili				
Risk screening context					
Reason and socio-economic benefits	Widely introduced out of its natural margins. Not yet introduced in the South Caucasus but				
Risk assessment area	South Caucasus				
Taxonomy	Actinopteri (ray-finned fishes) > Salmoniformes (Salmons) > Salmonidae (Salmonids)				
Native range	Nort America				
Introduced range	South America, Europe and Asia				
URL	https://www.fishbase.de/summary/Salvelinus-fontinalis.html				

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
1. L		ication/Cultivation			
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20	Yes	CABI, 2021. Salvelinus fontinalis (Brook trout). https://www.cabi.org/isc/datasheet/65325 (accessed November	Very high
2	1.02	generations? Is the taxon harvested in the wild and likely	Yes	2021) The species was extensively harvested and sold in its live forms in	Low
3		to be sold or used in its live form?	Yes	the past, but no information on recent harvesting and use is	Vorschich
		Does the taxon have invasive races, varieties, sub-taxa or congeners?	res	Congeneres	Very high
2. (, distribution and introduction risk			
4	2.01	How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range?	High	Results of climatch algoriyhm	Medium
5	2.02	What is the quality of the climate matching data?	Low	Due to low accuracy of local climate data	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	No	CABI, 2021. Salvelinus fontinalis (Brook trout). https://www.cabi.org/isc/datasheet/65325 (accessed November 2021)	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	>1	Aquacultural and recreational purpose	High
8	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)?	Yes	CABI, 2021. Salvelinus fontinalis (Brook trout). https://www.cabi.org/isc/datasheet/65325 (accessed November 2021)	High
3. I	nvasive	e elsewhere			
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	CABI, 2021. Salvelinus fontinalis (Brook trout). https://www.cabi.org/isc/datasheet/65325 (accessed November 2021)	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	No	No documented evidence	Medium
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	No such an evidence exists	High
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	No	No such an evidence is exists	High
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	No such an evidence is exists	High
B. I	Biology	//Ecology			
4. L	Indesir	able (or persistence) traits			
14	4.01	Is it likely that the taxon will be poisonous or pose other risks to human health?	No	Not a harmful species	Very high
15	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	No	It is reported that the species is outcompeted by a native river salmon (CABI, 2021. Salvelinus fontinalis (Brook trout). https://www.cabi.org/isc/datasheet/65325 (accessed November 2021))	High
	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	Not a parasite species	Very high
17	4.04	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?	No	No relevan information is available	Medium
18	4.05	Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA	No	Not expected	Medium
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	Not expected based on professional judgement	Medium
20	4.07	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA	No	No such parasite/infectious agent is known from the RA area	High
	4.08	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area?	Yes	CABI, 2021. Salvelinus fontinalis (Brook trout). https://www.cabi.org/isc/datasheet/65325 (accessed November 2021)	High
22	4.09	Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity?	Yes	Kottelat, M., & Freyhof, J. (2007). Handbook of European freshwater fishes. Publications Kottelat.	Very high

23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)?	Yes	Needs mountain rivers (medium to fast flowing). Hoever Mountain lakes are also invided CABI, 2021. Salvelinus fontinalis (Brook trout). https://www.cabi.org/isc/datasheet/65325 (accessed November 2021)	High
24	4.11	Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa?	No	Not expected	High
5	4.12	Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)?	No	Not expected, no relevant data	Medium
		ce exploitation			
		Is the taxon likely to consume threatened or protected native taxa in the RA area?	Yes	Some aquatic invertebrates	Low
/	5.02	Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?	Yes	Native salmon	High
. F	Reprodu		1		1
8	6.01	Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response	Yes	Muus BJ, Dahlström P, 1981. [English title not available]. (Sötvattensfisk och fiske i Europa.) Sötvattensfisk och fiske i	Medium
9	6.02	to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)?	No	Europa. Stockholm: PA Norstedt & Söners förlag No such an evidence exists	Low
	6.03	Is the taxon likely to hybridise naturally with native taxa?	Yes	CABI, 2021. Salvelinus fontinalis (Brook trout). https://www.cabi.org/isc/datasheet/65325 (accessed November 2021); Kottelat, M., & Freyhof, J. (2007). Handbook of European freshwater fishes. Publications Kottelat.	Very high
1	6.04	Is the taxon likely to be hermaphroditic or to	No	Sexually reproducing species	Medium
2	6.05	display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	No	Does not depend on any other species to complete life cycle	Very high
3	6.06	Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)?	No	Maximum several thousand of egges are reported (CABI, 2021. Salvelinus fontinalis (Brook trout). https://www.cabi.org/isc/datasheet/65325 (accessed November	Medium
4	6.07	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	1	2021)) year	High
'. L	Dispersa	al mechanisms			4
		How many potential internal	>1	Recreational and aquacultural purpose, can escape from captivity	High
6	7.02	vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more	Yes	Colchis national park along the Black Sea	High
7	7.03	protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal?	No	No such a behavior is ever recorded	Very high
8	7.04	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules	No	No such an evidence exists	Very high
9	7.05	(for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?	Yes	Juveniles are usually transported with water currents for long distance	Very high
0	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	No	Not occuring in neghboring seas	Very high
	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?		No such an evidence exists	Very high
2	7.08	Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be	Yes	Human meidated dispersal can be rapid depneding on the release intensity.	Medium
	7.09	Is dispersal of the taxon density dependent?	No	No such an evidence is known	High
		ce attributes			.
		Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle?	No	As other salmonids this species can not cope with out of water environment	Very high
	8.02	Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the	No	No such an evidnece exists	High
5		relevant water quality variable(c) being	1	No such an evidence exists	High
	8.03	relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	No		i ngin
6	8.03 8.04 8.05	Can the taxon be controlled or eradicated in the wild with chemical, biological, or other	No No No	Not expected based on professional judgment Not expected since in its natural environment th variability of	Very high

40	0.00				N 1 1 1
49		Are there effective natural enemies	No	No effectiv enatural enemies are known from the RA area	Very high
		(predators) of the taxon present in the RA			
		e change	_		
		change	1.		
50	9.01	Under the predicted future climatic	Increase	Based on professional guess	Low
		conditions, are the risks of entry into the RA			
		area posed by the taxon likely to increase,			
		decrease or not change?			
51	9.02	Under the predicted future climatic	Decrease	Based on professional guess	Low
		conditions, are the risks of establishment			
		posed by the taxon likely to increase,			
		decrease or not change?			
52	9.03	Under the predicted future climatic	Decrease	Based on professional guess	Low
		conditions, are the risks of dispersal within			
		the RA area posed by the taxon likely to			
		increase, decrease or not change?			
53	9.04	Under the predicted future climatic	No change	Based on professional guess	Low
		conditions, what is the likely magnitude of			
		future potential impacts on biodiversity			
		and/or ecological integrity/status?			
54	9.05	Under the predicted future climatic	No change	Based on professional guess	Low
		conditions, what is the likely magnitude of			
		future potential impacts on ecosystem			
		structure and/or function?			
55	9.06	Under the predicted future climatic	Higher	Based on professional guess	Low
		conditions, what is the likely magnitude of			
		future potential impacts on ecosystem			
		services/socio-economic factors?			

Statistics	
Scores	1
BRA	17.0
BRA Outcome	-
BRA+CCA	17.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	7.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	2.0
B. Biology/Ecology	10.0
4. Undesirable (or persistence) traits	2.0
5. Resource exploitation	7.0
6. Reproduction	3.0
7. Dispersal mechanisms	0.0
8. Tolerance attributes	-2.0
C. Climate change	0.0
9. Climate change	0.0
Answered Questions	
Total A. Biogeography/Historical	<u>55</u> 13
A. Biogeography/Historical	13
A. Biogeography/Historical 1. Domestication/Cultivation	13
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk	13
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere	13 3 5 5
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology	13 3 5 5 36
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere	13 3 5 5 36 12
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation	13 3 5 5 36 12 2 7
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction	13 3 5 5 36 12 2 7
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms	13 3 5 5 36 12 2 7 7 9
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes	13 3 5 5 36 12 2 7 7 9 6
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms	13 3 5 5 36 12 2 2 7 7 9
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change	13 3 5 5 36 12 2 7 9 9 6 6
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change	13 3 5 5 36 12 2 7 9 9 6 6
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected	13 3 5 5 36 12 2 7 9 6 6 6 6 8
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial Environmental	13 3 5 5 36 12 2 2 7 7 9 6 6 6 6
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial	13 3 5 5 36 12 2 7 9 6 6 6 6 6 8 6 6
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial Environmental	13 3 5 5 36 12 2 7 9 6 6 6 6 6 8 6 6

Thresholds	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.70
BRA	0.76
CCA	0.25
Date and Time	

16/05/2022 23:08:38

Taxon and Assessor details	
Category	Fishes and Lampreys (freshwater)
Taxon name	Salvelinus fontinalis
Common name	brook trout
Assessor	Giorgi Epitashvili
Risk screening context	
Reason and socio-economic benefits	S. fontinalis were intentionally introduced for aquaculture, sport fisheries and for food production
Risk assessment area	South Caucasus
Taxonomy	Salvelinus fontinalis (Mitchill, 1814)
Native range	North America: native to most of eastern Canada from Newfoundland and Labrador to western side
Introduced range	Introduced widely in North America and temperate regions of other continents. Acclimatization
URL	https://www.fishbase.se/summary/Salvelinus-fontinalis.html

			Response	Justification (references and/or other information)	Confidence
		ography/Historical			
1. l		tication/Cultivation	T		1
1	1.01	Has the taxon been the subject of	Yes	S. fontinalis were intentionally introduced for aquaculture, sport	Very high
		domestication (or cultivation) for at least 20		fisheries and for food production beginning in the late nineteenth	
		generations?		century throughout many temperate regions of the world. In	
				Europe, S. fontinalis was originally considered an attractive	
				species, especially for sports fisheries, and it has been extensively	
				stocked in natural waters. Brook trout are commercially raised in	
				large numbers for food production, being sold for human	
				consumption in both fresh and smoked forms.	
2	1.02	Is the taxon harvested in the wild and likely	Yes	In Yellowstone National Park, anglers may take an unlimited	High
-	1.02	to be sold or used in its live form?		number of non-native brook trout in some drainages.	
3	1.03	Does the taxon have invasive races,	Yes	Introductions of S. fontinalis began in the nineteenth century	Very high
5	1.05	varieties, sub-taxa or congeners?	103	(Welcomme, 1988), to more than 40 countries in temperate areas	very night
		varieties, sub-taxa or congeners:			
				on all continents, including the southern hemisphere (Welcomme,	
				1992). S. fontinalis is considered a poor to moderate invader, and	
				this is reflected in its mean fish invasiveness (FISK) score for the	
				United Kingdom (13.5), i.e. the 'medium risk' (of being invasive)	
				category (Copp et al., 2009). Potential impacts include predation	
				on various species of amphibians, zooplankton and other	
				invertebrates as well as increases in primary productivity (Adams	
				et al., 2002: Dunham et al., 2004).	
2. (Climate	e, distribution and introduction risk			
4	2.01	How similar are the climatic conditions of the	High	World Map of the Köppen-Geiger climate classification	Medium
		Risk Assessment (RA) area and the taxon's	5	e · · · · · · · · · · · · · · · · · · ·	
		native range?			
5	2.02	What is the quality of the climate matching	Medium	World Map of the Köppen-Geiger climate classification	Medium
Э	2.02		Medium	wond Map of the Koppen-Geiger chinate classification	Medium
-		data?			
6	2.03	Is the taxon already present outside of	No	No such fact has been detected	High
		captivity in the RA area?			
7	2.04	How many potential vectors could the taxon	One	This species may be entered in the SC region intentionally for	High
		use to enter in the RA area?		aquacultural purposes.	
8	2.05	Is the taxon currently found in close	Yes	Salvelinus fontinalis was introduced in Iran and known to compete	Very high
		proximity to, and likely to enter into, the RA		with native fish for resources in the Tigris-Euphrates basin.	, 5
		area in the near future (e.g. unintentional		· · · · · · · · · · · · · · · · · · ·	
		and intentional introductions)?			
3. 1	Invasiv	e elsewhere			
9		Has the taxon become naturalised	Yes	S. fontinalis becoming established in most of Northern Europe	Very high
_	5.01	(established viable populations) outside its	105	(NOBANIS, 2006), with populations believed to be established in	very mgn
		native range?		high altitude lakes of Corsica, Italy, the Czech Republic and	
1 0	2.02	native range?		high altitude lakes of Corsica, Italy, the Czech Republic and southern Germany.	Marana Ini 1
10	3.02	native range? In the taxon's introduced range, are there	Yes	high altitude lakes of Corsica, Italy, the Czech Republic and southern Germany. Studies from North America on the effects of introductions of S.	Very high
10	3.02	native range? In the taxon's introduced range, are there known adverse impacts to wild stocks or	Yes	high altitude lakes of Corsica, Italy, the Czech Republic and southern Germany.	Very high
10	3.02	native range? In the taxon's introduced range, are there	Yes	high altitude lakes of Corsica, Italy, the Czech Republic and southern Germany. Studies from North America on the effects of introductions of S.	Very high
10	3.02	native range? In the taxon's introduced range, are there known adverse impacts to wild stocks or	Yes	high altitude lakes of Corsica, Italy, the Czech Republic and southern Germany. Studies from North America on the effects of introductions of S. fontinalis into waters where it is not native have shown impacts	Very high
10	3.02	native range? In the taxon's introduced range, are there known adverse impacts to wild stocks or	Yes	high altitude lakes of Corsica, Italy, the Czech Republic and southern Germany. Studies from North America on the effects of introductions of S. fontinalis into waters where it is not native have shown impacts such as decline of native salmonid species. Species that have	Very high
10	3.02	native range? In the taxon's introduced range, are there known adverse impacts to wild stocks or	Yes	high altitude lakes of Corsica, Italy, the Czech Republic and southern Germany. Studies from North America on the effects of introductions of S. fontinalis into waters where it is not native have shown impacts such as decline of native salmonid species. Species that have been replaced or negatively impacted include strains of cutthroat trout (Oncorhynchus clarki), golden trout (O. aguabonita), and	Very high
		native range? In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?		high altitude lakes of Corsica, Italy, the Czech Republic and southern Germany. Studies from North America on the effects of introductions of S. fontinalis into waters where it is not native have shown impacts such as decline of native salmonid species. Species that have been replaced or negatively impacted include strains of cutthroat trout (Oncorhynchus clarki), golden trout (O. aguabonita), and bull trout (S. confluentus).	
	3.02	native range? In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? In the taxon's introduced range, are there	Yes	high altitude lakes of Corsica, Italy, the Czech Republic and southern Germany. Studies from North America on the effects of introductions of S. fontinalis into waters where it is not native have shown impacts such as decline of native salmonid species. Species that have been replaced or negatively impacted include strains of cutthroat trout (Oncorhynchus clarki), golden trout (O. aguabonita), and	Very high
11	3.03	native range? In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	high altitude lakes of Corsica, Italy, the Czech Republic and southern Germany. Studies from North America on the effects of introductions of S. fontinalis into waters where it is not native have shown impacts such as decline of native salmonid species. Species that have been replaced or negatively impacted include strains of cutthroat trout (Oncorhynchus clarki), golden trout (O. aguabonita), and bull trout (S. confluentus). Data deficient	Low
11		native range? In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? In the taxon's introduced range, are there known adverse impacts to aquaculture? In the taxon's introduced range, are there		high altitude lakes of Corsica, Italy, the Czech Republic and southern Germany. Studies from North America on the effects of introductions of S. fontinalis into waters where it is not native have shown impacts such as decline of native salmonid species. Species that have been replaced or negatively impacted include strains of cutthroat trout (Oncorhynchus clarki), golden trout (O. aguabonita), and bull trout (S. confluentus). Data deficient Some predominantly freshwater species that are also found in	
11	3.03	native range? In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? In the taxon's introduced range, are there known adverse impacts to aquaculture? In the taxon's introduced range, are there known adverse impacts to ecosystem	No	high altitude lakes of Corsica, Italy, the Czech Republic and southern Germany. Studies from North America on the effects of introductions of S. fontinalis into waters where it is not native have shown impacts such as decline of native salmonid species. Species that have been replaced or negatively impacted include strains of cutthroat trout (Oncorhynchus clarki), golden trout (O. aguabonita), and bull trout (S. confluentus). Data deficient Some predominantly freshwater species that are also found in marine environments have been included in our assessment.	Low
11	3.03	native range? In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? In the taxon's introduced range, are there known adverse impacts to aquaculture? In the taxon's introduced range, are there	No	high altitude lakes of Corsica, Italy, the Czech Republic and southern Germany. Studies from North America on the effects of introductions of S. fontinalis into waters where it is not native have shown impacts such as decline of native salmonid species. Species that have been replaced or negatively impacted include strains of cutthroat trout (Oncorhynchus clarki), golden trout (O. aguabonita), and bull trout (S. confluentus). Data deficient Some predominantly freshwater species that are also found in marine environments have been included in our assessment. While they have a high impact in the freshwater environment,	Low
11	3.03	native range? In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? In the taxon's introduced range, are there known adverse impacts to aquaculture? In the taxon's introduced range, are there known adverse impacts to ecosystem	No	high altitude lakes of Corsica, Italy, the Czech Republic and southern Germany. Studies from North America on the effects of introductions of S. fontinalis into waters where it is not native have shown impacts such as decline of native salmonid species. Species that have been replaced or negatively impacted include strains of cutthroat trout (Oncorhynchus clarki), golden trout (O. aguabonita), and bull trout (S. confluentus). Data deficient Some predominantly freshwater species that are also found in marine environments have been included in our assessment. While they have a high impact in the freshwater environment, most of these species are not invasive in marine waters and thus	Low
11	3.03	native range? In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? In the taxon's introduced range, are there known adverse impacts to aquaculture? In the taxon's introduced range, are there known adverse impacts to ecosystem	No	high altitude lakes of Corsica, Italy, the Czech Republic and southern Germany. Studies from North America on the effects of introductions of S. fontinalis into waters where it is not native have shown impacts such as decline of native salmonid species. Species that have been replaced or negatively impacted include strains of cutthroat trout (Oncorhynchus clarki), golden trout (O. aguabonita), and bull trout (S. confluentus). Data deficient Some predominantly freshwater species that are also found in marine environments have been included in our assessment. While they have a high impact in the freshwater environment, most of these species are not invasive in marine waters and thus were excluded from the proposed European inventory of alien	Low
11	3.03	native range? In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? In the taxon's introduced range, are there known adverse impacts to aquaculture? In the taxon's introduced range, are there known adverse impacts to ecosystem	No	high altitude lakes of Corsica, Italy, the Czech Republic and southern Germany. Studies from North America on the effects of introductions of S. fontinalis into waters where it is not native have shown impacts such as decline of native salmonid species. Species that have been replaced or negatively impacted include strains of cutthroat trout (Oncorhynchus clarki), golden trout (O. aguabonita), and bull trout (S. confluentus). Data deficient Some predominantly freshwater species that are also found in marine environments have been included in our assessment. While they have a high impact in the freshwater environment, most of these species are not invasive in marine waters and thus	Low
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11	3.03	native range? In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? In the taxon's introduced range, are there known adverse impacts to aquaculture? In the taxon's introduced range, are there known adverse impacts to ecosystem	No	high altitude lakes of Corsica, Italy, the Czech Republic and southern Germany. Studies from North America on the effects of introductions of S. fontinalis into waters where it is not native have shown impacts such as decline of native salmonid species. Species that have been replaced or negatively impacted include strains of cutthroat trout (Oncorhynchus clarki), golden trout (O. aguabonita), and bull trout (S. confluentus). Data deficient Some predominantly freshwater species that are also found in marine environments have been included in our assessment. While they have a high impact in the freshwater environment, most of these species are not invasive in marine waters and thus were excluded from the proposed European inventory of alien species that have a high impact on the ecosystem services and biodiversity of the marine environment. These species include the	Low
11	3.03	native range? In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? In the taxon's introduced range, are there known adverse impacts to aquaculture? In the taxon's introduced range, are there known adverse impacts to ecosystem	No	high altitude lakes of Corsica, Italy, the Czech Republic and southern Germany. Studies from North America on the effects of introductions of S. fontinalis into waters where it is not native have shown impacts such as decline of native salmonid species. Species that have been replaced or negatively impacted include strains of cutthroat trout (Oncorhynchus clarki), golden trout (O. aguabonita), and bull trout (S. confluentus). Data deficient Some predominantly freshwater species that are also found in marine environments have been included in our assessment. While they have a high impact in the freshwater environment, most of these species are not invasive in marine waters and thus were excluded from the proposed European inventory of alien species that have a high impact on the ecosystem services and	Low
11	3.03	native range? In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? In the taxon's introduced range, are there known adverse impacts to aquaculture? In the taxon's introduced range, are there known adverse impacts to ecosystem services? In the taxon's introduced range, are there	No Yes	high altitude lakes of Corsica, Italy, the Czech Republic and southern Germany. Studies from North America on the effects of introductions of S. fontinalis into waters where it is not native have shown impacts such as decline of native salmonid species. Species that have been replaced or negatively impacted include strains of cutthroat trout (Oncorhynchus clarki), golden trout (O. aguabonita), and bull trout (S. confluentus). Data deficient Some predominantly freshwater species that are also found in marine environments have been included in our assessment. While they have a high impact in the freshwater environment, most of these species are not invasive in marine waters and thus were excluded from the proposed European inventory of alien species that have a high impact on the ecosystem services and biodiversity of the marine environment. These species include the mysid Hemimysis anomala. and the fishes Oncorhynchus mykiss	Low Very high
11 12 13	3.03 3.04 3.05	native range? In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? In the taxon's introduced range, are there known adverse impacts to aquaculture? In the taxon's introduced range, are there known adverse impacts to ecosystem services? In the taxon's introduced range, are there known adverse impacts to ecosystem services?	No Yes	high altitude lakes of Corsica, Italy, the Czech Republic and southern Germany. Studies from North America on the effects of introductions of S. fontinalis into waters where it is not native have shown impacts such as decline of native salmonid species. Species that have been replaced or negatively impacted include strains of cutthroat trout (Oncorhynchus clarki), golden trout (O. aguabonita), and bull trout (S. confluentus). Data deficient Some predominantly freshwater species that are also found in marine environments have been included in our assessment. While they have a high impact in the freshwater environment, most of these species are not invasive in marine waters and thus were excluded from the proposed European inventory of alien species that have a high impact on the ecosystem services and biodiversity of the marine environment. These species include the mysid Hemimysis anomala. and the fishes Oncorhynchus mykiss	Low Very high
11 12 13 B.	3.03 3.04 3.05 Biology	native range? In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? In the taxon's introduced range, are there known adverse impacts to aquaculture? In the taxon's introduced range, are there known adverse impacts to ecosystem services? In the taxon's introduced range, are there known adverse socio-economic impacts? y/Ecology	No Yes	high altitude lakes of Corsica, Italy, the Czech Republic and southern Germany. Studies from North America on the effects of introductions of S. fontinalis into waters where it is not native have shown impacts such as decline of native salmonid species. Species that have been replaced or negatively impacted include strains of cutthroat trout (Oncorhynchus clarki), golden trout (O. aguabonita), and bull trout (S. confluentus). Data deficient Some predominantly freshwater species that are also found in marine environments have been included in our assessment. While they have a high impact in the freshwater environment, most of these species are not invasive in marine waters and thus were excluded from the proposed European inventory of alien species that have a high impact on the ecosystem services and biodiversity of the marine environment. These species include the mysid Hemimysis anomala. and the fishes Oncorhynchus mykiss	Low Very high
111 12 13 B. 4. (3.03 3.04 3.05 Biolog	native range? In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? In the taxon's introduced range, are there known adverse impacts to aquaculture? In the taxon's introduced range, are there known adverse impacts to ecosystem services? In the taxon's introduced range, are there known adverse impacts to ecosystem services? In the taxon's introduced range, are there known adverse socio-economic impacts? y/Ecology able (or persistence) traits	No Yes Yes	high altitude lakes of Corsica, Italy, the Czech Republic and southern Germany. Studies from North America on the effects of introductions of S. fontinalis into waters where it is not native have shown impacts such as decline of native salmonid species. Species that have been replaced or negatively impacted include strains of cutthroat trout (Oncorhynchus clarki), golden trout (O. aguabonita), and bull trout (S. confluentus). Data deficient Some predominantly freshwater species that are also found in marine environments have been included in our assessment. While they have a high impact in the freshwater environment, most of these species are not invasive in marine waters and thus were excluded from the proposed European inventory of alien species that have a high impact on the ecosystem services and biodiversity of the marine environment. These species include the mvsid Hemimvsis anomala. and the fishes Oncorhvnchus mvkiss Data deficient	Low Very high Low
11 12 13 B. 4. (3.03 3.04 3.05 Biolog	native range? In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? In the taxon's introduced range, are there known adverse impacts to aquaculture? In the taxon's introduced range, are there known adverse impacts to ecosystem services? In the taxon's introduced range, are there known adverse impacts to ecosystem services? In the taxon's introduced range, are there known adverse socio-economic impacts? y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or	No Yes Yes	high altitude lakes of Corsica, Italy, the Czech Republic and southern Germany. Studies from North America on the effects of introductions of S. fontinalis into waters where it is not native have shown impacts such as decline of native salmonid species. Species that have been replaced or negatively impacted include strains of cutthroat trout (Oncorhynchus clarki), golden trout (O. aguabonita), and bull trout (S. confluentus). Data deficient Some predominantly freshwater species that are also found in marine environments have been included in our assessment. While they have a high impact in the freshwater environment, most of these species are not invasive in marine waters and thus were excluded from the proposed European inventory of alien species that have a high impact on the ecosystem services and biodiversity of the marine environment. These species include the mysid Hemimysis anomala. and the fishes Oncorhynchus mykiss	Low Very high
11 12 13 <u>B.</u> 14	3.03 3.04 3.05 Biolog <i>Undesir</i> 4.01	native range? In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? In the taxon's introduced range, are there known adverse impacts to aquaculture? In the taxon's introduced range, are there known adverse impacts to ecosystem services? In the taxon's introduced range, are there known adverse impacts to ecosystem services? In the taxon's introduced range, are there known adverse socio-economic impacts? y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health?	No Yes Yes	high altitude lakes of Corsica, Italy, the Czech Republic and southern Germany. Studies from North America on the effects of introductions of S. fontinalis into waters where it is not native have shown impacts such as decline of native salmonid species. Species that have been replaced or negatively impacted include strains of cutthroat trout (Oncorhynchus clarki), golden trout (O. aguabonita), and bull trout (S. confluentus). Data deficient Some predominantly freshwater species that are also found in marine environments have been included in our assessment. While they have a high impact in the freshwater environment, most of these species are not invasive in marine waters and thus were excluded from the proposed European inventory of alien species that have a high impact on the ecosystem services and biodiversity of the marine environment. These species include the mvsid Hemimvsis anomala. and the fishes Oncorhynchus mvkiss Data deficient	Low Very high Low
11 12 13 <u>B.</u> 14	3.03 3.04 3.05 Biolog	native range? In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? In the taxon's introduced range, are there known adverse impacts to aquaculture? In the taxon's introduced range, are there known adverse impacts to ecosystem services? In the taxon's introduced range, are there known adverse socio-economic impacts? y/Ecology rable (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or	No Yes Yes	high altitude lakes of Corsica, Italy, the Czech Republic and southern Germany. Studies from North America on the effects of introductions of S. fontinalis into waters where it is not native have shown impacts such as decline of native salmonid species. Species that have been replaced or negatively impacted include strains of cutthroat trout (Oncorhynchus clarki), golden trout (O. aguabonita), and bull trout (S. confluentus). Data deficient Some predominantly freshwater species that are also found in marine environments have been included in our assessment. While they have a high impact in the freshwater environment, most of these species are not invasive in marine waters and thus were excluded from the proposed European inventory of alien species that have a high impact on the ecosystem services and biodiversity of the marine environment. These species include the mvsid Hemimvsis anomala. and the fishes Oncorhvnchus mvkiss Data deficient This species does not pose a threat to humans. In France, brown trout habitat, growth and apparent survival were	Low Very high Low
11 12 13 <u>B.</u> 14	3.03 3.04 3.05 Biolog <i>Undesir</i> 4.01	native range? In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? In the taxon's introduced range, are there known adverse impacts to aquaculture? In the taxon's introduced range, are there known adverse impacts to ecosystem services? In the taxon's introduced range, are there known adverse impacts to ecosystem services? In the taxon's introduced range, are there known adverse socio-economic impacts? y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health?	No Yes Yes	high altitude lakes of Corsica, Italy, the Czech Republic and southern Germany. Studies from North America on the effects of introductions of S. fontinalis into waters where it is not native have shown impacts such as decline of native salmonid species. Species that have been replaced or negatively impacted include strains of cutthroat trout (Oncorhynchus clarki), golden trout (O. aguabonita), and bull trout (S. confluentus). Data deficient Some predominantly freshwater species that are also found in marine environments have been included in our assessment. While they have a high impact in the freshwater environment, most of these species are not invasive in marine waters and thus were excluded from the proposed European inventory of alien species that have a high impact on the ecosystem services and biodiversity of the marine environment. These species include the mvsid Hemimvsis anomala. and the fishes Oncorhynchus mvkiss Data deficient	Low Very high Low

16	4.0	03 Are there any threatened or protected taxa	Yes	There are several protected and threatened species in the SC	Very high
		that the non-native taxon would parasitise in		region (Salmo labrax, S. caspius, S. gegarkuni, etc) which turns	
		the RA area?		out to be under the influence of S. fontinalis if this species will be	
				distributed in the region.	
17	4.0	04 Is the taxon adaptable in terms of climatic	Yes	The species is expected to adapt to local environmental conditions.	High
		and other environmental conditions, thus			
		enhancing its potential persistence if it has			
		invaded or could invade the RA area?			
18	4.0	05 Is the taxon likely to disrupt food-web	Yes	It is expected that this will happen.	High
		structure/function in aquatic ecosystems if it			
		has invaded or is likely to invade the RA			
19	4.0	06 Is the taxon likely to exert adverse impacts	Yes	Own judgement	Low
		on ecosystem services in the RA area?			
20	4.0		No	Data deficient	Low
		act as a vector for, recognised pests and			
		infectious agents that are endemic in the RA			
21	4.0		Yes	It is expected that this will happen.	Medium
		act as a vector for, recognised pests and			
		infectious agents that are absent from (novel			
		to) the RA area?			
22	4.0		Yes	This species is widely used in aquaculture. It has maximal length	Very high
~~		size that will make it more likely to be	105	86.0 cm SL male/unsexed; common length : 26.4 cm TL	very mgn
		released from captivity?		male/unsexed; max. published weight: 8.0 kg.	
23	4.1		Yes	The brook trout inhabits large and small lakes, rivers, streams,	Very high
<u>د م</u>		range of water velocity conditions (e.g.	103	creeks, and spring ponds. They prefer clear waters of high purity	very mgn
		versatile in habitat use)?		and a narrow pH range and are sensitive to poor oxygenation,	
		versatile in nabitat use)?			
24	4.1	11 Is it likely that the taxon's mode of existence	No	pollution, and changes in pH caused by environmental effects No research has been conducted in this direction	High
24	4.1		NU		High
		(e.g. excretion of by-products) or behaviours			
		(e.g. feeding) will reduce habitat quality for			
		native taxa?	NI-	Data deficient	1
25	4.1		No	Data deficient	Low
		population even when present in low			
		densities (or persisting in adverse conditions			
_	_	by way of a dormant form)?			
		source exploitation			
26	5.0	-	Yes	S. fontinalis is a predator fish and it is expected that it will eat	High
		protected native taxa in the RA area?		protected/threathened species in the SC region, e.g. Salmo spp,	
				Acipenser spp, etc.	
27	5.0	<i>,</i> ,	Yes	S. fontinalis is a predator fish and it is expected that this will	High
					5
		resources (including nutrients) to the		happen.	5
		detriment of native taxa in the RA area?		happen.	
		detriment of native taxa in the RA area?			
	<i>Repr</i> 6.0	detriment of native taxa in the RA area? production 01 Is the taxon likely to exhibit parental care	Yes	In brook trout populations there is a growing body of evidence	High
		detriment of native taxa in the RA area? production 01 Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response		In brook trout populations there is a growing body of evidence linking female preference for large males with greater survival of	
		detriment of native taxa in the RA area? production 01 Is the taxon likely to exhibit parental care		In brook trout populations there is a growing body of evidence linking female preference for large males with greater survival of eggs in fish where males make a significant parental investment.	
		detriment of native taxa in the RA area? production 01 Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response		In brook trout populations there is a growing body of evidence linking female preference for large males with greater survival of eggs in fish where males make a significant parental investment. In these cases male parental care leads to a greater hatching	
		detriment of native taxa in the RA area? production 01 Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response		In brook trout populations there is a growing body of evidence linking female preference for large males with greater survival of eggs in fish where males make a significant parental investment. In these cases male parental care leads to a greater hatching success of eggs due to the ability of large males to defend eggs	
28	6.0	detriment of native taxa in the RA area? production 01 Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?	Yes	In brook trout populations there is a growing body of evidence linking female preference for large males with greater survival of eggs in fish where males make a significant parental investment. In these cases male parental care leads to a greater hatching success of eggs due to the ability of large males to defend eggs from predators (Blanchfield 1998).	High
28		detriment of native taxa in the RA area? production 01 Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? 02 Is the taxon likely to produce viable gametes	Yes	In brook trout populations there is a growing body of evidence linking female preference for large males with greater survival of eggs in fish where males make a significant parental investment. In these cases male parental care leads to a greater hatching success of eggs due to the ability of large males to defend eggs	
28 29	6.0 6.0	detriment of native taxa in the RA area? production 01 Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? 02 Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	In brook trout populations there is a growing body of evidence linking female preference for large males with greater survival of eggs in fish where males make a significant parental investment. In these cases male parental care leads to a greater hatching success of eggs due to the ability of large males to defend eggs from predators (Blanchfield 1998). No such fact has been detected.	High Very high
28 29	6.0	detriment of native taxa in the RA area? production 01 Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? 02 Is the taxon likely to produce viable gametes or propagules (in the RA area)? 03 Is the taxon likely to hybridise naturally with	Yes	In brook trout populations there is a growing body of evidence linking female preference for large males with greater survival of eggs in fish where males make a significant parental investment. In these cases male parental care leads to a greater hatching success of eggs due to the ability of large males to defend eggs from predators (Blanchfield 1998). No such fact has been detected. The impact of introductions of S. fontinalis are relatively well	High
28 29	6.0 6.0	detriment of native taxa in the RA area? production 01 Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? 02 Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	In brook trout populations there is a growing body of evidence linking female preference for large males with greater survival of eggs in fish where males make a significant parental investment. In these cases male parental care leads to a greater hatching success of eggs due to the ability of large males to defend eggs from predators (Blanchfield 1998). No such fact has been detected. The impact of introductions of S. fontinalis are relatively well documented. For instance, in Canada S. fontinalis is known to	High Very high
28 29 30	6.0 6.0 6.0	detriment of native taxa in the RA area? production 01 Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? 02 Is the taxon likely to produce viable gametes or propagules (in the RA area)? 03 Is the taxon likely to hybridise naturally with native taxa?	Yes No Yes	In brook trout populations there is a growing body of evidence linking female preference for large males with greater survival of eggs in fish where males make a significant parental investment. In these cases male parental care leads to a greater hatching success of eggs due to the ability of large males to defend eggs from predators (Blanchfield 1998). No such fact has been detected. The impact of introductions of S. fontinalis are relatively well documented. For instance, in Canada S. fontinalis is known to hybridise with threatened native S. confluentus.	High Very high
28 29 30	6.0 6.0	detriment of native taxa in the RA area? production 01 15 the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? 02 Is the taxon likely to produce viable gametes or propagules (in the RA area)? 03 Is the taxon likely to hybridise naturally with native taxa? 04 Is the taxon likely to be hermaphroditic or to	Yes No Yes	In brook trout populations there is a growing body of evidence linking female preference for large males with greater survival of eggs in fish where males make a significant parental investment. In these cases male parental care leads to a greater hatching success of eggs due to the ability of large males to defend eggs from predators (Blanchfield 1998). No such fact has been detected. The impact of introductions of S. fontinalis are relatively well documented. For instance, in Canada S. fontinalis is known to	High Very high
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28 29 30 31 32 33 34 <u>7.</u> 35 36	3 6.0 0 6.0 0 6.0 0 6.0 0 6.0 0 6.0 0 6.0 0 6.0 0 6.0 0 6.0 0 6.0 0 6.0 0 6.0 0 6.0 0 6.0 0 7.0	detriment of native taxa in the RA area? production 01 Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? 02 15 the taxon likely to produce viable gametes or propagules (in the RA area)? 03 15 the taxon likely to hybridise naturally with native taxa? 04 15 the taxon likely to be hermaphroditic or to display asexual reproduction? 05 15 the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? 06 16 the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)?	Yes No Yes No 2 One Yes	In brook trout populations there is a growing body of evidence linking female preference for large males with greater survival of eggs in fish where males make a significant parental investment. In these cases male parental care leads to a greater hatching success of eggs due to the ability of large males to defend eggs from predators (Blanchfield 1998). No such fact has been detected. The impact of introductions of S. fontinalis are relatively well documented. For instance, in Canada S. fontinalis is known to hybridise with threatened native S. confluentus. Data deficient Brook trout are very specific when it comes to habitat, they require cold, clean, well-oxygenated water and even a seemingly minor change in these conditions can result in the loss of brook trout populations (LaConte, 1997). In S. fontinalis the numbers of eggs varies between 90 and 4,800 eggs. S. fontinalis reach sexual maturity after two to four years. It is likely that this species will spread within the region intentionally by humans. There is a probability of this.	High Very high Very high Low High Medium High High
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4.0	7.05				
40	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	No	This species does not reproduces in the SC region.	Very high
41	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No	No such fact has been detected.	Very high
42	7.08	Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be	No	Own judgement	Medium
	7.09	Is dispersal of the taxon density dependent?	Yes	Evidence of density-dependence in the periphery, consequently, may not be the result of local negative feedback, but rather is the result of a density-regulated source of immigrants. Under such a mechanism, when population size in the core habitat is low, population growth rates the following year are high. This results in an increased number of potential immigrants to the periphery and an increase in peripheral growth rates. High densities in the core then result in elevated growth rates in and dispersal to the	Very high
		ce attributes	1		T
44	8.01	Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle?	No	This species does not exist without water.	Very high
	8.02	Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being considered.]	Yes	Within their first year, most brook trout reared in aerated water could withstand oxygen concentrations down to 1.9 mg.O2/1. The 50% tolerance level was 1.75 mg.O2/1. Most fish died at 1.5 mg.O2/1. Acclimation to low (but not lethal) oxygen levels occurred; for a drop of 1.0 mg.O2/1. in environmental oxygen concentration, the tolerance level decreased by approximately 0.09 mg.O2/1. and resistance times at given lethal levels increased up to five-fold. By acclimations trout could exist at	High
46	8.03	Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	Yes	As established populations are difficult and costly to control, further introductions or stocking with S. fontinalis should be avoided. The only effective method of fish eradication is the application of rotenone, a pesticide that is also toxic to non-target	Medium
47	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	Yes	This species has spread by humans in many regions.	Very high
48	8.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	Yes	The brook trout inhabits large and small lakes, rivers, streams, creeks, and spring ponds. Semianadromous or sea-run brook trout, commonly called "salters", ranged from southern New Jersey, north throughout the Canadian maritime provinces, and west to Hudson Bay. Salters may spend up to three months at sea feeding on crustaceans, fish, and marine worms in the spring, not straving more than a few miles from the river mouth.	Very high
49	8.06	Are there effective natural enemies (predators) of the taxon present in the RA area?	Yes	There are several potential predators in the SC region which can controll the S. fontinalis populations: Esox lucius, Salmo spp, Sander lucioperca, etc.	Medium
с. с	Climate	e change			
		change			
50	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?	No change	Own judgement	Low
51	9.02	Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	No change	Own judgement	Low
	9.03	Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change?	No change	Own judgement	Low
	9.04	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	No change	Own judgement	Low
54	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Lower	Own judgement	Low
55	9.06	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	Lower	Own judgement	Medium

Statistics	
Scores	
BRA	33.0
BRA Outcome	-
BRA+CCA	29.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	18.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	0.0
3. Invasive elsewhere	14.0
B. Biology/Ecology	15.0
4. Undesirable (or persistence) traits	8.0

5. Resource exploitation	7.0
6. Reproduction	0.0
7. Dispersal mechanisms	-3.0
8. Tolerance attributes	3.0
C. Climate change	-4.0
9. Climate change	-4.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	
2. Climate, distribution and introduction risk	3 5 5
3. Invasive elsewhere	5
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2
6. Reproduction	12 2 7
7. Dispersal mechanisms	9
8. Tolerance attributes	6
C. Climate change	6
9. Climate change	6
Sectors affected	
Commercial	9
Environmental	10
Species or population nuisance traits	11
Thresholds	
Intechtique	

	BRA	-
	BRA+CCA	-
Confidence		
	BRA+CCA	0.70
	BRA	0.76
	CCA	0.29
Date and Time		

13/05/2022 18:34:08

Taxon and Assessor details						
Category	Fishes and Lampreys (freshwater)					
Taxon name	Salvelinus fontinalis					
Common name	brook trout					
Assessor Tatia Kuljanishvili						
Risk screening context						
Reason and socio-economic benefits	Has been introduced for aquaculture, sportfishing					
Risk assessment area	South Caucasus					
Taxonomy	Actinopteri (ray-finned fishes) > Salmoniformes (Salmons) > Salmonidae (Salmonids)					
Native range	Eastern Canada					
Introduced range	more than 40 countries in temperate areas on all continents					
URL	https://www.fishbase.se/summary/Salvelinus-fontinalis.html					

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
1. L		ication/Cultivation	1		
1	1.01	Has the taxon been the subject of	Yes	yes comercially valuable fish	Very high
		domestication (or cultivation) for at least 20			
2	1.02	generations?	¥	Ver True is becaused in wild and is cald in the live form	Marris Interne
2	1.02	Is the taxon harvested in the wild and likely	Yes	Yes. Taxon is harvested in wild and is sold in its live form	Very high
3	1.03	to be sold or used in its live form? Does the taxon have invasive races,	Yes	yes. Has invasive races	Vorschigh
3	1.05		res	yes. Has invasive faces	Very high
2 (Climato	varieties, sub-taxa or congeners? , distribution and introduction risk			
∠. (High	14 out of 19 stations are similar with the values of 7,8, and 9	Medium
7	2.01	Risk Assessment (RA) area and the taxon's	riigii	14 out of 19 stations are similar with the values of 7,8, and 9	Medium
		native range?			
5	2.02	What is the quality of the climate matching	Medium	Medium	Medium
Ŭ	2.02	data?	. iculuii		. iourum
6	2.03	Is the taxon already present outside of	No	No evidence.	Very high
-		captivity in the RA area?	-		- / 5
7	2.04	How many potential vectors could the taxon	>1	Aquaculture, sportfishing	Very high
		use to enter in the RA area?		1	- / 5
8	2.05	Is the taxon currently found in close	Yes	yes. Turkey	Very high
	1	proximity to, and likely to enter into, the RA			
1		area in the near future (e.g. unintentional			
		and intentional introductions)?			
	1	e elsewhere	1		
9	3.01	Has the taxon become naturalised	Yes	Yes it has become naturalized outside its native area	High
1	1	(established viable populations) outside its			
10	3.02	In the taxon's introduced range, are there	Yes	list of threatened taxa can be found on	Very high
		known adverse impacts to wild stocks or		https://www.cabi.org/isc/datasheet/65325	
		commercial taxa?			
11	3.03	In the taxon's introduced range, are there	No	Not assessed	Low
10	2.04	known adverse impacts to aquaculture?			
12	3.04	In the taxon's introduced range, are there	No	transmission of deseases	Low
12	2.05	known adverse impacts to ecosystem In the taxon's introduced range, are there	No	Not known	Law
13	3.05	known adverse socio-economic impacts?	NO		Low
B	Biology	y/Ecology			
		able (or persistence) traits			
		Is it likely that the taxon will be poisonous or	No	Not poisonous	Very high
- ·		pose other risks to human health?			,
15	4.02	Is it likely that the taxon will smother one or	Yes	list of threatened taxa can be found on	Very high
		more native taxa (that are not threatened or		https://www.cabi.org/isc/datasheet/65325	, -
		protected)?			
16	4.03	Are there any threatened or protected taxa	No	Does not parasite	Very high
		that the non-native taxon would parasitise in			
		the RA area?			
17	4.04	Is the taxon adaptable in terms of climatic	No	Very sensitive species does not tolerate wider range of climatic or	High
1		and other environmental conditions, thus		environmental conditions	
1		enhancing its potential persistence if it has			
I	1	invaded or could invade the RA area?			-
18	4.05	Is the taxon likely to disrupt food-web	No	No documented evidence	Low
1		structure/function in aquatic ecosystems if it			
-	4.65	has invaded or is likely to invade the RA			
19	4.06	Is the taxon likely to exert adverse impacts	No	diseases	Very high
20	4.07	on ecosystem services in the RA area?	N	N = 1-6-	1
20	4.07	Is it likely that the taxon will host, and/or	No	No info	Low
1		act as a vector for, recognised pests and			
21	4.08	infectious agents that are endemic in the RA Is it likely that the taxon will host, and/or	Yes	it is likely	Medium
~1	4.00	act as a vector for, recognised pests and	105	IL IS IINCIY	medium
1		infectious agents that are absent from (novel			
1		to) the RA area?			
22	4.09	Is it likely that the taxon will achieve a body	Yes	yes. See: https://www.fishbase.se/summary/Salvelinus-	Very high
~~	4.09	size that will make it more likely to be	103	fontinalis.html	very mgn
		released from captivity?			
23	4.10	Is the taxon capable of sustaining itself in a	Yes	yes. It is likely	High
23	7.10	range of water velocity conditions (e.g.	103	yes, it is incly	i iigii
1		versatile in habitat use)?			
	1	versaelle in nabitat usej:	l	1	1

24	4.11	Is it likely that the taxon's mode of existence	No	No information avalable	Very high
		(e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa?			
25	4.12	Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions	Yes	Yes. it is possible	Low
5. F	Resourc	by way of a dormant form)?			
	5.01	Is the taxon likely to consume threatened or	Yes	It is possible	High
		protected native taxa in the RA area?			
27	5.02	Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?	No	No. unlikely	High
6. R	Reprodu				
	6.01	Is the taxon likely to exhibit parental care	No	Does not exhibit parental care See:	High
		and/or to reduce age-at-maturity in response		https://www.fishbase.se/summary/Salvelinus-fontinalis.html	-
29	6.02	to environmental conditions? Is the taxon likely to produce viable gametes	No	less likely	Low
		or propagules (in the RA area)?			
30	6.03	Is the taxon likely to hybridise naturally with	No	No information available	Medium
31	6.04	native taxa? Is the taxon likely to be hermaphroditic or to	No	No. Does not display asexual reproduction	Very high
		display asexual reproduction?			
32	6.05	Is the taxon dependent on the presence of	No	No. See: https://www.fishbase.se/summary/Salvelinus- fontinalis.html	Very high
		another taxon (or specific habitat features) to complete its life cycle?		Tonunais.num	
33	6.06	Is the taxon known (or likely) to produce a	Yes	can produce up tp 5000 eggs	Medium
		large number of propagules or offspring			
24	6.07	within a short time span (e.g. < 1 year)? How many time units (days, months, years)	2	2.4.vozrc	Von/ high
54	0.07	does the taxon require to reach the age-at-	3	2-4 years	Very high
		first-reproduction?			
		al mechanisms	ſ		I
35	7.01	How many potential internal	>1	aquaculture or recreational fisheries	Very high
		vectors/pathways could the taxon use to disperse within the RA area (with suitable			
36	7.02	Will any of these vectors/pathways bring the	Yes	it is possible	Low
		taxon in close proximity to one or more			
		protected areas (e.g. MCZ, MPA, SSSI)?			
37	7.03	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship	No	No. Morphologically this species does not have a means of actively attaching itself to hard substrata	Very high
		hulls, pilings, buoys) such that it enhances			
		the likelihood of dispersal?			
38	7.04	Is natural dispersal of the taxon likely to	No	No. can not be distributed as eggs.	Very high
		occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?			
39	7.05	Is natural dispersal of the taxon likely to	Yes	Yes. it is possible.	Very high
		occur as larvae/juveniles (for animals) or as			
		fragments/seedlings (for plants) in the RA			
40	7.06	area? Are older life stages of the taxon likely to	Yes	it is possible	Medium
	/.00	migrate in the RA area for reproduction?			
41	7.07	Are propagules or eggs of the taxon likely to	No	No. Can not be dispersed by other ananimals	Very high
42	7.00	be dispersed in the RA area by other animals?	Net englischte		Ma di una
+2	7.08	Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous	Not applicable	not yet recorded in the wild.	Medium
		seven questions (35–41; i.e. both			
		unintentional or intentional) likely to be			
	7.09	Is dispersal of the taxon density dependent? ce attributes	Yes	They are territorial animals, therefore dispersal is density	Medium
		Is the taxon able to withstand being out of	No	No information avalable	High
		water for extended periods (e.g. minimum of			_
		one or more hours) at some stage of its life			
15	8.02	cvcle? Is the taxon tolerant of a wide range of	No	no. do not tolerate wide range of water quality conditions	High
	0.02		110	no, ao not tolerate while range of water quality conditions	ngn
τJ					
L		water quality conditions relevant to that taxon? [In the Justification field, indicate the			
		water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being			
	8.03	water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in	Yes	Yes but it is costy and sometimes inefective	Medium
	8.03	water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other	Yes	Yes but it is costy and sometimes inefective	Medium
16	8.03	water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in	Yes	Yes but it is costy and sometimes inefective	Medium Very high
46 47	8.04	water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Is the taxon likely to tolerate or benefit from environmental/human disturbance?	No	No	Very high
46 47		water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Is the taxon likely to tolerate or benefit from environmental/human disturbance? Is the taxon able to tolerate salinity levels			
46 47	8.04	water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Is the taxon likely to tolerate or benefit from environmental/human disturbance? Is the taxon able to tolerate salinity levels that are higher or lower than those found in	No	No	Very high
46 47 48	8.04 8.05	water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Is the taxon likely to tolerate or benefit from environmental/human disturbance? Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	No Yes	No It is possible	Very high High
46 47 48	8.04	water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Is the taxon likely to tolerate or benefit from environmental/human disturbance? Is the taxon able to tolerate salinity levels that are higher or lower than those found in	No	No	Very high
16 17 18 19	8.04 8.05 8.06	water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Is the taxon likely to tolerate or benefit from environmental/human disturbance? Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment? Are there effective natural enemies (predators) of the taxon present in the RA e change	No Yes	No It is possible	Very high High
46 47 48 49 C. C	8.04 8.05 8.06	water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Is the taxon likely to tolerate or benefit from environmental/human disturbance? Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment? Are there effective natural enemies (predators) of the taxon present in the RA a change	No Yes No	No It is possible No effective natural enemies present in RA area	Very high High Very high
46 47 48 49 C. C	8.04 8.05 8.06	water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Is the taxon likely to tolerate or benefit from environmental/human disturbance? Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment? Are there effective natural enemies (predators) of the taxon present in the RA e change Under the predicted future climatic	No Yes	No It is possible	Very high High
46 47 48 49 C. C	8.04 8.05 8.06	water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Is the taxon likely to tolerate or benefit from environmental/human disturbance? Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment? Are there effective natural enemies (predators) of the taxon present in the RA a change	No Yes No	No It is possible No effective natural enemies present in RA area	Very high High Very high

51	9.02	Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	Decrease	Decrease	Low
52	9.03	Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change?	Increase	They might be forced to dispers in higher altitudes where temperatures will be low	Low
53	9.04	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	No change	No change	Low
54	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	No change	no change	Medium
55	9.06	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	No change	no change	Low

Statistics

Statistics	
BRA	21.0
BRA Outcome	
BRA+CCA	23.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	11.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	6.0
B. Biology/Ecology	10.0
4. Undesirable (or persistence) traits	4.0
5. Resource exploitation	5.0
6. Reproduction	0.0
7. Dispersal mechanisms	2.0
8. Tolerance attributes	-1.0
C. Climate change	2.0
9. Climate change	2.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3
2. Climate, distribution and introduction risk	3 5 5
3. Invasive elsewhere	
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2
6. Reproduction	2 7 9
7. Dispersal mechanisms	
8. Tolerance attributes	6
C. Climate change	6 6
9. Climate change	0
Sectors affected Commercial	9
Environmental	9
Species or population nuisance traits	
Species of population nuisance traits	11
Thresholds	
Thresholds	
BRA	

	BRA	-
	BRA+CCA	-
Confidence		
	BRA+CCA	0.70
	BRA	0.74
	CCA	0.38
Date and Time		
	22/05/20	22 15:51:45

Taxon and Assessor details						
Category	Fishes and Lampreys (freshwater)					
Taxon name	Sander lucioperca					
Common name	pikeperch					
Assessor Bella Japoshvili						
Risk screening context						
Reason and socio-economic benefits	The species is naturally occurs in the Black-Caspian Sea basins, howver was not known from Arax					
Risk assessment area	South Caucasus					
Taxonomy	Actinopteri (ray-finned fishes) > Perciformes/Percoidei (Perchs) > Percidae (Perches)					
Native range	Europe					
Introduced range	Worldwide					
URL https://www.fishbase.de/summary/Sander-lucioperca.html						

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
		ication/Cultivation	24		h
T	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20	Yes	e.g. Zakęś, Z. (2007). Out-of-season spawning of cultured pikeperch [Sander lucioperca (L.)]. Aquaculture Research, 38(13),	Very high
2	1.02	generations? Is the taxon harvested in the wild and likely	Yes	1419-1427. Personal observation	Very high
3	1.03	to be sold or used in its live form? Does the taxon have invasive races,	No	Not known	High
2 (limato	varieties, sub-taxa or congeners? , distribution and introduction risk			
<u>2. (</u> 1	2.01	How similar are the climatic conditions of the	Modium	Posults of climatch algorithm	Low
4	2.01	Risk Assessment (RA) area and the taxon's native range?	Medium	Results of climatch algorithm	LOW
5	2.02	What is the quality of the climate matching data?	Low	Due to low accuracy of local climate data	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	e.g. Berg S, 2012. Zander Sander lucioperca (Linnaeus, 1758). (Sandart Sander lucioperca (Linnaeus, 1758).) In: Atlas over Danske ferskvandsfisk [ed. by Carl, H. \Møller, P. R.]. Copenhagen, Denmark: Natural History Museum of Denmark, University of Copenhagen, 585-599.	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	>1	Recreational purpose, Natural dispersal	High
8	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)?	Yes	Kuljanishvili, T., Mumladze, L., Japoshvili, B., Mustafayev, N., Ibrahimov, S., Patoka, J., & Kalous, L. (2021). The first unified inventory of non-native fishes of the South Caucasian countries, Armenia, Azerbaijan, and Georgia. Knowledge & Management of Aquatic Ecosystems, (422), 32.	Very high
3. 1	7	e elsewhere	1		
9	3.01	Has the taxon become naturalised (established viable populations) outside its	Yes	https://www.cabi.org/isc/datasheet/65338#F361ADBE-F16F-40BB- 967C-72193652783C	, -
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	Koed A; Jepsen N; Aarestrup K; Nielsen C, 2002. Initial mortality of radiotagged Atlantic salmon (Salmo salar L.) smolts following release downstream of a hydropower station. Hydrobiologia, 483:31-37.; Crivelli AJ, 1995. Are fish introductions a threat to endemic freshwater fishes in the northern Mediterranean region? Biological Conservation, 72:311-319.	High
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	Yes	Koed A; Jepsen N; Aarestrup K; Nielsen C, 2002. Initial mortality of radiotagged Atlantic salmon (Salmo salar L.) smolts following release downstream of a hydropower station. Hydrobiologia, 483:31-37.; Crivelli AJ, 1995. Are fish introductions a threat to endemic freshwater fishes in the northern Mediterranean region? Biological Conservation, 72:311-319.	High
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	No	No documented evidence	Low
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	No documented evidence	Low
B.	Biology	y/Ecology			
4. l	Indesir	able (or persistence) traits			
14	4.01	Is it likely that the taxon will be poisonous or pose other risks to human health?	No	Sepecies is harmless	High
15	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	Because of predatory lifestile	Medium
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	Yes	The species is strong predator consuming apropriately sized fishes and invertebrates of any kind	High
17	4.04	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?	Yes	Occures wide range of environmental conditions however not well doccumented the extrem environmental conditions	Low
	4.05	Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA area?	Yes	Due to preadoty lifestile e.g. Schulze, T., U. Baade, H. Dörner, R. Eckmann, S.S. Haertel-Borer, F. Hölker and T. Mehner 2006. Response of the residental piscivorous fish community to introduction of a new predator type in a mesotrophic lake. Canadian Journal of Fisheries and Aquatic Science	Low
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	No documented evidence	Low

20	4.07	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA	No	No documented evidence	Low
21	4.08	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area?	Yes	No documented evidence	Low
22	4.09	Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity?	Yes	Can be as large as 1 m	High
23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)?	No	Usually lives in standing or slowly moving rivers	Low
24	4.11	Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for	No	Most probaly no because of predatory foraging behavior	Low
	4.12	native taxa? Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)?	No	Not known	Low
	5.01	e exploitation Is the taxon likely to consume threatened or	Yes	Fishes (such as for instance Cuciobarbus capito, ro Salmo caspius)	Very high
		protected native taxa in the RA area?		······································	· · · / · · · g.·
	5.02	Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?	Yes	e.g. Esox lucius	Very high
	Reprodu				
	6.01	Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?	Yes	Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin.	Very high
29	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	It was recorded naturally with 10 years of a laps of time. Pipoyan SKH, Tigranyan EA. 2002. Modern fish fauna of Armenia. J Ichthyol (in Russian) 42: 601–604.; Pipoyan SKH. 2012. Ichthyofauna of Armenia: stages of formation and current state, Palmarium Academic Publishing (In Rissian), p. 538.	Medium
30	6.03	Is the taxon likely to hybridise naturally with native taxa?	Yes	Kahilainen KK; Teacher AGF; Kahkonen K; Vinni M; Lehtonen H; Merila J, 2010. First record of natural hybridization and intogression between pikeperch (Sander lucioperca) and perch (Perca fluviatilis). Ann. Zool. Fenn, 48:39-44. Müller T; Taller J; Kolics S; Kovács B; Urbányi B; Specziár A, 2010. First record of natural hybridization between pikeperch Sander lucioperca and	Very high
31	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	No	Volaa pikeperch S. volgensis. J. Appl. Ichthvol. 26:481-484. Reproducing sexually	High
32	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	No	Is independ during the completing its lifecycle	Very high
33	6.06	Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)?	Yes	Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin.	Very high
34	6.07	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	3	Years	High
		al mechanisms			1 .
35	7.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable	>1	Due to its value as a recreational fishery, it is supposed to be activle translocated. It can also dispers on its own	High
36	7.02	Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)?	No	No such PAs in the respective RA area	High
37	7.03	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal?	No	No such behavior is known	Very high
38	7.04	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?	No	No such an evidence exists	Medium
39	7.05	Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?	Yes	Juvenalis can spread through water currents	High
40	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	Yes	Since the species are known from nearby regions, it can migrate in the Aras basin for spowning. Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin.	Medium
41	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No	No such an evidence is knwon	High
42	7.08	Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both	Yes	Based on professional judgement	Low
47	7.09	unintentional or intentional) likely to be	No	Not known	Low
43		Is dispersal of the taxon density dependent?	No	Not known	Low

44	8.01	Is the taxon able to withstand being out of	No	Not known though not expected	Medium
44	0.01	water for extended periods (e.g. minimum of	NO	Not known though not expected	Medium
		1 (3			
I		one or more hours) at some stage of its life			
45	8.02	cycle? Is the taxon tolerant of a wide range of	No	Not well documented	1
45	8.02		NO	Not well documented	Low
		water quality conditions relevant to that			
		taxon? [In the Justification field, indicate the			
		relevant water quality variable(s) being			
46	8.03	Can the taxon be controlled or eradicated in	No	No documented cases exists	Low
		the wild with chemical, biological, or other			
		agents/means?			
47	8.04	Is the taxon likely to tolerate or benefit from	No	Based on professional judgement	Low
10		environmental/human disturbance?			
48		Is the taxon able to tolerate salinity levels	No	Based on professional judgement	Low
1		that are higher or lower than those found in			
-	0.00	its usual environment?			
49		Are there effective natural enemies	No	Based on professional judgement	Low
		(predators) of the taxon present in the RA	L		
		change			
		change			
50	9.01	Under the predicted future climatic	No change	Based on professional judgement	Medium
		conditions, are the risks of entry into the RA			
		area posed by the taxon likely to increase,			
		decrease or not change?			
51	9.02	Under the predicted future climatic	Increase	professional judgement	Medium
		conditions, are the risks of establishment			
		posed by the taxon likely to increase,			
		decrease or not change?			
52	9.03	Under the predicted future climatic	Increase	Based on professional judgement	Medium
1		conditions, are the risks of dispersal within			
1		the RA area posed by the taxon likely to			
		increase, decrease or not change?			
53	9.04	Under the predicted future climatic	Higher	Based on professional judgement	Medium
1		conditions, what is the likely magnitude of			
1		future potential impacts on biodiversity			
		and/or ecological integrity/status?			
54	9.05	Under the predicted future climatic	Higher	Based on professional judgement	Low
		conditions, what is the likely magnitude of			
1		future potential impacts on ecosystem			
		structure and/or function?			
55	9.06	Under the predicted future climatic	No change	Based on professional judgement	Low
1		conditions, what is the likely magnitude of			
1		future potential impacts on ecosystem			
		services/socio-economic factors?			

Statistics	
Scores	
BRA	30.0
BRA Outcome	-
BRA+CCA	38.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	14.0
1. Domestication/Cultivation	2.0
2. Climate, distribution and introduction risk	2.0
3. Invasive elsewhere	10.0
B. Biology/Ecology	16.0
4. Undesirable (or persistence) traits	6.0
5. Resource exploitation	7.0
6. Reproduction	4.0
7. Dispersal mechanisms	1.0
8. Tolerance attributes	-2.0
C. Climate change	8.0
9. Climate change	8.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3
2. Climate, distribution and introduction risk	3 5 5
3. Invasive elsewhere	5
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2 7 9 6
6. Reproduction	7
7. Dispersal mechanisms	9
8. Tolerance attributes	6
C. Climate change	6
9. Climate change	6
Sectors affected	
Commercial	15
Environmental	10
Species or population nuisance traits	17
Thresholds	
BRA	_
DRA	-

BRA+CCA	-
Confidence	
BRA+CCA	0.58
BRA	0.60
CCA	0.42
Date and Time	
16/05/2022	23:17:06

Taxon and Assessor details	
Category	Fishes and Lampreys (freshwater)
Taxon name	Sander lucioperca
Common name	pikeperch
Assessor	Giorgi Epitashvili
Risk screening context	
Reason and socio-economic benefits	The fish has wide distribution in the world. It is a trade important species.
Risk assessment area	South Caucasus
Taxonomy	Sander lucioperca (Linnaeus 1758)
Native range	Europe and Asia: Caspian, Baltic, Black and Aral Sea basins; Elbe (North Sea basin) and Maritza
Introduced range	Introduced widely in Europe and other regions of the world
URL	https://www.fishbase.se/summary/sander-lucioperca.html

-			Response	Justification (references and/or other information)	Confidence
		ography/Historical			
		ication/Cultivation			
1	1.01	Has the taxon been the subject of	Yes	Currently, the main producing countries of S. lucioperca are the	Very high
		domestication (or cultivation) for at least 20		Czech Republic, Denmark, Hungary, Romania, Tunisia and	
		generations?		Ukraine. In addition to the other countries shown on the FAO map,	
				pike-perch are also grown in the Netherlands and Poland.	
2	1.02	Is the taxon harvested in the wild and likely	Yes	Cultivating and maintaining broodstocks in RAS frees this type of	Very high
		to be sold or used in its live form?		pike-perch production from the necessity of catching spawners in	
				the wild.	
3	1.03	Does the taxon have invasive races,	Yes	As S. lucioperca is an obligate piscivore as an adult, this species	Very high
	1.00	varieties, sub-taxa or congeners?		will predate on native and non-native fish species where	ver, mgn
2 (limate	, distribution and introduction risk		Twin predate on native and non native nan apecies where	
	2.01	How similar are the climatic conditions of the	High	This species is naturally distributed in the South Caucasus region	Very high
+	2.01		riigii		very nigh
		Risk Assessment (RA) area and the taxon's		and translocated within the region by fishermans. Therefore,	
		native range?		natural conditions for this species between native and introduced	
				ranges is more or less similar	
5	2.02	What is the quality of the climate matching	High	Köppen-Geiger climate classification map	High
		data?			
5	2.03	Is the taxon already present outside of	Yes	This species is naturally distributed in the South Caucasus region	Very high
		captivity in the RA area?		(Kuljanishvili et al. 2020).	
7	2.04	How many potential vectors could the taxon	>1	This species is spread naturally within the SC region and also by	High
		use to enter in the RA area?		humans.	
8	2.05	Is the taxon currently found in close	Yes	These species is distributed in the Caucasus region and	Very high
-	2.55	proximity to, and likely to enter into, the RA		surrounding (Turkey, Iran, Russia, etc)	· · · · · · · · · · · · · · · · · · ·
				surrounding (Turkey, Iran, Russia, etc)	
		area in the near future (e.g. unintentional			
- T		and intentional introductions)?			
		e elsewhere	1.4		N/ 111
Э	3.01	Has the taxon become naturalised	Yes	Pikeperch is found naturalised as an alien species in a large	Very high
		(established viable populations) outside its		number of countries in Europe (Lever 1996), including the UK,	
		native range?		Denmark, Italy, Turkey, France and Holland (Perez-Bote & Roso,	
L0	3.02	In the taxon's introduced range, are there	Yes	As S. lucioperca is an obligate piscivore as an adult, this species	Very high
		known adverse impacts to wild stocks or		will predate on native and non-native fish species where	
		commercial taxa?		introduced.	
11	3.03	In the taxon's introduced range, are there	Yes	S. lucioperca can also potentially cause the collapse of a fishery	High
		known adverse impacts to aquaculture?		by removing many of the young fish not allowing them to grow	5
				and spawn.	
12	3.04	In the taxon's introduced range, are there	Yes	Data deficient	Low
12	5.04	known adverse impacts to ecosystem	103		LOW
1 2	3.05		Yes	There is insufficient information available to determine how	Low
13	5.05	In the taxon's introduced range, are there	165		Low
		known adverse socio-economic impacts?		Sander lucioperca would impact socio-economics in the Great	
				Lakes region, USA. S. lucioperca is a top predator of brown trout,	
				perch and salmonids, and as such could impact commercial	
				fisheries for these species. It is not known to what extent S.	
				lucioperca could affect these fisheries, but many think that it	
				could benefit North American fisheries due to its popularity as an	
2	Biology	y/Ecology			
		// Ecology			
	Jnaesin	able (or persistence) traits			
1. L		able (or persistence) traits	No	This species does not pose a threat to humans	High
4. L		able (or persistence) traits Is it likely that the taxon will be poisonous or	No	This species does not pose a threat to humans	High
<u>4. L</u> 14	4.01	able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health?			5
<i>1. L</i> L4		able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or	No Yes	Schulze et al. (2006) noted that when S. lucioperca was	High Very high
<i>1. L</i> L4	4.01	able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or		Schulze et al. (2006) noted that when S. lucioperca was introduced into a German lake, there was a shift in perch (Perca	5
<i>1. L</i> L4	4.01	able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or		Schulze et al. (2006) noted that when S. lucioperca was introduced into a German lake, there was a shift in perch (Perca fluviatilis) habitat usage from the pelagic zones of the lake	5
<i>1. L</i> 14	4.01	able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or		Schulze et al. (2006) noted that when S. lucioperca was introduced into a German lake, there was a shift in perch (Perca fluviatilis) habitat usage from the pelagic zones of the lake towards the littoral zone in response to the competition from the	5
<i>1. L</i> L4	4.01	able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or		Schulze et al. (2006) noted that when S. lucioperca was introduced into a German lake, there was a shift in perch (Perca fluviatilis) habitat usage from the pelagic zones of the lake towards the littoral zone in response to the competition from the pikeperch. They also stated there was an increase in predation on	5
<i>1. L</i> L4	4.01	able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or		Schulze et al. (2006) noted that when S. lucioperca was introduced into a German lake, there was a shift in perch (Perca fluviatilis) habitat usage from the pelagic zones of the lake towards the littoral zone in response to the competition from the pikeperch. They also stated there was an increase in predation on juvenile perch by both pikeperch and pike (Esox Lucius) leading to	5
<u>4. l</u> 14 15	4.01	able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?		Schulze et al. (2006) noted that when S. lucioperca was introduced into a German lake, there was a shift in perch (Perca fluviatilis) habitat usage from the pelagic zones of the lake towards the littoral zone in response to the competition from the pikeperch. They also stated there was an increase in predation on juvenile perch by both pikeperch and pike (Esox Lucius) leading to a decrease in the abundance of large perch	Very high
<u>. ц</u> .4	4.01	able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa		Schulze et al. (2006) noted that when S. lucioperca was introduced into a German lake, there was a shift in perch (Perca fluviatilis) habitat usage from the pelagic zones of the lake towards the littoral zone in response to the competition from the pikeperch. They also stated there was an increase in predation on juvenile perch by both pikeperch and pike (Esox Lucius) leading to	5
<u>. ц</u> .4	4.01	able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	Schulze et al. (2006) noted that when S. lucioperca was introduced into a German lake, there was a shift in perch (Perca fluviatilis) habitat usage from the pelagic zones of the lake towards the littoral zone in response to the competition from the pikeperch. They also stated there was an increase in predation on juvenile perch by both pikeperch and pike (Esox Lucius) leading to a decrease in the abundance of large perch	Very high
4. U	4.01	able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa	Yes	Schulze et al. (2006) noted that when S. lucioperca was introduced into a German lake, there was a shift in perch (Perca fluviatilis) habitat usage from the pelagic zones of the lake towards the littoral zone in response to the competition from the pikeperch. They also stated there was an increase in predation on juvenile perch by both pikeperch and pike (Esox Lucius) leading to a decrease in the abundance of large perch S. lucioperca is a predator fish and can eat threatened and	Very high
<u>4. (</u> 14 15	4.01 4.02 4.03	able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	Yes	Schulze et al. (2006) noted that when S. lucioperca was introduced into a German lake, there was a shift in perch (Perca fluviatilis) habitat usage from the pelagic zones of the lake towards the littoral zone in response to the competition from the pikeperch. They also stated there was an increase in predation on juvenile perch by both pikeperch and pike (Esox Lucius) leading to a decrease in the abundance of large perch S. lucioperca is a predator fish and can eat threatened and protected species in the South Caucasus region such as Luciobarbus capito, Salmo spp, Acipencer spp, etc.	Very high
<u>4. (</u> 14 15	4.01	able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic	Yes	Schulze et al. (2006) noted that when S. lucioperca was introduced into a German lake, there was a shift in perch (Perca fluviatilis) habitat usage from the pelagic zones of the lake towards the littoral zone in response to the competition from the pikeperch. They also stated there was an increase in predation on juvenile perch by both pikeperch and pike (Esox Lucius) leading to a decrease in the abundance of large perch S. lucioperca is a predator fish and can eat threatened and protected species in the South Caucasus region such as Luciobarbus capito, Salmo spp, Acipencer spp, etc. This species is naturally distributed in the SC region and therefore	Very high
1. U 14 15	4.01 4.02 4.03	able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus	Yes	Schulze et al. (2006) noted that when S. lucioperca was introduced into a German lake, there was a shift in perch (Perca fluviatilis) habitat usage from the pelagic zones of the lake towards the littoral zone in response to the competition from the pikeperch. They also stated there was an increase in predation on juvenile perch by both pikeperch and pike (Esox Lucius) leading to a decrease in the abundance of large perch S. lucioperca is a predator fish and can eat threatened and protected species in the South Caucasus region such as Luciobarbus capito, Salmo spp, Acipencer spp, etc.	Very high Very high
<u>.</u> 4 .5	4.01 4.02 4.03	able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has	Yes	Schulze et al. (2006) noted that when S. lucioperca was introduced into a German lake, there was a shift in perch (Perca fluviatilis) habitat usage from the pelagic zones of the lake towards the littoral zone in response to the competition from the pikeperch. They also stated there was an increase in predation on juvenile perch by both pikeperch and pike (Esox Lucius) leading to a decrease in the abundance of large perch S. lucioperca is a predator fish and can eat threatened and protected species in the South Caucasus region such as Luciobarbus capito, Salmo spp, Acipencer spp, etc. This species is naturally distributed in the SC region and therefore	Very high Very high
. <u>.</u> 6	4.01 4.02 4.03 4.04	able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?	Yes Yes Yes	Schulze et al. (2006) noted that when S. lucioperca was introduced into a German lake, there was a shift in perch (Perca fluviatilis) habitat usage from the pelagic zones of the lake towards the littoral zone in response to the competition from the pikeperch. They also stated there was an increase in predation on juvenile perch by both pikeperch and pike (Esox Lucius) leading to a decrease in the abundance of large perch S. lucioperca is a predator fish and can eat threatened and protected species in the South Caucasus region such as Luciobarbus capito, Salmo spp, Acipencer spp, etc. This species is naturally distributed in the SC region and therefore environmental conditions of the region is suitable for it.	Very high Very high Very high
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7	4.01 4.02 4.03 4.04	able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it	Yes Yes Yes	Schulze et al. (2006) noted that when S. lucioperca was introduced into a German lake, there was a shift in perch (Perca fluviatilis) habitat usage from the pelagic zones of the lake towards the littoral zone in response to the competition from the pikeperch. They also stated there was an increase in predation on juvenile perch by both pikeperch and pike (Esox Lucius) leading to a decrease in the abundance of large perch S. lucioperca is a predator fish and can eat threatened and protected species in the South Caucasus region such as Luciobarbus capito, Salmo spp, Acipencer spp, etc. This species is naturally distributed in the SC region and therefore environmental conditions of the region is suitable for it.	Very high Very high Very high
.6 .7	4.01 4.02 4.03 4.04 4.05	able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA	Yes Yes Yes	Schulze et al. (2006) noted that when S. lucioperca was introduced into a German lake, there was a shift in perch (Perca fluviatilis) habitat usage from the pelagic zones of the lake towards the littoral zone in response to the competition from the pikeperch. They also stated there was an increase in predation on juvenile perch by both pikeperch and pike (Esox Lucius) leading to a decrease in the abundance of large perch S. lucioperca is a predator fish and can eat threatened and protected species in the South Caucasus region such as Luciobarbus capito, Salmo spp, Acipencer spp, etc. This species is naturally distributed in the SC region and therefore environmental conditions of the region is suitable for it. As a predator, S. lucioperca can disrupt food web structure in such ecosystems where it was not naturally distributed.	Very high Very high Very high High
4. U 14 15 16	4.01 4.02 4.03 4.04	able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it	Yes Yes Yes	Schulze et al. (2006) noted that when S. lucioperca was introduced into a German lake, there was a shift in perch (Perca fluviatilis) habitat usage from the pelagic zones of the lake towards the littoral zone in response to the competition from the pikeperch. They also stated there was an increase in predation on juvenile perch by both pikeperch and pike (Esox Lucius) leading to a decrease in the abundance of large perch S. lucioperca is a predator fish and can eat threatened and protected species in the South Caucasus region such as Luciobarbus capito, Salmo spp, Acipencer spp, etc. This species is naturally distributed in the SC region and therefore environmental conditions of the region is suitable for it. As a predator, S. lucioperca can disrupt food web structure in such	Very high Very high Very high
.6 .7	4.01 4.02 4.03 4.04 4.05	able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA	Yes Yes Yes	Schulze et al. (2006) noted that when S. lucioperca was introduced into a German lake, there was a shift in perch (Perca fluviatilis) habitat usage from the pelagic zones of the lake towards the littoral zone in response to the competition from the pikeperch. They also stated there was an increase in predation on juvenile perch by both pikeperch and pike (Esox Lucius) leading to a decrease in the abundance of large perch S. lucioperca is a predator fish and can eat threatened and protected species in the South Caucasus region such as Luciobarbus capito, Salmo spp, Acipencer spp, etc. This species is naturally distributed in the SC region and therefore environmental conditions of the region is suitable for it. As a predator, S. lucioperca can disrupt food web structure in such ecosystems where it was not naturally distributed.	Very high Very high Very high High

20					
	4.07	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and	No	Data deficient	Low
		infectious agents that are endemic in the RA			
21	4.08	Is it likely that the taxon will host, and/or	Yes	S. lucioperca is a vector of fish diseases and parasites which can	Medium
~ +	1.00	act as a vector for, recognised pests and	105	be transmitted to native and farmed fish.	liculum
		infectious agents that are absent from (novel			
		to) the RA area?			
22	4.09	Is it likely that the taxon will achieve a body	Yes	This species generally attains lengths of 50-70 cm and body	Very high
		size that will make it more likely to be		weights (BW) of 2-5 kg but a maximum length of 130 cm and	
		released from captivity?		weights of 12-18 kg have been reported.	
23	4.10	Is the taxon capable of sustaining itself in a	Yes	Adults inhabit large, turbid rivers and eutrophic lakes, brackish	High
		range of water velocity conditions (e.g.		coastal lakes and estuaries.	
		versatile in habitat use)?			
24	4.11		No	In the South Caucasus this is not expected as S. lucioperca is a	Low
		(e.g. excretion of by-products) or behaviours	-	native species.	-
		(e.g. feeding) will reduce habitat quality for			
		native taxa?			
25	4.12	Is the taxon likely to maintain a viable	No	Data deficient	Low
		population even when present in low			
		densities (or persisting in adverse conditions			
		by way of a dormant form)?			
5. 1	Resourd	ce exploitation			
26	5.01	Is the taxon likely to consume threatened or	Yes	S. lucioperca is a predator fish and can eat threatened and	Very high
		protected native taxa in the RA area?		protected species in the South Caucasus region	
27	5.02	Is the taxon likely to sequester food	Yes	S. lucioperca is a predator fish and can other species distributed in	Low
		resources (including nutrients) to the		the SC region.	
_		detriment of native taxa in the RA area?			
	Reprod				1.
28	6.01	Is the taxon likely to exhibit parental care	Yes	Data deficient	Low
		and/or to reduce age-at-maturity in response			
0	6.02	to environmental conditions?	Vac	This species is patrophy and the CO	Vandhish
9	6.02	Is the taxon likely to produce viable gametes	Yes	This species is naturally reproduces in the SC region	Very high
0	6.03	or propagules (in the RA area)? Is the taxon likely to hybridise naturally with	Vac	A case of patural hybridization between allegenet (Candar	Von hich
50	6.03		Yes	A case of natural hybridization between pikeperch (Sander	Very high
		native taxa?		lucioperca) and perch (Perca fluviatilis) was confirmed based on	
				the intermediate morphological, anatomical and genetic	
1	6.04	Is the taxon likely to be hermaphroditic or to	No	characteristics of the hybrid (Kahilainen et al. 2011). No data	Medium
ът	0.04	display asexual reproduction?	NO	NO Udla	Medium
22	6.05	Is the taxon dependent on the presence of	No	Such a fact is not known.	Medium
2	0.05	another taxon (or specific habitat features)	NO		medium
		to complete its life cycle?			
22					
	6 06		Vac	Ecoundity varies from 12,000 to 1000000 ecos (Ninup et al. 2012)	Liah
در	6.06	Is the taxon known (or likely) to produce a	Yes	Fecundity varies from 13 000 to 1000000 eggs (Ninua et al. 2013).	High
دد	6.06	large number of propagules or offspring	Yes	Fecundity varies from 13 000 to 1000000 eggs (Ninua et al. 2013).	High
		large number of propagules or offspring within a short time span (e.g. < 1 year)?			_
	6.06	large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years)	Yes 2	Fecundity varies from 13 000 to 1000000 eggs (Ninua et al. 2013). The species become mature at the age of 2-4 (Ninua et al. 2013).	High High
		large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at-			_
34	6.07	large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?			_
34 7. j	6.07	large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms		The species become mature at the age of 2-4 (Ninua et al. 2013).	High
34 7. j	6.07 Dispers	large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? <i>al mechanisms</i> How many potential internal	2	The species become mature at the age of 2-4 (Ninua et al. 2013). This species is spread naturally in the SC region and possibly by	_
34 7. j	6.07 Dispers	large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to	2	The species become mature at the age of 2-4 (Ninua et al. 2013).	High
34 7. 1 35	6.07 Dispers	large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable	2	The species become mature at the age of 2-4 (Ninua et al. 2013). This species is spread naturally in the SC region and possibly by	High
34 7. 1 35	6.07 Dispers 7.01	large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to	2	The species become mature at the age of 2-4 (Ninua et al. 2013). This species is spread naturally in the SC region and possibly by humans (translocation)	High
34 7 <u>.</u> 35	6.07 Dispers 7.01	large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the	2	The species become mature at the age of 2-4 (Ninua et al. 2013). This species is spread naturally in the SC region and possibly by humans (translocation) This species is distributed in the protected areas of the SC region,	High
34 7. 1 35	6.07 Dispers 7.01	large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more	2	The species become mature at the age of 2-4 (Ninua et al. 2013). This species is spread naturally in the SC region and possibly by humans (translocation) This species is distributed in the protected areas of the SC region,	High
34 7. 1 35	6.07 Dispers 7.01 7.02	large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)?	2 >1 Yes	The species become mature at the age of 2-4 (Ninua et al. 2013). This species is spread naturally in the SC region and possibly by humans (translocation) This species is distributed in the protected areas of the SC region, for instance in Kolkheti National Park in Georgia.	High Medium High
34 7. 1 35 36	6.07 Dispers 7.01 7.02	large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? <i>al mechanisms</i> How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively	2 >1 Yes	The species become mature at the age of 2-4 (Ninua et al. 2013). This species is spread naturally in the SC region and possibly by humans (translocation) This species is distributed in the protected areas of the SC region, for instance in Kolkheti National Park in Georgia.	High Medium High
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34 7. 35 36 37 38 38 39 40 41 42 43	6.07 <i>Dispers</i> 7.01 7.02 7.03 7.04 7.04 7.05 7.06 7.07 7.08 7.09	large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersad of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent?	2 >1 Yes No Yes Yes Yes No	The species become mature at the age of 2-4 (Ninua et al. 2013). This species is spread naturally in the SC region and possibly by humans (translocation) This species is distributed in the protected areas of the SC region, for instance in Kolkheti National Park in Georgia. Such a fact is not known This species is naturally distributed in the SC region and other animals may move its eggs from one place to another. This species is naturally dispersed within the region This species is naturally reproduces within the region Probably yes (Data deficient) No data	High Medium High Very high Medium High Medium Low
334 355 366 377 388 399 400 411 42 133	6.07 <i>Dispers</i> 7.01 7.02 7.03 7.04 7.04 7.05 7.06 7.07 7.08 7.09 <i>Toleran</i>	large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? ce attributes	2 >1 Yes No Yes Yes Yes No Yes	The species become mature at the age of 2-4 (Ninua et al. 2013). This species is spread naturally in the SC region and possibly by humans (translocation) This species is distributed in the protected areas of the SC region, for instance in Kolkheti National Park in Georgia. Such a fact is not known This species is naturally distributed in the SC region and other animals may move its eggs from one place to another. This species is naturally dispersed within the region This species is naturally reproduces within the region Probably yes (Data deficient) No data No research has been conducted in this direction although its prevalence may depend on population density.	High Medium High Very high Medium High Medium Low
34 7. 35 36 37 38 39 40 41 42 43 8.	6.07 <i>Dispers</i> 7.01 7.02 7.03 7.04 7.04 7.05 7.06 7.07 7.08 7.09	large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of	2 >1 Yes No Yes Yes Yes No	The species become mature at the age of 2-4 (Ninua et al. 2013). This species is spread naturally in the SC region and possibly by humans (translocation) This species is distributed in the protected areas of the SC region, for instance in Kolkheti National Park in Georgia. Such a fact is not known This species is naturally distributed in the SC region and other animals may move its eggs from one place to another. This species is naturally dispersed within the region This species is naturally reproduces within the region Probably yes (Data deficient) No research has been conducted in this direction although its	High Medium High Very high Medium High Medium Low
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34 7. 355 36 377 383 383 383 383 383 383 383 383 383 383 383 383 383 383 383 383 383 393 440	6.07 <i>Dispers</i> 7.01 7.02 7.03 7.04 7.04 7.05 7.06 7.07 7.08 7.09 <i>Toleran</i> 8.01	large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? ce attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle?	2 >1 Yes No Yes Yes Yes No Yes	The species become mature at the age of 2-4 (Ninua et al. 2013). This species is spread naturally in the SC region and possibly by humans (translocation) This species is distributed in the protected areas of the SC region, for instance in Kolkheti National Park in Georgia. Such a fact is not known This species is naturally distributed in the SC region and other animals may move its eggs from one place to another. This species is naturally dispersed within the region This species is naturally reproduces within the region Probably yes (Data deficient) No data No research has been conducted in this direction although its prevalence may depend on population density. Such fact has not detect	High Medium High Very high Medium High Medium Low Low
34 7. 335 366 377 388 389 40 41 42 43 43 3. 444	6.07 <i>Dispers</i> 7.01 7.02 7.03 7.04 7.04 7.05 7.06 7.07 7.08 7.09 <i>Toleran</i>	large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? ce attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of	2 >1 Yes No Yes Yes Yes No Yes	The species become mature at the age of 2-4 (Ninua et al. 2013). This species is spread naturally in the SC region and possibly by humans (translocation) This species is distributed in the protected areas of the SC region, for instance in Kolkheti National Park in Georgia. Such a fact is not known This species is naturally distributed in the SC region and other animals may move its eggs from one place to another. This species is naturally dispersed within the region This species is naturally reproduces within the region Probably yes (Data deficient) No data No research has been conducted in this direction although its prevalence may depend on population density. Such fact has not detect S. lucioperca inhabits rivers, lakes, reservoirs, moderately running	High Medium High Very high Medium High Medium Low
34 7. 335 366 377 388 389 40 41 42 43 43 3. 444	6.07 <i>Dispers</i> 7.01 7.02 7.03 7.04 7.04 7.05 7.06 7.07 7.08 7.09 <i>Toleran</i> 8.01	large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that	2 >1 Yes No Yes Yes Yes No Yes	The species become mature at the age of 2-4 (Ninua et al. 2013). This species is spread naturally in the SC region and possibly by humans (translocation) This species is distributed in the protected areas of the SC region, for instance in Kolkheti National Park in Georgia. Such a fact is not known This species is naturally distributed in the SC region and other animals may move its eggs from one place to another. This species is naturally dispersed within the region This species is naturally reproduces within the region Probably yes (Data deficient) No data No research has been conducted in this direction although its prevalence may depend on population density. Such fact has not detect S. lucioperca inhabits rivers, lakes, reservoirs, moderately running waters and brackish coastal waters with salinities of ca. 12 ppt	High Medium High Very high Medium High Medium Low Low
44 5 56 77 88 99 00 11 2 33 33 34	6.07 <i>Dispers</i> 7.01 7.02 7.03 7.04 7.04 7.05 7.06 7.07 7.08 7.09 <i>Toleran</i> 8.01	large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? ce attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of	2 >1 Yes No Yes Yes Yes No Yes	The species become mature at the age of 2-4 (Ninua et al. 2013). This species is spread naturally in the SC region and possibly by humans (translocation) This species is distributed in the protected areas of the SC region, for instance in Kolkheti National Park in Georgia. Such a fact is not known This species is naturally distributed in the SC region and other animals may move its eggs from one place to another. This species is naturally dispersed within the region This species is naturally reproduces within the region Probably yes (Data deficient) No data No research has been conducted in this direction although its prevalence may depend on population density. Such fact has not detect S. lucioperca inhabits rivers, lakes, reservoirs, moderately running	High Medium High Very high Medium High Medium Low Low

	Can the taxon be controlled or eradicated in	No	As established populations are difficult and costly to control,	High
	the wild with chemical, biological, or other		further introductions or stocking should be avoided.	
	agents/means?			
		No	Data deficient	Low
		Yes		High
			waters and brackish coastal waters with salinities of ca. 12 ppt	
8.06	Are there effective natural enemies	Yes	There are several predator species which can eat S. lucioperca in	Very high
	(predators) of the taxon present in the RA		the Caucasus region: Esox lucius, Silurus glanis, etc.	
limate	e change			
				i
9.01	Under the predicted future climatic	Decrease	Own judgement	Medium
	conditions, are the risks of entry into the RA			
	area posed by the taxon likely to increase,			
	decrease or not change?			
9.02	Under the predicted future climatic	Decrease	Own judgement	Medium
	conditions, are the risks of establishment			
	posed by the taxon likely to increase,			
	decrease or not change?			
9.03	Under the predicted future climatic	Increase	Translocation by humans	Medium
	conditions, are the risks of dispersal within			
	the RA area posed by the taxon likely to			
	increase, decrease or not change?			
9.04	Under the predicted future climatic	Lower	Own judgement	Medium
	conditions, what is the likely magnitude of			
	future potential impacts on biodiversity			
	and/or ecological integrity/status?			
9.05		Lower	Own judgement	Medium
	conditions, what is the likely magnitude of			
	future potential impacts on ecosystem			
	structure and/or function?			
9.06	Under the predicted future climatic	Lower	Own judgement	Medium
	conditions, what is the likely magnitude of			
	future potential impacts on ecosystem			
	8.05 8.06 limatu <u>limate</u> 9.01 9.02 9.03 9.04	environmental/human disturbance? 8.05 Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment? 8.06 Are there effective natural enemies (predators) of the taxon present in the RA limate change Imate change 9.01 Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? 9.02 Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? 9.03 Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? 9.03 Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? 9.04 Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? 9.05 Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	environmental/human disturbance? 8.05 Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment? Yes 8.06 Are there effective natural enemies (predators) of the taxon present in the RA Yes Iimate change	environmental/human disturbance? 8.05 Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment? Yes S. lucioperca inhabits rivers, lakes, reservoirs, moderately running waters and brackish coastal waters with salinities of ca. 12 ppt 8.06 Are there effective natural enemies (predators) of the taxon present in the RA There are several predator species which can eat S. lucioperca in the Caucasus region: Esox lucius, Silurus glanis, etc. limate change 9.01 Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Decrease Own judgement 9.02 Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Decrease Own judgement 9.03 Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Increase Translocation by humans 9.04 Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on bioliversity and/or ecological integrity/status? Lower Own judgement 9.05 Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem Lower Own judgement 0.04 Under the predi

Statistics	
Scores	
BRA	50.0
BRA Outcome	-
BRA+CCA	42.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	24.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	2.0
3. Invasive elsewhere	18.0
B. Biology/Ecology	26.0
4. Undesirable (or persistence) traits	8.0
5. Resource exploitation	7.0
6. Reproduction	4.0
7. Dispersal mechanisms	6.0
8. Tolerance attributes	1.0
C. Climate change	-8.0
9. Climate change	-8.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	5
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2
6. Reproduction	
7. Dispersal mechanisms	7
8. Tolerance attributes	6
C. Climate change	6
9. Climate change	6
Sectors affected	
Commercial	16
Environmental	8
Species or population nuisance traits	22
Thresholds	
BRA	-
BRA+CCA	_
Confidence	
BRA+CCA	0.68
BRATECA	0.70
CCA	0.50
	0.50

Date and Time 13/05/2022 18:43:43

axon and Assessor details						
Category	Fishes and Lampreys (freshwater)					
Taxon name	Sander lucioperca					
Common name	pikeperch					
Assessor	Tatia Kuljanishvili					
Risk screening context						
Reason and socio-economic benefits	Sander lucioperca is native to the Black and Caspian Sea basins. This species was not recorded in					
Risk assessment area	South Caucasus					
Taxonomy	Actinopteri (ray-finned fishes) > Perciformes/Percoidei () > Percidae (Perches) > Luciopercinae					
Native range	The Black and Caspian Sea basins					
Introduced range	Aras River basin					
URL	https://www.fishbase.de/summary/Sander-lucioperca.html					

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
1. L		ication/Cultivation			l
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	It is possible to produce this fish in aquaculture facilities	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	This species has importance as it is eatable and tasty. They are sold in its life forms.	High
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	For example P. fluviatilis	High
2 (limate	, distribution and introduction risk			
4		How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range?	High	The climatic conditions are similar	Very high
5	2.02	What is the quality of the climate matching data?	Medium	The quality of climate matching is low since there are no much stations in Armenia	Very high
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	It has been caught in the Aras River at the Agarak-Megri district (Pipoyan & Tigranyan, 2002; Pipoyan, 2012), and was also recorded by Levin and Rubenyan (2010) in the Aras River. Though not officially reported, the repeated findings indicate the existence of established populations in Armenia	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	>1	Aquaculture, Recriation.	High
8	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)?	Yes	It has been caught in the Aras River at the Agarak-Megri district (Pipoyan & Tigranyan, 2002; Pipoyan, 2012), and was also recorded by Levin and Rubenyan (2010) in the Aras River. Though not officially reported, the repeated findings indicate the existence of established populations in Armenia	Very high
<u>3. 1</u> 9		e elsewhere Has the taxon become naturalised	Vac	Ves it has become not unlight outside its notive prop	Vorthigh
		(established viable populations) outside its	Yes	Yes it has become naturalized outside its native area	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	In Turkey it is known that it caused the extension of three endemics fish species (Crivelli 1995).	Very high
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	Yes	In France it caused the decline of sand smelt (Atherina boyeri) populations (Kiener 1968), In England it was main reason for waning of Cyprinids populations (Kell 1985; Manchester et al. 2000). because of this, S. lucioperca is considered as an invasive species (Fickling and Lee 1983).	Very high
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	Yes	It can be transmissing deseases	Low
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	Yes	there is definetely adverse socio-economic impact, however this is not assessed https://nas.er.usgs.gov/queries/greatlakes/FactSheet.aspx?Species ID=65&Potential=Y&Type=2&HUCNumber=DGreatLakes	Low
		y/Ecology			
		able (or persistence) traits			b
		Is it likely that the taxon will be poisonous or pose other risks to human health?		Not poisonous	Very high
15	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	It is possible and it had happened that it caused extripaton of some native taxa for example in Britain, Turkey	High
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	Does not parasite	Very high
		Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?	Yes	can tolerate turbidity and eutrophication (Kottelat & Freyhof 2007) and salinity brackish and freshwaters (Kottelat & Freyhof 2007)	High
	4.05	Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA area?	Yes	In great lakes, this species has become the top predator and it is known that has forgagin behaviour in the area https://nas.er.usgs.gov/queries/greatlakes/FactSheet.aspx?Species ID=65&Potential=Y&Type=2&HUCNumber=DGreatLakes	
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes	Can affect aquaculture production, and be transmitting deseaases and parasites	Medium
20	4.07	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA	Yes	Can be, however it is not documented	High

21	4.08	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and	Yes	Can be, however it is not documented	High
		infectious agents that are absent from (novel			
22	4.00	to) the RA area?) (augusta la la la
22	4.09	Is it likely that the taxon will achieve a body size that will make it more likely to be	Yes	This taxon can achive very large sizes An individual weighing 19 kg was reportedly caught in 1959 in Starnberger, Bavaria,	Very high
		released from captivity?		Germany (Peter Admicka, pers. Comm. E-mail:	
	4.10			peter.adamicka@oeaw.ac.at)	11:
23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g.	Yes	It can live in ponds, estuaries or rivers (Kottelat & Freyhof 2007)	High
		versatile in habitat use)?			
24	4.11	Is it likely that the taxon's mode of existence	No	Yes it has become naturalized outside its native area	Medium
		(e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for			
		native taxa?			
25	4.12	Is the taxon likely to maintain a viable	Yes	Yes (Poulet et al 2009)	High
		population even when present in low densities (or persisting in adverse conditions			
		by way of a dormant form)?			
		<i>e exploitation</i> Is the taxon likely to consume threatened or	Yes	In great lakes, this species has become the top predator and it is	Very high
20	5.01	protected native taxa in the RA area?	165	known that has forgagin behaviour in the area and consumes	very nigh
				protected or threatened native fishes	
				https://nas.er.usgs.gov/queries/greatlakes/FactSheet.aspx?Species ID=65&Potential=Y&Type=2&HUCNumber=DGreatLakes	
27	5.02	Is the taxon likely to sequester food	Yes	This taxon is known to expose foraging behaviour that might	Medium
		resources (including nutrients) to the		reduce food avalability to other piscivorous species in the area	
		detriment of native taxa in the RA area?		through competition, however there is no information id it can sequester nutrients minerals trace elements	
6. F	Reprodu	iction			1
28	6.01	Is the taxon likely to exhibit parental care	Yes	Males defend their nests and fans the eggs (Kottelat & Freyhof	Very high
		and/or to reduce age-at-maturity in response to environmental conditions?		2007)	
29	6.02		Yes	the conditions for maturation and reproduction are avalable in the	High
20	6.00	or propagules (in the RA area)?	X	RA area	
30	6.03	Is the taxon likely to hybridise naturally with native taxa?	Yes	It has been hybridising with native S. volgensis (Manchester & Bullock 2000)	High
31	6.04	Is the taxon likely to be hermaphroditic or to	No	No. Does not display asexual reproduction	Very high
22	6.05	display asexual reproduction? Is the taxon dependent on the presence of	No	No. Does not display provide reproduction	Vorubiah
52	0.05	another taxon (or specific habitat features)	NO	No. Does not display asexual reproduction	Very high
		to complete its life cycle?			
33	6.06	Is the taxon known (or likely) to produce a large number of propagules or offspring	Yes	The relative fecundity varies from the minimum of 48 to the	High
		within a short time span (e.g. < 1 year)?		maximum of 467 eggs per 1 g of the female (Erm 1961; Gaygalas & Gyarulaytis 1974). On average, it is between 150 and 400 eggs.	
34	6.07	How many time units (days, months, years)	4	4 years	Very high
		does the taxon require to reach the age-at- first-reproduction?			
		al mechanisms			
35	7.01	How many potential internal	>1	Aquaculture, ecriational fisheries, Self-dispersad	Very high
		vectors/pathways could the taxon use to disperse within the RA area (with suitable			
36	7.02	Will any of these vectors/pathways bring the	Yes	it is possible	High
		taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)?			
37	7.03	Does the taxon have a means of actively	No	No. Morphologically this species does not have a means of actively	Very high
		attaching itself to hard substrata (e.g. ship		attaching itself to hard substrata	-
		hulls, pilings, buoys) such that it enhances the likelihood of dispersal?			
38	7.04	Is natural dispersal of the taxon likely to	No	No. can not be distributed as eggs.	Very high
		occur as eggs (for animals) or as propagules			
39	7.05	(for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to	Yes	It is possible	Medium
		occur as larvae/juveniles (for animals) or as			
		fragments/seedlings (for plants) in the RA			
40	7.06	area? Are older life stages of the taxon likely to	Yes	This fish migrates for reproduction	Very high
		migrate in the RA area for reproduction?			, -
41	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No	No. Can not be dispersed by other ananimals	Very high
42	7.08	Is dispersal of the taxon along any of the	Yes	Yes all these vectors seem to be rapid	High
		vectors/pathways mentioned in the previous			
		seven questions (35-41; i.e. both unintentional or intentional) likely to be			
43	7.09	Is dispersal of the taxon density dependent?	Yes	Sice these species are territorial one might assume their dispersal	Medium
	Tolo::			is denisty dependent	
		ce attributes Is the taxon able to withstand being out of	No	No information avalable	Medium
8. 7	8.01		-		
8. 7	8.01	water for extended periods (e.g. minimum of			1
8. 7	8.01	one or more hours) at some stage of its life			
<u>8. 1</u> 44	8.01		Yes	turbidity, euthrophication, sallinity	Medium
<u>8. 1</u> 44		one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that	Yes	turbidity, euthrophication, sallinity	Medium
<u>8. 7</u> 44		one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of	Yes	turbidity, euthrophication, sallinity	Medium

46	8.03	Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	No	No. This is less likely.	High
47	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	No	No information	Low
48	8.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	Yes	Yes (KrystynaDemska-Zakęś et al 2021)	Very high
		Are there effective natural enemies (predators) of the taxon present in the RA	No	No effective natural enemies present in RA area	Very high
C. (Climat	e change			
		change			
50	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?	Increase	It was hypotheses that climate change might alert the mechanisms of transportation and introduction of non-native species. Commercial and recreational activities will increase, that itself increases the propagule pressure levels of non-native	Very high
51	9.02	Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	Increase	Increased temperatures do not seem to be an obstacle for this species survival. In addition increased temperatures will cause this species establish in higher altitudes	High
52	9.03	Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change?	Increase	With increased propagule pressure and resource avalability the risks of their dispersal are increasing	Very high
53	9.04	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	Higher	Population densities will increase making them on one hand impossible to eradicate and on the other hand, affecting native organisms due to competition, that does not leave much resources for native ones.	Very high
54	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	No change	Difficult to assume	Low
55	9.06	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	Higher	Under the predicted future climatic conditions, this species will disperse even wider, that will itself create the problem for native aquatic organisms. The widespread and abundance of this fish which is quite adaptive and plastic to different environmental conditions, will increase its impact on ecosystem services and socio-economic factors. For example: transmission of diseases, foraging behaviour and species adaptability It can also affect aquaculture and recreational fisheries	Very high

Statistics	
Scores BRA	49.0
BRA Outcome	49.0
BRA+CCA	59.0
BRA+CCA Outcome	59.0
Score partition	
A. Biogeography/Historical	24.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	2.0
3. Invasive elsewhere	18.0
B. Biology/Ecology	25.0
4. Undesirable (or persistence) traits	9.0
5. Resource exploitation	7.0
6. Reproduction	3.0
7. Dispersal mechanisms	3.0
8. Tolerance attributes	3.0
C. Climate change	10.0
9. Climate change	10.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	3 5 5 36
B. Biology/Ecology	
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2 7 9 6
6. Reproduction	7
7. Dispersal mechanisms	9
8. Tolerance attributes	6
	6
C. Climate change	
9. Climate change	6
9. Climate change Sectors affected	
9. Climate change Sectors affected Commercial	21
9. Climate change Sectors affected Commercial Environmental	21 14
9. Climate change Sectors affected Commercial	21
9. Climate change Sectors affected Commercial Environmental Species or population nuisance traits	21 14
9. Climate change Sectors affected Commercial Environmental Species or population nuisance traits Thresholds	21 14
9. Climate change Sectors affected Commercial Environmental Species or population nuisance traits Thresholds BRA	21 14
9. Climate change Sectors affected Commercial Environmental Species or population nuisance traits Thresholds	21 14

BRA+CCA	0.81
BRA	0.81

	CCA	0.83
Date and Time		
	22/05/2022	15:54:15

Taxon and Assessor details	
Category	Fishes and Lampreys (freshwater)
Taxon name	Syngnathus abaster
Common name	black-striped pipefish
Assessor	Bella Japoshvili
Risk screening context	
Reason and socio-economic benefits	The species is has some recreational value and due to this reason is translocated from its native
Risk assessment area	South Caucasus
Taxonomy	Actinopteri (ray-finned fishes) > Syngnathiformes (Pipefishes and seahorses) > Syngnathidae
Native range	Mediterranean basin
Introduced range	Caspian Sea basin
URL	https://www.fishbase.de/summary/Syngnathus-abaster.html

			Response	Justification (references and/or other information)	Confidence
A. I	Biogeo	graphy/Historical			
1. L	Domest	ication/Cultivation			
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	No	Species is not cultured for aquacultural purpose nor as ornamental fish.	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	No	Less possible and such case have not yet recorded	Very high
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	No	No other invasive race or congenerics have ever reported	High
2. (Climate	, distribution and introduction risk			
4			High	Kuljanishvili, T., Patoka, J., Bohatá, L., Rylková, K., Japoshvili, B.,	Medium
		Risk Assessment (RA) area and the taxon's native range?		& Kalous, L. (2021). Evaluation of the potential establishment of black-striped pipefish transferred by cultural drivers. Inland	
5	2.02	What is the quality of the climate matching data?	Medium	Kuljanishvili, T., Patoka, J., Bohatá, L., Rylková, K., Japoshvili, B., & Kalous, L. (2021). Evaluation of the potential establishment of black-striped pipefish transferred by cultural drivers. Inland	Medium
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	Kuljanishvili, T., Patoka, J., Bohatá, L., Rylková, K., Japoshvili, B., & Kalous, L. (2021). Evaluation of the potential establishment of black-striped pipefish transferred by cultural drivers. Inland	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	Translocation for recreational purpose	High
8	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional	No	Kuljanishvili, T., Patoka, J., Bohatá, L., Rylková, K., Japoshvili, B., & Kalous, L. (2021). Evaluation of the potential establishment of black-striped pipefish transferred by cultural drivers. Inland	Very high
		and intentional introductions)?		Waters, 1-8.	
	1	e elsewhere	1		1
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	Kuljanishvili, T., Patoka, J., Bohatá, L., Rylková, K., Japoshvili, B., & Kalous, L. (2021). Evaluation of the potential establishment of black-striped pipefish transferred by cultural drivers. Inland	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	No	Not reported such an effect	Very high
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	Not ever recorded such an effect	Very high
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	No	Not ever recorded such an effect	Very high
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	Not ever recorded such an effect	Very high
B. I	Biology	y/Ecology			
4. L	Indesir	able (or persistence) traits			
		Is it likely that the taxon will be poisonous or pose other risks to human health?		Not a harmful species	Very high
15	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	Based on professional judgement, it can reach to much density so that can suppress some other fishes though no documented evidence exists	Low
	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	Not a parasitic nor predator species	High
	4.04	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?	Yes	Can survive and reproduce in marin, brackish and freshwaters.	Very high
	4.05	Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA	Yes	Possible though not a documented evidence	Low
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	Professional judgement	Medium
20	4.07	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA	No	No such a pests/infectious agents are known	Low
21	4.08	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area?	Yes	Professional judgement	Medium
22	4.09	Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity?	No	Small bodied species	Very high

23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g.	No	Lives in lentic systems	High
24	4.11	versatile in habitat use)? Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for	Yes	Professional judgement, no documented evidence. It can reach high density and can produce large amount of excetion product	Low
25	4.12	native taxa? Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)?	Yes	Professional judgement, no documented evidence	Medium
5. R	lesourc	e exploitation			
	5.01	Is the taxon likely to consume threatened or protected native taxa in the RA area?	No	Professional judgement, no documented evidence (consumes only zooplankton - Didenko, A., Kruzhylina, S., & Gurbyk, A. (2018). Feeding patterns of the black-striped pipefish Syngnathus abaster in an invaded freshwater habitat. Environmental Biology of Fishes, 101(6), 917-931.)	High
27	5.02	Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?	Yes	Didenko, A., Kruzhylina, S., & Gurbyk, A. (2018). Feeding patterns of the black-striped pipefish Syngnathus abaster in an invaded freshwater habitat. Environmental Biology of Fishes,	Low
6. R	leprodu				
28	6.01	Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?	Yes	Herald, E. S. (1959). From pipefish to seahorse – a study of phylogenetic relationships. Proceedings of the Californian Academy of Sciences 29, 465–473	Very high
29	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	Kuljanishvili, T., Patoka, J., Bohatá, L., Rylková, K., Japoshvili, B., & Kalous, L. (2021). Evaluation of the potential establishment of black-striped pipefish transferred by cultural drivers. Inland	Very high
	6.03	Is the taxon likely to hybridise naturally with native taxa?	No	Not expected, no such an evidence is known	Very high
	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	No	Sexully reproducing species	High
	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	No	It can complete its lifecycle independently	Very high
	6.06	Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)?	No	Kottelat, M., & Freyhof, J. (2007). Handbook of European freshwater fishes. Publications Kottelat.	Very high
	6.07	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	1	Years	High
		al mechanisms			lue i
35	7.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable	One	Recreational purpose, indpendently through watercurrent	High
36	7.02	Will any of these vectors/pathways bring the taxon in close proximity to one or more	No	No PAs in the respective areas of RA area	High
37	7.03	protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal?	No	No such an evidence is known	Very high
38	7.04	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?	No	Nos such an evidence is known	High
39	7.05	Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?	Yes	It natiurally spreading. e.g Didenko, A., Kruzhylina, S., & Gurbyk, A. (2018). Feeding patterns of the black-striped pipefish Syngnathus abaster in an invaded freshwater habitat. Environmental Biology of Fishes, 101(6), 917-931.	Medium
40	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	No	Less possible based on professional epxerience	High
41	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No	Nos such an evidence is known	Very high
42	7.08	Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both	No	Based on professional judgemnet	Medium
43	7.09	unintentional or intentional) likely to be Is dispersal of the taxon density dependent?	No	Based on professional judgemnet, no documented evidence	Medium
		ce attributes			
		Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life	Yes	Based on professional judgemnet	Medium
45	8.02	cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the	Yes	Based on professional judgemnet	Very high
46	8.03	relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other	No	No documented evidence	Medium
		agents/means? Is the taxon likely to tolerate or benefit from	No	No such an evidence exists	Low
47	8.04	environmental/human disturbance?	-		

10	8.06	Are there effective natural enemies	No	Based on professional judgemnet	Medium
49		(predators) of the taxon present in the RA	NO	based on professional judgemilet	healann
с. (change			
		change			
50	9.01	Under the predicted future climatic	No change	Based on professional judgemnet	High
		conditions, are the risks of entry into the RA			
		area posed by the taxon likely to increase,			
		decrease or not change?			
51	9.02	Under the predicted future climatic	No change	Based on professional judgemnet	High
		conditions, are the risks of establishment			
		posed by the taxon likely to increase,			
		decrease or not change?			
52		Under the predicted future climatic	No change	Based on professional judgemnet	Medium
		conditions, are the risks of dispersal within			
		the RA area posed by the taxon likely to			
		increase, decrease or not change?			
53		Under the predicted future climatic	Higher	Based on professional judgemnet	Medium
		conditions, what is the likely magnitude of			
		future potential impacts on biodiversity			
F 4	0.05	and/or ecological integrity/status?	L li a la a u	Deced on anti-colling decement	Madium
54	9.05	Under the predicted future climatic	Higher	Based on professional judgemnet	Medium
		conditions, what is the likely magnitude of			
		future potential impacts on ecosystem			
FF	9.06	structure and/or function?	Higher	Based on professional judgemnet	Medium
55		Under the predicted future climatic	Higher		meululli
		conditions, what is the likely magnitude of			
		future potential impacts on ecosystem			
		services/socio-economic factors?			

Statistics	
Scores	
BRA	13.0
BRA Outcome	-
BRA+CCA	19.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	1.0
1. Domestication/Cultivation	-2.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	2.0
B. Biology/Ecology	12.0
4. Undesirable (or persistence) traits	6.0
5. Resource exploitation	2.0
6. Reproduction	2.0
7. Dispersal mechanisms	-3.0
8. Tolerance attributes	5.0
C. Climate change	6.0
9. Climate change	6.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3 5 5
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	5
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2
6. Reproduction	7
7. Dispersal mechanisms	9
8. Tolerance attributes	6
C. Climate change	6
9. Climate change	6
Sectors affected	
Commercial	2
Environmental	6
Species or population nuisance traits	12
Thresholds	
	_

Inresnolas	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.72
BRA	0.74
CCA	0.58
Date and Time	

16/05/2022 23:26:47

Taxon and Assessor details	
Category	Fishes and Lampreys (freshwater)
Taxon name	Syngnathus abaster
Common name	black-striped pipefish
Assessor	Giorgi Epitashvili
Risk screening context	
Reason and socio-economic benefits	The black-striped pipefish is a species of fish in the family Syngnathidae. Syngnathids are
Risk assessment area	South Caucasus
Taxonomy	Syngnathus abaster Risso 1827
Native range	S. abaster found in the eastern Atlantic from the southern Gulf of Biscay to Gibraltar, also in the
Introduced range	As the introduced species it is mentioned in the Caspian Sea and fresh waters of its basin.
URL	https://www.fishbase.se/summary/Syngnathus-abaster.html

Λ.	Riogen	aranhy (Historical	Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
1. L		Has the taxon been the subject of	No	This species does not have commercial value	Medium
-		domestication (or cultivation) for at least 20 generations?			
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	No	This species does not have commercial value	Medium
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	Although the invasiveness of S. abaster was doubted by MacIsaac et al. (2015), the species is considered likely to establish in the Great Lakes, and S. abaster is expected to expand its range and successfully take over new areas because of its ability to osmoregulate, which allows it to quickly adapt to salinity changes (Snyder et al. 2015). In a new environment, the pipefish may negatively affect the native ecosystem by feeding on zooplanktonic communities, mainly copepods, but it can also affect native fish species by predating their larvae (Didenko et al.	Very high
		, distribution and introduction risk	1		
4	2.01	Risk Assessment (RA) area and the taxon's native range?	High	S. abaster is naturally distributed in the western parto of the SC region and has been translocated in the Caspian basin. (World Map of the Köppen-Geiger climate classification)	Very high
5	2.02	What is the quality of the climate matching data?	High	World Map of the Köppen-Geiger climate classification	Very high
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	The black-striped pipefish is normally found in coastal waters of the Mediterranean, Black, and Azov seas. Recently this species found in the Tbilisi Reservoir, East Georgia (Kuljanishvili et al.	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	>1	This species is distributed in the region naturally and by humans.	Very high
8	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)?	Yes	This species is naturally distributed in the SC region and surrounding countries (Kuljanishvili et al. 2020).	Very high
3. I	nvasive	e elsewhere			1
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	We confirmed the existence and successful establishment of black- striped pipefish in the Tbilisi Reservoir. S. abaster has lived and been reproducing in the reservoir for at least 4 decades (Kuljanishvili et al. 2021).	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	In a new environment, the pipefish may negatively affect the native ecosystem by feeding on zooplanktonic communities, mainly copepods, but it can also affect native fish species by predating their larvae (Didenko et al. 2018; Kuljanishvili et al.	High
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	Data deficient	Medium
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	No	Data deficient	Low
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	Data deficient	Low
		y/Ecology			
		able (or persistence) traits	1		
		Is it likely that the taxon will be poisonous or pose other risks to human health?		This species does not pose a threat to humans	Medium
	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	In a new environment, the pipefish may negatively affect the native ecosystem by feeding on zooplanktonic communities, mainly copepods, but it can also affect native fish species by predating their larvae (Didenko et al. 2018).	High
		Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	Yes	In a new environment, the pipefish may negatively affect the native ecosystem by feeding on zooplanktonic communities, mainly copepods, but it can also affect native fish species by predating their larvae (Didenko et al. 2018).	High
	4.04	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?	Yes	This species is naturally distributed in the SC region (Ninua et al. 2013; Kuljanishvili et al. 2020).	High
18	4.05	Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA area?	Yes	In a new environment, the pipefish may negatively affect the native ecosystem by feeding on zooplanktonic communities, mainly copepods, but it can also affect native fish species by predating their larvae (Didenko et al. 2018).	High
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes	No research has been conducted in this direction.	Medium

Response Justification (references and/or other information) Confidence

	4.07	Is it likely that the taxon will host, and/or	Not applicable	No research has been conducted in this direction.	Low
		act as a vector for, recognised pests and			2011
		infectious agents that are endemic in the RA			
1	4.08	Is it likely that the taxon will host, and/or	Not applicable	No research has been conducted in this direction.	Low
		act as a vector for, recognised pests and			
		infectious agents that are absent from (novel			
h	4.09	to) the RA area? Is it likely that the taxon will achieve a body	No	S. abaster is small sized fish and does not have commercial value	High
2	4.09	size that will make it more likely to be	NO		підп
		released from captivity?			
3	4.10	Is the taxon capable of sustaining itself in a	No	The black-striped pipefish is found in coastal waters and in the	Very high
Ŭ		range of water velocity conditions (e.g.		lower reaches of rivers in the Caspian, Black and Mediterranean	• ci , iigii
		versatile in habitat use)?		Sea basins, living in relatively shallow waters around seaweed and	
		,		sea grass, and is also found in brackish waters	
4	4.11	Is it likely that the taxon's mode of existence	Yes	No research has been conducted in this direction.	Medium
		(e.g. excretion of by-products) or behaviours			
		(e.g. feeding) will reduce habitat quality for			
-		native taxa?			
5	4.12	Is the taxon likely to maintain a viable	Not applicable	Data deficient	Low
		population even when present in low			
		densities (or persisting in adverse conditions by way of a dormant form)?			
R	Resourc	ce exploitation			
	5.01	Is the taxon likely to consume threatened or	No	No such fact has been described	Low
		protected native taxa in the RA area?	-		-
7	5.02	Is the taxon likely to sequester food	Yes	In a new environment, the pipefish may negatively affect the	High
		resources (including nutrients) to the		native ecosystem by feeding on zooplanktonic communities,	
		detriment of native taxa in the RA area?		mainly copepods, but it can also affect native fish species by	
				predating their larvae (Didenko et al. 2018).	
	Reprodu				1.
3	6.01	Is the taxon likely to exhibit parental care	Not applicable	Data deficient	Low
		and/or to reduce age-at-maturity in response			
a	6.02	to environmental conditions? Is the taxon likely to produce viable gametes	Yes	This species is naturally reproduces in the SC region.	Very high
"	0.02	or propagules (in the RA area)?	105	This species is naturally reproduces in the SC region.	very nign
n	6.03	Is the taxon likely to hybridise naturally with	No	Such a fact is not described.	Low
	0.05	native taxa?	110		LOW
1	6.04	Is the taxon likely to be hermaphroditic or to	No	Such a fact is not known.	Low
		display asexual reproduction?	-		-
2	6.05	Is the taxon dependent on the presence of	No	Such a fact is not known.	Medium
		another taxon (or specific habitat features)			
		to complete its life cycle?			
3	6.06	Is the taxon known (or likely) to produce a	No	Females lay 10-60 eggs into a brood pouch on ventral surface of	Very high
		large number of propagules or offspring		tail of males.	
		within a short time span (e.g. < 1 year)?			
4	6.07	How many time units (days, months, years)	1	Own judgement	Medium
		does the taxon require to reach the age-at- first-reproduction?			
	Disners	al mechanisms			
				This species disperses within the region naturally and by other	
	7.01	How many potential internal	>1		High
			>1	organisms (birds, etc). Also unintentional translocation has been	High
		How many potential internal	>1	organisms (birds, etc). Also unintentional translocation has been noted in case of the Tbilisi Reservoir (Kuljanishvili et al. 2021).	High
5		How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the	>1 Yes		High
6	7.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more		noted in case of the Tbilisi Reservoir (Kuljanishvili et al. 2021).	
	7.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)?	Yes	noted in case of the Tbilisi Reservoir (Kuljanishvili et al. 2021). The probability of this is quite high	High
	7.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively		noted in case of the Tbilisi Reservoir (Kuljanishvili et al. 2021).	
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7 8	7.01 7.02 7.03 7.04	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to	Yes No Yes	noted in case of the Tbilisi Reservoir (Kuljanishvili et al. 2021). The probability of this is quite high This species does not have such means This species is naturally spreads in the SC region.	High High Very high
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7 8 9 0	7.01 7.02 7.03 7.04 7.05 7.06	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction?	Yes Yes Yes	noted in case of the Tbilisi Reservoir (Kuljanishvili et al. 2021). The probability of this is quite high This species does not have such means This species is naturally spreads in the SC region. This species is naturally spreads in the SC region. This species is naturally reproduces in the SC region.	High High Very high Very high
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7 8 9 0	7.01 7.02 7.03 7.04 7.05 7.06 7.07	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	Yes No Yes Yes Yes	noted in case of the Tbilisi Reservoir (Kuljanishvili et al. 2021). The probability of this is quite high This species does not have such means This species is naturally spreads in the SC region. This species is naturally spreads in the SC region. This species is naturally reproduces in the SC region. The probability of this is quite high.	High High Very high Very high Very high High
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7 8 9 0 1 2	7.01 7.02 7.03 7.04 7.05 7.06 7.07	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous	Yes No Yes Yes Yes	noted in case of the Tbilisi Reservoir (Kuljanishvili et al. 2021). The probability of this is quite high This species does not have such means This species is naturally spreads in the SC region. This species is naturally spreads in the SC region. This species is naturally reproduces in the SC region. The probability of this is quite high.	High High Very high Very high Very high High
7 8 9 0 1 2 3 . <i>T</i>	7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i>	Yes No Yes Yes Yes Yes Yes	noted in case of the Tbilisi Reservoir (Kuljanishvili et al. 2021). The probability of this is quite high This species does not have such means This species is naturally spreads in the SC region. This species is naturally spreads in the SC region. This species is naturally reproduces in the SC region. The probability of this is quite high. Own judgement	High High Very high Very high Very high High Medium
7 8 9 0 1 2 3 . <i>T</i>	7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of	Yes No Yes Yes Yes Yes	noted in case of the Tbilisi Reservoir (Kuljanishvili et al. 2021). The probability of this is quite high This species does not have such means This species is naturally spreads in the SC region. This species is naturally spreads in the SC region. This species is naturally reproduces in the SC region. The probability of this is quite high. Own judgement	High High Very high Very high Very high High Medium
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7 8 9 0 1 2 3 . <i>T</i>	7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life	Yes No Yes Yes Yes Yes Yes	noted in case of the Tbilisi Reservoir (Kuljanishvili et al. 2021). The probability of this is quite high This species does not have such means This species is naturally spreads in the SC region. This species is naturally spreads in the SC region. This species is naturally reproduces in the SC region. The probability of this is quite high. Own judgement	High High Very high Very high Very high High Medium
7 8 9 0 1 2 3 7 4	7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 6 <i>leran</i> 8.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle?	Yes No Yes Yes Yes Yes Yes No	noted in case of the Tbilisi Reservoir (Kuljanishvili et al. 2021). The probability of this is quite high This species does not have such means This species is naturally spreads in the SC region. This species is naturally spreads in the SC region. This species is naturally reproduces in the SC region. The probability of this is quite high. Own judgement No such fact has been described	High High Very high Very high Very high High Low High
7 8 9 0 1 2 3 7 4	7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of	Yes No Yes Yes Yes Yes Yes	noted in case of the Tbilisi Reservoir (Kuljanishvili et al. 2021). The probability of this is quite high This species does not have such means This species is naturally spreads in the SC region. This species is naturally spreads in the SC region. This species is naturally reproduces in the SC region. The probability of this is quite high. Own judgement Own judgement No such fact has been described Black-striped pipefish is an euryhaline species of fish that can	High High Very high Very high Very high High Medium
7 8 9 0 1 2 3 . <i>T</i> 4	7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 6 <i>leran</i> 8.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that	Yes No Yes Yes Yes Yes Yes No	noted in case of the Tbilisi Reservoir (Kuljanishvili et al. 2021). The probability of this is quite high This species does not have such means This species is naturally spreads in the SC region. This species is naturally spreads in the SC region. This species is naturally reproduces in the SC region. The probability of this is quite high. Own judgement No such fact has been described Black-striped pipefish is an euryhaline species of fish that can tolerate significant fluctuations in salinity, live in both fresh and	High High Very high Very high Very high High Low High
7 8 9 0 1 2 3 . <i>T</i> 4	7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 6 <i>leran</i> 8.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of	Yes No Yes Yes Yes Yes Yes No	noted in case of the Tbilisi Reservoir (Kuljanishvili et al. 2021). The probability of this is quite high This species does not have such means This species is naturally spreads in the SC region. This species is naturally spreads in the SC region. This species is naturally reproduces in the SC region. The probability of this is quite high. Own judgement Own judgement No such fact has been described Black-striped pipefish is an euryhaline species of fish that can	High High Very high Very high Very high High Low High

46	8.03	Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	Yes	Of the four chemical piscicides registered for use in the United States, antimycin A and rotenone are considered general piscicides, but no studies have been found about their effects on S. abaster (GLMRIS 2012)	High
47	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	Yes	Introductions of S. abaster into new areas were mostly due to self- spreading (Kuderskii 1971) but also to human-mediated activities such as river regulation, fish stocking (Slynko et al. 2011, Didenko et al. 2018, Marenkov 2018), and ballast water transport (Lavoie et al. 1999).	Very high
48	8.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	Yes	S.abaster living in relatively shallow waters around seaweed and sea grass, and is also found in brackish waters.	Very high
		Are there effective natural enemies (predators) of the taxon present in the RA area?	Yes	There are meny predator species in the SC region which can controll the S. abaster population: Sander lucioperca, Perca fluviatilis, Salmo spp, Squalius spp, etc.	Very high
		e change			
		Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?	Increase	Own judgement	Medium
51	9.02	Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	Increase	Own judgement	Medium
52	9.03	Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change?	Increase	Own judgement	Medium
53	9.04	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	Higher	Own judgement	Medium
54	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Higher	Own judgement	Medium
55	9.06	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	No change	Own judgement	Medium

Statistics	
Statistics	
BRA	27.0
BRA Outcome	27.0
BRA+CCA	37.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	8.0
1. Domestication/Cultivation	0.0
2. Climate, distribution and introduction risk	2.0
3. Invasive elsewhere	6.0
B. Biology/Ecology	19.0
4. Undesirable (or persistence) traits	6.0
5. Resource exploitation	2.0
6. Reproduction	1.0
7. Dispersal mechanisms	7.0
8. Tolerance attributes	3.0
C. Climate change	10.0
9. Climate change	10.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3
2. Climate, distribution and introduction risk	
3. Invasive elsewhere	5
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2
6. Reproduction	/
7. Dispersal mechanisms	9 6
8. Tolerance attributes C. Climate change	6
	6
9. Climate change Sectors affected	0
Commercial	7
Environmental	/
Species or population nuisance traits	0 77
	27
Thresholds	
BRA	-
BRA+CCA	-
Confidence	
BDA LCCA	

F

BRA+CCA 0.66

BRA	0.68
CCA	0.50

Date and Time 13/05/2022 18:54:13

Taxon and Assessor details					
Category	Fishes and Lampreys (freshwater)				
Taxon name	Syngnathus abaster				
Common name	black-striped pipefish				
Assessor	Tatia Kuljanishvili				
Risk screening context					
Reason and socio-economic benefits	Has been observed in a freshwater reservoir of the middle Kura River basin.				
Risk assessment area	South Caucasus				
Taxonomy	Syngnathiformes Syngnathidae Syngnathinae				
Native range	Mediterranean, Black and Azov seas.				
Introduced range	The Kura River Basin				
URL	https://www.fishbase.de/summary/Syngnathus-abaster.html				

			Response	Justification (references and/or other information)	Confidence
Α.	Biogeo	graphy/Historical			
1. L		ication/Cultivation			
1	1.01	Has the taxon been the subject of	No	Has not been subject of domestication or human selection.	High
1		domestication (or cultivation) for at least 20			
-		generations?			
2	1.02	Is the taxon harvested in the wild and likely	No	This species does not have trade importance.	High
_	4.00	to be sold or used in its live form?			
3	1.03	Does the taxon have invasive races,	No	No. However the taxon has been object of discussion if it is	Medium
		varieties, sub-taxa or congeners?		invasive itself or not, for example in freshwaters reservoirs of	
2				Ukraine, and Great Lakes.	
	· · · · · ·	distribution and introduction risk	LL: - h		11: -l-
4	2.01	How similar are the climatic conditions of the	High	Yes it is somehow similar.	High
		Risk Assessment (RA) area and the taxon's			
F	2.02	native range?	Madium	Native area versus Kura Diver basin before Mingachavir recorder	Lliab
5	2.02	What is the quality of the climate matching	Medium	Native area versus Kura River basin before Mingachevir reservoir	High
1		data?		shows climate similarity of 7-8 (out of 10) in east Georgia and	
6	2.02	Is the taxes already present systems of	Voc	west Azerbaijan however, whole Armenian territory is 4-5.	Vony high
0	2.03	Is the taxon already present outside of	Yes	S. abaster is normally found in coastal waters of the	Very high
1		captivity in the RA area?		Mediterranean, Black and Azov Seas; however, it has expanded its	
Ĩ				range upstream in the Danube, Dniester, Dnieper, Don and Volga	
				rivers (Berg, 1949; Svetovidov, 1964; Kottelat & Freyhof, 2007).	
Ĩ				Recently, this species has also become an invader of freshwater	
Ĩ				reservoirs (Kiryukhina, 2013a; 2013b; Tereshchenko et al., 2016;	
7	2.04	How many notontial vesters could the taves	>1	Didenko et al 2018: Marenkov. 2018).	Vony high
′	2.04	How many potential vectors could the taxon use to enter in the RA area?	-1	Self-spreading, fish stocking, ballast water transport, opening	Very high
8	2.05	Is the taxon currently found in close	Voc	channels to interconnect river basins (for example Volga-Don We found S. abaster in the freshwater reservoir in the middle Kura	Very high
0	2.05		Yes		Very high
1		proximity to, and likely to enter into, the RA		River basin (Kuljanishvili et al 2020: in review).	
1		area in the near future (e.g. unintentional and intentional introductions)?			
3 1	nyaciw	e elsewhere	I		1
<i>3.1</i> 9		Has the taxon become naturalised	Yes	Yes. Abovementioned articles (Q6) demonstrated that this species	Very high
7	3.01		105	is naturalised outside its native range. We found naturalised	very night
Ĩ		(established viable populations) outside its		population as well (our own data).	
10	3.02	native range? In the taxon's introduced range, are there	No	No information available	Medium
10	5.02	known adverse impacts to wild stocks or	110		neulum
		commercial taxa?			
11	3.03	In the taxon's introduced range, are there	No	No information avalable	Medium
1 I I	5.05	known adverse impacts to aquaculture?	110		neulum
17	3.04	In the taxon's introduced range, are there	No	Could be transmitting new diseases, otherwise does not have	Medium
- 2	5.04	known adverse impacts to ecosystem		adverse impacts to ecosystem services.	
13	3.05	In the taxon's introduced range, are there	No	No socio-economic impacts are known.	High
1.2	2.35	known adverse socio-economic impacts?			
B. 1	Biology	//Ecology			1
		able (or persistence) traits			
		Is it likely that the taxon will be poisonous or	No	S. abaster is harmless fish.	Very high
1		pose other risks to human health?			
15	4.02	Is it likely that the taxon will smother one or	Yes	It may impact native ecosystem through shaping zooplanktonic	Low
		more native taxa (that are not threatened or		communities by feeding its activity, which is mainly focused on	
		protected)?		copepods but can also affect native fish species (including	
1				threatened species) due to predation of their larvae (Didenko et	
16	4.03	Are there any threatened or protected taxa	No	No. S. abaster does not parasite.	Very high
Ĩ		that the non-native taxon would parasitise in	-		
1		the RA area?			
17	4.04	Is the taxon adaptable in terms of climatic	Yes	This species is of Ponto-Caspian origin (is distributed in coasts of	High
1		and other environmental conditions, thus		Mediterranean Sea as well). modern Ponto-Caspian fauna includes	
Ĩ		enhancing its potential persistence if it has		the species, that lived in the Thethys Sea and the marine ancestry	
		invaded or could invade the RA area?		has contributed to their ability to easily adapt to different salinity	
				fluctuations and has resulted in Ponto-Caspian species	
				invasiveness. Ponto-Caspian aquatic species are well known	
				invaders into North America due to their abilities to tolerate	
				different environmental conditions and salinities (Reid & Orlova,	
18	4.05	Is the taxon likely to disrupt food-web	No	It may impact native ecosystem through shaping zooplanktonic	Medium
Ĩ		structure/function in aquatic ecosystems if it	-	communities by feeding its activity, which is mainly focused on	
		has invaded or is likely to invade the RA		copepods but can also affect native fish species due to predation	
		area?		of their larvae (Didenko et al. 2018). However it is not	
		urcu.		documented if S. abaster can cause disruption of food-web	
1				structure in aquatic ecosystem.	
	1	1	1		

9	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	No.	High
0	4.07	Is it likely that the taxon will host, and/or	Not applicable	Nothing is known about this.	Low
		act as a vector for, recognised pests and			
		infectious agents that are endemic in the RA			-
L	4.08	Is it likely that the taxon will host, and/or	Yes	Can be. However, no research has been conducted.	Low
		act as a vector for, recognised pests and infectious agents that are absent from (novel			
		to) the RA area?			
2	4.09	Is it likely that the taxon will achieve a body	No	This species are very small body sized, in terms of their form,	Very high
		size that will make it more likely to be		which is like a needle or a tube. It can not reach such sizes that	
	4.10	released from captivity? Is the taxon capable of sustaining itself in a	Vac	could cause them to be released from captivity.	High
•	4.10	range of water velocity conditions (e.g.	Yes	This species native range is coastal and brackish waters of the Mediterranean, Black and Azov Seas, and they are invading	High
		versatile in habitat use)?		freshwater (standing waters) reservoirs in Ukraine and Georgia,	
				which means that they can sustain different ranges of velocity	
1	4.11	Is it likely that the taxon's mode of existence	No	Less likely.	Medium
		(e.g. excretion of by-products) or behaviours			
		(e.g. feeding) will reduce habitat quality for native taxa?			
5	4.12	Is the taxon likely to maintain a viable	Yes	The perfect example would be the study that we conducted	Very high
		population even when present in low		(Kuljanishvili et al 2020 in review). Few individuals of S. abaster	.,
		densities (or persisting in adverse conditions		were translocated from the Black Sea basin to Tbilisi freshwater	
		by way of a dormant form)?		reservoir, which locals call 'Tbilisi Sea'. Due to reservoirs 'marine'	
				name, local hobbyists assumed that, if the pipefish can live in the	
				Black Sea, why would not it live in 'Tbilisi Sea'. They transported	
				few individuals of pipefish from the Black Sea into the reservoir, and 20 years after we found S, abaster naturalised in the area.	
		ce exploitation			
5	5.01	Is the taxon likely to consume threatened or	No	Less likely.	High
,	5.02	protected native taxa in the RA area?	No	Loss likely	Madium
	5.02	Is the taxon likely to sequester food resources (including nutrients) to the	No	Less likely.	Medium
		detriment of native taxa in the RA area?			
	Reprodu	uction			
1	6.01	Is the taxon likely to exhibit parental care	Yes	They are characterised with 'Male pregnancy' which means taking	Very high
		and/or to reduce age-at-maturity in response		care of the inseminated eggs unless the larvae develops to fry and	
2	6.02	to environmental conditions?	Vec	then they hatch.	Von bish
1	0.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	during our field works we have found a few juvenile individuals.	Very high
)	6.03	Is the taxon likely to hybridise naturally with	No	No information available	High
		native taxa?	_		3
L	6.04	Is the taxon likely to be hermaphroditic or to	No	No. Does not display asexual reproduction	Very high
2	6.05	display asexual reproduction?	No	No. Construction field and the second second	Mara 111
2	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features)	No	No. See: https://www.fishbase.de/summary/Syngnathus- abaster.html	Very high
		to complete its life cycle?		abaster.ntm	
3	6.06	Is the taxon known (or likely) to produce a	No	They only have very limited number of propagules, only around	Verv high
		large number of propagules or offspring		40 eggs can be developed in their sacks, per spawning.	
_	-	within a short time span (e.g. < 1 year)?		-	
4	6.07	How many time units (days, months, years)	1	Spawns at 1 year.	Very high
		does the taxon require to reach the age-at- first-reproduction?			
Γ	Dispers	al mechanisms	1		
		How many potential internal	>1	Intentional release, natural dispersal.	High
		vectors/pathways could the taxon use to			
	7.05	disperse within the RA area (with suitable			
2	7.02	Will any of these vectors/pathways bring the	Yes	Difficult to answer. Possibly, yes.	Low
		taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)?			
,	7.03	Does the taxon have a means of actively	No	No. Morphologically this species does not have a means of actively	Very high
		attaching itself to hard substrata (e.g. ship		attaching itself to hard substrata	, 5
		hulls, pilings, buoys) such that it enhances			
	7.6.1	the likelihood of dispersal?			
3	7.04	Is natural dispersal of the taxon likely to	No	No, they are born as young individuals. They can not be dispersed	Very high
		occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?		as eggs whatsoever.	
9	7.05	Is natural dispersal of the taxon likely to	No	No. No documented evidence	Very high
		occur as larvae/juveniles (for animals) or as			
	1	fragments/seedlings (for plants) in the RA			
			1		Low
	7.00	area?	Vac		Low
1	7.06	area? Are older life stages of the taxon likely to	Yes	Migration is possible during winter. However, due to obstacles	
		area? Are older life stages of the taxon likely to migrate in the RA area for reproduction?		(dams), it is less likely.	Very high
	7.06 7.07	area? Are older life stages of the taxon likely to	Yes		Very high
L		area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to		(dams), it is less likely.	Very high High
L	7.07	area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No	(dams), it is less likely. No. Can not be dispersed by other ananimals	
L	7.07	area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both	No	(dams), it is less likely. No. Can not be dispersed by other ananimals	
2	7.07	area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be	No	(dams), it is less likely. No. Can not be dispersed by other ananimals No information avalable	High
2	7.07 7.08 7.09	area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent?	No	(dams), it is less likely. No. Can not be dispersed by other ananimals	
3	7.07 7.08 7.09	area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be	No	(dams), it is less likely. No. Can not be dispersed by other ananimals No information avalable	High
1 2 3 7	7.07 7.08 7.09 <i>Toleran</i>	area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i>	No No	(dams), it is less likely. No. Can not be dispersed by other ananimals No information avalable Not documented.	High

			I		I
45	8.02	Is the taxon tolerant of a wide range of	Yes	S. abaster can tolerate a wide range of salinities: freshwater,	High
		water quality conditions relevant to that		brackish and marine water conditions (Dawson 1984; Kottelat and	
		taxon? [In the Justification field, indicate the		Freyhof 2007).	
		relevant water quality variable(s) being			
46	8.03	Can the taxon be controlled or eradicated in	Yes	Possibly yes.	Medium
		the wild with chemical, biological, or other			
		agents/means?			
47	8.04	Is the taxon likely to tolerate or benefit from	No	We found this species in Tbilisi Reservoir shorelines, with	Medium
		environmental/human disturbance?		developed vegetation, where people do not visit.	
48	8.05	Is the taxon able to tolerate salinity levels	Yes	S. abaster is a euryhaline species that can tolerate a wide range	High
		that are higher or lower than those found in		of salinities: freshwater, brackish and marine water conditions	
		its usual environment?		(Dawson 1984; Kottelat and Freyhof 2007).	
49	8.06	Are there effective natural enemies	No	No effective natural enemies present in RA area	High
		(predators) of the taxon present in the RA			-
С. (Climate	e change			
9. (Climate	change			
50	9.01	Under the predicted future climatic	No change	It was hypotheses that climate change might alert the	Medium
		conditions, are the risks of entry into the RA	_	mechanisms of transportation and introduction of non-native	
		area posed by the taxon likely to increase,		species. Commercial and recreational activities will increase, that	
		decrease or not change?		itself increases the propagule pressure levels of non-native	
		5		species (Hellmann et al 2008). However, since, this species are	
				not connected commercial or recreational fisheries, I would	
				assume that in future, their spread will mostly be caused as self-	
				spread, rather than altered mechanism of transportation caused	
51	9.02	Under the predicted future climatic	Decrease	Warming temperatures can be intolerable for this species, which	Low
_		conditions, are the risks of establishment		can lead to the decrease of their establishment.	
		posed by the taxon likely to increase,			
		decrease or not change?			
52	9.03	Under the predicted future climatic	No change	I would assume that in future, their spread will mostly be caused	Low
		conditions, are the risks of dispersal within		as self-spread, rather than altered mechanism of transportation	
		the RA area posed by the taxon likely to		caused by climate change.	
		increase, decrease or not change?			
53	9.04	Under the predicted future climatic	No change	No change or even lower.	Medium
		conditions, what is the likely magnitude of			
		future potential impacts on biodiversity			
		and/or ecological integrity/status?			
54	9.05	Under the predicted future climatic	Lower	Possibly lower.	Medium
J'	2.05	conditions, what is the likely magnitude of			
		future potential impacts on ecosystem			
		structure and/or function?			
55	9.06	Under the predicted future climatic	No change	No change.	Medium
55	5.00	conditions, what is the likely magnitude of	no change	no change.	inculum
		future potential impacts on ecosystem			
		services/socio-economic factors?			
	l.	ISEIVICES/SUCIU-ECUTIONIC TACLOTS?			

Statistics	
Scores	
BRA	9.0
BRA Outcome	-
BRA+CCA	5.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	2.0
1. Domestication/Cultivation	-2.0
2. Climate, distribution and introduction risk	2.0
3. Invasive elsewhere	2.0
B. Biology/Ecology	7.0
4. Undesirable (or persistence) traits	5.0
5. Resource exploitation	0.0
6. Reproduction	2.0
7. Dispersal mechanisms	-1.0
8. Tolerance attributes	1.0
C. Climate change	-4.0
9. Climate change	-4.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3
2. Climate, distribution and introduction risk	3 5 5
3. Invasive elsewhere	5
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2
6. Reproduction	7
7. Dispersal mechanisms	9 6
8. Tolerance attributes	
C. Climate change	6
9. Climate change	6
Sectors affected	
Commercial	2
Environmental	-1
Species or population nuisance traits	8
Thresholds	
BRA	-

BRA+CCA	-
Confidence	
BRA+CCA	0.71
BRA	0.74
CCA	0.42
Date and Time	
22/05/2022	15:57:47