Taxon and Assessor details		
Category	Fishes and Lampreys (freshwater)	
Taxon name	Coregonus albula	
Common name	vendace	
Assessor	Ana Marić	
Risk screening context		
Reason and socio-economic benefits		
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS	
Taxonomy		
Native range		
Introduced range		
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	Management of vendace (Coregonus albula (L.)) in the lakes of northwest Poland in the late twentieth and early twenty-first centuries. 2006. Przemysław Czerniejewski Wawrzyniec	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	Management of vendace (Coregonus albula (L.)) in the lakes of northwest Poland in the late twentieth and early twenty-first	Very high
3	1.03	Does the taxon have invasive races,	Yes	centuries. 2006. Przemysław Czerniejewski Wawrzyniec https://www.cabi.org/isc/datasheet/88207 invasive itself	High
Ĵ	1.05	varieties, sub-taxa or congeners?	105	https://www.cubiolg/isc/uutusheet/oozo/ invusive itsen	ingn
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	Climach	High
5	2.02	What is the quality of the climate matching data?	Medium	https://www.cabi.org/isc/datasheet/88207	Medium
6	2.03	Is the taxon already present outside of captivity in the RA area?	No	Identifying threats from introduced and translocated non-native freshwater fishes in neighbouring countries under current and future climatic conditions Tena Radočaj a, Ivan Špelić a, Lorenzo Vilizzi b, *, Meta Povž c, Marina Piria. 2021	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	https://www.cabi.org/isc/datasheet/88207#toriskOfIntroduction	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	https://www.cabi.org/isc/datasheet/88207#todistributionDatabase Table Romania	High
2 -		and intentional introductions)?			
<u>3. 1</u> 9	<i>nvasive</i> 3.01	e elsewhere Has the taxon become naturalised	Yes	https://www.cabi.org/isc/datasheet/88207#todistributionDatabase	Very high
		(established viable populations) outside its	105	Table	, -
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	https://www.cabi.org/isc/datasheet/88207#toriskAndImpactFactor s	High
11	3.03	In the taxon's introduced range, are there	No	https://www.cabi.org/isc/datasheet/88207#toriskAndImpactFactor	Medium
12	3.04	known adverse impacts to aquaculture? In the taxon's introduced range, are there	Yes	s https://www.cabi.org/isc/datasheet/88207#toriskAndImpactFactor	High
13	3.05	known adverse impacts to ecosystem In the taxon's introduced range, are there	No	s https://www.cabi.org/isc/datasheet/88207#toriskAndImpactFactor	High
PI	Pielem	known adverse socio-economic impacts?		S	
		able (or persistence) traits			
		Is it likely that the taxon will be poisonous or	No	https://www.cabi.org/isc/datasheet/88207#toriskAndImpactFactor	Very high
1 5	4.02	pose other risks to human health?	Vac	S https://www.aphi.arg/icg/datashapt/22207#torigl/ApdImpactFactor	Vanubiah
15	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	https://www.cabi.org/isc/datasheet/88207#toriskAndImpactFactor s	Very high
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in	Yes	https://www.cabi.org/isc/datasheet/88207#toriskAndImpactFactor s	High
17	4.04	the RA area? Is the taxon adaptable in terms of climatic	Yes	https://www.cabi.org/isc/datasheet/88207#toriskAndImpactFactor	High
Ľ	1.54	and other environmental conditions, thus enhancing its potential persistence if it has		s	
L		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 has invaded or is likely to invade the RA	No	https://www.cabi.org/isc/datasheet/88207#toriskAndImpactFactor s	High
19	4.06	Is the taxon likely to exert adverse impacts	No	https://www.cabi.org/isc/datasheet/88207#toriskAndImpactFactor	High
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	s https://www.cabi.org/isc/datasheet/88207#toriskAndImpactFactor s	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	Invasion of vendace Coregonus albula in a subarctic watercourse PA Amundsen et al 1999	Very 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	https://www.cabi.org/isc/datasheet/88207#todescription	Very high
23	4.10	released from captivity? Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g.	No	Effects of temperature, swimming speed and body mass on standard and active metabolic rate in vendace (Coregonus albula)	High
		versatile in habitat use)?		Jan Ohlberger, Georg Staaks & Franz Hölker 2007	
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	https://www.cabi.org/isc/datasheet/88207#tobiologyAndEcology	High
		native taxa?			

5					
	4.12	Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions	Yes	https://www.cabi.org/isc/datasheet/88207#tobiologyAndEcology	High
		by way of a dormant form)?			
. R	Resourc	ce exploitation	•		•
6	5.01	Is the taxon likely to consume threatened or	Yes	https://www.cabi.org/isc/datasheet/88207#tobiologyAndEcology	High
		protected native taxa in the RA area?			
7	5.02	Is the taxon likely to sequester food	Yes	https://www.cabi.org/isc/datasheet/88207#tobiologyAndEcology	High
		resources (including nutrients) to the			
_	<u> </u>	detriment of native taxa in the RA area?			
	Reprodu		24		
3	6.01	Is the taxon likely to exhibit parental care	Yes		High
		and/or to reduce age-at-maturity in response		Who's got the upper hand in intraspecific competition? OT	
2	6.02	to environmental conditions? Is the taxon likely to produce viable gametes	No	Sandlund et al 1991	Madium
9	6.02	, , , ,	No	https://www.cabi.org/isc/datasheet/88207#tohistoryOfIntroduction	Mealum
<u> </u>	6.03	or propagules (in the RA area)?	No	AndSpread https://www.cabi.org/isc/datasheet/88207#tohistoryOfIntroduction	High
J	0.05	Is the taxon likely to hybridise naturally with native taxa?	NO		підп
	6.04	Is the taxon likely to be hermaphroditic or to	No	AndSpread https://www.cabi.org/isc/datasheet/88207#tohistoryOfIntroduction	Vorschigh
L	0.04	display asexual reproduction?	NO	AndSpread	very nigh
,	6.05	Is the taxon dependent on the presence of	No	https://www.cabi.org/isc/datasheet/88207#tohistoryOfIntroduction	High
-	0.05	another taxon (or specific habitat features)	NO	AndSpread	riigii
		to complete its life cycle?		Andopicad	
2	6.06	Is the taxon known (or likely) to produce a	Yes	https://www.cabi.org/isc/datasheet/88207#tobiologyAndEcology	Very high
,	0.00	large number of propagules or offspring	103	https://www.cabi.org/ise/addasheet/0020/#tobiologyAndecology	very nigh
		within a short time span (e.g. < 1 year)?			
ī	6.07	How many time units (days, months, years)	2	https://www.cabi.org/isc/datasheet/88207#tobiologyAndEcology	Very high
	,	does the taxon require to reach the age-at-	1	,,, ,,	,
		first-reproduction?			
Ľ	Dispers	al mechanisms			
	7.01	How many potential internal	One	https://www.cabi.org/isc/datasheet/88207#tobiologyAndEcology	High
		vectors/pathways could the taxon use to			-
	L	disperse within the RA area (with suitable			
	7.02	Will any of these vectors/pathways bring the	Yes	https://www.cabi.org/isc/datasheet/88207#tobiologyAndEcology	High
		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	https://www.cabi.org/isc/datasheet/88207#tobiologyAndEcology	Very high
		attaching itself to hard substrata (e.g. ship			
		hulls, pilings, buoys) such that it enhances			
		the likelihood of dispersal?			
	7.04	Is natural dispersal of the taxon likely to	No	https://www.cabi.org/isc/datasheet/88207#tobiologyAndEcology	High
		occur as eggs (for animals) or as propagules			
		(for plants: seeds, spores) in the RA area?			
	7.05	Is natural dispersal of the taxon likely to	Yes	https://www.cabi.org/isc/datasheet/88207#tobiologyAndEcology	High
		occur as larvae/juveniles (for animals) or as			
		fragments/seedlings (for plants) in the RA			
		area?			
)	7.06	Are older life stages of the taxon likely to	Yes	https://www.cabi.org/isc/datasheet/88207#tobiologyAndEcology	Very high
		migrate in the RA area for reproduction?			
	7.07	Are propagules or eggs of the taxon likely to	No	https://www.cabi.org/isc/datasheet/88207#tobiologyAndEcology	Very high
	7.00	be dispersed in the RA area by other animals?	••		
2	7.08		No		High
	/.00	Is dispersal of the taxon along any of the			
	7.00	vectors/pathways mentioned in the previous		S	
	7.00	vectors/pathways mentioned in the previous seven questions (35-41; i.e. both		5	
		vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be			
	7.09	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		Very high
3	7.09 Toleran	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>	T	https://www.cabi.org/isc/datasheet/88207#tobiologyAndEcology	
7	7.09 Toleran	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		Very high Very high
3	7.09 Toleran	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	T	https://www.cabi.org/isc/datasheet/88207#tobiologyAndEcology	
7	7.09 Toleran	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	T	https://www.cabi.org/isc/datasheet/88207#tobiologyAndEcology	
7	7.09 Foleran 8.01	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?	No	https://www.cabi.org/isc/datasheet/88207#tobiologyAndEcology https://www.cabi.org/isc/datasheet/88207#tobiologyAndEcology	Very high
7	7.09 Toleran	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	T	https://www.cabi.org/isc/datasheet/88207#tobiologyAndEcology https://www.cabi.org/isc/datasheet/88207#tobiologyAndEcology https://www.cabi.org/isc/datasheet/88207#topreventionAndContro	Very high
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7	7.09 Foleran 8.01	vectors/pathways mentioned in the previous seven questions (35-41; i.e. both <u>unintentional or intentional) likely to be</u> 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 <u>cycle</u> ? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the	No	https://www.cabi.org/isc/datasheet/88207#tobiologyAndEcology https://www.cabi.org/isc/datasheet/88207#tobiologyAndEcology https://www.cabi.org/isc/datasheet/88207#topreventionAndContro	Very high
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3 7 3	7.09 Foleran 8.01 8.02 8.03 8.04	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? Is the taxon able to tolerate salinity levels	No No No Yes	https://www.cabi.org/isc/datasheet/88207#tobiologyAndEcology https://www.cabi.org/isc/datasheet/88207#tobiologyAndEcology https://www.cabi.org/isc/datasheet/88207#topreventionAndContro l temperature https://www.cabi.org/isc/datasheet/88207#topreventionAndContro l temperature https://www.cabi.org/isc/datasheet/88207#topreventionAndContro l temperature https://www.cabi.org/isc/datasheet/88207#topreventionAndContro l temperature	Very high High High High
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7	7.09 oleran 8.01 8.02 8.03 8.04 8.05 8.06 Climat	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 its usual environment? Are there effective natural enemies (predators) of the taxon present in the RA	No No Yes Yes	https://www.cabi.org/isc/datasheet/88207#tobiologyAndEcology https://www.cabi.org/isc/datasheet/88207#tobiologyAndEcology https://www.cabi.org/isc/datasheet/88207#topreventionAndContro l temperature https://www.cabi.org/isc/datasheet/88207#topreventionAndImpactFactor s https://www.cabi.org/isc/datasheet/88207#topreventionAndEcology https://www.cabi.org/isc/datasheet/88207#topreventionAndEcology	Very high High High High
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	7.09 <i>oleran</i> 8.01 8.02 8.03 8.04 8.05 8.06 Climate 9.01 9.02	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 its usual environment? 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,	No No No Yes Yes Yes No change Decrease	https://www.cabi.org/isc/datasheet/88207#tobiologyAndEcology https://www.cabi.org/isc/datasheet/88207#tobiologyAndEcology https://www.cabi.org/isc/datasheet/88207#tobiologyAndEcology https://www.cabi.org/isc/datasheet/88207#topreventionAndContro l temperature https://www.cabi.org/isc/datasheet/88207#topreventionAndContro l temperature https://www.cabi.org/isc/datasheet/88207#topreventionAndContro l https://www.cabi.org/isc/datasheet/88207#topreventionAndEcology https://www.cabi.org/isc/datasheet/88207#topreventionAndEcology https://www.cabi.org/isc/datasheet/88207#tonotesOnNaturalEnem ies https://www.cabi.org/isc/datasheet/88207#tonotesOnNaturalEnem ies	Very high High High High Very high 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	https://www.cabi.org/isc/datasheet/88207#topreventionAndContro I	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	https://www.cabi.org/isc/datasheet/88207#topreventionAndContro I	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	https://www.cabi.org/isc/datasheet/88207#topreventionAndContro I	High

SE		

Scores	
BRA	28.5
BRA Outcome	-
BRA+CCA	20.5
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	17.0
4. Undesirable (or persistence) traits	5.0
5. Resource exploitation	7.0
6. Reproduction	1.0
7. Dispersal mechanisms	1.0
8. Tolerance attributes	3.0
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	
4. Undesirable (or persistence) traits	12 2 7 9 6 6
5. Resource exploitation 6. Reproduction	2
7. Dispersal mechanisms	/
8. Tolerance attributes	9
C. Climate change	6
9. Climate change	6
Sectors affected	0
Commercial	4
Environmental	5
Species or population nuisance traits	13
	15
Thresholds	
BRA	-
BRA+CCA	_
Confidence	

BRA+CCA	-
Confidence	
BRA+CCA	0.80
BRA	0.82
CCA	0.71
Date and Time	

24/05/2021 17:15:19

Taxon and Assessor details	axon and Assessor details						
Category	Fishes and Lampreys (freshwater)						
Taxon name	Coregonus albula						
Common name	vendace						
Assessor	Ivan Špelić						
Risk screening context							
Reason and socio-economic benefits							
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS						
Taxonomy							
Native range							
Introduced range							
URL							

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
		ication/Cultivation			Madium
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	Manikowska-Ślepowrońska, B., Szydzik, B. & Jakubas, D. Determinants of the presence of conflict bird and mammal species at pond fisheries in western Poland. Aquat Ecol 50, 87–95 (2016). https://doi.org/10.1007/s10452-015-9554-z. Farmed but no info on how Iona.	Medium
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	Harvested for human consumption, can be used for biological control and stocking (CABI 2019).	Medium
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	No	Coregonidae species are widely introduced but not quite invasive.	High
	1	, 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	Climatch 2020	Medium
5	2.02	What is the quality of the climate matching data?	Medium	Climatch 2020	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	No	Froese, R. and D. Pauly. Editors. 2021. FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021)	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	Intentional introduction for angling or aquaculture (CABI 2019).	Low
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	Hungary (not established) (Froese & Pauly 2020).	Low
2 1	'ny aciw	and intentional introductions)?			
	3.01	Has the taxon become naturalised	Yes	Froese & Pauly 2020	Very high
		(established viable populations) outside its			, -
	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	U.S. Fish and Wildlife Service (2012): Vendace (Coregonus albula) Ecological Risk Screening Summary. Revised, September 2014 and July 2015	Very high
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	Used in experimental aquaculture, no documented adverse impacts (U.S. Fish and Wildlife Service (2012): Vendace (Coregonus albula) Ecological Risk Screening Summary. Revised, September 2014 and July 2015).	High
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem services?	Yes	Being an effective zooplanktivore, vendace may heavily reduce the zooplankton stock, in turn leading to reduced algal grazing by zooplankton (trophic cascade). This may aid eutrophication of the lake (CABI 2019).	Medium
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	Except for effects related to fisheries and sport fishing, where employment can be created in rural areas, there are no obvious social impacts of vendace invasions (CABI 2019).	High
B. E	Biology	y/Ecology			
		able (or persistence) traits	1		
14	4.01	Is it likely that the taxon will be poisonous or pose other risks to human health?	No	Harmless (Froese & Pauly 2020).	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	Depletion of zooplankton and impact on native planktivorous species (U.S. Fish and Wildlife Service (2012): Vendace (Coregonus albula) Ecological Risk Screening Summary. Revised, September 2014 and July 2015).	High
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in	No	No parasitic behaviour.	Very high
17	4.04	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?	No	Coldwater species that tolerates temperatures up to 22 degrees Celsius (CABI 2019).	High
18	4.05	Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it	Yes	Can lead to trophic cascade due to depletion of zooplankton (CABI 2019).	Medium
19	4.06	has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts	Yes	Increased eutrophication and abundance of algae (CABI 2019).	Medium
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 infectious agents that are endemic in the RA	Yes	U.S. Fish and Wildlife Service (2012): Vendace (Coregonus albula) Ecological Risk Screening Summary. Revised, September 2014 and July 2015	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	U.S. Fish and Wildlife Service (2012): Vendace (Coregonus albula) Ecological Risk Screening Summary. Revised, September 2014 and July 2015	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	Maximum size 48 cm and 1 kg (Froese & Pauly 2020).	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	Lacustrine and marine in open water (Froese & Pauly 2020).	High

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	9.02	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	Decrease	Cold water species, tolerates water up to about 20 degrees Celsius (CABI 2019; COMTE, L., BUISSON, L., DAUFRESNE, M. and GRENOUILLET, G. (2013), Climate-induced changes in the distribution of freshwater fish: observed and predicted trends. Freshwater Biology, 58: 625-639. Cold water species, tolerates water up to about 20 degrees Celsius	5
		conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change?		(CABI 2019; COMTE, L., BUISSON, L., DAUFRESNE, M. and GRENOUILLET, G. (2013), Climate-induced changes in the distribution of freshwater fish: observed and predicted trends. Freshwater Biology, 58: 625-639.	5
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	Cold water species, tolerates water up to about 20 degrees Celsius (CABI 2019; COMTE, L., BUISSON, L., DAUFRESNE, M. and GRENOUILLET, G. (2013), Climate-induced changes in the distribution of freshwater fish: observed and predicted trends. Freshwater Biology, 58: 625-639. https://doi.org/10.1111/fwb.12081). Unsuitablle habitats will cause stress and decrease food ingestion that represents most	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		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	Cold water species, tolerates water up to about 20 degrees Celsius (CABI 2019; COMTE, L., BUISSON, L., DAUFRESNE, M. and GRENOUILLET, G. (2013), Climate-induced changes in the distribution of freshwater fish: observed and predicted trends. Freshwater Biology, 58: 625-639. https://doi.org/10.1111/fwb.12081). Unsuitablle habitats will cause stress and decrease food ingestion that represents most adverse impact and it is leading to eutrophication.	High

Statistics	
Scores	
BRA	15.0
BRA Outcome	-
BRA+CCA	5.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	12.0
1. Domestication/Cultivation	2.0
2. Climate, distribution and introduction risk	0.0
<i>3. Invasive elsewhere</i>	10.0
B. Biology/Ecology	3.0
4. Undesirable (or persistence) traits	6.0
5. Resource exploitation	0.0
6. Reproduction	0.0
7. Dispersal mechanisms	-3.0
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 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 7 9 6
6. Reproduction	7
7. Dispersal mechanisms	9
8. Tolerance attributes	
C. Climate change	6
9. Climate change	6
Sectors affected	
Commercial	7
Environmental	3
Species or population nuisance traits	-3
Thresholds	
BRA	-
BRA+CCA	-
Confidence BRA+CCA	
	0.73

	BRA+CCA	-
Confidence		
	BRA+CCA	0.73
	BRA	0.72
	CCA	0.75
Date and Time		
	19/05/20	021 11:23:44

axon and Assessor details						
Category	Fishes and Lampreys (freshwater)					
Taxon name	Coregonus albula					
Common name	vendace					
Assessor	Tamara Kanjuh					
Risk screening context						
Reason and socio-economic benefits						
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS					
Taxonomy						
Native range						
Introduced range						
URL						

			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	cabi.org	High
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	cabi.org	High
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	cabi.org	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	Dfa, Dfb (Köppen–Geiger climate classification system)	High
5	2.02	What is the quality of the climate matching data?	High	Köppen-Geiger climate classification system	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	Document?	High
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	Intentional stocking.	High
8	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA	Yes	Intentional stocking.	High
1		area in the near future (e.g. unintentional and intentional introductions)?			
3. I	nvasive	e elsewhere			
9		Has the taxon become naturalised (established viable populations) outside its	Yes	cabi.org	High
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	cabi.org	High
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	cabi.org	High
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	Yes	cabi.org	High
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	cabi.org	High
B. I	Biology	//Ecology			
		able (or persistence) traits	1		
14	4.01	Is it likely that the taxon will be poisonous or pose other risks to human health?	No	Harmless (FishBase)	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.org	High
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in	No	The taxon is not a parasite.	High
17	4.04	the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus	Yes	cabi.org	High
		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 structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA	Yes	cabi.org	High
19		Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes	cabi.org	High
20	4.07	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and	No	cabi.org	High
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	Yes	cabi.org	High
		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	No information found.	High
23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g.	Yes	cabi.org	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 native taxa?	Yes	cabi.org	High
25	4.12	Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions	Yes	cabi.org	High
		by way of a dormant form)?			

5 0	Pacouro	e exploitation			
	5.01	Is the taxon likely to consume threatened or	Yes	cabi.org	High
		protected native taxa in the RA area?			
27	5.02	Is the taxon likely to sequester food	Yes	cabi.org	High
		resources (including nutrients) to the			
6 1	Reprodu	detriment of native taxa in the RA area?			
		Is the taxon likely to exhibit parental care	No	No information found.	Medium
		and/or to reduce age-at-maturity in response	-		
		to environmental conditions?			
29	6.02	Is the taxon likely to produce viable gametes	Yes	cabi.org	High
30	6.03	or propagules (in the RA area)? Is the taxon likely to hybridise naturally with	Yes	cabi.org	Medium
50	0.05	native taxa?	103	cabilong	neulum
31	6.04	Is the taxon likely to be hermaphroditic or to	No	cabi.org	High
		display asexual reproduction?			
32	6.05	Is the taxon dependent on the presence of	No	cabi.org	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	cabi.org	High
		large number of propagules or offspring			5
		within a short time span (e.g. < 1 year)?			
34	6.07	How many time units (days, months, years)	2	"Vendace: Coregonus albula (L.)". NatureGate. Retrieved 2013-12- 18.	High
		does the taxon require to reach the age-at- first-reproduction?		10.	
7. L	Dispersa	al mechanisms			
35	7.01	How many potential internal	One	Intentional stocking.	High
		vectors/pathways could the taxon use to			
36	7.02	disperse within the RA area (with suitable Will any of these vectors/pathways bring the	Yes	Intentional stocking.	High
50	1.02	taxon in close proximity to one or more		Interioral stocking.	· ··g··
L		protected areas (e.g. MCZ, MPA, SSSI)?			
37	7.03	Does the taxon have a means of actively	No	cabi.org	High
1		attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances			
		the likelihood of dispersal?			
38	7.04	Is natural dispersal of the taxon likely to	Yes	cabi.org	High
		occur as eggs (for animals) or as propagules			
	7.05	(for plants: seeds, spores) in the RA area?			
39	7.05	Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as	Yes	cabi.org	High
		fragments/seedlings (for plants) in the RA			
		area?			
40	7.06	Are older life stages of the taxon likely to	No	cabi.org	Medium
41	7 07	migrate in the RA area for reproduction?	Ne		Medium
41	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No	cabi.org	Medium
42	7.08	Is dispersal of the taxon along any of the	Yes	Intentional stocking.	High
		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	cabi.org	High
		ce attributes	110	Teastions	
44	8.01	Is the taxon able to withstand being out of	No	cabi.org	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	cabi.org	High
1		water quality conditions relevant to that			-
1		taxon? [In the Justification field, indicate the			
46	8.03	relevant water quality variable(s) being Can the taxon be controlled or eradicated in	Yes	cabi.org	High
10	5.05	the wild with chemical, biological, or other			
L		agents/means?			
47	8.04	Is the taxon likely to tolerate or benefit from	Yes	cabi.org	High
48	8.05	environmental/human disturbance? Is the taxon able to tolerate salinity levels	Yes	cabi.org	High
10	5.05	that are higher or lower than those found in			
		its usual environment?			
49	8.06	Are there effective natural enemies	Yes	cabi.org	High
<u> </u>	Climat:	(predators) of the taxon present in the RA change			
		change			
		Under the predicted future climatic	No change	Highly adaptable to different environments.	High
1		conditions, are the risks of entry into the RA			
1		area posed by the taxon likely to increase,			
51	9.02	decrease or not change? Under the predicted future climatic	No change	Highly adaptable to different environments.	Medium
1		conditions, are the risks of establishment			
1		posed by the taxon likely to increase,			
_	0.02	decrease or not change?	No okara	Highly adaptable to different environment	Madium
52	9.03	Under the predicted future climatic conditions, are the risks of dispersal within	No change	Highly adaptable to different environments.	Medium
1		the RA area posed by the taxon likely to			
1		increase, decrease or not change?			
53	9.04	Under the predicted future climatic	No change	Highly adaptable to different environments.	Medium
1	1	conditions, what is the likely magnitude of future potential impacts on biodiversity			
1		nature Dotential IIIDacts on DIOGIVERSIEV			1
1		and/or ecological integrity/status?			

54		Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	No change	Highly adaptable to different environments.	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	Highly adaptable to different environments.	Medium

Statistics	
Scores	
BRA	32.0
BRA Outcome	-
BRA+CCA	32.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	10.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	5.0
B. Biology/Ecology	22.0
4. Undesirable (or persistence) traits	8.0
5. Resource exploitation	7.0
6. Reproduction	3.0
7. Dispersal mechanisms	1.0
8. Tolerance attributes	3.0
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	7
Environmental	11
Species or population nuisance traits	17
Thresholds	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.71
BRA	0.73
CCA	0.54
Date and Time	
03/06/20	021 14:45:25

Taxon and Assessor details	axon and Assessor details						
Category	Fishes and Lampreys (freshwater)						
Taxon name	Coregonus albula						
Common name	vendace						
Assessor	Tena Radocaj						
Risk screening context							
Reason and socio-economic benefits							
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS						
Taxonomy							
Native range							
Introduced range							
URL							

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
1. L		vication/Cultivation	Vec	Manikawaka Clanawanéstra D. Crustaila D. C. J. L. L. D.	Madium
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	Manikowska-Ślepowrońska, B., Szydzik, B. & Jakubas, D. Determinants of the presence of conflict bird and mammal species at pond fisheries in western Poland. Aquat Ecol 50, 87–95 (2016). https://doi.org/10.1007/s10452-015-9554-z. Farmed but no info on how long.	Medium
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	It is harvested for human consumption. (Freyhof, J. 2011. Coregonus albula. The IUCN Red List of Threatened Species 2011: e.T5360A97801719)	Medium
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	No	no	Low
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	The similarity between climatic conditions RA area and native range is medium. I use climatch.	Medium
5	2.02	What is the quality of the climate matching data?	Medium	The quality of the climate matching data is medium.	Medium
6	2.03	Is the taxon already present outside of captivity in the RA area?	No	Vendace is not present outside of captivity in the RA area.	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	>1	Vendace can use >1 potential vectors to enter in the RA area; intentional: human impact, unintentional: natural spread via natural and manmade watercourses	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	The nearest area where the Vedance lives is Poland, I think in the near future the Vedanec won't be present in the RA area.	Low
	1	e elsewhere	I		I
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	Præbel, K., Gjelland, K. Ø., Salonen, E., & Amundsen, P. A. (2013). Invasion genetics of vendace (Coregonus albula (L.)) in the I nari-P asvik watercourse: revealing the origin and expansion pattern of a rapid colonization event. Ecology and evolution, 3(5),	Medium
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	U.S. Fish and Wildlife Service (2012): Vendace (Coregonus albula) Ecological Risk Screening Summary. Revised, September 2014 and July 2015	Medium
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	Vendace no has adverse impacts on aquaculture.	Low
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem services?	Yes	Vendace have been observed to reduce zooplankton diversity, resulting in smaller zooplankton species and smaller sizes of individual zooplankters (Bøhn and Amundsen,1998; Amundsen et al., 2009). Being an effective zooplanktivore, vendace may heavily reduce the zooplankton stock, in turn leading to reduced algal grazing by zooplankton (trophic cascade). (CABI, 2019)	
	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	Except for effects related to fisheries and sport fishing, where employment can be created in rural areas, there are no obvious social impacts of vendace invasions (CABI 2019).	Low
		y/Ecology	_		
		able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health?	No	Harmless (Froese & Pauly 2020)	Medium
	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	Strong effects from the vendace planktivory have been reported as reduced zooplankton diversity, reduced individual zooplankter size, and reduced zooplankton densities. This has resulted in lowered zooplankton availability for planktivorous fish, and to a large extent displaced native planktivores from the pelagic fish communities through exploitative competition. (CABI, 2019)	Low
	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	No	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?	No	Coldwater species that tolerates temperatures up to 22 degrees Mediur Celsius (CABI 2019).	
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	Vendace maybe will disrupt food-web structure in the RA area. The presence of Vendace may result in a reduced availability of zooplankton for planktivorous fish and may adversely impact populations of native planktivore fish	
	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes	Vendace maybe will have a negative impact on the economic outcome of fisheries for other species that could be negatively affected by the vendace invasion.	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	Yes, the taxon may be a host or vector of known pests and infectious agents endemic to RA area. Because in every area exist infectious agents and pests.	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, each fish can host or vector the disease, as such it can introduce the disease into the area where it occurs.	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	Max length : 48.0 cm TL (Fishbase)	Medium
23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)?	No	Lacustrine and marine in open water (Froese & Pauly 2020).	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	Yes	Depletion of zooplankton causes eutrophication (CABI 2019).	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 by way of a dormant form)?	No	Introduction to one area with low number of specimens wasn't succesful	Low
		e exploitation	1		1
27	5.02	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?	No Not applicable	Vendace not consume threatened of protected native taxa in the RA area. not applicable	Low Very high
	Reprodu 6.01		No	Kottelat & Freyhof 2007	Low
20	0.01	Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?	NO		LOW
		Is the taxon likely to produce viable gametes or propagules (in the RA area)?	No	Only established in northern Europe (CABI 2019)	Medium
	6.03	Is the taxon likely to hybridise naturally with native taxa?	No	no	Low
	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	No	no	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	Low
	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	Vendace have high fecundity and many small eggs (80-300 egg per gram body mass). (CABI 2019)	Low
	6.07	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	2	Spawns for the first time at 2-5 years (Freyhof, J. 2011. Coregonus albula. The IUCN Red List of Threatened Species 2011: e.T5360A97801719)	High
		al mechanisms		1	Madium
35	7.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable	>1	1.accidental introduction, 2.human-impact 3. natural spread via natural and manmade watercourses	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	All of these vectors/pathways can bring taxon in protected 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	Low
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	Freyhof, J. 2011. Coregonus albula. The IUCN Red List of Threatened Species 2011: e.T5360A97801719	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?	No	Freyhof, J. 2011. Coregonus albula. The IUCN Red List of Threatened Species 2011: e.T5360A97801719	Low
40	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	No	no	Low
		Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No	No	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	There is a possibility of a high rate of spread of taxa. Eg. if a fertilized individual enters a new area by any means of expansion.	Low
		Is dispersal of the taxon density dependent?	No	Personal opinion	Low
		ce attributes	Ne		Low
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	personal opinion	Low
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	Sensitive	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 agents/means?	Not applicable	ble It is not regulated in Croatia Very high	
	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	Yes	Dispersal downstream within a watercourse can be expected, even Low if the watercourse is regulated by dams. (CABI, 2019)	
48	8.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	No	Vendace is a freshwater fish species. Although it can tolerate brackish water with a relatively low salinity, natural spread between different watercourses is typically limited by the high salinity of estuary waters. (CABI, 2019)	Low
				Silurus glanis, Northen pike, Brown trout	Ma altruna
49	8.06	Are there effective natural enemies (predators) of the taxon present in the RA	Yes	Shurus gianis, Northen pike, Brown trout	Medium

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	Only pathway is introduction by human	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	Cold water species, tolerates water up to about 20 degrees Celsius (CABI 2019).	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?	Decrease	Cold water species, tolerates water up to about 20 degrees Celsius (CABI 2019).	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	Unsuitablle habitats will cause stress and decrease food ingestion that represents most adverse impact.	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	Unsuitablle habitats will cause stress and decrease food ingestion that represents most adverse impact.	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	Unsuitablle habitats will cause stress and decrease food ingestion that represents most adverse impact and it is leading to eutrophication.	Low

Statistics	
Scores	
BRA	14.5
BRA Outcome	-
BRA+CCA	4.5
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	10.5
1. Domestication/Cultivation	2.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	7.5 4.0
B. Biology/Ecology	
4. Undesirable (or persistence) traits 5. Resource exploitation	6.0 0.0
6. Reproduction 7. Dispersal mechanisms	0.0
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
<i>3. Invasive elsewhere</i>	5
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2 7 9
6. Reproduction	7
7. Dispersal mechanisms	9
8. Tolerance attributes	6
C. Climate change	6
9. Climate change	6
Sectors affected	
Commercial	7
Environmental	3
Species or population nuisance traits	-2
Thresholds	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.38
BRA	0.39

	BRA+CCA	0.38
	BRA	0.39
	CCA	0.29
Date and Time		
	08/05/20	20 07:53:26

axon and Assessor details					
Category	Fishes and Lampreys (freshwater)				
Taxon name	Coregonus lavaretus				
Common name	European whitefish				
Assessor	Ana Marić				
Risk screening context					
Reason and socio-economic benefits					
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS				
Taxonomy					
Native range					
Introduced range					
URL					

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
	7	ication/Cultivation			
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	Effect of eye fluke infection on the growth of whitefish (Coregonus lavaretus) —An experimental approach Author links open overlay panelAnssiKarvonenaOttoSeppälä. 2008	High
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	https://www.iucnredlist.org/species/5369/174778292	High
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	Coregonus albula	High
2. (limate	, distribution and introduction risk			
4	2.01	How similar are the climatic conditions of the	High	Europe whitefish	Medium
		Risk Assessment (RA) area and the taxon's native range?	5		
5	2.02	What is the quality of the climate matching data?	Medium	Logic	Medium
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	Habekovic, D. (1972). Introdukcija Coregonusa ozimica u nase vode. Ribarstvo Jugoslavije, 28, 143.	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	Habekovic, D. (1972). Introdukcija Coregonusa ozimica u nase vode. Ribarstvo Jugoslavije, 28, 143.	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	Habekovic, D. (1972). Introdukcija Coregonusa ozimica u nase vode. Ribarstvo Jugoslavije, 28, 143.	Very high
		and intentional introductions)?			
3. 1	nvasive	e elsewhere			
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	FRESHWATER ALIEN FISH SPECIES INTRODUCED INTO CROATIA FOR AQUACULTURE AND CONSEQUENCES OF THEIR ESCAPES AND RELEASES IN INLAND WATERS Marina Piria1*, Divna Lukić1, Tatjana Boroša-Pecigoš 2016	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	No	Berg S., Jeppesen E., Søndergaard M., Mortensen E. (1994) Environmental effects of introducing whitefish, Coregonus lavaretus (L.), in Lake Ring. In: Mortensen E., Jeppesen E., Søndergaard M., Nielsen L.K. (eds) Nutrient Dynamics and Biological Structure in Shallow Freshwater and Brackish Lakes. Developments in Hydrobiology, vol 94. Springer, Dordrecht. https://doi.org/10.1007/978-94-017-2460-9 7	High
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	Berg S., Jeppesen E., Søndergaard M., Mortensen E. (1994) Environmental effects of introducing whitefish, Coregonus lavaretus (L.), in Lake Ring. In: Mortensen E., Jeppesen E., Søndergaard M., Nielsen L.K. (eds) Nutrient Dynamics and Biological Structure in Shallow Freshwater and Brackish Lakes. Developments in Hydrobiology, vol 94. Springer, Dordrecht. https://doi.org/10.1007/978-94-017-2460-9 7	High
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem services?	No	Berg S., Jeppesen E., Søndergaard M., Mortensen E. (1994) Environmental effects of introducing whitefish, Coregonus lavaretus (L.), in Lake Ring. In: Mortensen E., Jeppesen E., Søndergaard M., Nielsen L.K. (eds) Nutrient Dynamics and Biological Structure in Shallow Freshwater and Brackish Lakes. Developments in Hydrobiology, vol 94. Springer, Dordrecht. https://doi.org/10.1007/978-94-017-2460-9 7	High
	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	Berg S., Jeppesen E., Søndergaard M., Mortensen E. (1994) Environmental effects of introducing whitefish, Coregonus lavaretus (L.), in Lake Ring. In: Mortensen E., Jeppesen E., Søndergaard M., Nielsen L.K. (eds) Nutrient Dynamics and Biological Structure in Shallow Freshwater and Brackish Lakes. Developments in Hydrobiology, vol 94. Springer, Dordrecht. https://doi.org/10.1007/978-94-017-2460-9 7	High
		//Ecology			
		able (or persistence) traits Is it likely that the taxon will be poisonous or	No	https://www.iucnredlist.org/species/5369/174778292	Very high
15	4.02	pose other risks to human health? Is it likely that the taxon will smother one or	No	Berg S., Jeppesen E., Søndergaard M., Mortensen E. (1994)	High
		more native taxa (that are not threatened or protected)?		Environmental effects of introducing whitefish, Coregonus lavaretus (L.), in Lake Ring. In: Mortensen E., Jeppesen E., Søndergaard M., Nielsen L.K. (eds) Nutrient Dynamics and Biological Structure in Shallow Freshwater and Brackish Lakes. Developments in Hydrobiology, vol 94. Springer, Dordrecht. https://doi.org/10.1007/978-94-017-2460-9 7	
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	https://www.iucnredlist.org/species/5369/174778292	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	Kottelat 2007	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	Berg S., Jeppesen E., Søndergaard M., Mortensen E. (1994) Environmental effects of introducing whitefish, Coregonus lavaretus (L.), in Lake Ring. In: Mortensen E., Jeppesen E., Søndergaard M., Nielsen L.K. (eds) Nutrient Dynamics and Biological Structure in Shallow Freshwater and Brackish Lakes. Developments in Hydrobiology, vol 94. Springer, Dordrecht.	High
19	4.06	Is the taxon likely to exert adverse impacts	No	https://doi.org/10.1007/978-94-017-2460-9 7 Habekovic, D. (1972). Introdukcija Coregonusa ozimica u nase	High
20	4.07	on ecosystem services in the RA area?		vode. Ribarstvo Jugoslavije, 28, 143.	
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	Habekovic, D. (1972). Introdukcija Coregonusa ozimica u nase vode. Ribarstvo Jugoslavije, 28, 143.	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	Effect of eye fluke infection on the growth of whitefish (Coregonus lavaretus) —An experimental approach Author links open overlay panelAnssiKarvonenaOttoSeppälä. 2008	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	Kottelat 2007	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	https://www.fishbase.in/summary/Coregonus-lavaretus.html	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?	Yes	Berg S., Jeppesen E., Søndergaard M., Mortensen E. (1994) Environmental effects of introducing whitefish, Coregonus lavaretus (L.), in Lake Ring. In: Mortensen E., Jeppesen E., Søndergaard M., Nielsen L.K. (eds) Nutrient Dynamics and Biological Structure in Shallow Freshwater and Brackish Lakes. Developments in Hydrobiology, vol 94. Springer, Dordrecht.	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	https://doi.org/10.1007/978-94-017-2460-9_7 Berg S., Jeppesen E., Søndergaard M., Mortensen E. (1994) Environmental effects of introducing whitefish, Coregonus Ilavaretus (L.), in Lake Ring. In: Mortensen E., Jeppesen E., Søndergaard M., Nielsen L.K. (eds) Nutrient Dynamics and Biological Structure in Shallow Freshwater and Brackish Lakes. Developments in Hydrobiology, vol 94. Springer, Dordrecht. https://doi.org/10.1007/978-94-017-2460-9_7	High
		e exploitation	.		
	5.01	Is the taxon likely to consume threatened or protected native taxa in the RA area?	Yes	Berg S., Jeppesen E., Søndergaard M., Mortensen E. (1994) Environmental effects of introducing whitefish, Coregonus lavaretus (L.), in Lake Ring. In: Mortensen E., Jeppesen E., Søndergaard M., Nielsen L.K. (eds) Nutrient Dynamics and Biological Structure in Shallow Freshwater and Brackish Lakes. Developments in Hydrobiology, vol 94. Springer, Dordrecht. https://doi.org/10.1007/978-94-017-2460-9_7	High
	5.02	Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?	Yes	Berg S., Jeppesen E., Søndergaard M., Mortensen E. (1994) Environmental effects of introducing whitefish, Coregonus lavaretus (L.), in Lake Ring. In: Mortensen E., Jeppesen E., Søndergaard M., Nielsen L.K. (eds) Nutrient Dynamics and Biological Structure in Shallow Freshwater and Brackish Lakes. Developments in Hydrobiology, vol 94. Springer, Dordrecht. https://doi.org/10.1007/978-94-017-2460-9 7	High
	Reprodu		N/	Deskakle	Ma di una
28	6.01	Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?	Yes	Probably	Medium
29	6.02		Yes	Habekovic, D. (1972). Introdukcija Coregonusa ozimica u nase	High
30	6.03	or propagules (in the RA area)? Is the taxon likely to hybridise naturally with	No	vode. Ribarstvo Jugoslavije, 28, 143. Habekovic, D. (1972). Introdukcija Coregonusa ozimica u nase	Very high
		native taxa?		vode. Ribarstvo Jugoslavije, 28, 143.	
31	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	No	https://www.iucnredlist.org/species/5369/174778292	High
32	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features)	No	https://www.iucnredlist.org/species/5369/174778292	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	https://www.iucnredlist.org/species/5369/174778292	High
34	6.07	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	3	Planktivory and diet-overlap of densely rakered whitefish (Coregonus lavaretus (L.)) in a subarctic lake K. Kahilainen, E. Alajärvi, H. Lehtonen. 2005	High
		al mechanisms			
35	7.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable	One	Habekovic, D. (1972). Introdukcija Coregonusa ozimica u nase vode. Ribarstvo Jugoslavije, 28, 143.	High
36	7.02	Will any of these vectors/pathways bring the taxon in close proximity to one or more	Yes	Habekovic, D. (1972). Introdukcija Coregonusa ozimica u nase vode. Ribarstvo Jugoslavije, 28, 143.	Very 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	Habekovic, D. (1972). Introdukcija Coregonusa ozimica u nase vode. Ribarstvo Jugoslavije, 28, 143.	Very high
38	7.04	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules	No	Habekovic, D. (1972). Introdukcija Coregonusa ozimica u nase vode. Ribarstvo Jugoslavije, 28, 143.	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	Habekovic, D. (1972). Introdukcija Coregonusa ozimica u nase vode. Ribarstvo Jugoslavije, 28, 143.	High
40	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	Yes	Habekovic, D. (1972). Introdukcija Coregonusa ozimica u nase vode. Ribarstvo Jugoslavije, 28, 143.	High

41	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No	Habekovic, D. (1972). Introdukcija Coregonusa ozimica u nase vode. Ribarstvo Jugoslavije, 28, 143.	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	Habekovic, D. (1972). Introdukcija Coregonusa ozimica u nase vode. Ribarstvo Jugoslavije, 28, 143.	High
43	7.09	Is dispersal of the taxon density dependent?	Yes	Effects of Climatic and Density-Dependent Factors on Year-Class Strength of Coregonus lavaretus in Lake Constance Authors: Reiner Eckmann, Ursula Gaedke, and Hans Johst Wetzlar. 1988	Very high
8. 7	Foleran	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	https://www.fishbase.in/summary/Coregonus-lavaretus.html	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	No	https://www.luontoportti.com/suomi/en/kalat/whitefish	High
	8.03	Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	No	https://www.luontoportti.com/suomi/en/kalat/whitefish	High
47	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	No	https://www.luontoportti.com/suomi/en/kalat/whitefish	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	https://www.luontoportti.com/suomi/en/kalat/whitefish	Medium
49	8.06	Are there effective natural enemies (predators) of the taxon present in the RA	Yes	https://www.luontoportti.com/suomi/en/kalat/whitefish	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	Habekovic, D. (1972). Introdukcija Coregonusa ozimica u nase vode. Ribarstvo Jugoslavije, 28, 143.	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	Habekovic, D. (1972). Introdukcija Coregonusa ozimica u nase vode. Ribarstvo Jugoslavije, 28, 143.	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	Habekovic, D. (1972). Introdukcija Coregonusa ozimica u nase vode. Ribarstvo Jugoslavije, 28, 143.	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	Habekovic, D. (1972). Introdukcija Coregonusa ozimica u nase vode. Ribarstvo Jugoslavije, 28, 143.	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	Habekovic, D. (1972). Introdukcija Coregonusa ozimica u nase vode. Ribarstvo Jugoslavije, 28, 143.	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	Habekovic, D. (1972). Introdukcija Coregonusa ozimica u nase vode. Ribarstvo Jugoslavije, 28, 143.	Medium

Statistics	
Scores	
BRA	21.0
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	14.0
4. Undesirable (or persistence) traits	5.0
5. Resource exploitation	7.0
6. Reproduction	2.0
7. Dispersal mechanisms	1.0
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	3
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	5
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	3 5 5 36 12 2 7 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	2
Environmental	4

Species or population nuisance traits	11
Thresholds	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.77
BRA	0.79
CCA	0.63
Date and Time	
25/05/202	21 09:33:02

axon and Assessor details					
Category	Fishes and Lampreys (freshwater)				
Taxon name	Coregonus lavaretus				
Common name	European whitefish				
Assessor	Ivan Špelić				
Risk screening context					
Reason and socio-economic benefits					
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS				
Taxonomy					
Native range					
Introduced range					
URL					

			Response	Justification (references and/or other information)	Confidence
Α.Ι	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	Froese & Pauly 2020	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	No	Farmed for food and restocking, no harvesting	High
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	No	There is no invasive subspecies	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	Climatch 2020	Medium
5	2.02	What is the quality of the climate matching data?	Medium	Climatch 2020	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021)	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?		Already present (Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021)).	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)?	Not applicable	Already present (Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021)).	Very high
3. I		e elsewhere	la a		
9	3.01	Has the taxon become naturalised (established viable populations) outside its	Yes	Simonović, 2012	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	Introductions to countries outside its native range have resulted in negative impacts for native species (Powan (Coregonus lavaretus) Ecological Risk Screening Summary, U.S. Fish and Wildlife Service, August 2012).	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 services?	Yes	The species is one of the most widely introduced fish species in northern Europe and has partially or completely displaced many native Arctic charr (Salvelinus alpinus) populations (Powan (Coregonus lavaretus) Ecological Risk Screening Summary, U.S. Fish and Wildlife Service, August 2012) probably decreasing	Medium
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	Yes	The species is one of the most widely introduced fish species in northern Europe and has partially or completely displaced many native Arctic charr (Salvelinus alpinus) populations (Powan (Coregonus lavaretus) Ecological Risk Screening Summary, U.S. Fish and Wildlife Service. August 2012) probably decreasing	Medium
		//Ecology			
		able (or persistence) traits	N	1	N/ 1 · 1
		Is it likely that the taxon will be poisonous or pose other risks to human health?		Jevtić, 1991	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	The species is one of the most widely introduced fish species in northern Europe and has partially or completely displaced many native Arctic charr (Salvelinus alpinus) (Powan (Coregonus lavaretus) Ecological Risk Screening Summary, U.S. Fish and Wildlife Service, August 2012).	High
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	Jevtić, 1991	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	This is a species living in clear, cold and well-oxygenated waters (Orban et al. 2006).	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	Foraging by introduced C. lavaretus can change the structure of the zooplankton community (Powan (Coregonus lavaretus) Ecological Risk Screening Summary, U.S. Fish and Wildlife	High
	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes	The main conclusion is that whitefish stocking of eutrophic lakes for commercial or other purposes may delay their recovery following nutrient load reduction, or even lead to enhanced eutrophication (Berg 1994).	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	Skall et al. (2004)	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	Skall et al. (2004)	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	In introduced lake: 50 cm TL (Jevtić, 1991)	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	Jevtić, 1991	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?	No	It is written that there is no impact but without research (Jevtić, 1991)	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	Introduction to one area with low number of specimens wasn't succesful (Habeković, 1978)	Very high
		e exploitation Is the taxon likely to consume threatened or	No	Feeds on planktonic crustaceans (Froese & Pauly 2020).	High
20	5.01	protected native taxa in the RA area?	INO	reeds on planktonic crustaceans (rroese & Pauly 2020).	nigii
27	5.02	Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?	Not applicable	No data for calculations.	Very 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?	No	Jevtić, 1991	Very high
29	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	Jevtić, 1991	Very high
30	6.03	Is the taxon likely to hybridise naturally with	No	No related native taxa	Very high
31	6.04	native taxa? Is the taxon likely to be hermaphroditic or to	No	Jevtić, 1991	Very high
32	6.05	display asexual reproduction? Is the taxon dependent on the presence of	No	Spawns in gravel, near shore, in shallow waterv(Froese & Pauly	Very high
		another taxon (or specific habitat features) to complete its life cycle?		2020).	
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	Jevtić, 1991 (30 000-50000)	Very high
34	6.07	How many time units (days, months, years) does the taxon require to reach the age-at-	2	1-4 years in literature (Froese & Pauly 2020).	High
7. L	Dispersa	first-reproduction? al mechanisms			
		How many potential internal	>1	Intentional introductions for angling (Froese and Pauly 2020)	Low
		vectors/pathways could the taxon use to disperse within the RA area (with suitable		Floods (Povž 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)?	No	Personal opinion	Low
37	7.03	Does the taxon have a means of actively	No	No known adaptations	Very high
		attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal?			
38	7.04	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules	No	Jevtić, 1991	Low
39	7.05	(for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to	Yes	Næsje, T., Jonsson, B., and Sandlund, O. 1986. Drift of cisco and	High
		occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA		white-fish larvae in a Norwegian river. Transactions of the American Fisheries Society, 115: 37-41.	
40	7.06	area? Are older life stages of the taxon likely to	No	No documented data	Low
41	7.07	migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to	No	Personal opinion	Very high
		be dispersed in the RA area by other animals?			, ,
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	Floods, introductions	Very high
		unintentional or intentional) likely to be			
		Is dispersal of the taxon density dependent?	No	no documented data	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	Personal opinion	Very high
45	8.02	cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that	No	Very sensitive to changes in temperature (Povž et al. 2015).	Very high
46	8.03	taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in	No	not allowed in the region.	Very high
		the wild with chemical, biological, or other agents/means?			
47	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	Yes	Known to live in artificial reservoirs (Jevtić 1991).	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	Coregonus lavaretus sensu lato can be found in different kinds of fresh-, brackish- and saltwater habitats (Papakostas, S., A. Vasemägi, JP. Vähä, M. Himberg, L. Peil et al., 2012 A proteomics approach reveals divergent molecular responses to salinity in populations of European whitefish (Coregonus	High
49	8.06	Are there effective natural enemies (predators) of the taxon present in the RA area?	Yes	lavaretus). Mol. Ecol. 21: 3516–3530. Perch and pike (SAKSGÅRD, R., NÆSJE, T.F., SANDLUND O.T., UGEDAL, O. (2002): The effect of fish predators on whitefish (Coregonus lavaretus) habitat use in Lake Femund, a deep	Very high
с. с	Climate)

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?	Not applicable	Already present (Povže et al. 2015).	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	During the spawning season, water temperatures exceeding 8 °C, as are expected due to climate change, will likely cause a decline in whitefish reproductive success (Gillet 1991, Anneville et al. 2013).	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	During the spawning season, water temperatures exceeding 8 °C, as are expected due to climate change, will likely cause a decline in whitefish reproductive success (Gillet 1991, Anneville et al. 2013). Intentional releases may stay the same but natural recruitment may 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?	No change	No recorded impacts so no change expected.	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 recorded impact so no change 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?	No change	No recorded impact so no change expected.	Low

Statistics	
Statistics	
BRA	20.5
BRA Outcome	
BRA+CCA	16.5
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	11.5
1. Domestication/Cultivation	0.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	10.5
B. Biology/Ecology	9.0
4. Undesirable (or persistence) traits	6.0
5. Resource exploitation	0.0
6. Reproduction	1.0
7. Dispersal mechanisms	-1.0
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
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	0
Sectors affected	10
Commercial Environmental	
Species or population nuisance traits	5
Species of population nuisance traits	5
Thresholds	
BRA	_
BRA+CCA	
Confidence	
BRA+CCA	0.75
BRATCCA	0.79
CCA	0.46
	0.40
Date and Time	
	021 20:49:03

Taxon and Assessor details		
Category	Fishes and Lampreys (freshwater)	
Taxon name	Coregonus lavaretus	
Common name	European whitefish	
Assessor	Tamara Kanjuh	
Risk screening context		
Reason and socio-economic benefits		
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS	
Taxonomy		
Native range		
Introduced range		
URL		

			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 domestication (or cultivation) for at least 20 generations?	Yes	FishBase	High
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	FishBase	High
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	No	No information found.	Medium
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?	High	Dfa, Dfb (Köppen-Geiger climate classification system)	High
5	2.02	What is the quality of the climate matching data?	High	Köppen-Geiger climate classification system	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	Froese&Pauly (2015)	High
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	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	Yes	Fisheries, intentional stocking	High
		and intentional introductions)?			
	1	e elsewhere			1.12.1
		Has the taxon become naturalised (established viable populations) outside its	No	cabi.org	High
		In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	No	No information found.	Medium
	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	No information found.	Low
	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	No	No information found.	Low
		In the taxon's introduced range, are there known adverse socio-economic impacts?	Yes	cabi.org	Medium
		//Ecology			
		able (or persistence) traits			112.1
		Is it likely that the taxon will be poisonous or pose other risks to human health?		Harmless (FishBase)	High
15	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	Sandlund et al. (2011)	High
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	The taxon is not a parasite.	High
17	4.04	Is the taxon adaptable in terms of climatic and other environmental conditions, thus	Yes	cabi.org	High
		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 structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA	Yes	Sandlund et al. (2011)	High
19		Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes	cabi.rs	High
20	4.07	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and	No	No information found.	Medium
21	4.08	infectious agents that are endemic in the RA Is it likely that the taxon will host, and/or	Yes	Skill et al. (2004); Brzuzan et al. (2007)	High
ľ		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 size that will make it more likely to be	No	No information found.	Medium
23	4.10	released from captivity? Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g.	Yes	cabi.org	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 native taxa?	Yes	Eloranta et al. (2011); Berg et al. (1994)	High
25	4.12	Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions	No	No information found.	Medium
	<u> </u>	by way of a dormant form)?			

26 5 27 5 6. Re 28 6		e exploitation			
27 5 6. Re		Is the taxon likely to consume threatened or	Yes	fws.gov	High
6. Re		protected native taxa in the RA area?			
	5.02	Is the taxon likely to sequester food	Yes	fws.gov	High
		resources (including nutrients) to the			
	nrodu	detriment of native taxa in the RA area?			
		Is the taxon likely to exhibit parental care	No	No information found.	Medium
		and/or to reduce age-at-maturity in response			. iculuii
		to environmental conditions?			
29 6	5.02	Is the taxon likely to produce viable gametes	Yes	cabi.org	Medium
30 6	5.03	or propagules (in the RA area)? Is the taxon likely to hybridise naturally with	No	No information found.	Medium
50 0	5.05	native taxa?	NO		neulum
31 6	5.04	Is the taxon likely to be hermaphroditic or to	No	Froese&Pauly (2015)	Medium
		display asexual reproduction?			
32 6	5.05	Is the taxon dependent on the presence of	No	No information found.	Medium
		another taxon (or specific habitat features) to complete its life cycle?			
33 6	5.06	Is the taxon known (or likely) to produce a	Yes	Froese&Pauly (2015)	High
		large number of propagules or offspring			-
24 6		within a short time span (e.g. < 1 year)?	2		
34 6	5.07	How many time units (days, months, years) does the taxon require to reach the age-at-	2	Similiar to other Coregonus.	Medium
		first-reproduction?			
7. Dis	spersa	al mechanisms			
35 7	7.01	How many potential internal	One	Intentional stocking.	High
		vectors/pathways could the taxon use to disperse within the RA area (with suitable			
36 7	7.02	Will any of these vectors/pathways bring the	Yes	Intentional stocking.	High
ĺ		taxon in close proximity to one or more			
		protected areas (e.g. MCZ, MPA, SSSI)?			
37 7	7.03	Does the taxon have a means of actively	No	Not known.	High
		attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances			
		the likelihood of dispersal?			
38 7	7.04	Is natural dispersal of the taxon likely to	Yes	Eggs and larvae follow currents and drift downstream in rivers -	High
		occur as eggs (for animals) or as propagules		similar to other Coregonus.	
39 7	7 05	(for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to	Yes	Similar to other Coregonus.	High
55 /	.05	occur as larvae/juveniles (for animals) or as	165		mgn
		fragments/seedlings (for plants) in the RA			
		area?			
40 7	/.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	No	No infom information found.	Medium
41 7	7.07	Are propagules or eggs of the taxon likely to	No	cabi.org	Medium
		be dispersed in the RA area by other animals?			
42 7	7.08	Is dispersal of the taxon along any of the	Yes	Intentional stocking.	Medium
		vectors/pathways mentioned in the previous seven questions (35–41; i.e. both			
		unintentional or intentional) likely to be			
43 7		Is dispersal of the taxon density dependent?	No	No information found.	Medium
		ce attributes			
44 8	3.01	Is the taxon able to withstand being out of water for extended periods (e.g. minimum of	No	The taxon can not survive out of water.	High
		one or more hours) at some stage of its life			
		cycle?			
45 8	3.02	Is the taxon tolerant of a wide range of	Yes	cabi.org	Medium
		water quality conditions relevant to that taxon? [In the Justification field, indicate the			
		relevant water quality variable(s) being			
46 8	3.03	Can the taxon be controlled or eradicated in	No	No information found.	Medium
		the wild with chemical, biological, or other			
47 8	3.04	agents/means? Is the taxon likely to tolerate or benefit from	No	cabi.org	Medium
		environmental/human disturbance?			
48 8	3.05	Is the taxon able to tolerate salinity levels	Yes	cabi.org	High
		that are higher or lower than those found in			
	3 06	its usual environment? Are there effective natural enemies	No	No information found.	Medium
40 0		(predators) of the taxon present in the RA			. icululli
49 8	_				
C. Cli		e change			
C. Cl i 9. Cli	imate	change	No change	Adaptable to different environmente similat to other Correction	Medium
C. Cl i 9. Cli	imate	change Under the predicted future climatic	No change	Adaptable to different environments - similat to other Coregonus.	Medium
C. Cl i 9. Cli	imate	change	No change	Adaptable to different environments - similat to other Coregonus.	Medium
<u>C. Cli</u> 9. Cli 50 9	<i>imate</i> 9.01	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?			
C. Cl i 9. Cli	<i>imate</i> 9.01	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	Adaptable to different environments - similat to other Coregonus. Adaptable to different environments - similat to other Coregonus.	Medium Medium
<u>C. Cli</u> 9. Cli 50 9	<i>imate</i> 9.01	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			
<u>C. Cli</u> 9. Cli 50 9	<i>imate</i> 9.01	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>C. Cli</u> 9. Cli 50 9	<u>imate</u> 9.01 9.02	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			
C. Cli 9. Cli 50 9 51 9	<u>imate</u> 9.01 9.02	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	Adaptable to different environments - similat to other Coregonus.	Medium
C. Cli 9. Cli 50 9 51 9	<u>imate</u> 9.01 9.02	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	No change	Adaptable to different environments - similat to other Coregonus.	Medium
C. Cli 9. Cli 50 9 51 9 52 9	<u>imate</u> 9.01 9.02 9.03	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?	No change	Adaptable to different environments - similat to other Coregonus. Adaptable to different environments - similat to other Coregonus.	Medium
C. Cli 9. Cli 50 9 51 9	<u>imate</u> 9.01 9.02 9.03	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	No change	Adaptable to different environments - similat to other Coregonus.	Medium Medium
C. Cli 9. Cli 50 9 51 9 52 9	<u>imate</u> 9.01 9.02 9.03	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	No change	Adaptable to different environments - similat to other Coregonus. Adaptable to different environments - similat to other Coregonus.	Medium 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	Adaptable to different environments - similat to other Coregonus.	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	Adaptable to different environments - similat to other Coregonus.	Medium

Statistics	
Statistics	
BRA	24.0
BRA Outcome	24.0
BRA+CCA	24.0
BRA+CCA Outcome	24.0
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	19.0
4. Undesirable (or persistence) traits	7.0
5. Resource exploitation	7.0
6. Reproduction	1.0
7. Dispersal mechanisms	1.0
8. Tolerance attributes	3.0
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	3 5 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	9
Environmental	9
Species or population nuisance traits	9
Thresholds	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.61
BRA	0.63
CCA	0.50
Date and Time	021 23:57:03

Taxon and Assessor details		
Category	Fishes and Lampreys (freshwater)	
Taxon name	Coregonus lavaretus	
Common name	European whitefish	
Assessor	Tena Radocaj	
Risk screening context		
Reason and socio-economic benefits		
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS	
Taxonomy		
Native range		
Introduced range		
URL		

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
	1	ication/Cultivation			.
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	No	Habeković 1978; succesfully introduced 1977 in Croatia.	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 grown for human consummation and as a food source, whitefish is an appreciated and valuable freshwater fish species is caught in nature. (Vielma, J., Koskela, J., Ruohonen, K., Jokinen, I., & Kettunen, J. (2003). Optimal diet composition for European whitefish (Coregonus lavaretus): carbohydrate stress and immune parameter responses. Aquaculture, 225(1-4), 3-16.) (Orban, E., Masci, M., Nevigato, T., Di Lena, G., Casini, I., Caproni, R., & Rampacci, M. (2006). Nutritional quality and safety of whitefish (Coregonus lavaretus) from Italian lakes. Journal of Food Composition and Analysis. 19(6-7). 737-746.)	Very high
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	No	There is no invasive subspecies as I know; I didn't find any data	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	The similarity between climatic conditions RA area and native range is medium. I use climatch.	Medium
5	2.02	What is the quality of the climate matching data?	Medium	The quality of the climate matching data is medium.	Medium
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	This species is present outside of captivity in RA area	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	None	It is present in Croatia	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)?	Not applicable	not applicable	Very high
3. I	nvasive	e elsewhere	•		
9	3.01	Has the taxon become naturalised (established viable populations) outside its	Yes	Simonović, 2012	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 documented evidence	Medium
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem services?	No	It is stated that in introduced area no negative impacts (Jevtić (1991) Izbor ozimice za otvorene i zatvorene vode. Ribarstvo Jugoslavije 46:14-26.) but without any research	Medium
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	Personal opinion	Medium
B. I	Biology	//Ecology			
4. L		able (or persistence) traits			
		pose other risks to human health?	No	Jevtić (1991) Izbor ozimice za otvorene i zatvorene vode. Ribarstvo Jugoslavije 46:14-26.	Very high
	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	No	Also is stated that there is no competition with native species without research (Jevtić (1991) Izbor ozimice za otvorene i zatvorene vode. Ribarstvo Jugoslavije 46:14-26.)	Low
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	Jevtić (1991) Izbor ozimice za otvorene i zatvorene vode. Ribarstvo Jugoslavije 46:14-26.	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, this taxon is adapted on climate and environmental conditions, these species have self-sustaining populations in RA area. (Jevtić (1991) Izbor ozimice za otvorene i zatvorene vode. Ribarstvo Jugoslavije 46:14-26)	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	Maybe, it is possible there is a possibility that it will disrupt the nutritional structure, and reduce the abundance of benthic invertebrates.	Low
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	My personal opinion is no	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	Yes, the taxon may be a host or vector of known pests and infectious agents endemic to RA area. Because in every area exist infectious agents and pests.	Low

21	4.08	Is it likely that the taxon will host, and/or	Yes	Whitefish are potential carriers of VHSV [viral haemorrhagic	Medium
21	4.00	act as a vector for, recognised pests and	Tes	septicaemia virus] as they suffer only low mortality after infection	Medium
		infectious agents that are absent from (novel		but continue to carry virus, Bacterial kidney disease	
		to) the RA area?		Renibacterium salmoninarum. (Skall, H. F., T. E. Kjær, and N. J.	
				Olesen. 2004. Investigation of wild caught whitefish, Coregonus	
				lavaretus (L.), for infection with viral haemorrhagic septicaemia virus (VHSV) and experimental challenge of whitefish with VHSV.	
				Journal of Fish Diseases 27(7):401-408.) (Rimaila-Pärnänen, E.	
				2002. First case of bacterial kidney disease (BKD) in whitefish	
				(Coregonus lavaretus) in Finland. Bulletin of the European	
2	4.09	Is it likely that the taxon will achieve a body	Yes	Association of Fish Pathologists 22(6):403-404.) In introduced lake: 50 cm TL (Jevtić (1991) Izbor ozimice za	Very high
2	4.05	size that will make it more likely to be	103	otvorene i zatvorene vode. Ribarstvo Jugoslavije 46:14-26.)	very nigh
		released from captivity?			
3	4.10	Is the taxon capable of sustaining itself in a	Yes	Jevtić (1991) Izbor ozimice za otvorene i zatvorene vode.	Very high
		range of water velocity conditions (e.g.		Ribarstvo Jugoslavije 46:14-26.	
1	4.11	versatile in habitat use)? Is it likely that the taxon's mode of existence	Yes	It is written that there is no impact but without research (Jevtić	High
-	7.11	(e.g. excretion of by-products) or behaviours	103	(1991) Izbor ozimice za otvorene i zatvorene vode. Ribarstvo	ingn
		(e.g. feeding) will reduce habitat quality for		Jugoslavije 46:14-26.)	
_		native taxa?			
5	4.12	Is the taxon likely to maintain a viable population even when present in low	No	Introduction to one area with low number of specimens wasn't succesful (Habeković, 1978)	Very high
		densities (or persisting in adverse conditions			
		by way of a dormant form)?			
		ce exploitation	r		
6	5.01	Is the taxon likely to consume threatened or protected native taxa in the RA area?	Yes	It is possible that it consume endangered and protected native taxa in the RA area. If there are protected taxa in the RA area, the	Low
		protecteu native taxa in the KA area?		european whitefish will consume them, whether or not the taxon	
7	5.02	Is the taxon likely to sequester food	Not applicable	not applicable	Very high
		resources (including nutrients) to the			-
	lon	detriment of native taxa in the RA area?	I		1
	R <i>eprodu</i> 6.01	Is the taxon likely to exhibit parental care	No	Jevtić (1991) Izbor ozimice za otvorene i zatvorene vode.	Very high
ĺ		and/or to reduce age-at-maturity in response		Ribarstvo Jugoslavije 46:14-26.	.,
		to environmental conditions?			
9	6.02	Is the taxon likely to produce viable gametes	Yes	Jevtić (1991) Izbor ozimice za otvorene i zatvorene vode.	Very high
20	6.03	or propagules (in the RA area)? Is the taxon likely to hybridise naturally with	No	Ribarstvo Jugoslavije 46:14-26. Jevtić (1991) Izbor ozimice za otvorene i zatvorene vode.	Medium
0	0.05	native taxa?	NO	Ribarstvo Jugoslavije 46:14-26.	Medium
31	6.04	Is the taxon likely to be hermaphroditic or to	No	Jevtić (1991) Izbor ozimice za otvorene i zatvorene vode.	Very high
	L	display asexual reproduction?		Ribarstvo Jugoslavije 46:14-26.	
32	6.05	Is the taxon dependent on the presence of	No	Jevtić (1991) Izbor ozimice za otvorene i zatvorene vode.	Very high
		another taxon (or specific habitat features) to complete its life cycle?		Ribarstvo Jugoslavije 46:14-26.	
33	6.06	Is the taxon known (or likely) to produce a	Yes	30 000-50000. (Jevtić (1991) Izbor ozimice za otvorene i	Very high
		large number of propagules or offspring		zatvorene vode. Ribarstvo Jugoslavije 46:14-26).	-, 5
		within a short time span (e.g. < 1 year)?			
34	6.07	How many time units (days, months, years)	2	In the second year of life it reaches sexual maturity. (Orban, E.,	Very high
		does the taxon require to reach the age-at- first-reproduction?		Masci, M., Nevigato, T., Di Lena, G., Casini, I., Caproni, R., & Rampacci, M. (2006). Nutritional quality and safety of whitefish	
				(Coregonus lavaretus) from Italian lakes. Journal of Food	
_				Composition and Analysis, 19(6-7), 737-746.)	
		al mechanisms How many potential internal	>1	1.accidental introduction, 2.human-mediated 3. natural spread via	Medium
, ,	7.01	vectors/pathways could the taxon use to	- 1	natural and manmade watercourses	riculum
		disperse within the RA area (with suitable			
6	7.02	Will any of these vectors/pathways bring the	Yes	This species is present in protected area in Croatia	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	No	personal opinion	Low
		attaching itself to hard substrata (e.g. ship		P	
		hulls, pilings, buoys) such that it enhances			
0	7.04	the likelihood of dispersal?	No	levité (1991) Izbor ozimico za otvoreno i zatvoreno vede	Low
Ø	7.04	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules	No	Jevtić (1991) Izbor ozimice za otvorene i zatvorene vode. Ribarstvo Jugoslavije 46:14-26.	Low
		(for plants: seeds, spores) in the RA area?			
9	7.05	Is natural dispersal of the taxon likely to	Yes	Jevtić (1991) Izbor ozimice za otvorene i zatvorene vode.	High
		occur as larvae/juveniles (for animals) or as		Ribarstvo Jugoslavije 46:14-26.	
		fragments/seedlings (for plants) in the RA area?			
0	7.06	Are older life stages of the taxon likely to	Yes	No documented data	High
		migrate in the RA area for reproduction?			-
1	7.07	Are propagules or eggs of the taxon likely to	No	Personal opinion	Very high
2	7.08	be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the	Yes	There is a possibility of a high rate of spread of taxa. Eg. if a	Low
~ 2	1.00	vectors/pathways mentioned in the previous	100	fertilized individual enters a new area by any means of expansion.	LUW
		seven questions (35–41; i.e. both			
	7.05	unintentional or intentional) likely to be			
	7.09	Is dispersal of the taxon density dependent? ce attributes	No	no documented data	High
		Is the taxon able to withstand being out of	No	Personal opinion	Very high
		water for extended periods (e.g. minimum of		· · ·	· , ···g··
		one or more hours) at some stage of its life			
		cycle? Is the taxon tolerant of a wide range of	No	Capit survivo in ovtromos	Von hi-h
E		Its the taxon tolerally of a wide range of	INU	Can't survive in extremes	Very high
15	8.02	_			
15	8.02	water quality conditions relevant to that taxon? [In the Justification field, indicate the			

46		Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	Not applicable	No regulation in Croatia as I know	Very high
47		Is the taxon likely to tolerate or benefit from environmental/human disturbance?	No	Personal opinion	Very high
48		Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	No	Freshwater species	Very high
		Are there effective natural enemies (predators) of the taxon present in the RA	No	no known enemies in RA area	Low
		e change			
	9.01	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?	Not applicable	not applicable	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?	Decrease	Considering climate change, population in the RA area is likely to decline, as this species does not tolerate high temperatures.	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?	Decrease	The risk of taxa spreading in the RA area is declining, currently this species in Croatia resides in only one reservoir, I believe that under the influence of climate change it will not spread further, but its number will decline due to differences in temperature.	Medium
53		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	Low
54		Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	No change	Personal opinion, no impact	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 impact	Medium

Statistics	
Scores	
BRA	14.5
BRA Outcome	-
BRA+CCA	10.5
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	1.5
1. Domestication/Cultivation	0.0
2. Climate, distribution and introduction risk	0.0
3. Invasive elsewhere	1.5
B. Biology/Ecology	13.0
4. Undesirable (or persistence) traits	7.0
5. Resource exploitation	5.0
6. Reproduction	1.0
7. Dispersal mechanisms	2.0
8. Tolerance attributes	-2.0
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	3 5 5 36
B. Biology/Ecology	
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	3
Environmental	8
Species or population nuisance traits	3
Thresholds	
	-

BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.70
BRA	0.72
CCA	0.54
Date and Time	

01/06/2020 10:34:50

Taxon and Assessor details						
Category	Fishes and Lampreys (freshwater)					
Taxon name	Coregonus peled					
Common name	peled					
Assessor	Ana Marić					
Risk screening context	Risk screening context					
Reason and socio-economic benefits						
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS					
Taxonomy						
Native range						
Introduced range						
URL						

			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?	Yes	Occurrence of Yersinia ruckeri infection in farmed whitefish, Coregonus peled Gmelin and Coregonus muksun Pallas, and Atlantic salmon, Salmo salar L., in northern Finland. Rintamaki et	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	Habekovic. Introdukcija koregonusa u nase vode. 1972	Very high
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	Coregonus albula	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	Russia north	High
5	2.02	What is the quality of the climate matching data?	Medium	Logical	Very high
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	Habekovic. Introdukcija koregonusa u nase vode. 1972	High
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	Habekovic. Introdukcija koregonusa u nase vode. 1972	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	Habekovic. Introdukcija koregonusa u nase vode. 1972	Very high
3. I	nvasive	e elsewhere			
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	FRESHWATER ALIEN FISH SPECIES INTRODUCED INTO CROATIA FOR AQUACULTURE AND CONSEQUENCES OF THEIR ESCAPES AND RELEASES IN INLAND WATERS Marina Piria1*, Divna Lukiæ1, Tatjana Boroša-Pecigoš. 2016	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	Native vendace (Coregonus albula) and alien peled (C. peled): genetic comparison and introgressive hybridization. Borovikova, E et al. 2016 Introgressive hybridization of the introduced peled (Coregonus peled) with the native whitefish (Coregonus lavaretus) threatens indigenous coregonid populations: a case study.	Very high
11	3.03	In the taxon's introduced range, are there	No	Author(s) : Luczynski, M. ; Mamcarz, A. ; Brzuzan, P. ; Demska- https://www.luontoportti.com/suomi/en/kalat/peled	High
12	3.04	known adverse impacts to aquaculture? In the taxon's introduced range, are there	No	https://www.luontoportti.com/suomi/en/kalat/peled	High
13	3.05	known adverse impacts to ecosystem In the taxon's introduced range, are there	No	https://www.luontoportti.com/suomi/en/kalat/peled	High
		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?	No	https://www.fishbase.se/summary/Coregonus-peled.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)?	No	https://www.fishbase.se/summary/Coregonus-peled.html	High
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	https://www.fishbase.se/summary/Coregonus-peled.html	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	https://www.luontoportti.com/suomi/en/kalat/peled	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	Ecological succession in mountain lake ecosystems of Southern Siberia after the introduction of the peled – Coregonus peled (Gmeli, 1778) V. K. Popkov. 2017	High
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	https://www.luontoportti.com/suomi/en/kalat/peled	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	No	The Long-Term Dynamics of Parasite Infection in Coregonids with Different Food Specializations A. L. Gavrilov & O. A. Gos'kova. 2018	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	The Long-Term Dynamics of Parasite Infection in Coregonids with Different Food Specializations A. L. Gavrilov & O. A. Gos'kova. 2018	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?	No	https://www.luontoportti.com/suomi/en/kalat/peled	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	Drift of Cisco and Whitefish Larvae in a Norwegian River Tor F. Næsje, Bror Jonsson, Odd T. Sandlund. 1986	High

		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	https://www.luontoportti.com/suomi/en/kalat/peled	High
		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	Relationship between annual variation in reservoir conditions and year-class strength of peled (Coregonus peled) and whitefish (C. lavaretus) Tapio Sutela1, Ahti Mutenia2 & Erno Salonen. 2002	High
		e exploitation Is the taxon likely to consume threatened or	Yes	Ecological succession in mountain lake ecosystems of Southern	High
20		protected native taxa in the RA area?	Tes	Siberia after the introduction of the peled – Coregonus peled (Gmeli, 1778) V. K. Popkov. 2018	lign
27	5.02	Is the taxon likely to sequester food resources (including nutrients) to the	Yes	Ecological succession in mountain lake ecosystems of Southern Siberia after the introduction of the peled – Coregonus peled	High
		detriment of native taxa in the RA area?		(Gmeli, 1778) V. K. Popkov. 2018	
	eprodu				
28		Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?	Yes	Ecological succession in mountain lake ecosystems of Southern Siberia after the introduction of the peled – Coregonus peled (Gmeli, 1778) V. K. Popkov. 2018	High
29	6.02		Yes	FRESHWATER ALIEN FISH SPECIES INTRODUCED INTO CROATIA FOR AQUACULTURE AND CONSEQUENCES OF THEIR ESCAPES AND RELEASES IN INLAND WATERS Marina Piria1*, Divna Lukiæ1, Tatjana Boroša-Pecigoš2 1University. 2016	High
30	6.03	Is the taxon likely to hybridise naturally with native taxa?	Yes	Native vendace (Coregonus albula) and alien peled (C. peled): genetic comparison and introgressive hybridization. Borovikova, E et al. 2016 Introgressive hybridization of the introduced peled (Coregonus peled) with the native whitefish (Coregonus lavaretus) threatens indigenous coregonid populations: a case study. Author(s) : Luczynski, M.; Mamcarz, A.; Brzuzan, P.; Demska-	Very high
31	6.04	, .	No	https://www.fishbase.se/summary/Coregonus-peled.html	High
32		display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features)	No	https://www.fishbase.se/summary/Coregonus-peled.html	High
33		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	Relationship between annual variation in reservoir conditions and year-class strength of peled (Coregonus peled) and whitefish (C. lavaretus) Tapio Sutela1, Ahti Mutenia2 & Erno Salonen. 2002	Very high
34			2	Ecological succession in mountain lake ecosystems of Southern Siberia after the introduction of the peled – Coregonus peled (Gmeli, 1778) V. K. Popkov. 2018	High
		al mechanisms			
85		How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable	One	Habekovic. Introdukcija koregonusa u nase vode. 1972	High
36	7.02	Will any of these vectors/pathways bring the taxon in close proximity to one or more	Yes	Habekovic. Introdukcija koregonusa u nase vode. 1972	Very 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	https://www.fishbase.se/summary/Coregonus-peled.html	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	Habekovic. Introdukcija koregonusa u nase vode. 1972	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	Habekovic. Introdukcija koregonusa u nase vode. 1972	High
10	7.06	Are older life stages of the taxon likely to	Yes	Habekovic. Introdukcija koregonusa u nase vode. 1972	High
1		migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to	No	Habekovic. Introdukcija koregonusa u nase vode. 1972	High
2	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	No	https://www.luontoportti.com/suomi/en/kalat/peled	High
		seven questions (35–41; i.e. both unintentional or intentional) likely to be			
		Is dispersal of the taxon density dependent?	Yes	Effects of Climatic and Density-Dependent Factors on Year-Class Strength of Coregonus lavaretus in Lake Constance. Reiner Eckmann, Ursula Gaedke, and Hans Johst Wetzlar. 1988	Medium
		ce attributes	No	https://www.fichbaco.co/cumman/Camacaus.astathtms	Von hist
4		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	https://www.fishbase.se/summary/Coregonus-peled.html	Very high
5		cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? (In the Justification field, indicate the	No	https://www.luontoportti.com/suomi/en/kalat/peled Relationship between annual variation in reservoir conditions and year-class strength of peled (Coregonus peled) and whitefish (C. lavaretus)	Medium
6	8.03	Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	No	Tapio Sutela1, Ahti Mutenia2 & Erno Salonen. 2002 https://www.luontoportti.com/suomi/en/kalat/peled Relationship between annual variation in reservoir conditions and year-class strength of peled (Coregonus peled) and whitefish (C. lavaretus)	High
17		Is the taxon likely to tolerate or benefit from environmental/human disturbance?	No	Tapio Sutela1, Ahti Mutenia2 & Erno Salonen. 2002 https://www.luontoportti.com/suomi/en/kalat/peled	Very high
8	8.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in	Yes	https://www.fishbase.se/summary/Coregonus-peled.html	Medium
1		its usual environment?			1
	8.06	Are there effective natural enemies (predators) of the taxon present in the RA e change	Yes	https://www.fishbase.se/summary/Coregonus-peled.html	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?	No change	FRESHWATER ALIEN FISH SPECIES INTRODUCED INTO CROATIA FOR AQUACULTURE AND CONSEQUENCES OF THEIR ESCAPES AND RELEASES IN INLAND WATERS Marina Piria1*, Divna Lukić1, Tatiana Boroša-Pecigoš 2016	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		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	Coregonus peled, Northern Whitefish Assessment by: Freyhof, J. & Kottelat, M.	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	Coregonus peled, Northern Whitefish Assessment by: Freyhof, J. & Kottelat, M.	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	Coregonus peled, Northern Whitefish Assessment by: Freyhof, J. & Kottelat, M.	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	Coregonus peled, Northern Whitefish Assessment by: Freyhof, J. & Kottelat, M.	High

Statistics	
Scores	
BRA	23.5
BRA Outcome	-
BRA+CCA	19.5
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	14.0
4. Undesirable (or persistence) traits	3.0
5. Resource exploitation	7.0
6. Reproduction	4.0
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	5 5 36
3. Invasive elsewhere	5
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2
6. Reproduction	7
7. Dispersal mechanisms	2 7 9 6 6 6
8. Tolerance attributes	6
C. Climate change	6
9. Climate change	6
Sectors affected	
Commercial	7
Environmental	7
Species or population nuisance traits	8
Thresholds	
BRA	-
BRA+CCA	-

BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.83
BRA	0.83
CCA	0.79
Date and Time	
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24/05/2021 23:40:57

Taxon and Assessor details		
Category	Fishes and Lampreys (freshwater)	
Taxon name	Coregonus peled	
Common name	peled	
Assessor	Ivan Špelić	
Risk screening context		
Reason and socio-economic benefits		
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS	
Taxonomy		
Native range		
Introduced range		
URL		

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
1. L		ication/Cultivation	N	Metawarda 1. Chaideal V. Darlare M. A. K. H. J. (2016). Th	
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	Matousek, J., Stejskal, V., Prokesova, M., & Kouril, J. (2016). The effect of water temperature on growth parameters of intensively reared juvenile peled Coregonus peled . Aquaculture Research, 48(4), 1877–1884. doi:10.1111/are.13025	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	No	Harvested for food, stocked from farms (personal opinion).	Medium
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	No	Coregonidae are widely introduced but not considered as serious pests.	High
2. (limate	, distribution and introduction risk			
4	2.01	How similar are the climatic conditions of the	Medium	Climatch 2020	Medium
		Risk Assessment (RA) area and the taxon's native range?			
5	2.02	What is the quality of the climate matching data?	Medium	Climatch 2020	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	Introduced to Serbia (Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021))	Medium
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	Not applicable	Already present	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)?	Not applicable	Already present.	Medium
		e elsewhere			
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	Salonen, E. & Mutenia, A. 2007. Alien fish species in northern- most Finland. Riista- ja kalatalous – Tutkimuksia 2: 1 – 16(Report of the Finnish Game and Fisheries Research Institute).	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	Popović, D., Szczepkowski, M., Heese, T., & Weglenski, P. (2015). Introgression of peled (Coregonus peled) into European whitefish (C. lavaretus) in Poland. Conservation Genetics, 17(2), 503–508. doi:10.1007/s10592-015-0786-1	Very high
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	No reported adverse impacts, used in aquaculture (Matousek, J., Stejskal, V., Prokesova, M., & Kouril, J. (2016). The effect of water temperature on growth parameters of intensively reared juvenile peled Coregonus peled. Aquaculture Research, 48(4), 1877–1884. doi:10.1111/are.13025).	High
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem services?	No	Salonen, E. & Mutenia, A. 2007. Alien fish species in northern- most Finland. Rista- ja kalatalous – Tutkimuksia 2: 1 – 16(Report of the Finnish Game and Fisheries Research Institute).	High
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	Salonen, E. & Mutenia, A. 2007. Alien fish species in northern- most Finland. Riista- ja kalatalous – Tutkimuksia 2: 1 – 16(Report of the Finnish Game and Fisheries Research Institute).	High
B.	Biology	//Ecology		of the finition durie and fishenes rescaren institute).	
		able (or persistence) traits			
		Is it likely that the taxon will be poisonous or	No	Potential pest but no direct harm to human health (Froese & Pauly	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	2020). Salonen, E. & Mutenia, A. 2007. Alien fish species in northern- most Finland. Riista- ja kalatalous – Tutkimuksia 2: 1 – 16(Report	High
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	of the Finnish Game and Fisheries Research Institute). No parasitic behaviour.	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	Coregonids need oligothrophic to mesotrophic waters, cool and well oxygenated. Lethal temperature for C. lavaretus is more or less 22°C with an optimum of less than 15°C. C. peled is more tolerant dealing with temperatures ranging from 0 to 28°C, but on the other hand recommends water temperature is below 25°C.	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	Not reported anywhere (Northern Whitefish (Coregonus peled) Ecological Risk Screening Summary. U.S. Fish and Wildlife Service, March 2011,;Revised, September 2014 and July 2015).	Medium
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	Summary. U.S. Fish and Wildlife Service, March 2011, Revised, September 2014 and July 2015.	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 PA	Yes	Enteric Redmouth Disease, Bacterial diseases (Froese & Pauly 2020).	High
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?	Yes	Enteric Redmouth Disease, Bacterial diseases (Froese & Pauly 2020).	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	50 cm, 5 kg max (Froese & Pauly 2020).	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	Lacustrine, fluvial and anadromous forms exist (Froese & Pauly 2020).	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 mentioned as impact in literature.	Medium
	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	Introduced populations rely mostly on stocking (Salonen, E. & Mutenia, A. 2007. Alien fish species in northern-most Finland. Riista- ja kalatalous – Tutkimuksia 2: 1 – 16(Report of the Finnish Game and Fisheries Research Institute)(Malbrouck, C., P. Mergen and JC. Micha, 2005. Growth and diet of introduced coregonid fish Coregonus peled (Gmelin) and Coregonus lavaretus (L.) in two Belgian reservoir lakes. Appl. Ecol. Env. Res. 4(1):27-44.).	High
	5.01	<i>e exploitation</i> Is the taxon likely to consume threatened or	No	Feeds on zooplankton (mostly crustaceans), benthic animals	High
	5.01	protected native taxa in the RA area?		(especially insect larvae and mussels, also algae) and insects from surface (Froese & Pauly 2020).	_
		Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?		No data for calculation.	Very high
	R <i>eprodu</i> 6.01	Is the taxon likely to exhibit parental care	No	No information in literature.	Medium
		and/or to reduce age-at-maturity in response to environmental conditions?			Medium
29	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	No natural reproduction in most areas of introduction but probably possible if all conditions met (Salonen, E. & Mutenia, A. 2007. Alien fish species in northern-most Finland. Riista- ja kalatalous – Tutkimuksia 2: 1 – 16(Report of the Finnish Game and Fisheries Research Institute)(Malbrouck, C., P. Mergen and JC. Micha, 2005. Growth and diet of introduced coregonid fish Coregonus peled (Gmelin) and Coregonus lavaretus (L.) in two Belgian reservoir lakes. Appl. Ecol. Env. Res. 4(1):27-44.).	Low
0	6.03	Is the taxon likely to hybridise naturally with native taxa?	No	No native Coregonidae in RA area (Kottelat & Freyhof 2007).	Very high
1	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	No	Kottelat & Freyhof 2007	Very high
32	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	Yes	(Salonen, E. & Mutenia, A. 2007. Alien fish species in northern- most Finland. Riista- ja kalatalous – Tutkimuksia 2: 1 – 16(Report of the Finnish Game and Fisheries Research Institute)(Malbrouck, C., P. Mergen and JC. Micha, 2005. Growth and diet of introduced coregonid fish Coregonus peled (Gmelin) and	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	Coregonus lavaretus (L.) in two Belgian reservoir lakes. Appl. Up to 105000 eggs per female (Froese & Pauly 2020).	Very high
84	6.07	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	3	In Russia (Froese & Pauly 2020).	Medium
		al mechanisms	Ī		1 .
5	7.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable habitats nearby)?	>1	Intentional introductions for angling (Northern Whitefish (Coregonus peled) Ecological Risk Screening Summary. U.S. Fish and Wildlife Service, March 2011,;Revised, September 2014 and July 2015.) Floods (Povž et al. 2015)	Medium
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	Personal opinion	Low
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 adaptations.	Very high
8	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	Eggs deposited on gravel or sand (Kottelat & Freyhof 2007).	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	Larval drift in rivers (Bogdanov, V. D., & Bogdanova, E. N. (2012). Ecological aspects of larval drift in coregonids with long migration routes. Russian Journal of Ecology, 43(4), 315–322. doi:10.1134/s1067413612040042).	High
0	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	Yes	Salonen, E. & Mutenia, A. 2007. Alien fish species in northern- most Finland. Riista- ja kalatalous – Tutkimuksia 2: 1 – 16(Report of the Finnish Game and Fisheries Research Institute	Medium
1	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No	Eggs deposited on gravel or sand (Kottelat & Freyhof 2007).	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	Introductions and floods.	High
3	7.09	Is dispersal of the taxon density dependent?	No	No such information in literature.	Low
		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 cycle?	No	Sensitive species	Very high
5	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	Malbrouck, C., P. Mergen and JC. Micha, 2005. Growth and diet of introduced coregonid fish Coregonus peled (Gmelin) and Coregonus lavaretus (L.) in two Belgian reservoir lakes. Appl. Ecol. Env. Res. 4(1):27-44.)	High
	8.03	Can the taxon be controlled or eradicated in	No	Not allowed in the region.	Very high

		Is the taxon likely to tolerate or benefit from environmental/human disturbance?	Yes	Introduced in reservoirs where it survives (Malbrouck, C., P. Mergen and JC. Micha, 2005. Growth and diet of introduced coregonid fish Coregonus peled (Gmelin) and Coregonus lavaretus (L.) in two Belgian reservoir lakes. Appl. Ecol. Env. Res. 4(1):27-	Medium
48		Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	No	Moskalenko, B.K. 1971. The whitefishes of Siberia. Pishchevaya Promyshlennost, Report SFWFR-TR-73-05, Moscow (translated from Russian in 1972 by R.M. Howland and G. Kavanagh, U.S. Department of the Interior, Division of Fishery Research, Washington, D.C., USA.	Very high
49		Are there effective natural enemies	Yes	Piscivorous fish and birds, otters (personal opinion).	Medium
<u> </u>		(predators) of the taxon present in the RA			
		change			
		Under the predicted future climatic	Not applicable	Already present.	Medium
20		conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?		Alleady present.	Medium
51		Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	Decrease	Native in polar climate, increased temperatures will narrow its suitable habitats (personal opinion).	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?	Decrease	Native in polar climate, increased temperatures will narrow its suitable habitats (personal opinion). Intentional releases may stay the same but natural recruitment may decrease.	Medium
	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 expected impact in current conditions, no impact expected under future conditions.	Medium
54		Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	No change	No expected impact in current conditions, no impact expected under future conditions.	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 expected impact in current conditions, no impact expected under future conditions.	Medium

Statistics	
Scores	
BRA	9.5
BRA Outcome	-
BRA+CCA	5.5
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	5.5
1. Domestication/Cultivation	0.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	4.5
B. Biology/Ecology	4.0
4. Undesirable (or persistence) traits	4.0
5. Resource exploitation	0.0
6. Reproduction	-1.0
7. Dispersal mechanisms	1.0
8. Tolerance attributes	0.0
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	36
B. Biology/Ecology	
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2
6. Reproduction 7. Dispersal mechanisms	9
8. Tolerance attributes	9
C. Climate change	6
9. Climate change	6
Sectors affected	0
	7
Commercial	
Commercial Environmental	0
Environmental	0
	0
Environmental Species or population nuisance traits	0
Environmental	0

BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.70
BRA	0.72
CCA	0.50
Date and Time	
13/05/2	021 20:49:30

Taxon and Assessor details		
Category	Fishes and Lampreys (freshwater)	
Taxon name	Coregonus peled	
Common name	peled	
Assessor	Tamara Kanjuh	
Risk screening context		
Reason and socio-economic benefits		
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS	
Taxonomy		
Native range		
Introduced range		
URL		

			Response	Justification (references and/or other information)	Confidence
A. E	Biogeo	graphy/Historical			
		ication/Cultivation			
1		Has the taxon been the subject of domestication (or cultivation) for at least 20	Yes	Froese & Pauly (2015)	High
2		generations? Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	Froese & Pauly (2015)	High
3	1.03	Does the taxon have invasive races,	No	No information found.	Medium
2 (limata	varieties, sub-taxa or congeners? distribution and introduction risk			
2. C 4		How similar are the climatic conditions of the	High	Dfa, Dfb (Köppen–Geiger climate classification system)	High
-		Risk Assessment (RA) area and the taxon's native range?	i ligit	bid, bib (Roppen Geiger climate classification system)	T light
5		What is the quality of the climate matching data?	High	Köppen-Geiger climate classification system	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	No	No information found.	Medium
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	Fisheries	High
8		Is the taxon currently found in close proximity to, and likely to enter into, the RA	No	No information found.	Medium
1		area in the near future (e.g. unintentional			
2 7	nyachu	and intentional introductions)?	L		I
		Has the taxon become naturalised	No	No infrmation found.	Medium
		(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	Witkowski & Grabowska (2012)	High
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	No information found.	Medium
12		In the taxon's introduced range, are there known adverse impacts to ecosystem	Yes	Similar to other Coregonus.	High
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	No information found.	Medium
B. E		//Ecology			
4. L		able (or persistence) traits			
14		Is it likely that the taxon will be poisonous or pose other risks to human health?	No	Harmless (FishBase)	High
15		Is it likely that the taxon will smother one or more native taxa (that are not threatened or	Yes	fws.gov	High
16		protected)? Are there any threatened or protected taxa	No	The taxon is not a parasite.	High
10		that the non-native taxon would parasitise in the RA area?	110		T light
17	4.04	Is the taxon adaptable in terms of climatic	Yes	Similar to other Coregonus.	Medium
		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	fws.gov	High
10		structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA			
19		Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes	Similar to other Coregonus.	Medium
20	4.07	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and	No	No information found.	Medium
21		infectious agents that are endemic in the RA Is it likely that the taxon will host, and/or	Vec	FishBase	Medium
21		act as a vector for, recognised pests and infectious agents that are absent from (novel	Yes		meulum
		to) the RA area?			
22		Is it likely that the taxon will achieve a body size that will make it more likely to be	No	No information found.	Medium
23	4.10	released from captivity? Is the taxon capable of sustaining itself in a	Yes	Similar to other Coregonus.	Medium
2.5	1.10	range of water velocity conditions (e.g. versatile in habitat use)?	1.03		i iculum
24	4.11	Is it likely that the taxon's mode of existence	Yes	fws.gov	High
ľ		(e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for			
25		native taxa? Is the taxon likely to maintain a viable	No	No information found.	Medium
		population even when present in low densities (or persisting in adverse conditions			
		by way of a dormant form)?			

F 7	200000	a synlaitation			
	5.01	e exploitation Is the taxon likely to consume threatened or	Yes	fws.gov	Medium
	5.01	protected native taxa in the RA area?			. iculuit
27	5.02	Is the taxon likely to sequester food	Yes	fws.gov	Medium
		resources (including nutrients) to the			
6 F	Reprodu	detriment of native taxa in the RA area?			
	6.01	Is the taxon likely to exhibit parental care	No	FishBase	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)?	No	No information found.	Medium
30	6.03	Is the taxon likely to hybridise naturally with	Yes	Kirtiklis & Jankun (2006)	High
		native taxa?			
31	6.04	Is the taxon likely to be hermaphroditic or to	No	FishBase	Medium
22	6.05	display asexual reproduction?	Ne	Nativasua	Madium
52	0.05	Is the taxon dependent on the presence of another taxon (or specific habitat features)	No	Not known.	Medium
		to complete its life cycle?			
33	6.06	Is the taxon known (or likely) to produce a	Yes	cabi.org	Medium
		large number of propagules or offspring			
34	6.07	within a short time span (e.g. < 1 year)? How many time units (days, months, years)	2	Similar to other Coregonus.	Medium
54	0.07	does the taxon require to reach the age-at-	2		Healam
		first-reproduction?			
		al mechanisms	r.		
35	7.01	How many potential internal	One	Intentional stocking.	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	Intentional stocking.	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 attaching itself to hard substrata (e.g. ship	No	Not known.	High
		hulls, pilings, buoys) such that it enhances			
		the likelihood of dispersal?			
38	7.04	Is natural dispersal of the taxon likely to	Yes	Similar to other Coregonus.	High
		occur as eggs (for animals) or as propagules			
20	7.05	(for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to	Yes	Similar to other Coregonus.	Medium
55	7.05	occur as larvae/juveniles (for animals) or as	165		Healam
		fragments/seedlings (for plants) in the RA			
		area?			
40	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	No	No information found.	Medium
41	7.07	Are propagules or eggs of the taxon likely to	No	No information found.	Medium
		be dispersed in the RA area by other animals?			
42	7.08	Is dispersal of the taxon along any of the	Yes	Intentional stocking.	High
		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 information found.	Medium
		ce attributes	P		
44	8.01	Is the taxon able to withstand being out of water for extended periods (e.g. minimum of	No	The taxon can nit survive out of water.	High
		one or more hours) at some stage of its life			
		cycle?			
45	8.02	Is the taxon tolerant of a wide range of	Yes	Similar to other Coregonus.	High
		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	Similar to other Coregonus.	Medium
		the wild with chemical, biological, or other		-	
4-	0.01	agents/means?		Circilian to athen Company	Madia
4/	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	Yes	Similar to other Coregonus.	Medium
48	8.05	Is the taxon able to tolerate salinity levels	Yes	Similar to other Coregonus.	High
		that are higher or lower than those found in		-	-
I	-	its usual environment?			
49	8.06	Are there effective natural enemies (predators) of the taxon present in the RA	Yes	FishBase	Medium
C. (Climate	change			
9. (Climate	change			
50	9.01	Under the predicted future climatic	No change	Adaptable to different environments - similar to other Coregonus.	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	Adaptable to different environments - similar to other Coregonus.	Medium
		conditions, are the risks of establishment	-		
		posed by the taxon likely to increase,			
52	9.03	decrease or not change? Under the predicted future climatic	No change	Adaptable to different environments - similar to other Coregonus.	Medium
22	5.05	conditions, are the risks of dispersal within	no change	subprase to unreferr environments - similar to other coregonus.	
		the RA area posed by the taxon likely to			
	-	increase, decrease or not change?			
53	9.04	Under the predicted future climatic	No change	Adaptable to different environments - similar to other Coregonus.	Medium
		conditions, what is the likely magnitude of future potential impacts on biodiversity			
1		and/or ecological integrity/status?			
		,,			1

54	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	No change	Adaptable to different environments - similar to other Coregonus.	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	Adaptable to different environments - similar to other Coregonus.	Medium

Statistics				
Scores				
BRA	30.0			
BRA Outcome	-			
BRA+CCA	30.0			
BRA+CCA Outcome	-			
Score partition				
A. Biogeography/Historical	10.0			
1. Domestication/Cultivation	2.0			
2. Climate, distribution and introduction risk	0.0			
3. Invasive elsewhere	8.0			
B. Biology/Ecology	20.0			
4. Undesirable (or persistence) traits	7.0			
5. Resource exploitation	7.0			
6. Reproduction	2.0			
7. Dispersal mechanisms	1.0			
8. Tolerance attributes	3.0			
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	3 5 5 36			
B. Biology/Ecology				
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	8			
Environmental	13			
Species or population nuisance traits	11			
Thresholds				
BRA	-			
BRA+CCA	-			
Confidence				
BRA+CCA	0.60			
BRA	0.61			
CCA	0.50			
Date and Time				
04/06/2021 00:29:06				

Faxon and Assessor details						
Category	Fishes and Lampreys (freshwater)					
Taxon name	Coregonus peled					
Common name	peled					
Assessor	Tena Radocaj					
Risk screening context						
Reason and socio-economic benefits						
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS					
Taxonomy						
Native range						
Introduced range						
URL						

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
<i>1. L</i> 1		<i>ication/Cultivation</i> Has the taxon been the subject of	No	Habeković, 1978, introduced	Very high
1	1.01	domestication (or cultivation) for at least 20 generations?	110		very nigh
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 grown for human consumption and Coregonus peled reared in intensive RAS. (Matousek, J., Prokesova, M., Novikava, K., Sebesta, R., Zuskova, E., & Stejskal, V. (2017). The effect of water oxygen saturation on growth and haematological profile of juvenile peled Coregonus peled (Gmelin). Aquaculture Research, 48(10), 5411-5417.)	High
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	No	Jevtić (1991) Izbor ozimice za otvorene i zatvorene vode. Ribarstvo Jugoslavije 46:14-26.	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	The similarity between climatic conditions RA area and native range is medium. I use climatch.	Medium
5	2.02	What is the quality of the climate matching data?	Medium	The quality of the climatic matching data is medium.	Medium
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	This species is present outside of captivity in the RA area.	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	None	It is present in Croatia	Very 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)?	Not applicable	not applicable	Very high
3. I	1	e elsewhere			
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	Its importance increased with introduction to another countries such as Estonia, Lithuania, Latvia, Byelorussia, Poland, Germany, Finland, the Czech Republic, France and Japan. (Matousek, J., Prokesova, M., Novikava, K., Sebesta, R., Zuskova, E., & Stejskal, V. (2017). The effect of water oxygen saturation on growth and haematological profile of juvenile peled Coregonus peled (Gmelin). Aquaculture Research, 48(10), 5411-5417.)	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	No	Personal opinion	Low
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	Personal opinion	Low
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	No	Personal opinion	Low
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	Personal opinion, I don't any data about that	Medium
		//Ecology			
		able (or persistence) traits			N/ 111
14	4.01	Is it likely that the taxon will be poisonous or pose other risks to human health?	NO	no	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	Jevtić (1991) Izbor ozimice za otvorene i zatvorene vode. Ribarstvo Jugoslavije 46:14-26.	Low
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	Jevtić (1991) Izbor ozimice za otvorene i zatvorene vode. Ribarstvo Jugoslavije 46:14-26.	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, this taxon is adapted on climate and environmental conditions, these species have self-sustaining populations in RA area. (Jevtić (1991) Izbor ozimice za otvorene i zatvorene vode. Ribarstvo Jugoslavije 46:14-26)	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	Maybe, it is possible there is a possibility that it will disrupt the nutritional structure	Low
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	no	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	Yes, the taxon may be a host or vector of known pests and infectious agents endemic to RA area. Because in every area exist infectious agents and pests.	Medium
		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	Enteric Redmouth Disease, Bacterial diseases (Froese, R., and D. Pauly, editors. 2015. Coregonus peled (Gmelin, 1789). FishBase. Available: http://www.fishbase.org/summary/4687. July 2015)	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	Jevtić (1991) Izbor ozimice za otvorene i zatvorene vode. Ribarstvo Jugoslavije 46:14-26.	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	Kottelat and Freyhof, 2007	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	Jevtić (1991) Izbor ozimice za otvorene i zatvorene vode. Ribarstvo Jugoslavije 46:14-26.	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	Jevtić (1991) Izbor ozimice za otvorene i zatvorene vode. Ribarstvo Jugoslavije 46:14-26.	High
		e exploitation			
	5.01	Is the taxon likely to consume threatened or protected native taxa in the RA area?	Yes	It is possible that it consume endangered and protected native taxa in the RA area. If there are protected taxa in the RA area, the european whitefish will consume them, whether or not the taxon	Low
		Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?	Not applicable	not applicable	Very high
	eprodu 6.01	Is the taxon likely to exhibit parental care	No	Jevtić (1991) Izbor ozimice za otvorene i zatvorene vode.	Very high
		and/or to reduce age-at-maturity in response to environmental conditions?		Ribarstvo Jugoslavije 46:14-26.	
	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	Yes	Jevtić (1991) Izbor ozimice za otvorene i zatvorene vode. Ribarstvo Jugoslavije 46:14-26. Personal opinion	Very high High
		native taxa?			-
31	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	No	Personal opinion	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	Personal opinion	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	Jevtić (1991) Izbor ozimice za otvorene i zatvorene vode. Ribarstvo Jugoslavije 46:14-26.	Very high
34	6.07	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	3	Freyhof, J. & Kottelat, M. 2008. Coregonus peled . The IUCN Red List of Threatened Species 2008: e.T5374A11125006. https://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T5374A11125006. en. Downloaded on 05 February 2020.	High
		al mechanisms			_
35	7.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable	>1	1.accidental introduction, 2.human-mediated 3. natural spread via natural and manmade watercourses	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	It is present in protected area.	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	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	Jevtić (1991) Izbor ozimice za otvorene i zatvorene vode. Ribarstvo Jugoslavije 46:14-26.	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	Jevtić (1991) Izbor ozimice za otvorene i zatvorene vode. Ribarstvo Jugoslavije 46:14-26.	Low
40	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	No	Personal opinion	Low
41	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No	Personal opinion	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	There is a possibility of a high rate of spread of taxa. Eg. if a fertilized individual enters a new area by any means of expansion.	Low
43	7.09	unintentional or intentional) likely to be Is dispersal of the taxon density dependent?	No	Personal opinion	High
		e attributes			<u> </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	Personal opinion	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	Jevtić (1991) Izbor ozimice za otvorene i zatvorene vode. Ribarstvo Jugoslavije 46:14-26.	High
46	8.03	relevant water guality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	Not applicable	Personal opinion	High
47	8.04	Is the taxon likely to tolerate or benefit from	No	Jevtić (1991) Izbor ozimice za otvorene i zatvorene vode.	Very high
48	8.05	environmental/human disturbance? Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual anvironment?	No	Ribarstvo Jugoslavije 46:14-26. Kotelat and Frayhof, 2007	High
49	8.06	its usual environment? Are there effective natural enemies	No	Personal opinion	High
	limate	(predators) of the taxon present in the RA change			
C C					
	limate	change			
9. C		change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase,	Not applicable	not apllicable	Very high

51	9.02	Under the predicted future climatic	Decrease	Considering climate change, population in the RA area is likely to	Low
		conditions, are the risks of establishment		decline, as this species does not tolerate high temperatures.	
		posed by the taxon likely to increase,			
		decrease or not change?			
52	9.03	Under the predicted future climatic	Decrease	The risk of taxa spreading in the RA area is declining, currently	Low
		conditions, are the risks of dispersal within		this species in Croatia resides in only one reservoir, I believe that	
		the RA area posed by the taxon likely to		under the influence of climate change it will not spread further,	
		increase, decrease or not change?		but its number will decline due to differences in temperature.	
53	9.04	Under the predicted future climatic	No change	no	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	No impact	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	There will be no impact on ecosystem	Low
		conditions, what is the likely magnitude of			
		future potential impacts on ecosystem			
		services/socio-economic factors?			

Statistics Scores BRA 10.5 **BRA Outcome** 6.5 BRA+CCA BRA+CCA Outcome Score partition A. Biogeography/Historical 1.5 1. Domestication/Cultivation 0.0 2. Climate, distribution and introduction risk 0.0 1.5 **9.0** 3. Invasive elsewhere 4. Undesirable (or persistence) traits 7.0 5. Resource exploitation 5.0 1.0 -2.0 6. Reproduction 7. Dispersal mechanisms -2.0 -4.0 -4.0 8. Tolerance attributes C. Climate change 9. Climate change Answered Questions Total 55 A. Biogeography/Historical 1. Domestication/Cultivation 13 3 2. Climate, distribution and introduction risk 5 3. Invasive elsewhere 5 B. Biology/Ecology 36 4. Undesirable (or persistence) traits 12 2 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 9 8. Tolerance attributes 6 C. Climate change 6 6 9. Climate change Sectors affected Commercial з Environmental Species or population nuisance traits Thresholds BRA

BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.66
BRA	0.69
CCA	0.42
Date and Time	
01/06/2	020 11:50:54

Taxon and Assessor details	
Category	Fishes and Lampreys (freshwater)
Taxon name	Hucho hucho
Common name	huchen
Assessor	Ana Marić
Risk screening context	
Reason and socio-economic benefits	
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS
Taxonomy	
Native range	
Introduced range	
URL	

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
		ication/Cultivation			T
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	Some notes to the farming and conservation of tile Danube salmon (Hucho hucho)* Mathias Jungwirth 1978 For conservation purposes, not easily reared.	High
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	NAredba o merama za ocuvanje i zastitu ribljeg fonda. "Službeni glasnik RS", br. 104/2009 Na osnovu člana 21. stav 2. Zakona o zaštiti i održivom korišćenju ribljeg fonda	Very high
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	No	European Red List of Freshwater Fishes. Freyhor and Brooks. 2011	Very high
2. (Climate	, distribution and introduction risk			
4			High	Same drainge basin, same range	Very high
5	2.02	What is the quality of the climate matching data?	High	Climach	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	http://www.politika.rs/sr/clanak/268003/Drugi-zivot-mladice	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	Stocking	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	Zaštita ihtiofaune i zakonska regulativa u Srbiji Stevan Maletin, Aleksandar Matić , Miroslav Ćirković Nikolina Milošević1 Željka Jurakić1	High
31	nvacive	and intentional introductions)?			
		Has the taxon become naturalised (established viable populations) outside its	Yes	PAst and present of and perspectives for the DAnube huchen Hucho hucho in the Danube basin. Witkovski et al. 2013.	High
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	No	Past and present of and perspectives for the Danube huchen Hucho hucho in the Danube basin. Witkovski et al. 2013.	Very high
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	Past and present of and perspectives for the Danube huchen Hucho hucho in the Danube basin. Witkovski et al. 2013.	Very high
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	No	Past and present of and perspectives for the Danube huchen Hucho hucho in the Danube basin. Witkovski et al. 2013.	Very high
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	Past and present of and perspectives for the Danube huchen Hucho hucho in the Danube basin. Witkovski et al. 2013.	Very high
B. I	Biology	//Ecology			
4. L		able (or persistence) traits			
14	4.01	Is it likely that the taxon will be poisonous or pose other risks to human health?	No	Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof,	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	Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin. 646 pp	Very high
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in	No	Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof,	Very high
17	4.04	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?	No	Berlin. 646 pp Past and present of and perspectives for the Danube huchen Hucho hucho in the Danube basin. Witkovski et al. 2013.	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	Past and present of and perspectives for the Danube huchen Hucho hucho in the Danube basin. Witkovski et al. 2013.	Very high
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	Past and present of and perspectives for the Danube huchen Hucho hucho in the Danube basin. Witkovski et al. 2013.	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	Yes	Connectivity Solution for huchen Hucho hucho (L.) in human- altered habitats. Simonovic et al. 2015	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?	No	Past and present of and perspectives for the Danube huchen, Hucho hucho (L.), in the Danube basin Andrzej Witkowski, Aleksandar Bajiæ, Tomislav Treer, Aleksandar Hegediš, Saša Mariæ, Nikica Šprem, Marina Piria, Andrzej Kapusta. 2013	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	Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin. 646 pp	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	Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin. 646 pp	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	Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin. 646 pp	Very high

25	4.12	Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions	No	The history of huchen in Poland-distribution, restoration and conservation. Witkovski et al. 2013	Very high
		by way of a dormant form)?			
. 1	Resourc	ce exploitation	1		
5	5.01	Is the taxon likely to consume threatened or	Yes	Kottelat, M. and J. Freyhof, 2007. Handbook of European	High
		protected native taxa in the RA area?		freshwater fishes. Publications Kottelat, Cornol and Freyhof,	
7	5.02	Is the taxon likely to sequester food	No	The history of huchen in Poland-distribution, restoration and	High
		resources (including nutrients) to the		conservation. Witkovski et al. 2013	
	Dereve	detriment of native taxa in the RA area?			
	R <i>eprod</i>	Is the taxon likely to exhibit parental care	No	The history of huchen in Poland-distribution, restoration and	High
0	0.01	and/or to reduce age-at-maturity in response	110	conservation. Witkovski et al. 2013	ingn
		to environmental conditions?			
9	6.02	Is the taxon likely to produce viable gametes	Yes	Past and present of and perspectives for the Danube huchen,	Very high
		or propagules (in the RA area)?		Hucho hucho (L.), in the Danube basin Andrzej Witkowski,	, ,
				Aleksandar Bajiæ, Tomislav Treer, Aleksandar Hegediš, Saša	
				Mariæ, Nikica Šprem, Marina Piria, Andrzej Kapusta. 2013	
0	6.03	Is the taxon likely to hybridise naturally with	No	Kottelat, M. and J. Freyhof, 2007. Handbook of European	High
		native taxa?		freshwater fishes. Publications Kottelat, Cornol and Freyhof,	
81	6.04	Is the taxon likely to be hermaphroditic or to	No	http://www.politika.rs/sr/clanak/268003/Drugi-zivot-mladice	Very high
		display asexual reproduction?			
32	6.05	Is the taxon dependent on the presence of	Yes	Kottelat, M. and J. Freyhof, 2007. Handbook of European	Very high
		another taxon (or specific habitat features)		freshwater fishes. Publications Kottelat, Cornol and Freyhof,	
-	6.06	to complete its life cycle?	×	Berlin. 646 pp	
5	6.06	Is the taxon known (or likely) to produce a	Yes	Kottelat, M. and J. Freyhof, 2007. Handbook of European	High
		large number of propagules or offspring within a short time span (e.g. < 1 year)?		freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin. 646 pp	
4	6.07	How many time units (days, months, years)	4	Some notes to the farming and conservation of tile Danube	Very high
. 7	0.07	does the taxon require to reach the age-at-	.	salmon (Hucho hucho)* Mathias Jungwirth 1978.	, cry mgn
		first-reproduction?			
7. 1	Dispers	al mechanisms			
		How many potential internal	One	Stocking. The history of huchen in Poland-distribution, restoration	Very high
		vectors/pathways could the taxon use to		and conservation. Witkovski et al. 2013	
		disperse within the RA area (with suitable			1
86	7.02	Will any of these vectors/pathways bring the	Yes	Past and present of and perspectives for the Danube huchen,	High
		taxon in close proximity to one or more		Hucho hucho (L.), in the Danube basin Andrzej Witkowski,	
		protected areas (e.g. MCZ, MPA, SSSI)?		Aleksandar Bajjæ, Tomislav Treer, Aleksandar Hegediš, Saša	
_			••	Mariæ, Nikica Šprem, Marina Piria, Andrzej Kapusta. 2013	
37	7.03	Does the taxon have a means of actively	No	Kottelat, M. and J. Freyhof, 2007. Handbook of European	Very high
		attaching itself to hard substrata (e.g. ship		freshwater fishes. Publications Kottelat, Cornol and Freyhof,	
		hulls, pilings, buoys) such that it enhances		Berlin. 646 pp	
28	7.04	the likelihood of dispersal? Is natural dispersal of the taxon likely to	No	Kottelat, M. and J. Freyhof, 2007. Handbook of European	Very high
,0	7.04	occur as eggs (for animals) or as propagules	NO	freshwater fishes. Publications Kottelat, Cornol and Freyhof,	very mgn
		(for plants: seeds, spores) in the RA area?		Berlin. 646 pp	
39	7.05	Is natural dispersal of the taxon likely to	Yes	Kottelat, M. and J. Freyhof, 2007. Handbook of European	High
		occur as larvae/juveniles (for animals) or as		freshwater fishes. Publications Kottelat, Cornol and Freyhof,	
		fragments/seedlings (for plants) in the RA		Berlin. 646 pp	
		area?			
0	7.06	Are older life stages of the taxon likely to	Yes	Kottelat, M. and J. Freyhof, 2007. Handbook of European	High
	7 07	migrate in the RA area for reproduction?		freshwater fishes. Publications Kottelat, Cornol and Freyhof,	
ŧ٦	7.07	Are propagules or eggs of the taxon likely to	No	Kottelat, M. and J. Freyhof, 2007. Handbook of European	High
12	7 0 9	be dispersed in the RA area by other animals?	No	freshwater fishes. Publications Kottelat, Cornol and Freyhof, The history of huchen in Poland-distribution, restoration and	Very high
ŧ۷	7.08	Is dispersal of the taxon along any of the	NO		very nigh
		vectors/pathways mentioned in the previous seven questions (35–41; i.e. both		conservation. Witkovski et al. 2013	
		unintentional or intentional) likely to be			
13	7.09	Is dispersal of the taxon density dependent?	No	The history of huchen in Poland-distribution, restoration and	Medium
2			-	conservation. Witkovski et al. 2013	
3. ⁻	Toleran	ce attributes			
		Is the taxon able to withstand being out of	No	The history of huchen in Poland-distribution, restoration and	Very high
		water for extended periods (e.g. minimum of		conservation. Witkovski et al. 2013	_
		one or more hours) at some stage of its life			
	-	cycle?			
5	8.02	Is the taxon tolerant of a wide range of	No	The history of huchen in Poland-distribution, restoration and	Very high
		water quality conditions relevant to that		conservation. Witkovski et al. 2013	
		taxon? [In the Justification field, indicate the			
6	8.03	relevant water quality variable(s) being Can the taxon be controlled or eradicated in	Not applicable	European Red List of Freshwater Fishes. Freyhof and Brooks. 2011.	Very high
U	0.03	the wild with chemical, biological, or other	have applicable	Latopean Neu List of Freshwater Fishes, Freyhol dhu Drooks, 2011.	very mgn
		agents/means?			
17	8.04	Is the taxon likely to tolerate or benefit from	No	The history of huchen in Poland-distribution, restoration and	High
		environmental/human disturbance?		conservation. Witkovski et al. 2013	
8	8.05	Is the taxon able to tolerate salinity levels	No	The history of huchen in Poland-distribution, restoration and	Medium
		that are higher or lower than those found in		conservation. Witkovski et al. 2013	
		its usual environment?			
9	8.06	Are there effective natural enemies	Yes	Kottelat, M. and J. Freyhof, 2007. Handbook of European	High
		(predators) of the taxon present in the RA		freshwater fishes. Publications Kottelat, Cornol and Freyhof,	
		e change			
		change			I
0	9.01	Under the predicted future climatic	No change	Past and present of and perspectives for the Danube huchen,	High
		conditions, are the risks of entry into the RA		Hucho hucho (L.), in the Danube basin Andrzej Witkowski,	
		area posed by the taxon likely to increase,		Aleksandar Bajiæ, Tomislav Treer, Aleksandar Hegediš, Saša	
	0.00	decrease or not change?	Daam	Mariæ, Nikica Šprem, Marina Piria, Andrzej Kapusta. 2013	Manuality
	9.02	Under the predicted future climatic	Decrease	Past and present of and perspectives for the Danube huchen,	Very high
51			1	Hucho hucho (L.), in the Danube basin Andrzej Witkowski,	1
51		conditions, are the risks of establishment			
51		posed by the taxon likely to increase, decrease or not change?		Aleksandar Bajiæ, Tomislav Treer, Aleksandar Hegediš, Saša Mariæ, Nikica Šprem, Marina Piria, Andrzej Kapusta. 2013	

52	9.03	Under the predicted future climatic	Decrease	Past and present of and perspectives for the Danube huchen,	Very high
		conditions, are the risks of dispersal within		Hucho hucho (L.), in the Danube basin Andrzej Witkowski,	
		the RA area posed by the taxon likely to		Aleksandar Bajiæ, Tomislav Treer, Aleksandar Hegediš, Saša	
		increase, decrease or not change?		Mariæ, Nikica Šprem, Marina Piria, Andrzej Kapusta. 2013	
53	9.04	Under the predicted future climatic	Lower	Past and present of and perspectives for the Danube huchen,	High
		conditions, what is the likely magnitude of		Hucho hucho (L.), in the Danube basin Andrzej Witkowski,	
		future potential impacts on biodiversity		Aleksandar Bajiæ, Tomislav Treer, Aleksandar Hegediš, Saša	
		and/or ecological integrity/status?		Mariæ, Nikica Šprem, Marina Piria, Andrzej Kapusta. 2013	
54	9.05	Under the predicted future climatic	Lower	Past and present of and perspectives for the Danube huchen,	High
		conditions, what is the likely magnitude of		Hucho hucho (L.), in the Danube basin Andrzej Witkowski,	
		future potential impacts on ecosystem		Aleksandar Bajiæ, Tomislav Treer, Aleksandar Hegediš, Saša	
		structure and/or function?		Mariæ, Nikica Šprem, Marina Piria, Andrzej Kapusta. 2013	
55	9.06	Under the predicted future climatic	Lower	Past and present of and perspectives for the Danube huchen,	High
		conditions, what is the likely magnitude of		Hucho hucho (L.), in the Danube basin Andrzej Witkowski,	
		future potential impacts on ecosystem		Aleksandar Bajiæ, Tomislav Treer, Aleksandar Hegediš, Saša	
		services/socio-economic factors?		Mariæ, Nikica Šprem, Marina Piria, Andrzej Kapusta. 2013	

Statistics	
Scores	
BRA	6.0
BRA Outcome	-
BRA+CCA	-4.0
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	1.0
4. Undesirable (or persistence) traits	2.0
5. Resource exploitation	5.0
6. Reproduction	-2.0
7. Dispersal mechanisms	0.0
8. Tolerance attributes	-4.0
C. Climate change	-10.0
9. Climate change	-10.0
Answered Questions	
Total	55
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
Total A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology	13
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
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
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
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
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	13
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	13 3 5 5 36 12 2 7 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
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 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
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 Environmental Environmental	13 3 5 5 36 12 2 7 7 9 6 6 6 6 6 6 2 2
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
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 Environmental Environmental	13 3 5 5 36 12 2 7 7 9 9 6 6 6 6 6 2 2 2

Inresnolas	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.88
BRA	0.88
CCA	0.83
Date and Time	
16/05/2	021 18:30:57

Taxon and Assessor details		
Category	Fishes and Lampreys (freshwater)	
Taxon name	Hucho hucho	
Common name	huchen	
Assessor	Ivan Špelić	
Risk screening context		
Reason and socio-economic benefits		
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS	
Taxonomy		
Native range		
Introduced range		
URL		

			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	For stocking purposes (Muhamedagić S., Habibović E. 2013 – The State and Perspective of Danube huchen (Hucho hucho) in Bosnia and Herzegovina– Arch. Pol. Fish. 21: 155-160).	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	For stocking purposes (Muhamedagić S., Habibović E. 2013 – The State and Perspective of Danube huchen (Hucho hucho) in Bosnia and Herzegovina– Arch. Pol. Fish. 21: 155-160), personal	Very high
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	No	No such species.	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	Very high, within same country and basin.	Very high
5	2.02	What is the quality of the climate matching data?	#N/A	No climate analysis, within the same country and basin.	Very high
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	Fishbase	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	Introduction for angling (Holcik, J., 1984 Review on experiments with introduction and acclimatization of the huchen -Hucho hucho (Linnaeus, 1758) (Salmonidae). EIFAC Tech.Pap., (42)	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	Present in all countries, translocation is possible (Holcik, J., 1984 Review on experiments with introduction and acclimatization of the huchen -Hucho hucho (Linnaeus, 1758) (Salmonidae). EIFAC Tech.Pap., (42) Vol.2:289–98).	Very high
3. I	nvasive	e elsewhere		Tech.rdp., (42) Vol.2.209-90).	
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	Holcik, J., 1984 Review on experiments with introduction and acclimatization of the huchen -Hucho hucho (Linnaeus, 1758) (Salmonidae). EIFAC Tech.Pap., (42) Vol.2:289–98; Witkowski, Andrzej, Goryczko, Krzysztof and Kowalewski, Mieczysław. "The history of huchen, Hucho hucho (L.), in Poland – distribution, restoration and conservation" Fisheries & Aquatic Life, vol.21, and conservation" Fisheries & Aquatic Life, vol.21, 2012, 2012, 2012	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	no.3. 2013. pp.161-168. https://doi.org/10.2478/aopf-2013-0013 Holcik, J., 1984 Review on experiments with introduction and acclimatization of the huchen -Hucho hucho (Linnaeus, 1758) (Colmaridae) EFICC Tach Page (A2) Vol. 2:280. 09	High
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	(Salmonidae). EIFAC Tech.Pap., (42) Vol.2:289-98 No such reports.	Medium
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem services?	Yes	There has been a documented negative impact associated with one of those populations, the decline of other large sport fish (https://www.fws.gov/fisheries/ANS/erss/highrisk/ERSS-Hucho- hucho Final.pdf).	High
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	Not listed in literature.	Medium
B. E	Biology	//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	Harmless (Luna, Susan M. in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021)).	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	Brown trout, grayling, nase (Holcik, J., 1984 Review on experiments with introduction and acclimatization of the huchen - Hucho hucho (Linnaeus, 1758) (Salmonidae). EIFAC Tech.Pap.,	Medium
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	No parasitic behaviour.	Very high
17	4.04	Its 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	Very sensitive species: "The huchen may be transplanted into streams of the foot-hill zone with stony-gravel or gravel-sandy bottom, where the water temperature in summer months is not higher than 20°C, the dissolved oxygen does not fall below 8–9 mg/1, and the water is not polluted either by industrial, urban or agricultural waste. Those parts of a river where riffles alternate with bigger and deeper pools, where the flow is branched by islands, the banks are overgrown with shrubs and trees and interrupted by the mouths of tributaries are to be preferred. Reaches selected should be sufficiently long and the zone of the of foothill brooks with possible spawning grounds should be accessible. The overall length of a reach should be about 20 km" (Holcik, J., 1984 Review on experiments with introduction and participation of the burben. Hurbe burbe (intergene 1750)	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	acclimatization of the huchen -Hucho hucho (Linnaeus, 1758) Not documented.	Medium

	1		1		
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	Could impact the native fish species if established, but usually fail to establish natural populations where introduced (Holcik, J., 1984 Review on experiments with introduction and acclimatization of the huchen -Hucho hucho (Linnaeus, 1758) (Salmonidae). EIFAC	Low
				Tech.Pap., (42) Vol.2:289–98).	
0	4.07	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and	Yes	Susceptible to parasites and diseases (https://www.fws.gov/fisheries/ANS/erss/highrisk/ERSS-Hucho-	High
		infectious agents that are endemic in the RA		hucho_Final.pdf).	
1	4.08	Is it likely that the taxon will host, and/or	Yes	Susceptible to parasites and diseases	High
		act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area?		(https://www.fws.gov/fisheries/ANS/erss/highrisk/ERSS-Hucho- hucho_Final.pdf).	
2	4.09	Is it likely that the taxon will achieve a body size that will make it more likely to be	Yes	Max 150 cm and 52 kg (Luna, Susan M. in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic	Very high
		released from captivity?		publication. www.fishbase.org, (02/2021)).	
3	4.10	Is the taxon capable of sustaining itself in a	No	The huchen may be transplanted into streams of the foot-hill zone	Very high
		range of water velocity conditions (e.g. versatile in habitat use)?		with stony-gravel or gravel-sandy bottom, where the water temperature in summer months is not higher than 20°C, the	
				dissolved oxygen does not fall below 8–9 mg/1, and the water is not polluted either by industrial, urban or agricultural waste.	
				Those parts of a river where riffles alternate with bigger and	
				deeper pools, where the flow is branched by islands, the banks are	
				overgrown with shrubs and trees and interrupted by the mouths of	
				tributaries are to be preferred. Reaches selected should be sufficiently long and the zone of the of foothill brooks with	
				possible spawning grounds should be accessible. The overall	
				length of a reach should be about 20 km" (Holcik, J., 1984 Review	
				on experiments with introduction and acclimatization of the	
1	4.11	Is it likely that the taxon's mode of existence	No	huchen -Hucho hucho (Linnaeus, 1758) (Salmonidae) EIEAC Not documented.	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	No	Not documented.	Low
		population even when present in low	-		
		densities (or persisting in adverse conditions			
J	Resource	by way of a dormant form)?			
		Is the taxon likely to consume threatened or	Yes	Carnivore. Juveniles feed mainly on invertebrates and adults	Very high
		protected native taxa in the RA area?		mostly on fishes, but also prey on amphibians, reptiles, small	
				mammals and waterfowl (Luna, Susan M. in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic	
				publication. www.fishbase.org, (02/2021)).	
7	5.02	Is the taxon likely to sequester food	Not applicable		Very high
		resources (including nutrients) to the detriment of native taxa in the RA area?			
. 1					
	Reprodu				
3		uction Is the taxon likely to exhibit parental care	Yes	Both sexes covered the eggs with substrate. They both defend the	Very high
8		Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response	Yes	spawning site up to 2 weeks after spawning (Luna, Susan M. in	Very high
8		uction Is the taxon likely to exhibit parental care	Yes	spawning site up to 2 weeks after spawning (Luna, Susan M. in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web	Very high
		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	spawning site up to 2 weeks after spawning (Luna, Susan M. in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021)). Attempts to introduce the huchen inside the original area of its	Very high Medium
	6.01	uction Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?		spawning site up to 2 weeks after spawning (Luna, Susan M. in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021)). Attempts to introduce the huchen inside the original area of its distribution (transplantation), as in RA area, were more successful	
	6.01	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		spawning site up to 2 weeks after spawning (Luna, Susan M. in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021)). Attempts to introduce the huchen inside the original area of its distribution (transplantation), as in RA area, were more successful (Holcik, J., 1984 Review on experiments with introduction and	
	6.01	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		spawning site up to 2 weeks after spawning (Luna, Susan M. in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021)). Attempts to introduce the huchen inside the original area of its distribution (transplantation), as in RA area, were more successful	
9	6.01	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)?	Yes	spawning site up to 2 weeks after spawning (Luna, Susan M. in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021)). Attempts to introduce the huchen inside the original area of its distribution (transplantation), as in RA area, were more successful (Holcik, J., 1984 Review on experiments with introduction and acclimatization of the huchen -Hucho hucho (Linnaeus, 1758) (Salmonidae). EIFAC Tech.Pap., (42) Vol.2:289–98), taking that succesful introduction is possibility to spawn in the wild.	Medium
9	6.01 6.02 6.03	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	spawning site up to 2 weeks after spawning (Luna, Susan M. in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021)). Attempts to introduce the huchen inside the original area of its distribution (transplantation), as in RA area, were more successful (Holcik, J., 1984 Review on experiments with introduction and acclimatization of the huchen -Hucho hucho (Linnaeus, 1758) (Salmonidae). EIFAC Tech.Pap., (42) Vol.2:289–98), taking that succesful introduction is possibility to spawn in the wild. No suitable native species to hybridize with.	Medium Very high
9	6.01	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	spawning site up to 2 weeks after spawning (Luna, Susan M. in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021)). Attempts to introduce the huchen inside the original area of its distribution (transplantation), as in RA area, were more successful (Holcik, J., 1984 Review on experiments with introduction and acclimatization of the huchen -Hucho hucho (Linnaeus, 1758) (Salmonidae). EIFAC Tech.Pap., (42) Vol.2:289–98), taking that succesful introduction is possibility to spawn in the wild.	Medium
9	6.01 6.02 6.03	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	spawning site up to 2 weeks after spawning (Luna, Susan M. in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021)). Attempts to introduce the huchen inside the original area of its distribution (transplantation), as in RA area, were more successful (Holcik, J., 1984 Review on experiments with introduction and acclimatization of the huchen -Hucho hucho (Linnaeus, 1758) (Salmonidae). EIFAC Tech.Pap., (42) Vol.2:289–98), taking that succesful introduction is possibility to spawn in the wild. No suitable native species to hybridize with. No such behavior or adaptations. Small and shallow streams in upper reaches of tributaries, on	Medium Very high
9	6.01 6.02 6.03 6.04	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)	Yes No No	spawning site up to 2 weeks after spawning (Luna, Susan M. in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021)). Attempts to introduce the huchen inside the original area of its distribution (transplantation), as in RA area, were more successful (Holcik, J., 1984 Review on experiments with introduction and acclimatization of the huchen -Hucho hucho (Linnaeus, 1758) (Salmonidae). EIFAC Tech.Pap., (42) Vol.2:289–98), taking that succesful introduction is possibility to spawn in the wild. No suitable native species to hybridize with. No such behavior or adaptations. Small and shallow streams in upper reaches of tributaries, on gravelly bottom (Luna, Susan M. in Froese, R. and D. Pauly.	Medium Very high Very high
9	6.01 6.02 6.03 6.04	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	spawning site up to 2 weeks after spawning (Luna, Susan M. in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021)). Attempts to introduce the huchen inside the original area of its distribution (transplantation), as in RA area, were more successful (Holcik, J., 1984 Review on experiments with introduction and acclimatization of the huchen -Hucho hucho (Linnaeus, 1758) (Salmonidae). EIFAC Tech.Pap., (42) Vol.2:289–98), taking that succesful introduction is possibility to spawn in the wild. No suitable native species to hybridize with. No such behavior or adaptations. Small and shallow streams in upper reaches of tributaries, on gravelly bottom (Luna, Susan M. in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication.	Medium Very high Very high
9 0 1 2	6.01 6.02 6.03 6.04	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	Yes No No	spawning site up to 2 weeks after spawning (Luna, Susan M. in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021)). Attempts to introduce the huchen inside the original area of its distribution (transplantation), as in RA area, were more successful (Holcik, J., 1984 Review on experiments with introduction and acclimatization of the huchen -Hucho hucho (Linnaeus, 1758) (Salmonidae). EIFAC Tech.Pap., (42) Vol.2:289–98), taking that succesful introduction is possibility to spawn in the wild. No suitable native species to hybridize with. No such behavior or adaptations. Small and shallow streams in upper reaches of tributaries, on gravelly bottom (Luna, Susan M. in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021)). 1600-27000 eggs per female (Luna, Susan M. in Froese, R. and D.	Medium Very high Very high
9 0 1 2	6.01 6.02 6.03 6.04 6.05	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	Yes No Yes	spawning site up to 2 weeks after spawning (Luna, Susan M. in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021)). Attempts to introduce the huchen inside the original area of its distribution (transplantation), as in RA area, were more successful (Holcik, J., 1984 Review on experiments with introduction and acclimatization of the huchen -Hucho hucho (Linnaeus, 1758) (Salmonidae). EIFAC Tech.Pap., (42) Vol.2:289–98), taking that succesful introduction is possibility to spawn in the wild. No suitable native species to hybridize with. No such behavior or adaptations. Small and shallow streams in upper reaches of tributaries, on gravelly bottom (Luna, Susan M. in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021)). 1600-27000 eggs per female (Luna, Susan M. in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic	Medium Very high Very high Very high
9 0 1 2 3	6.01 6.02 6.03 6.04 6.05	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	Yes No Yes	spawning site up to 2 weeks after spawning (Luna, Susan M. in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021)). Attempts to introduce the huchen inside the original area of its distribution (transplantation), as in RA area, were more successful (Holcik, J., 1984 Review on experiments with introduction and acclimatization of the huchen -Hucho hucho (Linnaeus, 1758) (Salmonidae). EIFAC Tech.Pap., (42) Vol.2:289–98), taking that succesful introduction is possibility to spawn in the wild. No suitable native species to hybridize with. No such behavior or adaptations. Small and shallow streams in upper reaches of tributaries, on gravelly bottom (Luna, Susan M. in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021)). 1600-27000 eggs per female (Luna, Susan M. in Froese, R. and D.	Medium Very high Very high Very high
)) 1	6.01 6.02 6.03 6.04 6.05 6.06	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-	Yes No Yes Yes	spawning site up to 2 weeks after spawning (Luna, Susan M. in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021)). Attempts to introduce the huchen inside the original area of its distribution (transplantation), as in RA area, were more successful (Holcik, J., 1984 Review on experiments with introduction and acclimatization of the huchen -Hucho hucho (Linnaeus, 1758) (Salmonidae). EIFAC Tech.Pap., (42) Vol.2:289–98), taking that succesful introduction is possibility to spawn in the wild. No suitable native species to hybridize with. No such behavior or adaptations. Small and shallow streams in upper reaches of tributaries, on gravelly bottom (Luna, Susan M. in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021)). 1600-27000 eggs per female (Luna, Susan M. in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021)). Luna, Susan M. in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021)).	Medium Very high Very high Very high Medium
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40	1		I.		
40	7.06	Are older life stages of the taxon likely to	Yes	Ptoamodromous, spawning migrations (Luna, Susan M. in Froese,	Very high
		migrate in the RA area for reproduction?		R. and D. Pauly. Editors. 2021. FishBase. World Wide Web	
			••	electronic publication. www.fishbase.org, (02/2021)).	
41	7.07	Are propagules or eggs of the taxon likely to	No	Parental care of the spawning site (Luna, Susan M. in Froese, R.	High
		be dispersed in the RA area by other animals?		and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic	
				publication. www.fishbase.org, (02/2021)).	
42	7.08	Is dispersal of the taxon along any of the	Yes	Drift, migrations, introductions.	High
		vectors/pathways mentioned in the previous			
		seven questions (35-41; i.e. both			
		unintentional or intentional) likely to be			
	7.09		No	No documented evidence.	Low
		<i>ce attributes</i> Is the taxon able to withstand being out of	Ne	Very sensitive species (personal communication).) (am think
44	8.01	5	No	very sensitive species (personal communication).	Very high
		water for extended periods (e.g. minimum of			
		one or more hours) at some stage of its life			
45	8.02	cycle? Is the taxon tolerant of a wide range of	No	Very sensitive to pollution and water quality (Holcik, J., 1984	Very high
45	0.02	water quality conditions relevant to that	NO	Review on experiments with introduction and acclimatization of	very nigh
		taxon? [In the Justification field, indicate the		the huchen -Hucho hucho (Linnaeus, 1758) (Salmonidae). EIFAC	
46	8.03	relevant water quality variable(s) being Can the taxon be controlled or eradicated in	Not applicable	Tech.Pap., (42) Vol.2:289-98).	Very high
-0	0.05	the wild with chemical, biological, or other	and applicable		very mgn
		agents/means?			
47	8.04	Is the taxon likely to tolerate or benefit from	No	In spite of its great areas of distribution the huchen is now	Very high
· /	5.07	environmental/human disturbance?		considered to be an endangered species because of the effects on	very mgn
				stocks of increasing stream regulation and pollution (Holcik, J.,	
				1984 Review on experiments with introduction and acclimatization	
				of the huchen -Hucho hucho (Linnaeus, 1758) (Salmonidae).	
				EIFAC Tech.Pap., (42) Vol.2:289–98)).	
48	8.05	Is the taxon able to tolerate salinity levels	No	Exclusively freshwater species.	Very high
10	0.05	that are higher or lower than those found in			very mgn
		its usual environment?			
49	8.06	Are there effective natural enemies	Yes	Piscivorous birds and mammals prey on smaller specimens	Medium
		(predators) of the taxon present in the RA		(personal opinion).	
		e change			
	Climate				
50		e change			
		change Under the predicted future climatic	No change	Translocation mediated by humans, no natural dispersion from	Medium
		e change Under the predicted future climatic conditions, are the risks of entry into the RA	No change	Translocation mediated by humans, no natural dispersion from current locations.	Medium
		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		Medium
	9.01	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?		current locations.	
51		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	No change Decrease	current locations. Future conditions will impact flow regimes and temperatures wich	Medium
51	9.01	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		current locations. Future conditions will impact flow regimes and temperatures wich have great influence on populations (Holcik, J., 1984 Review on	
51	9.01	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,		current locations. Future conditions will impact flow regimes and temperatures wich have great influence on populations (Holcik, J., 1984 Review on experiments with introduction and acclimatization of the huchen -	
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	9.01	 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 	Decrease	current locations. Future conditions will impact flow regimes and temperatures wich have great influence on populations (Holcik, J., 1984 Review on experiments with introduction and acclimatization of the huchen - Hucho hucho (Linnaeus, 1758) (Salmonidae). EIFAC Tech.Pap., (42) Vol.2:289–98). Future conditions will impact flow regimes and temperatures,	Medium
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Statistics	
Scores	
BRA	9.0
BRA Outcome	-
BRA+CCA	-1.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	3.0
1. Domestication/Cultivation	2.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	0.0
B. Biology/Ecology	6.0
4. Undesirable (or persistence) traits	3.0
5. Resource exploitation	5.0
6. Reproduction	0.0
7. Dispersal mechanisms	2.0
8. Tolerance attributes	-4.0
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	4
Environmental	2
Species or population nuisance traits	-3
Thresholds	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.75
BRA	0.79
	0.50
	0.79

Date and Time	e	

18/05/2021 09:35:00

axon and Assessor details						
Category	Fishes and Lampreys (freshwater)					
Taxon name	Hucho hucho					
Common name	huchen					
Assessor	Tamara Kanjuh					
Risk screening context						
Reason and socio-economic benefits						
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS					
Taxonomy						
Native range						
Introduced range						
URL						

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
1. L		ication/Cultivation	N		lue i
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	Currently, Danube salmon populations are fragmented within the Danube drainage, with many being supported by artißicial reproduction and stocking programs (Ihut et al., 2014).	High
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	Fisheries: commercial; aquaculture: commercial; gamefish: yes (fishbase.de)	High
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	No	No information found.	Low
2 (limate	, distribution and introduction risk			
4			High	Dfa, Dfb (Köppen-Geiger climate classification system)	High
		Risk Assessment (RA) area and the taxon's native range?			
5	2.02	What is the quality of the climate matching data?	High	Köppen-Geiger climate classification system	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	Currently, Danube salmon populations are fragmented within the Danube drainage, with many being supported by artißicial reproduction and stocking programs (Inhut et al., 2014).	Medium
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	>1	Aquaculture, sportfishing, angling.	Medium
8	2.05	Is the taxon currently found in close	Yes	In Serbia the main river inhabited by huchen is the Drina and its	High
1		proximity to, and likely to enter into, the RA		tributaries. This river is 346 km long with an average discharge of	
		area in the near future (e.g. unintentional		395 m3 s-1, 220 km of which flow through Serbia (Mijović-	
3 1	Invacius	and intentional introductions)?	L	Magdić, 2007).	L
<i>3.1</i> 9		Has the taxon become naturalised	Yes	In one stretch of the Hornád River, Czechoslovakia, a transplanted	Low
5	5.01	(established viable populations) outside its native range?	165	and naturalized population of huchen had to be eradicated because the abundance of the brown trout and the grayling (Thymallus thymallus) significantly decreased (Skácel, 1976).	LOW
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or	No	In one stretch of the Hornád River, Czechoslovakia, a transplanted and naturalized population of huchen had to be eradicated	Low
		commercial taxa?		because the abundance of the brown trout and the grayling (Thymallus thymallus) significantly decreased (Skácel, 1976).	
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	No information found.	Low
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	No	No information flound.	Low
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	No information found.	Low
в. І	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	Harmless (fishbase.de)	High
15	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or	No	No information found.	Low
16	4.02	protected)?	No	No information found.	Law
10	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	NO	No mornation round.	Low
17	4.04	Is the taxon adaptable in terms of climatic	No	The taxon is very sensitive to environmental conditions.	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	No	No information found.	Low
10	05	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 information found.	Low
20	4.07	on ecosystem services in the RA area? Is it likely that the taxon will host, and/or	No	No information found.	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 act as a vector for, recognised pests and infectious agents that are absent from (novel	No	No information found.	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?	No	No informartion found.	Low
23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g.	Yes	Over 3.5 m/s (Bănăduc, 2008).	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	No	No information found.	Low
		native taxa?			

25	4.12	Is the taxon likely to maintain a viable	No	No information found.	Low
		population even when present in low densities (or persisting in adverse conditions			
		by way of a dormant form)?			
5. F	Resourc	ce exploitation			
		Is the taxon likely to consume threatened or	No	No information found.	Low
		protected native taxa in the RA area?			
27	5.02	Is the taxon likely to sequester food	Yes	Danube huchen grows faster than the other species of salmonids	Medium
		resources (including nutrients) to the		early in its life cycle due to the early beginning of predatory	
5 4	Reprodu	detriment of native taxa in the RA area?		feeding (Bastl and Kirka, 1958).	
		Is the taxon likely to exhibit parental care	No	No parental care (fishbase.de)	Medium
		and/or to reduce age-at-maturity in response			
		to environmental conditions?			
29	6.02	Is the taxon likely to produce viable gametes	Yes	The species were translocated in the Danube Basin into other	Medium
		or propagules (in the RA area)?		rivers of the same basin.	
30	6.03	Is the taxon likely to hybridise naturally with	No	No information found.	Low
21	6.04	native taxa? Is the taxon likely to be hermaphroditic or to	No	No information found.	Low
т	0.04	display asexual reproduction?	NO		LOW
2	6.05	Is the taxon dependent on the presence of	No	No information found.	Low
		another taxon (or specific habitat features)			
		to complete its life cycle?			
33	6.06	Is the taxon known (or likely) to produce a	Yes	The number of eggs deposited depends on body (Ihut et al., 2014).	Low
		large number of propagules or offspring			
21	6.07	within a short time span (e.g. < 1 year)? How many time units (days, months, years)	3	According to Ivaska. (1951) the females reach sexual maturity at	High
,+	0.07	does the taxon require to reach the age-at-	5	the age of 5 years; other authors give 3 or 4 years.	i iigii
		first-reproduction?			
'. L	Dispers	al mechanisms			·
5	7.01	How many potential internal	One	Intentional restocking.	Medium
		vectors/pathways could the taxon use to			
<i>c</i>	7 00	disperse within the RA area (with suitable	Ne	No information found	Low
σ	7.02	Will any of these vectors/pathways bring the taxon in close proximity to one or more	No	No information found.	Low
		protected areas (e.g. MCZ, MPA, SSSI)?			
37	7.03	Does the taxon have a means of actively	No	No information found.	Low
		attaching itself to hard substrata (e.g. ship			-
		hulls, pilings, buoys) such that it enhances			
		the likelihood of dispersal?			
8	7.04	Is natural dispersal of the taxon likely to	No	The dispersion of the taxon occurs as juvenil.	Low
		occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?			
9	7.05	Is natural dispersal of the taxon likely to	Yes	The dispersion of the taxon occurs as juvenil.	Low
		occur as larvae/juveniles (for animals) or as		· · · · · · · · · · · · · · · · · · ·	-
		fragments/seedlings (for plants) in the RA			
		area?			
0	7.06	Are older life stages of the taxon likely to	Yes	pawning migrations can be restricted to just a few hundred	Medium
1	7.07	migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to	No	meters (Ihut et al., 2014). No information found.	Low
ŧΤ	7.07	be dispersed in the RA area by other animals?	NO		LOW
12	7.08	Is dispersal of the taxon along any of the	Yes	Intentional restocking.	Low
		vectors/pathways mentioned in the previous			-
		seven questions (35-41; i.e. both			
		unintentional or intentional) likely to be			
			No	No information found.	Low
		ce attributes Is the taxon able to withstand being out of	No	The taxon cannot survive out of the water.	Low
	0.01	water for extended periods (e.g. minimum of	NO	The taxon cannot survive out of the water.	LOW
		one or more hours) at some stage of its life			
_	1	, 3			1
15		cycle?			
۴J	8.02	Is the taxon tolerant of a wide range of	No	The taxon is very sensitive to environmental changes.	Medium
	8.02	Is the taxon tolerant of a wide range of water quality conditions relevant to that	No	The taxon is very sensitive to environmental changes.	Medium
ŗJ	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	The taxon is very sensitive to environmental changes.	Medium
		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			
	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	No	The taxon is very sensitive to environmental changes. No information found.	Medium
		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			
6		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			
16	8.03	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 information found. Excessive anthropogenic impacts like habitat destruction, irresponsible deforestation, pollution, poaching and dam	Low
6	8.03	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	No	No information found. Excessive anthropogenic impacts like habitat destruction, irresponsible deforestation, pollution, poaching and dam construction, have led to significant reductions in population	Low
16	8.03	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?	No	No information found. Excessive anthropogenic impacts like habitat destruction, irresponsible deforestation, pollution, poaching and dam construction, have led to significant reductions in population abundances (Cristea, 2007; Geist et al., 2009).	Low High
6	8.03	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	No	No information found. Excessive anthropogenic impacts like habitat destruction, irresponsible deforestation, pollution, poaching and dam construction, have led to significant reductions in population	Low
16	8.03	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	No	No information found. Excessive anthropogenic impacts like habitat destruction, irresponsible deforestation, pollution, poaching and dam construction, have led to significant reductions in population abundances (Cristea, 2007; Geist et al., 2009).	Low High
16	8.03	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	No	No information found. Excessive anthropogenic impacts like habitat destruction, irresponsible deforestation, pollution, poaching and dam construction, have led to significant reductions in population abundances (Cristea, 2007; Geist et al., 2009).	Low High
46 47 48	8.03 8.04 8.05	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?	No	No information found. Excessive anthropogenic impacts like habitat destruction, irresponsible deforestation, pollution, poaching and dam construction, have led to significant reductions in population abundances (Cristea, 2007; Geist et al., 2009). The taxon is very sensitive to environmental changes.	Low High Low
-6 -7 -8 -9	8.03 8.04 8.05 8.06	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 area?	No	No information found. Excessive anthropogenic impacts like habitat destruction, irresponsible deforestation, pollution, poaching and dam construction, have led to significant reductions in population abundances (Cristea, 2007; Geist et al., 2009). The taxon is very sensitive to environmental changes. Mature H. hucho have no predators. Young and small individuals,	Low High Low
16 17 18	8.03 8.04 8.05 8.06	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 area? e change	No	No information found. Excessive anthropogenic impacts like habitat destruction, irresponsible deforestation, pollution, poaching and dam construction, have led to significant reductions in population abundances (Cristea, 2007; Geist et al., 2009). The taxon is very sensitive to environmental changes. Mature H. hucho have no predators. Young and small individuals, when they arrive in waters which run relatively slowly, can	Low High Low
16 17 18 19	8.03 8.04 8.05 8.06 Climate	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 area? e change	No No No	No information found. Excessive anthropogenic impacts like habitat destruction, irresponsible deforestation, pollution, poaching and dam construction, have led to significant reductions in population abundances (Cristea, 2007; Geist et al., 2009). The taxon is very sensitive to environmental changes. Mature H. hucho have no predators. Young and small individuals, when they arrive in waters which run relatively slowly, can become the prev of the pike (Esox lucius) (FAO, 1968).	Low High Low High
6 7 8 9	8.03 8.04 8.05 8.06	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 area? e change Under the predicted future climatic	No	No information found. Excessive anthropogenic impacts like habitat destruction, irresponsible deforestation, pollution, poaching and dam construction, have led to significant reductions in population abundances (Cristea, 2007; Geist et al., 2009). The taxon is very sensitive to environmental changes. Mature H. hucho have no predators. Young and small individuals, when they arrive in waters which run relatively slowly, can become the prey of the pike (Esox lucius) (FAO, 1968). The effects of climate change have been much discussed but	Low High Low
.6 .7 .8 .9	8.03 8.04 8.05 8.06 Climate	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 area? e change Under the predicted future climatic conditions, are the risks of entry into the RA	No No No	No information found. Excessive anthropogenic impacts like habitat destruction, irresponsible deforestation, pollution, poaching and dam construction, have led to significant reductions in population abundances (Cristea, 2007; Geist et al., 2009). The taxon is very sensitive to environmental changes. Mature H. hucho have no predators. Young and small individuals, when they arrive in waters which run relatively slowly, can become the prey of the pike (Esox lucius) (FAO, 1968). The effects of climate change have been much discussed but presently, especially for the Balkan region, there is a lack of	Low High Low High
.6 .7 .8 .9	8.03 8.04 8.05 8.06 Climate	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 area? 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 No No	No information found. Excessive anthropogenic impacts like habitat destruction, irresponsible deforestation, pollution, poaching and dam construction, have led to significant reductions in population abundances (Cristea, 2007; Geist et al., 2009). The taxon is very sensitive to environmental changes. Mature H. hucho have no predators. Young and small individuals, when they arrive in waters which run relatively slowly, can become the prey of the pike (Esox lucius) (FAO, 1968). The effects of climate change have been much discussed but presently, especially for the Balkan region, there is a lack of reference data or reliable models to make any serious prediction	Low High Low High
6 7 8 9	8.03 8.04 8.05 8.06 Climate	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 area? e change Under the predicted future climatic conditions, are the risks of entry into the RA	No No No	No information found. Excessive anthropogenic impacts like habitat destruction, irresponsible deforestation, pollution, poaching and dam construction, have led to significant reductions in population abundances (Cristea, 2007; Geist et al., 2009). The taxon is very sensitive to environmental changes. Mature H. hucho have no predators. Young and small individuals, when they arrive in waters which run relatively slowly, can become the prey of the pike (Esox lucius) (FAO, 1968). The effects of climate change have been much discussed but presently, especially for the Balkan region, there is a lack of	Low High Low High
16 17 18 19 <u>2. (</u> 50	8.03 8.04 8.05 8.06 Climate	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 area? 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	No No No	No information found. Excessive anthropogenic impacts like habitat destruction, irresponsible deforestation, pollution, poaching and dam construction, have led to significant reductions in population abundances (Cristea, 2007; Geist et al., 2009). The taxon is very sensitive to environmental changes. Mature H. hucho have no predators. Young and small individuals, when they arrive in waters which run relatively slowly, can become the prev of the pike (Esox lucius) (FAO, 1968). The effects of climate change have been much discussed but presently, especially for the Balkan region, there is a lack of reference data or reliable models to make any serious prediction on the potential effects of climate on the species in the region	Low High Low High
16 17 18 19 2. (50	8.03 8.04 8.05 8.06 Climate 9.01	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 area? 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	No No No change	No information found. Excessive anthropogenic impacts like habitat destruction, irresponsible deforestation, pollution, poaching and dam construction, have led to significant reductions in population abundances (Cristea, 2007; Geist et al., 2009). The taxon is very sensitive to environmental changes. Mature H. hucho have no predators. Young and small individuals, when they arrive in waters which run relatively slowly, can become the prey of the pike (Esox lucius) (FAO, 1968). The effects of climate change have been much discussed but presently, especially for the Balkan region, there is a lack of reference data or reliable models to make any serious prediction on the potential effects of climate on the species in the region (Fryhof et al.,2015). The taxon is very sensitive to environmental	Low High Low High
6 7 8 9	8.03 8.04 8.05 8.06 Climate 9.01	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 area? 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	No No No change	No information found. Excessive anthropogenic impacts like habitat destruction, irresponsible deforestation, pollution, poaching and dam construction, have led to significant reductions in population abundances (Cristea, 2007; Geist et al., 2009). The taxon is very sensitive to environmental changes. Mature H. hucho have no predators. Young and small individuals, when they arrive in waters which run relatively slowly, can become the prey of the pike (Esox lucius) (FAO, 1968). The effects of climate change have been much discussed but presently, especially for the Balkan region, there is a lack of reference data or reliable models to make any serious prediction on the potential effects of climate on the species in the region (Fryhof et al.,2015). The taxon is very sensitive to environmental	Low High Low High

52	9.03	Under the predicted future climatic	Increase	The taxon is very sensitive to environmental changes.	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	Lower	The taxon is very sensitive to environmental changes.	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	The taxon is very sensitive to environmental changes.	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	The taxon is very sensitive to environmental changes.	Low
		conditions, what is the likely magnitude of			
		future potential impacts on ecosystem			
		services/socio-economic factors?			

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

DRA	·
BRA+CCA	
Confidence	
BRA+CCA	0.39
BRA	0.39
CCA	0.38
Date and Time	
30/05/2	021 15:13:13

axon and Assessor details						
Category	Fishes and Lampreys (freshwater)					
Taxon name	Hucho hucho	Hucho hucho				
Common name	huchen					
Assessor	Tena Radocaj					
Risk screening context						
Reason and socio-economic benefits						
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS					
Taxonomy						
Native range						
Introduced range						
URL						

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
<u>1. [</u> 1	Domesti 1.01	<i>ication/Cultivation</i> Has the taxon been the subject of	Yes	Fisheries: commercial; aquaculture: commercial; gamefish: yes	High
1	1.01	domestication (or cultivation) for at least 20 generations?	Tes	(Fishbase)	Ingn
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	No	No	Low
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	No	No invasive races, varieties, sub-taxa or congeners.	Low
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 similarity between climatic conditions RA area and native range is high. I use climatch.	Medium
5	2.02	What is the quality of the climate matching data?	High	Distribution Map and Climatch.	Very high
6	2.03	Is the taxon already present outside of captivity in the RA area?	No	H. hucho is not present outside of captivity in the RA area.	Medium
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	Stocking (U.S. Fish & Wildlife Service, April 2011 Revised, January 2019, February 2019 Web Version, 4/30/2019)	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	H. hucho is established in a neighbouring rivers. (Witkowski, A., Bajić, A., Treer, T., Hegediš, A., Marić, S., Šprem, N., & Kapusta, A. (2013). Past and present of and perspectives for the Danube huchen, Hucho hucho (L.), in the Danube basin. Fisheries & Aquatic Life, 21(3), 129-142).	Medium
3.1	1	e elsewhere	Vec	In the 1050s it [H, bucke] was transloopted for concernation	High
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	In the 1950s it [H. hucho] was translocated for conservation purposes to some tributaries of the upper stretch of the Vistula River [Poland] where it established self-sustained populations (Witkowski 1996). Currently huchen is being stocked also into water courses of the Oder River catchment [Poland]. (Grabowska, J., J. Kotusz, and A. Witkowski. 2010. Alien invasive fish species in Polish waters: an overview. Folia Zoologica 59(1):73–85.)	High
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	In one stretch of the Hornád River, Czechoslovakia, a transplanted and naturalized population of huchen had to be eradicated because the abundance of the brown trout and the grayling (Thymallus thymallus) significantly decreased (Skácel, 1976) (U.S. Fish & Wildlife Service, April 2011 Revised, January 2019, February 2019 Web Version, 4/30/2019).	Low
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	No evidence	Medium
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem services?	Yes	May have adverse impact on some native species (competition). (U.S. Fish & Wildlife Service, April 2011 Revised, January 2019, February 2019 Web Version, 4/30/2019).	Low
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	No evidence	Low
B . I	Biology	//Ecology			
		able (or persistence) traits		-	I
		Is it likely that the taxon will be poisonous or pose other risks to human health?		H. hucho is harmless (Fishbase)	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 evidence	Low
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	No	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. hucho is adaptable to climatic and other environmental conditions in the RA area. (Witkowski, A., Bajić, A., Treer, T., Hegediš, A., Marić, S., Šprem, N., & Kapusta, A. (2013). Past and present of and perspectives for the Danube huchen, Hucho hucho (L.), in the Danube basin. Fisheries & Aquatic Life, 21(3),	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	Competition (U.S. Fish & Wildlife Service, April 2011 Revised, January 2019, February 2019 Web Version, 4/30/2019).	Low
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	(U.S. Fish & Wildlife Service, April 2011 Revised, January 2019, February 2019 Web Version, 4/30/2019).	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 area?	Yes	U.S. Fish & Wildlife Service, April 2011 Revised, January 2019, February 2019 Web Version, 4/30/2019 Infection with Gyrodactylus salaris is an OIE-reportable disease (OIE 2019). Popiołek et al. (2013) does not specify which species of Gyrodatcylus can infect Hucho hucho	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	According to CABI (2019), Hucho hucho can carry the following diseases: infectious pancreatic necrosis, Renibacterium salmoninarum, bacterial kidney disease, whirling disease and lernaeopdid infection of fish. (CABI, 2019)	Medium

22	4.09	Is it likely that the taxon will achieve a body size that will make it more likely to be	Yes	Max length : 150 cm TL (Fishbase)	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	Usually solitary, inhabits deeper regions of swift flowing streams with oxygen rich waters. (Fishbase)	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?	No	No evidence	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	Fishbase	Low
5. F	Resourc	e exploitation	* 		
26	5.01	Is the taxon likely to consume threatened or protected native taxa in the RA area?	Yes	Juveniles feed mainly on invertebrates and adults mostly on fishes, but also prey on amphibians, reptiles, small mammals and waterfowl (Fishbase)	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?	Not applicable	Not applicable	Very high
5. F	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	They both defend the spawning site up to 2 weeks after spawning. (Fishbase)	Low
29	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	Witkowski, A., Bajić, A., Treer, T., Hegediš, A., Marić, S., Šprem, N., & Kapusta, A. (2013). Past and present of and perspectives for the Danube huchen, Hucho hucho (L.), in the Danube basin. Fisheries & Aquatic Life, 21(3), 129-142).	High
80	6.03	Is the taxon likely to hybridise naturally with native taxa?	No	No evidence	Low
81	6.04	Is the taxon likely to be hermaphroditic or to	No	No	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?	Yes	Spawns in very clean gravel in fast-flowing water, usually in small river tributaries. (Freyhof, J. & Kottelat, M. 2008. Hucho hucho. The IUCN Red List of Threatened Species)	Low
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	Freyhof, J. & Kottelat, M. 2008. Hucho hucho. The IUCN Red List of Threatened Species	Low
34	6.07	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	4	Males reproduce for the first time at 3-4 years and about 1 kg, females at 4-5 years and 2-3 kg (Freyhof, J. & Kottelat, M. 2008. Hucho hucho. The IUCN Red List of Threatened Species 2008)	Medium
		al mechanisms	n.		
35	7.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable	One	Human influence	Medium
36	7.02	Will any of these vectors/pathways bring the taxon in close proximity to one or more	No	No	Very 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 adaptations	Very high
38	7.04	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules	No	Spawns on gravelly bottom where female makes a shallow hole where the eggs are laid and covered with gravel (Ref. 682). Both	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	sexes covered the eggs with substrate. (Fishbase) Freyhof, J. & Kottelat, M. 2008. Hucho hucho. The IUCN Red List of Threatened Species 2008	Low
40	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	Yes	Sexually mature fish migrate upstream into smaller and shallower (0.3-1.5 m deep) streams (Ref. 26170), usually in upper reaches of tributaries (Fishbase)	Very high
11	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No	Fishbase	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	There is the possibility of a high rate of dispersal of taxa. E.g. when a fertilized individual enters a new area by some kind of dispersal.	Low
43	7.09	unintentional or intentional) likely to be Is dispersal of the taxon density dependent?	No	No evidence	Low
		ce attributes			
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, it sensitive species	Very 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	Usually solitary, inhabits deeper regions of swift flowing streams with oxygen rich waters. Adults are territorial but not solitary (Fishbase)	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	Very high
47	8.04	agents/means? Is the taxon likely to tolerate or benefit from environmental/human disturbance?	No	Historically overfishing, pollution and dam construction caused the decline of the species. Currently the main the threats are hydropower stations which heavily regulate flow regime (which impacts upon their prey and habitat), and pollution in some countries (Bosnia and Croatia). (Freyhof, J. & Kottelat, M. 2008. Hucho hucho. The IUCN Red List of Threatened Species)	Very high
48	8.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in	No	Freshwater fish	Very high

49	8.06	Are there effective natural enemies	Yes	Juvenile- catfish, zander, pike	Medium
		(predators) of the taxon present in the RA			
		e change			
		change			
50	9.01	Under the predicted future climatic	Decrease	The risks of entry into the RA area is no change. Maybe because	Medium
		conditions, are the risks of entry into the RA		of human impact, but not because of climate change.	
		area posed by the taxon likely to increase,			
		decrease or not change?			
51	9.02	Under the predicted future climatic	Decrease	Comte, L., Buisson, L., Daufresne, M., & Grenouillet, G. (2013).	Medium
		conditions, are the risks of establishment		Climate-induced changes in the distribution of freshwater fish:	
		posed by the taxon likely to increase,		observed and predicted trends. Freshwater Biology, 58(4), 625-	
		decrease or not change?		639.	
52	9.03	Under the predicted future climatic	Decrease	Comte, L., Buisson, L., Daufresne, M., & Grenouillet, G. (2013).	Medium
		conditions, are the risks of dispersal within		Climate-induced changes in the distribution of freshwater fish:	
		the RA area posed by the taxon likely to		observed and predicted trends. Freshwater Biology, 58(4), 625-	
		increase, decrease or not change?		639.	
53	9.04	Under the predicted future climatic	Lower	Comte, L., Buisson, L., Daufresne, M., & Grenouillet, G. (2013).	Medium
		conditions, what is the likely magnitude of		Climate-induced changes in the distribution of freshwater fish:	
		future potential impacts on biodiversity		observed and predicted trends. Freshwater Biology, 58(4), 625-	
		and/or ecological integrity/status?		639.	
54	9.05	Under the predicted future climatic	Lower	Comte, L., Buisson, L., Daufresne, M., & Grenouillet, G. (2013).	Medium
		conditions, what is the likely magnitude of		Climate-induced changes in the distribution of freshwater fish:	
		future potential impacts on ecosystem		observed and predicted trends. Freshwater Biology, 58(4), 625-	
		structure and/or function?		639.	
55	9.06	Under the predicted future climatic	No change	Comte, L., Buisson, L., Daufresne, M., & Grenouillet, G. (2013).	Medium
		conditions, what is the likely magnitude of		Climate-induced changes in the distribution of freshwater fish:	
		future potential impacts on ecosystem		observed and predicted trends. Freshwater Biology, 58(4), 625-	
		services/socio-economic factors?		639.	

Statistics	
Scores	
BRA	15.0
BRA Outcome	-
BRA+CCA	5.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	10.0
1. Domestication/Cultivation	0.0
2. Climate, distribution and introduction risk	0.0
3. Invasive elsewhere	10.0
B. Biology/Ecology	5.0
4. Undesirable (or persistence) traits	6.0
5. Resource exploitation	5.0
6. Reproduction	-2.0
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
1. Domestication/Cultivation	3
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	3 5 5 36 12 2 7 9
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	6
Species or population nuisance traits	-6
Thresholds	
DDA.	

Thresholds	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.60
BRA	0.62
CCA	0.50
Date and Time	
19/05/2	021 12:32:12

Taxon and Assessor details		
Category	Fishes and Lampreys (freshwater)	
Taxon name	Oncorhynchus mykiss	
Common name	rainbow trout	
Assessor	Ana Marić	
Risk screening context		
Reason and socio-economic benefits		
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS	
Taxonomy		
Native range		
Introduced range		
URL		

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical ication/Cultivation			
1.1		Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin. 646 pp https://www.fishbase.se/summary/Oncorhynchus-	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	Frimodt, C., 1995. Multilingual illustrated guide to the world's commercial coldwater fish. Fishing News Books, Osney Mead, Oxford, England. 215 p.	Very high
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	http://www.iucngisd.org/gisd/species.php?sc=103 invasive itself, does it count?	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	Climach	High
5	2.02	What is the quality of the climate matching data?	Low	Very unsure	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	Risks to Stocks of Native Trout of the Genus Salmo (Actinopterygii: Salmoniformes: Salmonidae) of Serbia and Management for their Recovery. Lovili u Belosavcu	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	>1	Stocking and escape from farms	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	A brief review of non-native freshwater fishes in Slovenia M. Povž, S. Šumer	Very high
3.1		e elsewhere	¥	A brief review of non-notive freebuncter fielder in Clausein M. Devž) (am think
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	A brief review of non-native freshwater fishes in Slovenia M. Povž, S. Šumer Invasions of rainbow trout and brown trout in Japan: A comparison of invasiveness and impact on native species Koh Hasegawa 2019	Very high
	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	The impact of introduced brown and r bow trout on native fish: the case of Australasia TODD A. CROWL ~*, COLIN R. TOWNSEND and ANGUS R. MCINTOSH 1992	Very high
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	Check ref	Medium
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	No	Check	Medium
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	It was introduced intentionaly	High
		y/Ecology			
		able (or persistence) traits Is it likely that the taxon will be poisonous or	No	No	Very high
		pose other risks to human health?			, -
15	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	Invasions of rainbow trout and brown trout in Japan: A comparison of invasiveness and impact on native species Koh Hasegawa	Very high
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	No	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	Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin. 646 pp	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	A handbook of global freshwater invasive species. Frencis. 2012	Very high
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	No	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	Invasions of rainbow trout and brown trout in Japan: A comparison of invasiveness and impact on native species Koh Hasegawa.2019	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	Invasions of rainbow trout and brown trout in Japan: A comparison of invasiveness and impact on native species Koh Hasegawa. 2019	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	Invasions of rainbow trout and brown trout in Japan: A comparison of invasiveness and impact on native species Koh Hasegawa. 2002	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	Invasions of rainbow trout and brown trout in Japan: A comparison of invasiveness and impact on native species Koh Hasegawa. 2002	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?	No	Invasions of rainbow trout and brown trout in Japan: A comparison of invasiveness and impact on native species Koh Hasegawa	Medium

5	4.12	Is the taxon likely to maintain a viable	Yes	Invasions of rainbow trout and brown trout in Japan: A	High
		population even when present in low densities (or persisting in adverse conditions		comparison of invasiveness and impact on native species Koh Hasegawa. 2019.	
		by way of a dormant form)?		Tiasegawa. 2019.	
		ce exploitation			I a a
6	5.01	Is the taxon likely to consume threatened or protected native taxa in the RA area?	Yes	Invasions of rainbow trout and brown trout in Japan: A comparison of invasiveness and impact on native species Koh	Very high
7	5.02	Is the taxon likely to sequester food	Yes	Invasions of rainbow trout and brown trout in Japan: A	High
		resources (including nutrients) to the	I	comparison of invasiveness and impact on native species Koh	-
F	Reprodu	detriment of native taxa in the RA area?		Hasegawa.2019	
		Is the taxon likely to exhibit parental care	Yes	Invasions of rainbow trout and brown trout in Japan: A	Very high
		and/or to reduce age-at-maturity in response	I	comparison of invasiveness and impact on native species Koh	
2	6.02	to environmental conditions? Is the taxon likely to produce viable gametes	Yes	Hasegawa. 2019 Kottelat 2007	Very high
	0.02	or propagules (in the RA area)?	105		very nigh
)	6.03	Is the taxon likely to hybridise naturally with	Yes	Slovenia check	Very high
	6.04	native taxa? Is the taxon likely to be hermaphroditic or to	No	No	Very high
_		display asexual reproduction?	L		
<u>'</u>	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features)	No	No	Very high
		to complete its life cycle?	I		
3	6.06	Is the taxon known (or likely) to produce a	Yes	Kottekat 2007	High
		large number of propagules or offspring within a short time span (e.g. < 1 year)?			
1	6.07	How many time units (days, months, years)	2	Kottelat 2007	Very high
		does the taxon require to reach the age-at-			
[Dispers	first-reproduction? al mechanisms			L
	7.01	How many potential internal	>1	Escape stocking	Very high
	1	vectors/pathways could the taxon use to disperse within the RA area (with suitable	1		
	7.02	Will any of these vectors/pathways bring the	Yes	Espetially stocking	Very high
	1	taxon in close proximity to one or more	1		
,	7.03	protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively	No	no	Very high
	7.05	attaching itself to hard substrata (e.g. ship			very night
		hulls, pilings, buoys) such that it enhances			
2	7.04	the likelihood of dispersal? Is natural dispersal of the taxon likely to	No	Kottelat 2007	Very high
,	7.04	occur as eggs (for animals) or as propagules			very night
		(for plants: seeds, spores) in the RA area?	<u> </u>		
)	7.05	Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as	Yes	Kottelat 2007	High
		fragments/seedlings (for plants) in the RA	I		
_	7.06	area?	¥	K H L L 2007	
J	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	Yes	Kottelat 2007	Very high
L	7.07	Are propagules or eggs of the taxon likely to	No	Kottelat 2007	Very high
)	7.08	be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the	Yes	Invasions of rainbow trout and brown trout in Japan: A	Very high
-	7.00	vectors/pathways mentioned in the previous	165	comparison of invasiveness and impact on native species Koh	very nigh
		seven questions (35-41; i.e. both		Hasegawa 2019	
2	7 09	unintentional or intentional) likely to be Is dispersal of the taxon density dependent?	Yes	Probably, partial migratory	Medium
		ce attributes	165		Medium
	8.01	Is the taxon able to withstand being out of	No	Kottelat 2007	Very high
		water for extended periods (e.g. minimum of one or more hours) at some stage of its life			
		cycle?	I		
-	8.02				
5	0.02	Is the taxon tolerant of a wide range of	No	Small-scale rainbow trout farming FAO 2011.	Very high
5	0.02	Is the taxon tolerant of a wide range of water quality conditions relevant to that	No	Small-scale rainbow trout farming FAO 2011.	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			
	8.03	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	Recolonization by the mountain galaxias Galaxias olidus of a	Very 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 Can the taxon be controlled or eradicated in the wild with chemical, biological, or other			
5		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		Recolonization by the mountain galaxias Galaxias olidus of a montane stream after the eradication of rainbow trout	
	8.03 8.04	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?	No Yes	Recolonization by the mountain galaxias Galaxias olidus of a montane stream after the eradication of rainbow trout Oncorhynchus mykiss Mark Lintermans 2000 MAybe flood?	High High
,	8.03	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	No	Recolonization by the mountain galaxias Galaxias olidus of a montane stream after the eradication of rainbow trout Oncorhynchus mykiss Mark Lintermans 2000	High
	8.03 8.04 8.05	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?	No Yes Yes	Recolonization by the mountain galaxias Galaxias olidus of a montane stream after the eradication of rainbow trout Oncorhynchus mykiss Mark Lintermans 2000 MAybe flood? Kottelat 2007	High High Very high
	8.03 8.04	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	No Yes	Recolonization by the mountain galaxias Galaxias olidus of a montane stream after the eradication of rainbow trout Oncorhynchus mykiss Mark Lintermans 2000 MAybe flood?	High High
(8.03 8.04 8.05 8.06 Climat	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 e change	No Yes Yes	Recolonization by the mountain galaxias Galaxias olidus of a montane stream after the eradication of rainbow trout Oncorhynchus mykiss Mark Lintermans 2000 MAybe flood? Kottelat 2007	High High Very high
	8.03 8.04 8.05 8.06 Climate	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 e change	No Yes Yes Yes	Recolonization by the mountain galaxias Galaxias olidus of a montane stream after the eradication of rainbow trout Oncorhynchus mykiss Mark Lintermans 2000 MAybe flood? Kottelat 2007 Fish and mamals	High High Very high Very high
	8.03 8.04 8.05 8.06 Climat	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 e change	No Yes Yes	Recolonization by the mountain galaxias Galaxias olidus of a montane stream after the eradication of rainbow trout Oncorhynchus mykiss Mark Lintermans 2000 MAybe flood? Kottelat 2007	High High Very high
	8.03 8.04 8.05 8.06 Climate	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 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 Yes Yes Yes	Recolonization by the mountain galaxias Galaxias olidus of a montane stream after the eradication of rainbow trout Oncorhynchus mykiss Mark Lintermans 2000 MAybe flood? Kottelat 2007 Fish and mamals Assessing the impact of a downscaled climate change simulation	High High Very high Very high
; ; (()	8.03 8.04 8.05 8.06 Climat 9.01	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 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?	No Yes Yes Increase	Recolonization by the mountain galaxias Galaxias olidus of a montane stream after the eradication of rainbow trout Oncorhynchus mykiss Mark Lintermans 2000 MAybe flood? Kottelat 2007 Fish and mamals Assessing the impact of a downscaled climate change simulation on the fish fauna in an Inner-Alpine River C. Matulla & S. Schmutz & A. Melcher & T. Gerersdorfer & P. Haas 2007	High High Very high Very high
; ; (()	8.03 8.04 8.05 8.06 Climate	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 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 Yes Yes Yes	Recolonization by the mountain galaxias Galaxias olidus of a montane stream after the eradication of rainbow trout Oncorhynchus mykiss Mark Lintermans 2000 MAybe flood? Kottelat 2007 Fish and mamals Assessing the impact of a downscaled climate change simulation on the fish fauna in an Inner-Alpine River C. Matulla & S. Schmutz	High High Very high Very high
; ; (()	8.03 8.04 8.05 8.06 Climat 9.01	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 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,	No Yes Yes Increase	Recolonization by the mountain galaxias Galaxias olidus of a montane stream after the eradication of rainbow trout Oncorhynchus mykiss Mark Lintermans 2000 MAybe flood? Kottelat 2007 Fish and mamals Assessing the impact of a downscaled climate change simulation on the fish fauna in an Inner-Alpine River C. Matulla & S. Schmutz & A. Melcher & T. Gerersdorfer & P. Haas 2007 Assessing the impact of a downscaled climate change simulation	High High Very high Very high
;	8.03 8.04 8.05 8.06 Climate 9.01 9.02	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 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 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 Yes Yes Increase	Recolonization by the mountain galaxias Galaxias olidus of a montane stream after the eradication of rainbow trout Oncorhynchus mykiss Mark Lintermans 2000 MAybe flood? Kottelat 2007 Fish and mamals Assessing the impact of a downscaled climate change simulation on the fish fauna in an Inner-Alpine River C. Matulla & S. Schmutz & A. Melcher & T. Gerersdorfer & P. Haas 2007 Assessing the impact of a downscaled climate change simulation on the fish fauna in an Inner-Alpine River C. Matulla & S. Schmutz & A. Melcher & T. Gerersdorfer & P. Haas 2007	High High Very high Very high Very high
) (()	8.03 8.04 8.05 8.06 Climat 9.01	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 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,	No Yes Yes Increase	Recolonization by the mountain galaxias Galaxias olidus of a montane stream after the eradication of rainbow trout Oncorhynchus mykiss Mark Lintermans 2000 MAybe flood? Kottelat 2007 Fish and mamals Assessing the impact of a downscaled climate change simulation on the fish fauna in an Inner-Alpine River C. Matulla & S. Schmutz & A. Melcher & T. Gerersdorfer & P. Haas 2007 Assessing the impact of a downscaled climate change simulation on the fish fauna in an Inner-Alpine River C. Matulla & S. Schmutz	High High Very high 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	Assessing the impact of a downscaled climate change simulation on the fish fauna in an Inner-Alpine River C. Matulla & S. Schmutz & A. Melcher & T. Gerersdorfer & P. Haas 2007	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	Assessing the impact of a downscaled climate change simulation on the fish fauna in an Inner-Alpine River C. Matulla & S. Schmutz & A. Melcher & T. Gerersdorfer & P. Haas 2007	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?	No change	Assessing the impact of a downscaled climate change simulation on the fish fauna in an Inner-Alpine River C. Matulla & S. Schmutz & A. Melcher & T. Gerersdorfer & P. Haas 2007	High

Statistics	
Scores	
BRA	37.0
BRA Outcome	-
BRA+CCA	47.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	12.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	2.0
3. Invasive elsewhere	6.0
B. Biology/Ecology	25.0
4. Undesirable (or persistence) traits	8.0
5. Resource exploitation	7.0
6. Reproduction	4.0
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	
1. Domestication/Cultivation	3
2. Climate, distribution and introduction risk	3 5
	3 5 5
2. Climate, distribution and introduction risk	36
2. Climate, distribution and introduction risk 3. Invasive elsewhere	36
2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology	36
2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology / Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction	36
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	36 12 2 7 9
2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology / Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction	36 12 2 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	36 12 2 7 9 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	36 12 2 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	36 12 2 7 9 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	36 12 2 7 9 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	36 12 2 7 9 6 6 6 6 6 1 1 1 1
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	36 12 2 7 9 6 6 6 6 6 11
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	36 12 2 7 9 6 6 6 6 6 6 1 1 1 1
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	36 12 2 7 9 6 6 6 6 6 6 1 1 1 1

BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.90
BRA	0.90
CCA	0.92
- · · · · -·	

Date and Time 22/05/2021 00:51:42

Taxon and Assessor details							
Category	Fishes and Lampreys (freshwater)						
Taxon name	Oncorhynchus mykiss						
Common name	rainbow trout						
Assessor	Ivan Špelić						
Risk screening context							
Reason and socio-economic benefits							
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS						
Taxonomy							
Native range							
Introduced range							
URL							

			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?	Yes	FAO	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	No	Not harvested but farmed and used for stocking (Stanković et al. 2015).	Medium
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	No	Baruš V. and Oliva O. 1995. Fauna of the Czech and Slovak Republics. Volume 28/2. Fishes - Osteichthyes. Academia, Praha. (in Czech with English summary).	Very high
2. (Climate	, distribution and introduction risk		The effect with English Summary).	
4	2.01	How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range?	High	Climatch	Medium
5	2.02	What is the quality of the climate matching data?	Medium	Climatch	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	Stanković et al. 2015	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?		Already present (Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021)).	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	Not applicable	Already present (Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021)).	Very high
_		and intentional introductions)?			
<u>3. 1</u> 9	3.01	e elsewhere Has the taxon become naturalised (established viable populations) outside its native range?	Yes	Baruš V. and Oliva O. 1995. Fauna of the Czech and Slovak Republics. Volume 28/2. Fishes - Osteichthyes. Academia, Praha. (in Czech with English summary). Welcomme, R.L., 1988. International introductions of inland aquatic species. FAO Fish.	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or	Yes	Baruš V. and Oliva O. 1995. Fauna of the Czech and Slovak Republics. Volume 28/2. Fishes - Osteichthyes. Academia, Praha.	Very high
		commercial taxa?		(in Czech with English summary).	
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	Baruš V. and Oliva O. 1995. Fauna of the Czech and Slovak Republics. Volume 28/2. Fishes - Osteichthyes. Academia, Praha. (in Czech with English summary).	Very high
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem services?	Yes	Baruš V. and Oliva O. 1995. Fauna of the Czech and Slovak Republics. Volume 28/2. Fishes - Osteichthyes. Academia, Praha. (in Czech with English summary).	Very high
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	Species used in aquaculture, there is an impact on biodiversity but no recognized socio-economic impact for Great Lakes (Fuller et al. 2020).	Medium
В.	Biology	y/Ecology		[2020].	
		able (or persistence) traits			
14	4.01	Is it likely that the taxon will be poisonous or pose other risks to human health?	No	Baruš V. and Oliva O. 1995. Fauna of the Czech and Slovak Republics. Volume 28/2. Fishes - Osteichthyes. Academia, Praha. (in Czech with English summary).	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	Baruš V. and Oliva O. 1995. Fauna of the Czech and Slovak Republics. Volume 28/2. Fishes - Osteichthyes. Academia, Praha. (in Czech with English summary).	Very high
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	Baruš V. and Oliva O. 1995. Fauna of the Czech and Slovak Republics. Volume 28/2. Fishes - Osteichthyes. Academia, Praha. (in Czech with English summary).	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	Inhabits clear, cold waters. Not tolerating temperatures above 25 degrees Celzius and low oxygen levels (<5 mg/l) (Froese and Pauly 2019, CABI 2019).	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	No information on such impact.	High
	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	It can be beneficial for angling and aquaculture, no other impacts regonized (Jonsson, B. (2011): NOBANIS – Invasive Alien Species Fact Sheet – Oncorhynchus mykiss. – From: Online Database of the European Network on Invasive Alien Species – NOBANIS www.nobanis.org, Date of access x/x/201x.)	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 area?	Yes	Host to parasites (Stanković et al. 2015; Fuller, P., J. Larson, A. Fusaro, T.H. Makled, and M. Neilson, 2020, Oncorhynchus mykiss (Walbaum, 1792): U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, FL, https://nas.er.usgs.gov/queries/factsheet.aspx?SpeciesID=910, Revision Date: 9/12/2019, Peer Review Date: 4/1/2016, Access Date: 2/11/2020	Very high

21	1 00				
~ 1	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	Host to parasites (Stanković et al. 2015; Fuller, P., J. Larson, A. Fusaro, T.H. Makled, and M. Neilson, 2020, Oncorhynchus mykiss (Walbaum, 1792): U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, FL, https://nas.er.usgs.gov/queries/factsheet.aspx?SpeciesID=910, Revision Date: 9/12/2019, Peer Review Date: 4/1/2016, Access Date: 2/11/2020	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	Baruš V. and Oliva O. 1995. Fauna of the Czech and Slovak Republics. Volume 28/2. Fishes - Osteichthyes. Academia, Praha. (in Czech with English summary).	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	Baruš V. and Oliva O. 1995. Fauna of the Czech and Slovak Republics. Volume 28/2. Fishes - Osteichthyes. Academia, Praha. (in Czech with English summary).	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	Yes	The presence of live salmonids may have an even greater effect on nutrients in streams through the excretion of ammonium and soluable reactive phosphorus and their mechanical disturbance of	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 by way of a dormant form)?	No	the stream bottom during spawning runs (Ivan et al. 2011, Tiegs Baruš V. and Oliva O. 1995. Fauna of the Czech and Slovak Republics. Volume 28/2. Fishes - Osteichthyes. Academia, Praha. (in Czech with English summary).	High
		e exploitation	×		N/ 1 · 1
	5.01	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?	Yes Not applicable	Anglers occasionally report the presence of olm remains in the gut of caught rainbow trout (Stanković et al. 2015). No sufficient information to calculate.	Very high
	Reprodu	iction			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	Kottelat & Freyhof 2007	Very high
	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	Stanković et al. 2015	High
	6.03 6.04	native taxa?	No	Stanković et al. 2015 Kottelat & Freyhof 2007	Very high Very high
	0.01	display asexual reproduction?			very nigh
	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	Yes	Reported not to establish breeding populations if the peak emergence of fry corresponds to flood season and cold summer temperatures and if temperature does not fall below 13°C (Kottelat & Freyhof 2007).	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	Fecundity up to over 12000 eggs per female (Froese & Pauly 2019).	Very high
34	6.07	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	2	Froese & Pauly 2019	Very high
		al mechanisms	. 1		L li ala
5	7.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable	>1	Restocking, ecsapes from farms, ilegal introductions	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 restocking of protected areas with alien species, natural dispersion most unlikely because of the ecological demands of 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 adaptations (personal opinion)	Very high
38	7.04	Is natural dispersal of the taxon likely to	No	Eggs covered in gravel pit (Froese & Pauly 2019).	
		occur as eggs (for animals) or as propagules		Lygs covered in graver pic (ridese & Pauly 2019).	High
39	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 occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?	Yes	Young fish move downstream at night, shortly after emergence (Froese & Pauly 2019).	High Very high
	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 Yes	Young fish move downstream at night, shortly after emergence	
10		(for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur 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		Young fish move downstream at night, shortly after emergence (Froese & Pauly 2019). Mature individuals undertake short spawning migrations. Anadromous and lake forms may migrate long distances to	Very high
40 41	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	Young fish move downstream at night, shortly after emergence (Froese & Pauly 2019). Mature individuals undertake short spawning migrations. Anadromous and lake forms may migrate long distances to spawning streams (Froese & Pauly 2019).	Very high Very high
40 41 42 43	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	Young fish move downstream at night, shortly after emergence (Froese & Pauly 2019). Mature individuals undertake short spawning migrations. Anadromous and lake forms may migrate long distances to spawning streams (Froese & Pauly 2019). No, eggs covered with gravel (Froese and Pauly 2019).	Very high Very high Very high
10 11 12 13 13	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? <i>ce attributes</i>	Yes No Yes No	Young fish move downstream at night, shortly after emergence (Froese & Pauly 2019). Mature individuals undertake short spawning migrations. Anadromous and lake forms may migrate long distances to spawning streams (Froese & Pauly 2019). No, eggs covered with gravel (Froese and Pauly 2019). Stocking. Personal opinion	Very high Very high Very high Very high Low
40 41 42 43 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? <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	Young fish move downstream at night, shortly after emergence (Froese & Pauly 2019). Mature individuals undertake short spawning migrations. Anadromous and lake forms may migrate long distances to spawning streams (Froese & Pauly 2019). No, eggs covered with gravel (Froese and Pauly 2019). Stocking.	Very high Very high Very high Very high
40 41 42 43 8. 7 44	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 water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being	Yes No Yes No	Young fish move downstream at night, shortly after emergence (Froese & Pauly 2019). Mature individuals undertake short spawning migrations. Anadromous and lake forms may migrate long distances to spawning streams (Froese & Pauly 2019). No, eggs covered with gravel (Froese and Pauly 2019). Stocking. Personal opinion Baruš V. and Oliva O. 1995. Fauna of the Czech and Slovak Republics. Volume 28/2. Fishes - Osteichthyes. Academia, Praha. (in Czech with English summary). The rainbow trout is a hardy fish that is easy to spawn, fast growing, tolerant to a wide range of environments and handling (FAO). Rainbow trout is more temperature tolerant than native Salmonid species (Matulla et al. 2007). Better tolerance to	Very high Very high Very high Very high Low
40 41 42 43 3. 7 44	7.06 7.07 7.08 7.09 <i>oleranc</i> 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? 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	Young fish move downstream at night, shortly after emergence (Froese & Pauly 2019). Mature individuals undertake short spawning migrations. Anadromous and lake forms may migrate long distances to spawning streams (Froese & Pauly 2019). No, eggs covered with gravel (Froese and Pauly 2019). Stocking. Personal opinion Baruš V. and Oliva O. 1995. Fauna of the Czech and Slovak Republics. Volume 28/2. Fishes - Osteichthyes. Academia, Praha. (in Czech with English summary). The rainbow trout is a hardy fish that is easy to spawn, fast growing, tolerant to a wide range of environments and handling (FAO). Rainbow trout is more temperature tolerant than native	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?	Yes	Froese & Pauly 2019	High
49	8.06	Are there effective natural enemies (predators) of the taxon present in the RA	Yes	Piscivorous birds and otters (personal opinion).	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?	Not applicable	Already present (Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021)).	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?	No change	Climate change will not dramatically alter the status of rainbow trout (predicted for USA) (Isaak et al. 2010).	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	Climate change will not dramatically alter the status of rainbow trout (predicted for USA) (Isaak et al. 2010).	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	Native salmonids may be at risk of losing habitat in favour of invaders like more tolerant rainbow trout (Matulla et a. 2007).	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	Species may possibly limit upward shifts of native Salmonids, brown trout and grayling, reducing their numbers which may have effects on ecosystem.	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	Reduced numbers of grayling and brown trout may have adverse influence on salmonid sport fishing and loss in economic value (Matulla et al. 2007).	High

Statistics	
Scores	
BRA	26.0
BRA Outcome	-
BRA+CCA	32.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	11.0
1. Domestication/Cultivation	0.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	10.0
B. Biology/Ecology	15.0
4. Undesirable (or persistence) traits	5.0
5. Resource exploitation	5.0
6. Reproduction	-1.0
7. Dispersal mechanisms	1.0
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	5
3. Invasive elsewhere	5
B. Biology/Ecology	5 5 12 2 7 9
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	10
Environmental	14
Species or population nuisance traits	11
Thresholds	
	_
BRA BRA+CCA	

	BRA+CCA	-
Confidence		
	BRA+CCA	0.85
	BRA	0.87
	CCA	0.67
Date and Time		
	13/05/202	1 20.40.40

axon and Assessor details						
Category	Fishes and Lampreys (freshwater)					
Taxon name	Oncorhynchus mykiss					
Common name	rainbow trout					
Assessor	Tamara Kanjuh					
Risk screening context						
Reason and socio-economic benefits						
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS					
Taxonomy						
Native range						
Introduced range						
URL						

			Response	Justification (references and/or other information)	Confidence
A. I	Biogeo	ography/Historical			
1. L		tication/Cultivation			
1	1.01	Has the taxon been the subject of	Yes	Rainbow trout have been cultured for hundred of years, and are	Very high
		domestication (or cultivation) for at least 20		the most widely farmed trout in the world (Hardy, 2002).	
		generations?			
2	1.02	Is the taxon harvested in the wild and likely	Yes	The rainbow trout has long been used for fish farming (Hardy,	Very high
		to be sold or used in its live form?		2002).	
3	1.03	Does the taxon have invasive races,	Yes	Robert J. Behnke (2002) listed 15 subspecies of rainbow trout.	Very high
2 (Cline - t -	varieties, sub-taxa or congeners?			
2. C	2.01	e, distribution and introduction risk How similar are the climatic conditions of the	High	Dfa, Dfb (Köppen–Geiger climate classification system)	Medium
4	2.01	Risk Assessment (RA) area and the taxon's	riigii	Dia, Dib (Koppen-Geiger chinate classification system)	Medium
		native range?			
5	2.02	What is the quality of the climate matching	High	Köppen–Geiger climate classification system	Medium
5	2.02	data?	ingii	Roppen oolger ennute elussification system	licalam
6	2.03	Is the taxon already present outside of	Yes	The occurrence of a resident form of rainbow trout in the Danube	Very high
Ŭ	2.00	captivity in the RA area?		is rare but pretty regular, especially in the proximity of Djerdap	• c. ,
				dam I and II (Nikčecić, et al., 2016).	
7	2.04	How many potential vectors could the taxon	>1	Aquaculture, hunting, angling, sport fishing (Lemhardt et al.,	Very high
	1	use to enter in the RA area?		2011).	, ,
8	2.05	Is the taxon currently found in close	No	There is no established population of rainbow trout in Serbian	High
	1	proximity to, and likely to enter into, the RA		natural waters, its populations being associated with escapes from	-
	1	area in the near future (e.g. unintentional		fish farms.	
		and intentional introductions)?			
3. I	Invasiv	e elsewhere			
9	3.01	Has the taxon become naturalised	Yes	The highest abundance of suchpopulations was observed in the	Very high
	1	(established viable populations) outside its		Alpine foothills of central Europe where naturalization is notlimited	
		native range?		to modified waters less suitable for native salmonids but also	
I	1			occurs commonly inpristine and near-natural waters (Stanković et	
10	3.02	In the taxon's introduced range, are there	Yes	Native rainbow trout and other congeneric trout can suffer	Very high
		known adverse impacts to wild stocks or		significant loss of genetic diversity and integrity due to	
		commercial taxa?		hybridization with introduced hatchery populations (Pearse et al.,	
				2010; Simmons et al., 2010; Finger et al., 2011). Rainbow trout	
				can have a severe negative impact on other salmonid species	
				through redd superimposition and competition for space and food	
				(Scott&Irvine, 2000; Seiler and Keeley, 2009; Van Zwol et al.,	
				2012b). Non-native rainbow trout can also affect congeneric trout	
1.1	2.02	To the true of the durant second the second	¥	species by predation or competition, or both (Stanković et al.,	Madium
11	3.03	In the taxon's introduced range, are there	Yes	Rainbow trout have been introduced throughout the world,	Medium
		known adverse impacts to aquaculture?		negatively impacting species of native freshwater fishes and,	
	1			therefore, native fisheries	
17	3.04	In the taxon's introduced range, are there	Yes	(https://animaldiversity.org/accounts/Oncorhynchus_mykiss/). Rainbow trout have been introduced throughout the world,	Medium
12	5.04	known adverse impacts to ecosystem	105	negatively impacting species of native freshwater fishes and,	naeululli
	1	services?	1	inegatively impacting species of native meshwater insites dilu,	
	1			therefore native fisheries	
13				therefore, native fisheries (https://animaldiversity.org/accounts/Oncorhynchus_mykiss/)	
	3.05		Yes	(https://animaldiversity.org/accounts/Oncorhynchus_mykiss/).	
15	3.05	In the taxon's introduced range, are there	Yes	(https://animaldiversity.org/accounts/Oncorhynchus_mykiss/). Rainbow trout have been introduced throughout the world,	Medium
13	3.05		Yes	(https://animaldiversity.org/accounts/Oncorhynchus_mykiss/). Rainbow trout have been introduced throughout the world, negatively impacting species of native freshwater fishes and,	
15	3.05	In the taxon's introduced range, are there	Yes	(https://animaldiversity.org/accounts/Oncorhynchus_mykiss/). Rainbow trout have been introduced throughout the world, negatively impacting species of native freshwater fishes and, therefore, native fisheries	
		In the taxon's introduced range, are there	Yes	(https://animaldiversity.org/accounts/Oncorhynchus_mykiss/). Rainbow trout have been introduced throughout the world, negatively impacting species of native freshwater fishes and,	
B. I 4. (Biolog Undesir	In the taxon's introduced range, are there known adverse socio-economic impacts? y/Ecology rable (or persistence) traits		(https://animaldiversity.org/accounts/Oncorhynchus_mykiss/). Rainbow trout have been introduced throughout the world, negatively impacting species of native freshwater fishes and, therefore, native fisheries (https://animaldiversity.org/accounts/Oncorhynchus_mykiss/).	
B. I 4. (Biolog Undesir	In the taxon's introduced range, are there known adverse socio-economic impacts?		(https://animaldiversity.org/accounts/Oncorhynchus_mykiss/). Rainbow trout have been introduced throughout the world, negatively impacting species of native freshwater fishes and, therefore, native fisheries	
B. I 4. U 14	Biolog Undesir 4.01	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?	Yes	(https://animaldiversity.org/accounts/Oncorhynchus_mykiss/). Rainbow trout have been introduced throughout the world, negatively impacting species of native freshwater fishes and, therefore, native fisheries (https://animaldiversity.org/accounts/Oncorhynchus_mykiss/).	Medium
B. I 4. U 14	Biolog Undesir 4.01	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	(https://animaldiversity.org/accounts/Oncorhynchus_mykiss/). Rainbow trout have been introduced throughout the world, negatively impacting species of native freshwater fishes and, therefore, native fisheries (https://animaldiversity.org/accounts/Oncorhynchus_mykiss/). Potenitial pests (fishbase.se) Alongside hybridization, competition has been implicated in the	Medium
B. I 4. U 14	Biolog Undesir 4.01	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	(https://animaldiversity.org/accounts/Oncorhynchus_mykiss/). Rainbow trout have been introduced throughout the world, negatively impacting species of native freshwater fishes and, therefore, native fisheries (https://animaldiversity.org/accounts/Oncorhynchus_mykiss/). Potenitial pests (fishbase.se) Alongside hybridization, competition has been implicated in the extinction of the Alvord cutthroat trout (O. c. alvordensis) and in	Medium
B. I 4. U 14	Biolog Undesir 4.01	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	 (https://animaldiversity.org/accounts/Oncorhynchus_mykiss/). Rainbow trout have been introduced throughout the world, negatively impacting species of native freshwater fishes and, therefore, native fisheries (https://animaldiversity.org/accounts/Oncorhynchus_mykiss/). Potenitial pests (fishbase.se) Alongside hybridization, competition has been implicated in the extinction of the Alvord cutthroat trout (O. c. alvordensis) and in having a severe negative impact on several other cutthroat trout 	Medium
B. I 4. (14 15	Biolog Undesir 4.01 4.02	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)?	Yes	 (https://animaldiversity.org/accounts/Oncorhynchus_mykiss/). Rainbow trout have been introduced throughout the world, negatively impacting species of native freshwater fishes and, therefore, native fisheries (https://animaldiversity.org/accounts/Oncorhynchus_mykiss/). Potenitial pests (fishbase.se) Alongside hybridization, competition has been implicated in the extinction of the Alvord cutthroat trout (O. c. alvordensis) and in having a severe negative impact on several other cutthroat trout subspecies (Allendorf and Leary, 1988; Seiler and Keeley, 2009).	Medium Medium Very high
B. I 4. (14 15	Biolog Undesir 4.01	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	Yes	(https://animaldiversity.org/accounts/Oncorhynchus_mykiss/). Rainbow trout have been introduced throughout the world, negatively impacting species of native freshwater fishes and, therefore, native fisheries (https://animaldiversity.org/accounts/Oncorhynchus_mykiss/). Potenitial pests (fishbase.se) Alongside hybridization, competition has been implicated in the extinction of the Alvord cutthroat trout (O. c. alvordensis) and in having a severe negative impact on several other cutthroat trout subspecies (Allendorf and Leary, 1988; Seiler and Keeley, 2009). Introduction of salmonids into karstic waters of Adriatic Croatia	Medium
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B. I 4. (14 15	Biolog Undesir 4.01 4.02	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	Yes	 (https://animaldiversity.org/accounts/Oncorhynchus_mykiss/). Rainbow trout have been introduced throughout the world, negatively impacting species of native freshwater fishes and, therefore, native fisheries (https://animaldiversity.org/accounts/Oncorhynchus_mykiss/). Potenitial pests (fishbase.se) Alongside hybridization, competition has been implicated in the extinction of the Alvord cutthroat trout (O. c. alvordensis) and in having a severe negative impact on several other cutthroat trout subspecies (Allendorf and Leary, 1988; Seiler and Keeley, 2009). Introduction of salmonids into karstic waters of Adriatic Croatia represents a special problem as these waters host various endemic minnow-like fish, which are in danger of local and even 	Medium Medium Very high
B. I 4. (14 15	Biolog <i>Undesir</i> 4.01 4.02 4.03	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	 (https://animaldiversity.org/accounts/Oncorhynchus_mykiss/). Rainbow trout have been introduced throughout the world, negatively impacting species of native freshwater fishes and, therefore, native fisheries (https://animaldiversity.org/accounts/Oncorhynchus_mykiss/). Potenitial pests (fishbase.se) Alongside hybridization, competition has been implicated in the extinction of the Alvord cutthroat trout (O. c. alvordensis) and in having a severe negative impact on several other cutthroat trout subspecies (Allendorf and Leary, 1988; Seiler and Keeley, 2009). Introduction of salmonids into karstic waters of Adriatic Croatia represents a special problem as these waters host various endemic minnow-like fish, which are in danger of local and even total extinction due to predation by rainbow trout (Stanković et	Medium Medium Very high Very high
B. I 4. (14 15	Biolog Undesir 4.01 4.02	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	Yes	 (https://animaldiversity.org/accounts/Oncorhynchus_mykiss/). Rainbow trout have been introduced throughout the world, negatively impacting species of native freshwater fishes and, therefore, native fisheries (https://animaldiversity.org/accounts/Oncorhynchus_mykiss/). Potenitial pests (fishbase.se) Alongside hybridization, competition has been implicated in the extinction of the Alvord cutthroat trout (O. c. alvordensis) and in having a severe negative impact on several other cutthroat trout subspecies (Allendorf and Leary, 1988; Seiler and Keeley, 2009). Introduction of salmonids into karstic waters of Adriatic Croatia represents a special problem as these waters host various endemic minnow-like fish, which are in danger of local and even total extinction due to predation by rainbow trout (Stanković et Forexample,O.mykisscan survive in waters between approximately	Medium Medium Very high
B. I 4. (14 15	Biolog <i>Undesir</i> 4.01 4.02 4.03	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	Yes Yes Yes	 (https://animaldiversity.org/accounts/Oncorhynchus_mykiss/). Rainbow trout have been introduced throughout the world, negatively impacting species of native freshwater fishes and, therefore, native fisheries (https://animaldiversity.org/accounts/Oncorhynchus_mykiss/). Potenitial pests (fishbase.se) Alongside hybridization, competition has been implicated in the extinction of the Alvord cutthroat trout (O. c. alvordensis) and in having a severe negative impact on several other cutthroat trout subspecies (Allendorf and Leary, 1988; Seiler and Keeley, 2009). Introduction of salmonids into karstic waters of Adriatic Croatia represents a special problem as these waters host various endemic minnow-like fish, which are in danger of local and even total extinction due to predation by rainbow trout (Stanković et Forexample,O.mykisscan survive in waters between approximately 0.0 °C and 29.8 °C ,depending on the temperature history and 	Medium Medium Very high Very high
B. I 4. (14 15	Biolog <i>Undesir</i> 4.01 4.02 4.03	In the taxon's introduced range, are there known adverse socio-economic impacts? 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 Yes Yes	(https://animaldiversity.org/accounts/Oncorhynchus_mykiss/). Rainbow trout have been introduced throughout the world, negatively impacting species of native freshwater fishes and, therefore, native fisheries (https://animaldiversity.org/accounts/Oncorhynchus_mykiss/). Potenitial pests (fishbase.se) Alongside hybridization, competition has been implicated in the extinction of the Alvord cutthroat trout (O. c. alvordensis) and in having a severe negative impact on several other cutthroat trout subspecies (Allendorf and Leary, 1988; Seiler and Keeley, 2009). Introduction of salmonids into karstic waters of Adriatic Croatia represents a special problem as these waters host various endemic minnow-like fish, which are in danger of local and even total extinction due to predation by rainbow trout (Stanković et Forexample,O.mykisscan survive in waters between approximately 0.0 °C and 29.8 °C, depending on the temperature history and strain of the fish being tested (Rodgers&Griffiths, 1983; Currie et	Medium Medium Very high Very high
B. I 4. (14 15	Biolog <i>Undesir</i> 4.01 4.02 4.03	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	Yes Yes Yes	(https://animaldiversity.org/accounts/Oncorhynchus_mykiss/). Rainbow trout have been introduced throughout the world, negatively impacting species of native freshwater fishes and, therefore, native fisheries (https://animaldiversity.org/accounts/Oncorhynchus_mykiss/). Potenitial pests (fishbase.se) Alongside hybridization, competition has been implicated in the extinction of the Alvord cutthroat trout (O. c. alvordensis) and in having a severe negative impact on several other cutthroat trout subspecies (Allendorf and Leary, 1988; Seiler and Keeley, 2009). Introduction of salmonids into karstic waters of Adriatic Croatia represents a special problem as these waters host various endemic minnow-like fish, which are in danger of local and even total extinction due to predation by rainbow trout (Stanković et Forexample,O.mykisscan survive in waters between approximately 0.0 °C and 29.8 °C ,depending on the temperature history and strain of the fish being tested (Rodgers&Griffiths, 1983; Currie et al., 1998) and the rate of temperature change (Elliott&Elliott,	Medium Medium Very high Very high
B. I 4. (14 15	Biolog <i>Undesir</i> 4.01 4.02 4.03	In the taxon's introduced range, are there known adverse socio-economic impacts? 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 Yes Yes	 (https://animaldiversity.org/accounts/Oncorhynchus_mykiss/). Rainbow trout have been introduced throughout the world, negatively impacting species of native freshwater fishes and, therefore, native fisheries (https://animaldiversity.org/accounts/Oncorhynchus_mykiss/). Potenitial pests (fishbase.se) Alongside hybridization, competition has been implicated in the extinction of the Alvord cutthroat trout (0. c. alvordensis) and in having a severe negative impact on several other cutthroat trout subspecies (Allendorf and Leary, 1988; Seiler and Keeley, 2009). Introduction of salmonids into karstic waters of Adriatic Croatia represents a special problem as these waters host various endemic minnow-like fish, which are in danger of local and even total extinction due to predation by rainbow trout (Stanković et Forexample,O.mykisscan survive in waters between approximately 0.0 °C and 29.8 °C , depending on the temperature history and strain of the fish being tested (Rodgers&Griffiths, 1983; Currie et al., 1998) and the rate of temperature range for survival, or for	Medium Medium Very high Very high
B. I 4. (14 15	Biolog <i>Undesir</i> 4.01 4.02 4.03	In the taxon's introduced range, are there known adverse socio-economic impacts? 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 Yes Yes	 (https://animaldiversity.org/accounts/Oncorhynchus_mykiss/). Rainbow trout have been introduced throughout the world, negatively impacting species of native freshwater fishes and, therefore, native fisheries (https://animaldiversity.org/accounts/Oncorhynchus_mykiss/). Potenitial pests (fishbase.se) Alongside hybridization, competition has been implicated in the extinction of the Alvord cutthroat trout (O. c. alvordensis) and in having a severe negative impact on several other cutthroat trout subspecies (Allendorf and Leary, 1988; Seiler and Keeley, 2009). Introduction of salmonids into karstic waters of Adriatic Croatia represents a special problem as these waters host various endemic minnow-like fish, which are in danger of local and even total extinction due to predation by rainbow trout (Stanković et Forexample,O.mykisscan survive in waters between approximately 0.0 °C and 29.8 °C ,depending on the temperature history and strain of the fish being tested (Rodgers&Griffiths, 1983; Currie et al., 1998) and the rate of temperature range (Elliott&Elliott, 1995). However, within this temperature range for survival, or for any other variable,O.mykisshave a preferred range in which	Medium Medium Very high Very high
B. I 4. (14 15	Biolog <i>Undesir</i> 4.01 4.02 4.03	In the taxon's introduced range, are there known adverse socio-economic impacts? 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 Yes Yes	 (https://animaldiversity.org/accounts/Oncorhynchus_mykiss/). Rainbow trout have been introduced throughout the world, negatively impacting species of native freshwater fishes and, therefore, native fisheries (https://animaldiversity.org/accounts/Oncorhynchus_mykiss/). Potenitial pests (fishbase.se) Alongside hybridization, competition has been implicated in the extinction of the Alvord cutthroat trout (0. c. alvordensis) and in having a severe negative impact on several other cutthroat trout subspecies (Allendorf and Leary, 1988; Seiler and Keeley, 2009). Introduction of salmonids into karstic waters of Adriatic Croatia represents a special problem as these waters host various endemic minnow-like fish, which are in danger of local and even total extinction due to predation by rainbow trout (Stanković et Forexample,O.mykisscan survive in waters between approximately 0.0 °C and 29.8 °C , depending on the temperature history and strain of the fish being tested (Rodgers&Griffiths, 1983; Currie et al., 1998) and the rate of temperature range for survival, or for	Medium Medium Very high Very high

18	4.05	Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it	Yes	Reduction of rainbow trout densities led to compensatory responses in other components of the Castle Lake fish assemblage	High
		has invaded or is likely to invade the RA area?		as brook trout and golden shiners increased in abundance. This compensation resulted in increased rates of vertebrate planktivory	
				on daphnids within 2 yr after trout stocking was discontinued. Zooplankton shifts in response to discontinuance of trout stocking were more rapid, particularly an immediate increase in a	
.9	4.06	Is the taxon likely to exert adverse impacts	No	previously rare invertebrate predator (Diacvclops thomasi) (Elser Recreational fishing is a multifaceted activity with complex	Medium
0	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	benefits for individuals and society (Liu et al., 2019). No information found.	Low
1	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	No	No information found.	Low
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	No information found.	Low
. 2	4.05	size that will make it more likely to be released from captivity?			Low
23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g.	Yes	The study showed that the highest trout densities were found in the fastest flowing waters (based on volume throughput estimates	Very high
		versatile in habitat use)?		of individual streams). The highest trout densities were recorded in water velocities of 45.6 – 76.0 cm*sec-1. However, trout have also been recorded in high abundance in water speeds exceeding	
1	4.11	Is it likely that the taxon's mode of existence	Yes	156-321 cm*sec-1 (Varley&Gresswell, 1988). Rainbow trout can have a severe negative impact on other	High
-	7.11	(e.g. excretion of by-products) or behaviours	103	salmonid species through redd superimposition and competition	, iigii
		(e.g. feeding) will reduce habitat quality for native taxa?		for space and food (Scott&Irvine, 2000; Seiler&Keeley, 2009; Van Zwol et al., 2012b).	
5	4.12	Is the taxon likely to maintain a viable	Yes	The evidence for stronger dominance hierarchies in the 10 kg	Low
		population even when present in low densities (or persisting in adverse conditions		m-3 treatment, indicate that low as well as high stocking densities have the potential to adversely affect trout welfare	
	Resour	by way of a dormant form)?		(North et al., 2006).	
	5.01	Is the taxon likely to consume threatened or	Yes	Introduction of salmonids into karstic waters of Adriatic Croatia	Very high
		protected native taxa in the RA area?		represents a special problem as these waters host various endemic minnow-like fish, which are in danger of local and even	
				total extinction due to predation by rainbow trout. This has	
				already happened with the striped minnow (Telestes metohiensis) in the River Ljuta (Zupančič&Bogutskaya, 2002; Zupančič, 2008).	
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 found.	Low
	Reprod	uction	NI-	There is an annual source of the mest of the same (Deishow Trant	Madium
	6.01	Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?	No	There is no parental care of the nest or the eggs (Rainbow Trout - Lake Superior Streams, https://www.lakesuperiorstreams.org).	Medium
29	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	Recent records on naturalized rainbow trout populations in Croatia are rare. MacCrimmon (1971) reported self-sustaining rainbow trout populations from the disappearing river systems of Gacka and Dretulja and in Plitvice Lakes, all in Lika County. Recently, a self-sustaining population was observed in the karstic disappearing river system Ljuta near Dubrovnik (Zupančič&Bogutskaya, 2002; Zupančič, 2008; unpublished personal observations), in River Jadro and Žrnovnica near Split, and in an artificial canal of the Drava near Prolog (Nikica Šprem, personal communication: unpublished personal observations).	Very high
0	6.03	Is the taxon likely to hybridise naturally with native taxa?	Yes	Native rainbow trout and other congeneric trout can suffer significant loss of genetic diversity and integrity due to	Very high
				hybridization with introduced hatchery populations (Pearse et al., 2010; Simmons et al., 2010; Finger et al., 2011). Such accounts are reported throughout the entire range of North American native trout. Hybridization has especially affected the inland resident redband trout of the Columbia, Sacramento and northern Great basins, the subspecies of the Kern River basin, Gila trout (Oncorhynchus gilae gilae) from Arizona and Apache trout (O.g.	
31	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	No	hybridization with introduced hatchery populations (Pearse et al., 2010; Simmons et al., 2010; Finger et al., 2011). Such accounts are reported throughout the entire range of North American native trout. Hybridization has especially affected the inland resident redband trout of the Columbia, Sacramento and northerm Great basins, the subspecies of the Kern River basin, Gila trout	Medium
	6.04	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	 hybridization with introduced hatchery populations (Pearse et al., 2010; Simmons et al., 2010; Finger et al., 2011). Such accounts are reported throughout the entire range of North American native trout. Hybridization has especially affected the inland resident redband trout of the Columbia, Sacramento and northern Great basins, the subspecies of the Kern River basin, Gila trout (Oncorhynchus gilae gilae) from Arizona and Apache trout (O. g. anache) from New Mexico. along with many subspecies of No information found. Cover, defined as sheltered areas in a stream where trout can rest or hide from predators (i.e. snags, logs, undercut banks, large rocks, etc), was positively correlated with trout abundance. The best trout areas had in excess of 55% of the available area of the stream containing some form of cover. The most inadequate 	
32		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		hybridization with introduced hatchery populations (Pearse et al., 2010; Simmons et al., 2010; Finger et al., 2011). Such accounts are reported throughout the entire range of North American native trout. Hybridization has especially affected the inland resident redband trout of the Columbia, Sacramento and northern Great basins, the subspecies of the Kern River basin, Gila trout (Oncorhynchus gilae gilae) from Arizona and Apache trout (O. g. anache) from New Mexico. along with many subspecies of No information found. Cover, defined as sheltered areas in a stream where trout can rest or hide from predators (i.e. snags, logs, undercut banks, large rocks, etc), was positively correlated with trout abundance. The best trout areas had in excess of 55% of the available area of the stream containing some form of cover. The most inadequate streams still had cover, but less than 10% of the area of a stream Female rainbow trout usually produce 2000 to 3000 4-to-5- millimetre eggs per kilogram of weight (Tyler et al., 1996). Range	Medium
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	 hybridization with introduced hatchery populations (Pearse et al., 2010; Simmons et al., 2010; Finger et al., 2011). Such accounts are reported throughout the entire range of North American native trout. Hybridization has especially affected the inland resident redband trout of the Columbia, Sacramento and northern Great basins, the subspecies of the Kern River basin, Gila trout (Oncorhynchus gilae gilae) from Arizona and Apache trout (O. g. anache) from New Mexico. along with many subspecies of No information found. Cover, defined as sheltered areas in a stream where trout can rest or hide from predators (i.e. snags, logs, undercut banks, large rocks, etc), was positively correlated with trout abundance. The best trout areas had in excess of 55% of the available area of the stream containing some form of cover. The most inadequate streams still had cover, but less than 10% of the area of a stream Female rainbow trout usually produce 2000 to 3000 4-to-5-millimetre eggs per kilogram of weight (Tyler et al., 1996). Range number of offspring 200 to 8000 (https://animaldiversity.org/accounts/Oncorhynchus_mykiss/). 	Medium High Medium
3	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	 hybridization with introduced hatchery populations (Pearse et al., 2010; Simmons et al., 2010; Finger et al., 2011). Such accounts are reported throughout the entire range of North American native trout. Hybridization has especially affected the inland resident redband trout of the Columbia, Sacramento and northerm Great basins, the subspecies of the Kern River basin, Gila trout (Oncorhynchus gilae gilae) from Arizona and Apache trout (O. g. anache) from New Mexico. along with many subspecies of No information found. Cover, defined as sheltered areas in a stream where trout can rest or hide from predators (i.e. snags, logs, undercut banks, large rocks, etc), was positively correlated with trout abundance. The best trout areas had in excess of 55% of the available area of the stream containing some form of cover. The most inadequate streams still had cover, but less than 10% of the area of a stream Female rainbow trout usually produce 2000 to 3000 4-to-5-millimetre eggs per kilogram of weight (Tyler et al., 1996). Range number of offspring 200 to 8000 	Medium High
3	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 Yes 3	 hybridization with introduced hatchery populations (Pearse et al., 2010; Simmons et al., 2010; Finger et al., 2011). Such accounts are reported throughout the entire range of North American native trout. Hybridization has especially affected the inland resident redband trout of the Columbia, Sacramento and northern Great basins, the subspecies of the Kern River basin, Gila trout (Oncorhynchus gilae gilae) from Arizona and Apache trout (O. g. anache) from New Mexico. along with many subspecies of No information found. Cover, defined as sheltered areas in a stream where trout can rest or hide from predators (i.e. snags, logs, undercut banks, large rocks, etc), was positively correlated with trout abundance. The best trout areas had in excess of 55% of the available area of the stream containing some form of cover. The most inadequate streams still had cover, but less than 10% of the area of a stream Female rainbow trout usually produce 2000 to 3000 4-to-5-millimetre eggs per kilogram of weight (Tyler et al., 1996). Range number of offspring 200 to 8000 (https://animaldiversity.org/accounts/Oncorhynchus_mykiss/). As a result, temperature and food availability influence growth and maturation, causing age at maturity to vary; though it is usually 3-4 years (fao.org). 	Medium High Medium High
3 3 4 7. 1	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	hybridization with introduced hatchery populations (Pearse et al., 2010; Simmons et al., 2010; Finger et al., 2011). Such accounts are reported throughout the entire range of North American native trout. Hybridization has especially affected the inland resident redband trout of the Columbia, Sacramento and northern Great basins, the subspecies of the Kern River basin, Gila trout (Oncorhynchus gilae gilae) from Arizona and Apache trout (O. g. anache) from New Mexico. along with many subspecies of No information found. Cover, defined as sheltered areas in a stream where trout can rest or hide from predators (i.e. snags, logs, undercut banks, large rocks, etc), was positively correlated with trout abundance. The best trout areas had in excess of 55% of the area of a stream Still had cover, but less than 10% of the area of a stream Female rainbow trout usually produce 2000 to 3000 4-to-5-millimetre eggs per kilogram of weight (Tyler et al., 1996). Range number of offspring 200 to 8000 (https://animaldiversity.org/accounts/Oncorhynchus_mykiss/). As a result, temperature and food availability influence growth and maturation, causing age at maturity to vary; though it is	Medium High 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	No information found.	Low
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 information found.	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	Other than these established populations, adults have been frequently captured during many years in streams all along the estuary. Given that no reproduction has been detected in these rivers, captures are believed to be composed of vagrant fish	Medium
40	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	Yes	Rainbow trout populations in Lake Constance should receive special attention as they exhibit migratory behavior. Individuals leave the lake and migrate upstream for spawning where, presumably, they compete with brown trout for spawning grounds	Medium
41	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No	(Peter, 1997; Dußling&Berg, 2001). No information found.	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	Yes	Expansion for sport fishing.	Medium
43	7.09	unintentional or intentional) likely to be Is dispersal of the taxon density dependent?	Yes	The evidence for stronger dominance hierarchies in the 10 kg $m-3$ treatment, indicate that low as well as high stocking densities have the potential to adversely affect trout welfare	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 cycle?	No	It cannot survive out of the water.	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.]	No	Oxygen concentration has been identified as the critical factor for the survival of O.mykiss from spawning to hatching (Rubin 1998). Although O.mykiss have been recorded in a range of dissolved oxygen levels (2.6 - 8.6 mg.L-1 (Thurston et al., 1981), <1.0 - 5.0 mg.L-1 (Matthews&Berg 1997)), sub-lethal effects have been recorded in O.mykiss and other salmonids at moderate levels of dissolved oxygen. For example, the distribution of adult O.mykiss was observed to be restricted to areas where dissolved oxygen concentrations were above 2.5 mg.L-1 (Rowe&Chisnall 1995).	High
46	8.03	Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	Yes	Although some areas still intentionally stock rainbow trout, other areas are attempting to cut down on rainbow trout numbers. There are two main methods to remove the fish: fish traps and electro-fishing. Electro-fishing only stuns the fish, so it has the added benefit of allowing scientists to monitor populations of other fish while also removing rainbow trout. These methods are currently employed by rangers at the Grand Canyon National Park, where they're attempting to remove non-native trout to help the recovery of the native humpback chub (http://www.invasivespeciesinitiative.com/rainbow-trout).	High
47	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	No	No information found.	Low
48	8.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in	Yes	In terms of a tolerance range to salinity, both O.mykiss and S.trutta appear to be able to cope with salinities between 0 - 35	High
49	8.06	its usual environment? Are there effective natural enemies (predators) of the taxon present in the RA area?	Yes	% (Molony, 2001). The rainbow trout is prey for larger fish, fish eating birds, including herons and kingfishers, and mammals (https://www.chesapeakebay.net/discover/field- auide/entry/rainbow trout)	Medium
		e change			
		change	D		Mardin
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	Warming of rivers can be assumed to affect these populations by exceeding temperature preference and tolerance limits (Matulla et al., 2007).	Medium
51	9.02	Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase,	Decrease	Warming of rivers can be assumed to affect these populations by exceeding temperature preference and tolerance limits (Matulla et al., 2007).	Medium
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	Warming of rivers can be assumed to affect these populations by exceeding temperature preference and tolerance limits (Matulla et al., 2007).	Medium
53	9.04	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity	Lower	Warming of rivers can be assumed to affect these populations by exceeding temperature preference and tolerance limits (Matulla et al., 2007).	Medium
54	9.05	and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of	Lower	Warming of rivers can be assumed to affect these populations by exceeding temperature preference and tolerance limits (Matulla et al., 2007).	Medium
5.		future potential impacts on ecosystem structure and/or function?			

Statistics	
Scores	
BRA	38.0
BRA Outcome	-
BRA+CCA	26.0
BRA+CCA Outcome	-
BIAT CEA OUCCOME	

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	14.0
4. Undesirable (or persistence) traits	8.0
5. Resource exploitation	5.0
6. Reproduction	1.0
7. Dispersal mechanisms	3.0
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	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	
C. Climate change	6
9. Climate change	6
Sectors affected	
Commercial	17
Environmental	8
Species or population nuisance traits	6
Thresholds	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.63
BRA	0.64
CCA	0.50
Date and Time	
28/05/20	021 08:59:34

Faxon and Assessor details						
Category	Fishes and Lampreys (freshwater)					
Taxon name	Oncorhynchus mykiss					
Common name	rainbow trout					
Assessor	Tena Radocaj					
Risk screening context						
Reason and socio-economic benefits						
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS					
Taxonomy						
Native range						
Introduced range						
URL						

			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	Baruš V. and Oliva O. 1995. Fauna of the Czech and Slovak Republics. Volume 28/2. Fishes - Osteichthyes. Academia, Praha. (in Czech with English summary).	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	Rainbow trout is most important trout species in croatia aquaculture (90 %)	Medium
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	No	Baruš V. and Oliva O. 1995. Fauna of the Czech and Slovak Republics. Volume 28/2. Fishes - Osteichthyes. Academia, Praha.	Very high
				(in Czech with English summary).	
		, 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?	High	Baruš V. and Oliva O. 1995. Fauna of the Czech and Slovak Republics. Volume 28/2. Fishes - Osteichthyes. Academia, Praha. (in Czech with English summary).	High
5	2.02	What is the quality of the climate matching data?	High	Baruš V. and Oliva O. 1995. Fauna of the Czech and Slovak Republics. Volume 28/2. Fishes - Osteichthyes. Academia, Praha. (in Czech with English summary). plus climatch	Very high
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	R. trout is present in Croatia	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	None	R. trout is present in Croatia	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)?	Not applicable	not applicable	Very high
3. I		e elsewhere			
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	Baruš V. and Oliva O. 1995. Fauna of the Czech and Slovak Republics. Volume 28/2. Fishes - Osteichthyes. Academia, Praha. (in Czech with English summary). Welcomme, R.L., 1988. International introductions of inland aquatic species. FAO Fish.	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	Baruš V. and Oliva O. 1995. Fauna of the Czech and Slovak Republics. Volume 28/2. Fishes - Osteichthyes. Academia, Praha. (in Czech with English summary).	Very high
		In the taxon's introduced range, are there known adverse impacts to aquaculture?	Yes	Baruš V. and Oliva O. 1995. Fauna of the Czech and Slovak Republics. Volume 28/2. Fishes - Osteichthyes. Academia, Praha. (in Czech with English summary).	Very high
		In the taxon's introduced range, are there known adverse impacts to ecosystem services?	Yes	Baruš V. and Oliva O. 1995. Fauna of the Czech and Slovak Republics. Volume 28/2. Fishes - Osteichthyes. Academia, Praha. (in Czech with English summary).	Very high
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	Yes	Baruš V. and Oliva O. 1995. Fauna of the Czech and Slovak Republics. Volume 28/2. Fishes - Osteichthyes. Academia, Praha. (in Czech with English summary).	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	Baruš V. and Oliva O. 1995. Fauna of the Czech and Slovak Republics. Volume 28/2. Fishes - Osteichthyes. Academia, Praha. (in Czech with English summary).	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	Baruš V. and Oliva O. 1995. Fauna of the Czech and Slovak Republics. Volume 28/2. Fishes - Osteichthyes. Academia, Praha. (in Czech with English summary).	Very high
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	Baruš V. and Oliva O. 1995. Fauna of the Czech and Slovak Republics. Volume 28/2. Fishes - Osteichthyes. Academia, Praha. (in Czech with English summary).	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	R. trout adapted on climate and another environmental condition in RA area, it has developed self-sustaining populations in Croatia	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	Maybe, there is a possibility that the taxon will impair the nutritional structure and function of the ecosystem in the RA area. Becasue of that Rainbow trout are known to have damaged native species populations (through competition and predation). (Hasegawa, K. Invasions of rainbow trout and brown trout in Japan: A comparison of invasiveness and impact on native species. Ecology of Freshwater Fish.)	High
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	The taxon will not adversely affect ecosystem services in the RA area. There is no recorded negative impact on aquaculture.	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	Yes, the taxon may be a host or vector of known pests and infectious agents endemic to RA area. Because in every area exist infectious agents and pests.	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	Rainbow trout were infected concomitantly with Argulus coregoni and Flavobacterium columnare (Bandilla, M., Valtonen, E. T., Suomalainen, L. R., Aphalo, P. J., & Hakalahti, T. (2006). A link between ectoparasite infection and susceptibility to bacterial disease in rainbow trout. International journal for parasitology,	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	Baruš V. and Oliva O. 1995. Fauna of the Czech and Slovak Republics. Volume 28/2. Fishes - Osteichthyes. Academia, Praha. (in Czech with English summary).	Very high
23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g.	Yes	Baruš V. and Oliva O. 1995. Fauna of the Czech and Slovak Republics. Volume 28/2. Fishes - Osteichthyes. Academia, Praha.	Very 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	(in Czech with English summary). Baruš V. and Oliva O. 1995. Fauna of the Czech and Slovak Republics. Volume 28/2. Fishes - Osteichthyes. Academia, Praha. (in Czech with English summary).	Very high
25	4.12	Is the taxon likely to maintain a viable	No	Baruš V. and Oliva O. 1995. Fauna of the Czech and Slovak	High
-		population even when present in low densities (or persisting in adverse conditions by way of a dormant form)?		Republics. Volume 28/2. Fishes - Osteichthyes. Academia, Praha. (in Czech with English summary).	5
		e exploitation			
26	5.01	Is the taxon likely to consume threatened or protected native taxa in the RA area?	Yes	The diet sometimes includes native salmonids and other fish species. It is possible that it consume endangered and protected native taxa in the RA area. If there are protected taxa in the RA	Medium
27	5.02	Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?	Not applicable	area will consume them, whether or not the taxon is endangered. not applicable	Very high
5. F	Reprodu				
		Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response	No	Baruš V. and Oliva O. 1995. Fauna of the Czech and Slovak Republics. Volume 28/2. Fishes - Osteichthyes. Academia, Praha.	Very high
29	6.02	to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	(in Czech with English summary). Baruš V. and Oliva O. 1995. Fauna of the Czech and Slovak Republics. Volume 28/2. Fishes - Osteichthyes. Academia, Praha.	High
30	6.03		No	(in Czech with English summary). Baruš V. and Oliva O. 1995. Fauna of the Czech and Slovak Republics. Volume 28/2. Fishes - Osteichthyes. Academia, Praha.	Very high
31	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	No	(in Czech with English summary). Baruš V. and Oliva O. 1995. Fauna of the Czech and Slovak Republics. Volume 28/2. Fishes - Osteichthyes. Academia, Praha.	Very high
32	6.05	Is the taxon dependent on the presence of	No	(in Czech with English summary). Baruš V. and Oliva O. 1995. Fauna of the Czech and Slovak	Very high
33	6.06	another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a	No	Republics. Volume 28/2. Fishes - Osteichthyes. Academia, Praha. (in Czech with English summary). Baruš V. and Oliva O. 1995. Fauna of the Czech and Slovak	Very high
		large number of propagules or offspring within a short time span (e.g. < 1 year)?	2	Republics. Volume 28/2. Fishes - Osteichthyes. Academia, Praha. (in Czech with English summary).	
34	6.07	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	2	Baruš V. and Oliva O. 1995. Fauna of the Czech and Slovak Republics. Volume 28/2. Fishes - Osteichthyes. Academia, Praha. (in Czech with English summary).	Very high
7. L	Dispersa	al mechanisms			
35	7.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable	>1	1. anglers for recreational fishing 2. flooding 3. natural spread via natural and manmade watercourses (Hasegawa, K. Invasions of rainbow trout and brown trout in Japan: A comparison of	Medium
36	7.02	habitats nearby)? Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)?	Yes	invasiveness and impact on native species. Ecology of Freshwater This species is present in protect area.	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	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	Baruš V. and Oliva O. 1995. Fauna of the Czech and Slovak Republics. Volume 28/2. Fishes - Osteichthyes. Academia, Praha. (in Czech with English summary).	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	Yes	Baruš V. and Oliva O. 1995. Fauna of the Czech and Slovak Republics. Volume 28/2. Fishes - Osteichthyes. Academia, Praha. (in Czech with English summary).	High
10	7.06	area? Are older life stages of the taxon likely to migrate in the RA area for reproduction?	Yes	Baruš V. and Oliva O. 1995. Fauna of the Czech and Slovak Republics. Volume 28/2. Fishes - Osteichthyes. Academia, Praha. (in Czech with English summary).	Very high
1	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No	Baruš V. and Oliva O. 1995. Fauna of the Czech and Slovak Republics. Volume 28/2. Fishes - Osteichthyes. Academia, Praha. (in Czech with English summary).	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 a possibility of a high rate of spread of taxa. Eg. if a fertilized individual enters a new area by any means of expansion.	Medium
13	7.09	unintentional or intentional) likely to be Is dispersal of the taxon density dependent?	No	Baruš V. and Oliva O. 1995. Fauna of the Czech and Slovak Republics. Volume 28/2. Fishes - Osteichthyes. Academia, Praha. (in Czech with English summary).	High
3, 7	Toleran	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	Baruš V. and Oliva O. 1995. Fauna of the Czech and Slovak Republics. Volume 28/2. Fishes - Osteichthyes. Academia, Praha. (in Czech with English summary).	Very high
15	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	Baruš V. and Oliva O. 1995. Fauna of the Czech and Slovak Republics. Volume 28/2. Fishes - Osteichthyes. Academia, Praha. (in Czech with English summary).	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	Not applicable	Baruš V. and Oliva O. 1995. Fauna of the Czech and Slovak Republics. Volume 28/2. Fishes - Osteichthyes. Academia, Praha.	Very high
17	8.04	agents/means? Is the taxon likely to tolerate or benefit from environmental/human disturbance?	No	(in Czech with English summary). Baruš V. and Oliva O. 1995. Fauna of the Czech and Slovak Republics. Volume 28/2. Fishes - Osteichthyes. Academia, Praha. (in Czech with English summary).	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	Baruš V. and Oliva O. 1995. Fauna of the Czech and Slovak Republics. Volume 28/2. Fishes - Osteichthyes. Academia, Praha. (in Czech with English summary).	Very high
49	8.06	Are there effective natural enemies (predators) of the taxon present in the RA area?	No	Baruš V. and Oliva O. 1995. Fauna of the Czech and Slovak Republics. Volume 28/2. Fishes - Osteichthyes. Academia, Praha. (in Czech with English summary).	Very high
		e change			
-		change			T
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?	Not applicable	not applicable	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 risk of a taxon becoming domesticated is increasing. Rainbow trout (Oncorhynchus mykiss), is better adapted to higher water temperatures. Matulla, C., Schmutz, S., Melcher, A., Gerersdorfer, T., & Haas, P. (2007). Assessing the impact of a downscaled climate change simulation on the fish fauna in an Inner-Alpine River. International journal of biometeorology, 52(2), 127-137.	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	The risk of distribution of this taxon is increased. Matulla, C., Schmutz, S., Melcher, A., Gerersdorfer, T., & Haas, P. (2007). Assessing the impact of a downscaled climate change simulation on the fish fauna in an Inner-Alpine River. International journal of biometeorology, 52(2), 127-137.	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	Increase	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	Rainbow trout are known to have damaged native species populations (through competition and predation). Matulla, C., Schmutz, S., Melcher, A., Gerersdorfer, T., & Haas, P. (2007). Assessing the impact of a downscaled climate change simulation on the fish fauna in an Inner-Alpine River. International journal of	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	Matulla, C., Schmutz, S., Melcher, A., Gerersdorfer, T., & Haas, P. (2007). Assessing the impact of a downscaled climate change simulation on the fish fauna in an Inner-Alpine River. International journal of biometeorology, 52(2), 127-137.	Medium

Statistics	
Scores	
BRA	38.0
BRA Outcome	-
BRA+CCA	48.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	20.0
1. Domestication/Cultivation	2.0
2. Climate, distribution and introduction risk	0.0
3. Invasive elsewhere	18.0
B. Biology/Ecology	18.0
4. Undesirable (or persistence) traits	8.0
5. Resource exploitation	5.0
6. Reproduction	0.0
7. Dispersal mechanisms	2.0
8. Tolerance attributes	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 3 5
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 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 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 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	13 3 5 5 36 12 2 7 9 6 6 6 6 19
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 6 6 6 6 6 6 19 19
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 19
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 19 19
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 6 6 6 6 6 19 19

BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.83
BRA	0.86
CCA	0.58
Date and Time	

02/06/2020 09:54:41

Taxon and Assessor details		
Category	Fishes and Lampreys (freshwater)	
Taxon name	Oncorhynchus tshawytscha	
Common name	chinook salmon	
Assessor	Ana Marić	
Risk screening context		
Reason and socio-economic benefits		
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS	
Taxonomy		
Native range		
Introduced range		
URL		

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
	1	ication/Cultivation			
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	Genetic Variation within and Between Domesticated Chinook Salmon, Oncorhynchus tshawytscha, Strains and their Progenitor Populations Ji Eun Kim, Ruth E. Withler, Carol Ritland & Kimberly	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	Genetic Variation within and Between Domesticated Chinook Salmon, Oncorhynchus tshawytscha, Strains and their Progenitor Populations Ji Eun Kim, Ruth E. Withler, Carol Ritland & Kimberly M. Cheng. 2004 https://www.fisheries.noaa.gov/species/chinook-	Very high
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	https://www.cabi.org/isc/datasheet/71815#toidentity incasive itself? and rainbow trout	Very high
		, distribution and introduction risk	1		T
4	2.01	How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range?	Medium	Koppen Geiger climate system	High
5	2.02	What is the quality of the climate matching data?	Medium	climach 11/26 in 5 in target region, 10-8-5-3-1 in source region of 653	Very high
6	2.03	Is the taxon already present outside of captivity in the RA area?	No	Identifying threats from introduced a 1 nd translocated non-native freshwater fishes in neighbouring countries under current and future climatic conditions Tena Radočaj a, Ivan Špelić a, Lorenzo Vilizzi b, *, Meta Povž c, Marina Piria. 2021	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	Stocking	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	Identifying threats from introduced a 1 nd translocated non-native freshwater fishes in neighbouring countries under current and future climatic conditions Tena Radočaj a, Ivan Špelić a, Lorenzo	Very high
3 1	nvacive	and intentional introductions)?		Vilizzi b, *, Meta Povž c, Marina Piria 2021	
<u>3. 1</u> 9	3.01	Has the taxon become naturalised	Yes	Impacts of Introduced and Translocated Freshwater Fishes in	Very high
10	3.02	(established viable populations) outside its In the taxon's introduced range, are there known adverse impacts to wild stocks or	Yes	Australia A.H. ARTHINGTON. 1989 Impacts of Introduced and Translocated Freshwater Fishes in Australia A.H. ARTHINGTON 1989. Center for Catchment and In-st	Very high
11	3.03	commercial taxa? In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	ream Research. Establishment of Chinook salmon (Oncorhynchus tshawytscha) in Pacific basins of southern South America and its potential	Very high
12	3.04	In the taxon's introduced range, are there	No	ecosystem implications. DORIS SOTO1, 2, IVÁN ARISMENDI1, CECILIA DI PRINZIO3 & FERNANDO JARA 2007 https://www.fishbase.se/summary/Oncorhynchus-	High
		known adverse impacts to ecosystem services?		tshawytscha.html Establishment of Chinook salmon (Oncorhynchus tshawytscha) in Pacific basins of southern South America and its potential ecosystem implications. DORIS SOTO1, 2, IVÁN ARISMENDI1, CECILIA DI PRINZIO3 & FERNANDO JARA	
	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	Establishment of Chinook salmon (Oncorhynchus tshawytscha) in Pacific basins of southern South America and its potential ecosystem implications. DORIS SOTO1, 2, IVÁN ARISMENDI1, CECILIA DI PRINZIO3 & FERNANDO JARA 2007	High
		//Ecology			
		able (or persistence) traits	N		Manual 1
	4.01	Is it likely that the taxon will be poisonous or pose other risks to human health?		https://www.fishbase.se/summary/Oncorhynchus- tshawytscha.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	Impacts of Introduced and Translocated Freshwater Fishes in Australia A.H. ARTHINGTON Center for Catchment and In-st ream Research. 1989	High
	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	https://www.fishbase.se/summary/Oncorhynchus- tshawytscha.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	https://www.cabi.org/isc/datasheet/71815#toclimate	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	Impacts of Introduced and Translocated Freshwater Fishes in Australia A.H. ARTHINGTON Center for Catchment and In-st ream Research. 1989	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/71815#toclimate	High
20	4.07	act as a vector for, recognised pests and infectious agents that are endemic in the RA	Yes	Marine netpen farming leads to infections with some unusual parasites Author links open overlay panelMichael LKent 2000	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	Marine netpen farming leads to infections with some unusual parasites Author links open overlay panelMichael LKent	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	https://www.cabi.org/isc/datasheet/71815#topathwayCauses	Very high

	area posed by the taxon likely to increase,			
9.01	Under the predicted future climatic conditions, are the risks of entry into the RA	No change	Stocking	Very high
	change	No change	Stocking	Very high
	e change			
0.00	(predators) of the taxon present in the RA	103		very night
9 8.06	its usual environment? Are there effective natural enemies	Yes	https://www.cabi.org/isc/datasheet/71815#tonaturalEnemies	Very high
8 8.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in	Yes	https://www.fishbase.se/summary/Oncorhynchus- tshawytscha.html	High
7 8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	No	https://www.cabi.org/isc/datasheet/71815#toriskAndImpactFactor s	Medium
	the wild with chemical, biological, or other agents/means?		s	
8.03	relevant water quality variable(s) being Can the taxon be controlled or eradicated in	No		Very high
	water quality conditions relevant to that taxon? [In the Justification field, indicate the		s oxygen, amonia	
8.02	one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of	No	https://www.cabi.org/isc/datasheet/71815#toriskAndImpactFactor	High
8.01	Is the taxon able to withstand being out of water for extended periods (e.g. minimum of	No	https://www.cabi.org/isc/datasheet/71815#toriskAndImpactFactor s	High
Tolora			RICHARD W. ZABEL,* MARK D. SCHEUERELL, MICHETTF M. McCLURE, AND JOHN G. WILLIAMS. 2006	
3 7.09	unintentional or intentional) likely to be Is dispersal of the taxon density dependent?	Yes	The Interplay between Climate Variability and Density Dependence in the Population Viability of Chinook Salmon	High
_ /.00	vectors/pathways mentioned in the previous seven questions (35–41; i.e. both		s	, iigii
2 7.08	be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the	No	tshawytscha.html	High
7.07	migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to	No	tshawytscha.html https://www.fishbase.se/summary/Oncorhynchus-	Very high
7.06	area? Are older life stages of the taxon likely to	Yes	https://www.fishbase.se/summary/Oncorhynchus-	Very high
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	https://www.fishbase.se/summary/Oncorhynchus- tshawytscha.html	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?	No	https://www.fishbase.se/summary/Oncorhynchus- tshawytscha.html	Very high
2.04	attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal?	No	http://www.fichbaco.co/commany/Operation-to	Vonchist
7.03	protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively	No	https://www.fisheries.noaa.gov/species/chinook-salmon	High
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	Stocing protected area	High
7.01	How many potential internal vectors/pathways could the taxon use to	One	Most probably stocking	Very high
Dispers	first-reproduction?			
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	https://www.fisheries.noaa.gov/species/chinook-salmon	Very high
6.06	Is the taxon known (or likely) to produce a large number of propagules or offspring	Yes	https://www.cabi.org/isc/datasheet/71815#toriskAndImpactFactor s	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	https://www.cabi.org/isc/datasheet/71815#toriskAndImpactFactor s	Very high
L 6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	Yes	https://www.cabi.org/isc/datasheet/71815#tonaturalEnemies	High
0 6.03	Is the taxon likely to hybridise naturally with native taxa?	No	https://www.cabi.org/isc/datasheet/71815#tonaturalEnemies	Medium
9 6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	As O, mykiss is	Medium
5.01	and/or to reduce age-at-maturity in response to environmental conditions?		Ishawytscha Returning to Alaska Bert Lewis ,W. Stewart Grant,Richard E. Brenner,Toshihide Hamazaki. 2015	
<i>Reprod</i> 3 6.01		Yes	Changes in Size and Age of Chinook Salmon Oncorhynchus	High
5.02	resources (including nutrients) to the detriment of native taxa in the RA area?		Australia A.H. ARTHINGTON Center for Catchment and In-st ream Research. 1989	
7 5.02	protected native taxa in the RA area? Is the taxon likely to sequester food	Yes	https://www.fishbase.se/summary/Oncorhynchus- Impacts of Introduced and Translocated Freshwater Fishes in	High
Resour	<i>ce exploitation</i> Is the taxon likely to consume threatened or	Yes	https://www.cabi.org/isc/datasheet/71815#tonaturalEnemies	Very high
	densities (or persisting in adverse conditions by way of a dormant form)?			
5 4.12	native taxa? Is the taxon likely to maintain a viable population even when present in low	No	https://www.cabi.org/isc/datasheet/71815#tonaturalEnemies	High
	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	https://www.fishbase.se/summary/Oncorhynchus- tshawytscha.html	High
4.11	To the literation of the state			Linh

51	9.02	Under the predicted future climatic	Decrease	Potential climate change impacts on thermal habitats of Pacific	Very high
		conditions, are the risks of establishment		salmon (Oncorhynchus spp.) in the North Pacific Ocean and	
		posed by the taxon likely to increase,		adjacent seas Omar I. Abdul-Aziz, Nathan J. Mantua, and	
		decrease or not change?		Katherine W. Myers. 2010	
52	9.03	Under the predicted future climatic	No change	Potential climate change impacts on thermal habitats of Pacific	High
		conditions, are the risks of dispersal within		salmon (Oncorhynchus spp.) in the North Pacific Ocean and	
		the RA area posed by the taxon likely to		adjacent seas Omar I. Abdul-Aziz, Nathan J. Mantua, and	
		increase, decrease or not change?		Katherine W. Myers. 2010	
53	9.04	Under the predicted future climatic	Lower	Potential climate change impacts on thermal habitats of Pacific	High
		conditions, what is the likely magnitude of		salmon (Oncorhynchus spp.) in the North Pacific Ocean and	
		future potential impacts on biodiversity		adjacent seas Omar I. Abdul-Aziz, Nathan J. Mantua, and	
		and/or ecological integrity/status?		Katherine W. Myers. 2010	
54	9.05	Under the predicted future climatic	Lower	Potential climate change impacts on thermal habitats of Pacific	High
		conditions, what is the likely magnitude of		salmon (Oncorhynchus spp.) in the North Pacific Ocean and	
		future potential impacts on ecosystem		adjacent seas Omar I. Abdul-Aziz, Nathan J. Mantua, and	
		structure and/or function?		Katherine W. Myers. 2010	
55	9.06	Under the predicted future climatic	Lower	Potential climate change impacts on thermal habitats of Pacific	High
		conditions, what is the likely magnitude of		salmon (Oncorhynchus spp.) in the North Pacific Ocean and	
		future potential impacts on ecosystem		adjacent seas Omar I. Abdul-Aziz, Nathan J. Mantua, and	
		services/socio-economic factors?		Katherine W. Myers. 2010	

Statistics

Scores

BRA	26.5
BRA Outcome	-
BRA+CCA	18.5
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	18.0
4. Undesirable (or persistence) traits	7.0
5. Resource exploitation	7.0
6. Reproduction	4.0
7. Dispersal mechanisms	1.0
8. Tolerance attributes	-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
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	5
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12 12 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	4
Environmental	3
Species or population nuisance traits	13
Thresholds	

BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.85
BRA	0.85
CCA	0.83
Date and Time	
23/05/2	021 16:37:28

Taxon and Assessor details	
Category	Fishes and Lampreys (freshwater)
Taxon name	Oncorhynchus tshawytscha
Common name	chinook salmon
Assessor	Ivan Špelić
Risk screening context	
Reason and socio-economic benefits	
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS
Taxonomy	
Native range	
Introduced range	
URL	

			Response	Justification (references and/or other information)	Confidence
Α.	Biogeo	graphy/Historical			
1.1	1	ication/Cultivation			
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	Species Fact Sheet: Oncorhynchus tshawytscha (Walbaum, 1792). FAO. Archived from the original on 3 April 2020.	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	Maybe for restocking (personal opinion).	Low
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	O. mykiss (CABI 2019).	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	Climatch 2020	Medium
5	2.02	What is the quality of the climate matching data?	Medium	Climatch 2020	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	No	Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021)	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	>1	Escape from aquaculture, introduced for angling (CABI 2019).	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	No	Not established in Europe (Froese & Pauly 2020).	High
3	Invacius	and intentional introductions)?	I		L
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	Fuller, P., G. Jacobs, M. Cannister, J. Larson, and A. Fusaro, 2020, Oncorhynchus tshawytscha (Walbaum in Artedi, 1792): U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, FL, https://nas.er.usgs.gov/queries/FactSheet.aspx?speciesID=920, Revision Date: 12/20/2019, Peer Review Date: 6/26/2014, Access Date: 4/28/2020	High
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	Fuller, P., G. Jacobs, M. Cannister, J. Larson, and A. Fusaro, 2020, Oncorhynchus tshawytscha (Walbaum in Artedi, 1792): U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, FL, https://nas.er.usgs.gov/queries/FactSheet.aspx?speciesID=920, Revision Date: 12/20/2019, Peer Review Date: 6/26/2014, Access Date: 4/28/2020	High
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	Farmed and no adverse impacts (Species Fact Sheet: Oncorhynchus tshawytscha (Walbaum, 1792). FAO. Archived from	High
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	No	the original on 3 April 2020.). No examples in introduced areas.	Medium
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	Positive impact on sportfishing (Scott, C. 2003. "Oncorhynchus tshawytscha" (On-line), Animal Diversity Web. Accessed April 28, 2020 at https://animaldiversity.org/accounts/Oncorhynchus tshawytscha/)	Medium
В.	Biology	//Ecology			
		able (or persistence) traits			
14	4.01	Is it likely that the taxon will be poisonous or	No	Potential pest but no direct risk (Froese & Pauly 2020).	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	Fuller, P., G. Jacobs, M. Cannister, J. Larson, and A. Fusaro, 2020, Oncorhynchus tshawytscha (Walbaum in Artedi, 1792): U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, FL, https://nas.er.usgs.gov/queries/FactSheet.aspx?speciesID=920, Revision Date: 12/20/2019, Peer Review Date: 6/26/2014, Access Date: 4/28/2020	Medium
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	No parasitic behaviour.	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	The freshwater streams are relatively deep with course gravel. The water must be cool, under 14 C for maximum survival, and fast flowing (Scott, C. 2003. "Oncorhynchus tshawytscha" (On- line), Animal Diversity Web. Accessed April 28, 2020 at https://animaldiversity.org/accounts/Oncorhynchus_tshawytscha/)	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	CABI 2019 listed altered trophic level as invasion outcome but there is no documented evidence. In Great Lakes caused a substantial loss of forage fish (Fuller, P., G. Jacobs, M. Cannister, J. Larson, and A. Fusaro, 2020, Oncorhynchus tshawytscha (Walbaum in Artedi, 1792): U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, FL, https://nas.er.usgs.gov/queries/FactSheet.aspx?speciesID=920, Revision Date: 12/20/2019, Peer Review Date: 6/26/2014, Access Date: 4/28/2020).	Medium

	4.06	Is the taxon likely to exert adverse impacts	No	No examples of such imapacts in invaded areas.	Medium
		on ecosystem services in the RA area?			
0	4.07	Is it likely that the taxon will host, and/or	Yes	Rauque, C., Viozzi, G., Flores, V., Vega, R., Waicheim, A., &	High
		act as a vector for, recognised pests and		Salgado-Maldonado, G. (2018). Helminth parasites of alien freshwater fishes in Patagonia (Argentina). International journal	
		infectious agents that are endemic in the RA area?		for parasitology. Parasites and wildlife, 7(3), 369–379.	
				https://doi.org/10.1016/j.ijppaw.2018.09.008	
1	4.08	Is it likely that the taxon will host, and/or	Yes	Rauque, C., Viozzi, G., Flores, V., Vega, R., Waicheim, A., &	High
		act as a vector for, recognised pests and		Salgado-Maldonado, G. (2018). Helminth parasites of alien	
		infectious agents that are absent from (novel		freshwater fishes in Patagonia (Argentina). International journal	
		to) the RA area?		for parasitology. Parasites and wildlife, 7(3), 369–379.	
2	4.09	Is it likely that the taxon will achieve a body	Yes	https://doi.org/10.1016/i.ijppaw.2018.09.008 150 cm, 61 kg (Froese & Pauly 2020).	Very high
		size that will make it more likely to be			· • · , · · · j.·
		released from captivity?			
23	4.10	Is the taxon capable of sustaining itself in a	Yes	Streams, lakes, sea (Froese & Pauly 2020).	Very high
		range of water velocity conditions (e.g.			
04	4.11	versatile in habitat use)? Is it likely that the taxon's mode of existence	No	Supply of marine derived nutrients to headwaters (Soto D,	Medium
	7.11	(e.g. excretion of by-products) or behaviours	140	Arismendi I, Di Prinzio C, Jara F (2007) Establishment of Chinook	riculum
		(e.g. feeding) will reduce habitat quality for		Salmon (Oncorhynchus tshawytscha) in Pacific basins of Southern	
		native taxa?		South America and its potential ecosystem implications. Rev Chil	
		• · · · · · · · · · · · · · · ·		Hist Nat 80:81–98), but this is not likely for Slovenia (personal	
15	4.12	Is the taxon likely to maintain a viable population even when present in low	No	Establishments of populations in new areas are very rare (CABI	High
		densities (or persisting in adverse conditions		2019).	
_		by way of a dormant form)?			
		ce exploitation	1		1 .
6	5.01	Is the taxon likely to consume threatened or	Yes	Food in streams is mainly terrestrial insects and small	Medium
		protected native taxa in the RA area?		crustaceans; adults prey on fish in the sea (Froese & Pauly 2020).	
				Landlocked populations in great lakes feed on fish (Fuller, P., G. Jacobs, M. Cannister, J. Larson, and A. Fusaro, 2020,	
				Oncorhynchus tshawytscha (Walbaum in Artedi, 1792): U.S.	
				Geological Survey, Nonindigenous Aquatic Species Database,	
				Gainesville, FL,	
				https://nas.er.usgs.gov/queries/FactSheet.aspx?speciesID=920,	
7	5.02	Is the taxon likely to sequester food	Not applicable	Revision Date: 12/20/2019. Peer Review Date: 6/26/2014. Access No obtained data for calculation.	Very high
_/	5.02	resources (including nutrients) to the	nor applicable		very myn
		detriment of native taxa in the RA area?			
	Reprodu	uction			
28	6.01	Is the taxon likely to exhibit parental care	No	Froese & Pauly 2020	Very high
		and/or to reduce age-at-maturity in response			
9	6.02	to environmental conditions? Is the taxon likely to produce viable gametes	No	Never established in Europe despite continuous effort through	Very high
	0.02	or propagules (in the RA area)?		history (Crawford SS, Muir AM (2008) Global introductions of	very nigh
		······································		salmon and trout in the genus Oncorhynchus: 1870–2007.	
				Reviews in Fish Biology and Fisheries 18: 313- 344.).	
30	6.03	Is the taxon likely to hybridise naturally with	No	No related native taxa (Kottelat & Freyhof 2007).	Very high
٤1					
	6.04	native taxa?	No	No reports in literature	Very high
	6.04	Is the taxon likely to be hermaphroditic or to	No	No reports in literature.	Very high
32	6.04 6.05		No	No reports in literature. Anadromous spawner, needs specific habitats. Freshwater	Very high Very high
32		Is the taxon likely to be hermaphroditic or to display asexual reproduction?			, 3
32		Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of		Anadromous spawner, needs specific habitats. Freshwater streams, estuaries, and the open ocean are all important habitats. The freshwater streams are relatively deep with course gravel.	, 3
32		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)		Anadromous spawner, needs specific habitats. Freshwater streams, estuaries, and the open ocean are all important habitats. The freshwater streams are relatively deep with course gravel. The water must be cool, under 14 C for maximum survival, and	, 3
32		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)		Anadromous spawner, needs specific habitats. Freshwater streams, estuaries, and the open ocean are all important habitats. The freshwater streams are relatively deep with course gravel. The water must be cool, under 14 C for maximum survival, and fast flowing. There are landlocked populations in Great Lakes but	, 3
32		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)		Anadromous spawner, needs specific habitats. Freshwater streams, estuaries, and the open ocean are all important habitats. The freshwater streams are relatively deep with course gravel. The water must be cool, under 14 C for maximum survival, and fast flowing. There are landlocked populations in Great Lakes but they also migrate to connected streams to spawn (Scott, C. 2003.	, 3
32		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)		Anadromous spawner, needs specific habitats. Freshwater streams, estuaries, and the open ocean are all important habitats. The freshwater streams are relatively deep with course gravel. The water must be cool, under 14 C for maximum survival, and fast flowing. There are landlocked populations in Great Lakes but they also migrate to connected streams to spawn (Scott, C. 2003. "Oncorhynchus tshawytscha" (On-line), Animal Diversity Web.	, 3
32		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)		Anadromous spawner, needs specific habitats. Freshwater streams, estuaries, and the open ocean are all important habitats. The freshwater streams are relatively deep with course gravel. The water must be cool, under 14 C for maximum survival, and fast flowing. There are landlocked populations in Great Lakes but they also migrate to connected streams to spawn (Scott, C. 2003.	, 3
32		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)		Anadromous spawner, needs specific habitats. Freshwater streams, estuaries, and the open ocean are all important habitats. The freshwater streams are relatively deep with course gravel. The water must be cool, under 14 C for maximum survival, and fast flowing. There are landlocked populations in Great Lakes but they also migrate to connected streams to spawn (Scott, C. 2003. "Oncorhynchus tshawytscha" (On-line), Animal Diversity Web. Accessed April 28, 2020 at https://animaldiversity.org/accounts/Oncorhynchus_tshawytscha/; Fuller, P., G. Jacobs, M. Cannister, J. Larson, and A. Fusaro,	, 3
32		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)		Anadromous spawner, needs specific habitats. Freshwater streams, estuaries, and the open ocean are all important habitats. The freshwater streams are relatively deep with course gravel. The water must be cool, under 14 C for maximum survival, and fast flowing. There are landlocked populations in Great Lakes but they also migrate to connected streams to spawn (Scott, C. 2003. "Oncorhynchus tshawytscha" (On-line), Animal Diversity Web. Accessed April 28, 2020 at https://animaldiversity.org/accounts/Oncorhynchus_tshawytscha'; Fuller, P., G. Jacobs, M. Cannister, J. Larson, and A. Fusaro, 2020, Oncorhynchus tshawytscha (Walbaum in Artedi, 1792): U.S.	, 3
32		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)		Anadromous spawner, needs specific habitats. Freshwater streams, estuaries, and the open ocean are all important habitats. The freshwater streams are relatively deep with course gravel. The water must be cool, under 14 C for maximum survival, and fast flowing. There are landlocked populations in Great Lakes but they also migrate to connected streams to spawn (Scott, C. 2003. "Oncorhynchus tshawytscha" (On-line), Animal Diversity Web. Accessed April 28, 2020 at https://animaldiversity.org/accounts/Oncorhynchus_tshawytscha'; Fuller, P., G. Jacobs, M. Cannister, J. Larson, and A. Fusaro, 2020, Oncorhynchus tshawytscha (Walbaum in Artedi, 1792): U.S. Geological Survey, Nonindigenous Aquatic Species Database,	, 3
32		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)		Anadromous spawner, needs specific habitats. Freshwater streams, estuaries, and the open ocean are all important habitats. The freshwater streams are relatively deep with course gravel. The water must be cool, under 14 C for maximum survival, and fast flowing. There are landlocked populations in Great Lakes but they also migrate to connected streams to spawn (Scott, C. 2003. "Oncorhynchus tshawytscha" (On-line), Animal Diversity Web. Accessed April 28, 2020 at https://animaldiversity.org/accounts/Oncorhynchus_tshawytscha/; Fuller, P., G. Jacobs, M. Cannister, J. Larson, and A. Fusaro, 2020, Oncorhynchus tshawytscha (Walbaum in Artedi, 1792): U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, FL,	, 3
32		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)		Anadromous spawner, needs specific habitats. Freshwater streams, estuaries, and the open ocean are all important habitats. The freshwater streams are relatively deep with course gravel. The water must be cool, under 14 C for maximum survival, and fast flowing. There are landlocked populations in Great Lakes but they also migrate to connected streams to spawn (Scott, C. 2003. "Oncorhynchus tshawytscha" (On-line), Animal Diversity Web. Accessed April 28, 2020 at https://animaldiversity.org/accounts/Oncorhynchus_tshawytscha/; Fuller, P., G. Jacobs, M. Cannister, J. Larson, and A. Fusaro, 2020, Oncorhynchus tshawytscha (Walbaum in Artedi, 1792): U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, FL, https://nas.er.usgs.gov/queries/FactSheet.aspx?speciesID=920,	, 3
	6.05	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?	Yes	Anadromous spawner, needs specific habitats. Freshwater streams, estuaries, and the open ocean are all important habitats. The freshwater streams are relatively deep with course gravel. The water must be cool, under 14 C for maximum survival, and fast flowing. There are landlocked populations in Great Lakes but they also migrate to connected streams to spawn (Scott, C. 2003. "Oncorhynchus tshawytscha" (On-line), Animal Diversity Web. Accessed April 28, 2020 at https://animaldiversity.org/accounts/Oncorhynchus_tshawytscha'; Fuller, P., G. Jacobs, M. Cannister, J. Larson, and A. Fusaro, 2020, Oncorhynchus tshawytscha (Walbaum in Artedi, 1792): U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, FL, https://nas.er.usgs.gov/queries/FactSheet.aspx?speciesID=920, Revision Date: 12/20/2019, Peer Review Date: 6/26/2014, Access	Very high
		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		Anadromous spawner, needs specific habitats. Freshwater streams, estuaries, and the open ocean are all important habitats. The freshwater streams are relatively deep with course gravel. The water must be cool, under 14 C for maximum survival, and fast flowing. There are landlocked populations in Great Lakes but they also migrate to connected streams to spawn (Scott, C. 2003. "Oncorhynchus tshawytscha" (On-line), Animal Diversity Web. Accessed April 28, 2020 at https://animaldiversity.org/accounts/Oncorhynchus_tshawytscha/; Fuller, P., G. Jacobs, M. Cannister, J. Larson, and A. Fusaro, 2020, Oncorhynchus tshawytscha (Walbaum in Artedi, 1792): U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, FL, https://nas.er.usgs.gov/queries/FactSheet.aspx?speciesID=920, Revision Date: 12/20/2019, Peer Review Date: 6/26/2014, Access	, 3
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33	6.05	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	Anadromous spawner, needs specific habitats. Freshwater streams, estuaries, and the open ocean are all important habitats. The freshwater streams are relatively deep with course gravel. The water must be cool, under 14 C for maximum survival, and fast flowing. There are landlocked populations in Great Lakes but they also migrate to connected streams to spawn (Scott, C. 2003. "Oncorhynchus tshawytscha" (On-line), Animal Diversity Web. Accessed April 28, 2020 at https://animaldiversity.org/accounts/Oncorhynchus_tshawytscha/; Fuller, P., G. Jacobs, M. Cannister, J. Larson, and A. Fusaro, 2020, Oncorhynchus tshawytscha (Walbaum in Artedi, 1792): U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, FL, https://nas.er.usgs.gov/queries/FactSheet.aspx?speciesID=920, Revision Date: 12/20/2019, Peer Review Date: 6/26/2014, Access Date: 4/28/20201 Max 13,600 eggs per female (Froese & Pauly 2020).	Very high
33	6.05	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	Anadromous spawner, needs specific habitats. Freshwater streams, estuaries, and the open ocean are all important habitats. The freshwater streams are relatively deep with course gravel. The water must be cool, under 14 C for maximum survival, and fast flowing. There are landlocked populations in Great Lakes but they also migrate to connected streams to spawn (Scott, C. 2003. "Oncorhynchus tshawytscha" (On-line), Animal Diversity Web. Accessed April 28, 2020 at https://animaldiversity.org/accounts/Oncorhynchus_tshawytscha'; Fuller, P., G. Jacobs, M. Cannister, J. Larson, and A. Fusaro, 2020, Oncorhynchus tshawytscha (Walbaum in Artedi, 1792): U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, FL, https://nas.er.usgs.gov/queries/FactSheet.aspx?speciesID=920, Revision Date: 12/20/2019, Peer Review Date: 6/26/2014, Access	Very high
33	6.05 6.06 6.07	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	Anadromous spawner, needs specific habitats. Freshwater streams, estuaries, and the open ocean are all important habitats. The freshwater streams are relatively deep with course gravel. The water must be cool, under 14 C for maximum survival, and fast flowing. There are landlocked populations in Great Lakes but they also migrate to connected streams to spawn (Scott, C. 2003. "Oncorhynchus tshawytscha" (On-line), Animal Diversity Web. Accessed April 28, 2020 at https://animaldiversity.org/accounts/Oncorhynchus_tshawytscha/; Fuller, P., G. Jacobs, M. Cannister, J. Larson, and A. Fusaro, 2020, Oncorhynchus tshawytscha (Walbaum in Artedi, 1792): U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, FL, https://nas.er.usgs.gov/queries/FactSheet.aspx?speciesID=920, Revision Date: 12/20/2019, Peer Review Date: 6/26/2014, Access Date: 4/28/20201 Max 13,600 eggs per female (Froese & Pauly 2020).	Very high
:3 :4	6.05 6.06 6.07 Dispers	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 2	Anadromous spawner, needs specific habitats. Freshwater streams, estuaries, and the open ocean are all important habitats. The freshwater streams are relatively deep with course gravel. The water must be cool, under 14 C for maximum survival, and fast flowing. There are landlocked populations in Great Lakes but they also migrate to connected streams to spawn (Scott, C. 2003. "Oncorhynchus tshawytscha" (On-line), Animal Diversity Web. Accessed April 28, 2020 at https://animaldiversity.org/accounts/Oncorhynchus_tshawytscha/; Fuller, P., G. Jacobs, M. Cannister, J. Larson, and A. Fusaro, 2020, Oncorhynchus tshawytscha (Walbaum in Artedi, 1792): U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, FL, https://nas.er.usgs.gov/queries/FactSheet.aspx?speciesID=920, Revision Date: 12/20/2019, Peer Review Date: 6/26/2014, Access Date: 4/28/2020) Max 13,600 eggs per female (Froese & Pauly 2020).	Very high High Medium
33 34 7. [6.05 6.06 6.07	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	Yes	Anadromous spawner, needs specific habitats. Freshwater streams, estuaries, and the open ocean are all important habitats. The freshwater streams are relatively deep with course gravel. The water must be cool, under 14 C for maximum survival, and fast flowing. There are landlocked populations in Great Lakes but they also migrate to connected streams to spawn (Scott, C. 2003. "Oncorhynchus tshawytscha" (On-line), Animal Diversity Web. Accessed April 28, 2020 at https://animaldiversity.org/accounts/Oncorhynchus_tshawytscha/; Fuller, P., G. Jacobs, M. Cannister, J. Larson, and A. Fusaro, 2020, Oncorhynchus tshawytscha (Walbaum in Artedi, 1792): U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, FL, https://nas.er.usgs.gov/queries/FactSheet.aspx?speciesID=920, Revision Date: 12/20/2019, Peer Review Date: 6/26/2014, Access Date: 4/28/20201 Max 13,600 eggs per female (Froese & Pauly 2020).	Very high
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33 34 7 <u>. [</u>	6.05 6.06 6.07 Dispers	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	Yes Yes 2	Anadromous spawner, needs specific habitats. Freshwater streams, estuaries, and the open ocean are all important habitats. The freshwater streams are relatively deep with course gravel. The water must be cool, under 14 C for maximum survival, and fast flowing. There are landlocked populations in Great Lakes but they also migrate to connected streams to spawn (Scott, C. 2003. "Oncorhynchus tshawytscha" (On-line), Animal Diversity Web. Accessed April 28, 2020 at https://animaldiversity.org/accounts/Oncorhynchus_tshawytscha/; Fuller, P., G. Jacobs, M. Cannister, J. Larson, and A. Fusaro, 2020, Oncorhynchus tshawytscha (Walbaum in Artedi, 1792): U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, FL, https://nas.er.usgs.gov/queries/FactSheet.aspx?speciesID=920, Revision Date: 12/20/2019, Peer Review Date: 6/26/2014, Access Date: 4/28/2020) Max 13,600 eggs per female (Froese & Pauly 2020).	Very high High Medium
33 34 7 <u>. [</u>	6.05 6.06 6.07 <u>Dispers</u> 7.01	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	Yes Yes 2 One	Anadromous spawner, needs specific habitats. Freshwater streams, estuaries, and the open ocean are all important habitats. The freshwater streams are relatively deep with course gravel. The water must be cool, under 14 C for maximum survival, and fast flowing. There are landlocked populations in Great Lakes but they also migrate to connected streams to spawn (Scott, C. 2003. "Oncorhynchus tshawytscha" (On-line), Animal Diversity Web. Accessed April 28, 2020 at https://animaldiversity.org/accounts/Oncorhynchus_tshawytscha/; Fuller, P., G. Jacobs, M. Cannister, J. Larson, and A. Fusaro, 2020, Oncorhynchus tshawytscha (Walbaum in Artedi, 1792): U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, FL, https://nas.er.usgs.gov/queries/FactSheet.aspx?speciesID=920, Revision Date: 12/20/2019, Peer Review Date: 6/26/2014, Access Date: 4/28/20201 Max 13,600 eggs per female (Froese & Pauly 2020).	Very high High Medium
33 34 7 <u>. [</u> 36	6.05 6.06 6.07 7.01 7.02	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)?	Yes Yes 2 One No	Anadromous spawner, needs specific habitats. Freshwater streams, estuaries, and the open ocean are all important habitats. The freshwater streams are relatively deep with course gravel. The water must be cool, under 14 C for maximum survival, and fast flowing. There are landlocked populations in Great Lakes but they also migrate to connected streams to spawn (Scott, C. 2003. "Oncorhynchus tshawytscha" (On-line), Animal Diversity Web. Accessed April 28, 2020 at https://animaldiversity.org/accounts/Oncorhynchus_tshawytscha/; Fuller, P., G. Jacobs, M. Cannister, J. Larson, and A. Fusaro, 2020, Oncorhynchus tshawytscha (Walbaum in Artedi, 1792): U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, FL, https://nas.er.usgs.gov/queries/FactSheet.aspx?speciesID=920, Revision Date: 12/20/2019, Peer Review Date: 6/26/2014, Access Data: 4/28/2020) Waries from 2-7 (Froese & Pauly 2020).	Very high High Medium Low
33 34 7 <u>. [</u> 36	6.05 6.06 6.07 <u>Dispers</u> 7.01	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	Yes Yes 2 One	Anadromous spawner, needs specific habitats. Freshwater streams, estuaries, and the open ocean are all important habitats. The freshwater streams are relatively deep with course gravel. The water must be cool, under 14 C for maximum survival, and fast flowing. There are landlocked populations in Great Lakes but they also migrate to connected streams to spawn (Scott, C. 2003. "Oncorhynchus tshawytscha" (On-line), Animal Diversity Web. Accessed April 28, 2020 at https://animaldiversity.org/accounts/Oncorhynchus_tshawytscha/; Fuller, P., G. Jacobs, M. Cannister, J. Larson, and A. Fusaro, 2020, Oncorhynchus tshawytscha (Walbaum in Artedi, 1792): U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, FL, https://nas.er.usgs.gov/queries/FactSheet.aspx?speciesID=920, Revision Date: 12/20/2019, Peer Review Date: 6/26/2014, Access Date: 4/28/20201 Max 13,600 eggs per female (Froese & Pauly 2020).	Very high High Medium
333 34 7 <u>. [</u> 36	6.05 6.06 6.07 7.01 7.02	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? In 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 Yes 2 One No	Anadromous spawner, needs specific habitats. Freshwater streams, estuaries, and the open ocean are all important habitats. The freshwater streams are relatively deep with course gravel. The water must be cool, under 14 C for maximum survival, and fast flowing. There are landlocked populations in Great Lakes but they also migrate to connected streams to spawn (Scott, C. 2003. "Oncorhynchus tshawytscha" (On-line), Animal Diversity Web. Accessed April 28, 2020 at https://animaldiversity.org/accounts/Oncorhynchus_tshawytscha/; Fuller, P., G. Jacobs, M. Cannister, J. Larson, and A. Fusaro, 2020, Oncorhynchus tshawytscha (Walbaum in Artedi, 1792): U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, FL, https://nas.er.usgs.gov/queries/FactSheet.aspx?speciesID=920, Revision Date: 12/20/2019, Peer Review Date: 6/26/2014, Access Data: 4/28/2020) Waries from 2-7 (Froese & Pauly 2020).	Very high High Medium Low
33 34 7 <u>. [</u> 36	6.05 6.06 6.07 7.01 7.02	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>The transmention</i> disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or 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 2 One No	Anadromous spawner, needs specific habitats. Freshwater streams, estuaries, and the open ocean are all important habitats. The freshwater streams are relatively deep with course gravel. The water must be cool, under 14 C for maximum survival, and fast flowing. There are landlocked populations in Great Lakes but they also migrate to connected streams to spawn (Scott, C. 2003. "Oncorhynchus tshawytscha" (On-line), Animal Diversity Web. Accessed April 28, 2020 at https://animaldiversity.org/accounts/Oncorhynchus_tshawytscha/; Fuller, P., G. Jacobs, M. Cannister, J. Larson, and A. Fusaro, 2020, Oncorhynchus tshawytscha (Walbaum in Artedi, 1792): U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, FL, https://nas.er.usgs.gov/queries/FactSheet.aspx?speciesID=920, Revision Date: 12/20/2019, Peer Review Date: 6/26/2014, Access Data: 4/28/2020) Waries from 2-7 (Froese & Pauly 2020).	Very high High Medium Low
33 34 7 <u>7 (</u> 335 336	6.05 6.06 6.07 7.01 7.02	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?	Yes Yes 2 One No	Anadromous spawner, needs specific habitats. Freshwater streams, estuaries, and the open ocean are all important habitats. The freshwater streams are relatively deep with course gravel. The water must be cool, under 14 C for maximum survival, and fast flowing. There are landlocked populations in Great Lakes but they also migrate to connected streams to spawn (Scott, C. 2003. "Oncorhynchus tshawytscha" (On-line), Animal Diversity Web. Accessed April 28, 2020 at https://animaldiversity.org/accounts/Oncorhynchus_tshawytscha/; Fuller, P., G. Jacobs, M. Cannister, J. Larson, and A. Fusaro, 2020, Oncorhynchus tshawytscha (Walbaum in Artedi, 1792): U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, FL, https://nas.er.usgs.gov/queries/FactSheet.aspx?speciesID=920, Revision Date: 12/20/2019, Peer Review Date: 6/26/2014, Access Data: 4/28/2020) Waries from 2-7 (Froese & Pauly 2020).	Very high High Medium Low
33 34 7 <u>7 (</u> 335 336	6.05 6.06 6.07 7.01 7.02 7.03	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>The transmention</i> disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or 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 2 One No No	Anadromous spawner, needs specific habitats. Freshwater streams, estuaries, and the open ocean are all important habitats. The freshwater streams are relatively deep with course gravel. The water must be cool, under 14 C for maximum survival, and fast flowing. There are landlocked populations in Great Lakes but they also migrate to connected streams to spawn (Scott, C. 2003. "Oncorhynchus tshawytscha" (On-line), Animal Diversity Web. Accessed April 28, 2020 at https://animaldiversity.org/accounts/Oncorhynchus_tshawytscha/; Fuller, P., G. Jacobs, M. Cannister, J. Larson, and A. Fusaro, 2020, Oncorhynchus tshawytscha (Walbaum in Artedi, 1792): U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, FL, https://nas.er.usgs.gov/queries/FactSheet.aspx?speciesID=920, Revision Date: 12/20/2019, Peer Review Date: 6/26/2014, Access Date: 4/28/20201 Max 13,600 eggs per female (Froese & Pauly 2020). Varies from 2-7 (Froese & Pauly 2020).	Very high High Medium Low 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	No	Almost certainly it will not spawn in RA area due to non optimum conditions (Crawford SS, Muir AM (2008) Global introductions of salmon and trout in the genus Oncorhynchus: 1870–2007. Deviave: a Eich Biolagu and Eicharder (19: 212 – 244)	Very high
		area?		Reviews in Fish Biology and Fisheries 18: 313- 344).	
40	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	No	Anadromous spawners (potamodromous in Great Lakes) but no so far no suitable conditions for natural spawning in Europe (Crawford SS, Muir AM (2008) Global introductions of salmon and trout in the genus Oncorhynchus: 1870–2007. Reviews in Fish Biology and Fisheries 18: 313–344).	Very high
41	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No	Almost certainly it will not spawn in RA area due to non optimum conditions (Crawford SS, Muir AM (2008) Global introductions of salmon and trout in the genus Oncorhynchus: 1870–2007. Reviews in Fish Biology and Fisheries 18: 313– 344).	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	Introductions	Medium
	7.09	Is dispersal of the taxon density dependent?	No	In streams only during spawning and while smoltifying (Froese & Pauly 2020).	Very high
		ce attributes	T.		1
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	Probably sensitive as other Salmonids (personal opinion).	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	CABI 2019	Very high
46	8.03	Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	No	Not allowed.	Very high
47	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	No	Needs rivers without obstacles to reach spawning streams (COSEWIC 2006. COSEWIC assessment and status report on the chinook salmon Oncorhynchus tshawytscha (Okanagan population) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vii + 41 pp.	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	Anadromous species (Froese & Pauly 2020).	Very high
49	8.06	Are there effective natural enemies (predators) of the taxon present in the RA area?	Yes	Piscivorous fish and birds (Scott, C. 2003. "Oncorhynchus tshawytscha" (On-line), Animal Diversity Web. Accessed April 28, 2020 at https://animaldiversity.org/accounts/Oncorhynchus tshawytscha/)	Medium
		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	Only pathway is introduction by man.	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	Almost certainly not able to establish viable population (Crawford SS, Muir AM (2008) Global introductions of salmon and trout in the genus Oncorhynchus: 1870–2007. Reviews in Fish Biology and Fisheries 18: 313– 344), it is a cold water species so no change with climate change.	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	Almost certainly not able to establish viable population (Crawford SS, Muir AM (2008) Global introductions of salmon and trout in the genus Oncorhynchus: 1870–2007. Reviews in Fish Biology and Fisheries 18: 313– 344), it is a cold water species so no change with climate change.	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?	Lower	Potential stocked specimens would be stressed under predicted increase in temperature because it is a cold water species (Myrick, C.A., and J.J. Cech, Jr. 2001. Temperature effects on Chinook salmon and steelhead: a review focusing on California's Central Valley populations. Bay-Delta Modeling Forum Technical	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	Potential stocked specimens would be stressed under predicted increase in temperature because it is a cold water species (Myrick, C.A., and J.J. Cech, Jr. 2001. Temperature effects on Chinook salmon and steelhead: a review focusing on California's Central Vallev populations. Bay-Delta Modeling Forum Technical	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	Predicted impact is not certain even in this conditions so no change.	Medium

Statistics	
Scores	
BRA	14.0
BRA Outcome	-
BRA+CCA	10.0
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	3.0
4. Undesirable (or persistence) traits	5.0
5. Resource exploitation	5.0
6. Reproduction	-2.0
7. Dispersal mechanisms	-4.0
8. Tolerance attributes	-1.0

-4.0	C. Climate change
-4.0	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
6	C. Climate change
6	9. Climate change
	Sectors affected
9	Commercial
2	Environmental
1	Species or population nuisance traits
	Thresholds
	BRA
-	BRA+CCA
	Confidence
	BRA+CCA
0.76	BRATCCA

 BRA
 0.77

 BRA
 0.77

 CCA
 0.71

 Date and Time
 12/05/2021 08:02:54

Taxon and Assessor details							
Category	Fishes and Lampreys (freshwater)						
Taxon name	Oncorhynchus tshawytscha						
Common name	chinook salmon						
Assessor	Tamara Kanjuh						
Risk screening context	Risk screening context						
Reason and socio-economic benefits							
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS						
Taxonomy							
Native range							
Introduced range							
URL							

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
		ication/Cultivation	24		
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	The world's largest producer and market supplier of the Chinook salmon is New Zealand ("Aquaculture New Zealand Industry Overview". Retrieved September 20, 2011.)	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	"Fisheries and Aquaculture Department Statistics". Food and Agriculture Organization of the United Nations. Retrieved 2012-09-	Very high
3	1.03	Does the taxon have invasive races,	No	cabi.org	High
2 (Cline a ha	varieties, sub-taxa or congeners?			
2. (4	2.01	, distribution and introduction risk How similar are the climatic conditions of the	Medium	Dfa, Dfb (Köppen-Geiger climate classification system)	High
Ľ	2.01	Risk Assessment (RA) area and the taxon's native range?			. iigii
5	2.02	What is the quality of the climate matching data?	High	Köppen-Geiger climate classification system	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	Document???	Medium
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	Intentional stocking, aquaculture	High
8	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA	Yes	Intentional stocking	High
		area in the near future (e.g. unintentional			
3.1	Invasiv	and intentional introductions)?	I	l	1
9	3.01	Has the taxon become naturalised	No	No information found.	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	cabi.org	High
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	cabi.org	High
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	No	cabi.org	High
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	cabi.org	High
		//Ecology			
		able (or persistence) traits			
		Is it likely that the taxon will be poisonous or pose other risks to human health?		Potential pests (FishBase)	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.org	High
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in	No	The taxon is not a parasite.	High
17	4.04	the RA area?	Vaa	ashi ara	High
17	4.04	Is the taxon adaptable in terms of climatic and other environmental conditions, thus	Yes	cabi.org	High
		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	cabi.org	High
		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 on ecosystem services in the RA area?	Yes	cabi.org	High
20	4.07	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and	No	No information found.	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 infectious agents that are absent from (novel	Yes	cabi.org	High
22	4.09	to) the RA area? Is it likely that the taxon will achieve a body	No	Not in captivity.	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.	Yes	cabi.org	High
<u>.</u>	4.4.5	versatile in habitat use)?			
24	4.11	Is it likely that the taxon's mode of existence	Yes	cabi.org	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	No	cabi.org	High
		densities (or persisting in adverse conditions			
1	1	by way of a dormant form)?	1		1

5 /	Decourc	e exploitation			
	5.01	Is the taxon likely to consume threatened or	Yes	cabi.org	High
		protected native taxa in the RA area?			
27	5.02	Is the taxon likely to sequester food	Yes	cabi.org	High
		resources (including nutrients) to the			
6 1	Reprodu	detriment of native taxa in the RA area?			
	6.01	Is the taxon likely to exhibit parental care	No	cabi.org	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	No	No information found.	Medium
30	6.03	or propagules (in the RA area)? Is the taxon likely to hybridise naturally with	No	cabi.org	High
50	0.05	native taxa?	No	cabilorg	ingn
31	6.04	Is the taxon likely to be hermaphroditic or to	Yes	cabi.org	High
		display asexual reproduction?			
32	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features)	No	cabi.org	High
		to complete its life cycle?			
33	6.06	Is the taxon known (or likely) to produce a	Yes	cabi.org	High
		large number of propagules or offspring			
24	6.07	within a short time span (e.g. < 1 year)?	c	CUTNOOK CALMON FACTORIUS Free Debuil Deside Chabes Marine	L l'ala
34	6.07	How many time units (days, months, years) does the taxon require to reach the age-at-	6	"CHINOOK SALMON FACTSBlue Face Baby". Pacific States Marine Fisheries Commission. 2010-03-05. Retrieved 2010-03-05. 1996-	High
		first-reproduction?		12-16	
		al mechanisms			
35	7.01	How many potential internal	One	Intentional stocking.	High
1		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	Intentional stocking.	High
ſ		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 attaching itself to hard substrata (e.g. ship	No	cabi.org	High
1		hulls, pilings, buoys) such that it enhances			
L		the likelihood of dispersal?			
38	7.04	Is natural dispersal of the taxon likely to	No	cabi.org	High
1		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	cabi.org	High
55	7.05	occur as larvae/juveniles (for animals) or as	103	cabilorg	ingn
		fragments/seedlings (for plants) in the RA			
	7.05	area?			
40	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	Yes	cabi.org	High
41	7.07	Are propagules or eggs of the taxon likely to	No	cabi.org	High
		be dispersed in the RA area by other animals?		-	-
42	7.08	Is dispersal of the taxon along any of the	Yes	Intentional stocking.	High
		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 information found.	Medium
		ce attributes			
44	8.01	Is the taxon able to withstand being out of water for extended periods (e.g. minimum of	No	cabi.org	High
		one or more hours) at some stage of its life			
		cycle?			
45	8.02	Is the taxon tolerant of a wide range of	Yes	cabi.org	High
1		water quality conditions relevant to that taxon? [In the Justification field, indicate the			
L	L	relevant water quality variable(s) being			
46	8.03	Can the taxon be controlled or eradicated in	No	No information found.	Medium
1		the wild with chemical, biological, or other			
47	8.04	agents/means? Is the taxon likely to tolerate or benefit from	Yes	cabi.org	High
		environmental/human disturbance?			
48	8.05	Is the taxon able to tolerate salinity levels	Yes	cabi.org	High
1		that are higher or lower than those found in			
40	8.06	its usual environment? Are there effective natural enemies	Yes	cabi.org	High
79	0.00	(predators) of the taxon present in the RA		cabilor g	. iigii
		e change			
		change Under the predicted future climatic	No change	cabi.org	High
50	5.01	conditions, are the risks of entry into the RA	no change	cabilor g	. iigii
1		area posed by the taxon likely to increase,			
I		decrease or not change?			
51	9.02	Under the predicted future climatic	No change	cabi.org	High
1		conditions, are the risks of establishment posed by the taxon likely to increase,			
L	L	decrease or not change?			
52	9.03	Under the predicted future climatic	No change	cabi.org	High
		conditions, are the risks of dispersal within			
1		the RA area posed by the taxon likely to increase, decrease or not change?			
1	1		No change	cabi.org	High
53	9.04	Under the predicted future climatic			
53	9.04	conditions, what is the likely magnitude of	No change		-
53	9.04		no chunge		

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	cabi.org	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	cabi.org	High

Statistics	
Statistics	
BRA	25.0
BRA Outcome	23.0
BRA+CCA	25.0
BRA+CCA Outcome	25.0
Score partition	_
A. Biogeography/Historical	3.0
1. Domestication/Cultivation	2.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	0.0
B. Biology/Ecology	22.0
4. Undesirable (or persistence) traits	8.0
5. Resource exploitation	7.0
6. Reproduction	1.0
7. Dispersal mechanisms	1.0
8. Tolerance attributes	5.0
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	7
Environmental	9
Species or population nuisance traits	12
Thresholds	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.73
BRA	0.73
CCA	0.75
Date and Time	
03/06/20	021 13:06:30

Taxon and Assessor details					
Category	Fishes and Lampreys (freshwater)				
Taxon name	Oncorhynchus tshawytscha	ncorhynchus tshawytscha			
Common name	chinook salmon				
Assessor	Tena Radocaj				
Risk screening context					
Reason and socio-economic benefits					
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS				
Taxonomy					
Native range					
Introduced range					
URL					

			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 domestication (or cultivation) for at least 20 generations?	Yes	Species Fact Sheet: Oncorhynchus tshawytscha (Walbaum, 1792). FAO. Archived from the original on 3 April 2020.	Medium
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	No	Personal opinion	Low
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	Oncorhynchus mykiss (CABI 2019).	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?	High	The similarity between climatic conditions RA area and native range is high. I use climatch.	Medium
5	2.02	What is the quality of the climate matching data?	Medium	The quality of the climate matching data is medium.	Medium
6	2.03	Is the taxon already present outside of captivity in the RA area?	No	Chinook salmon is not present outside of captivity in the RA area	High
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	>1	Escape from aquaculture, introduced for angling (CABI 2019)	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	Chinook salmon not established in Europe (Froese & Pauly 2020).	Medium
3. I	nvasive	e elsewhere			
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	Fuller, P., G. Jacobs, M. Cannister, J. Larson, and A. Fusaro, 2020, Oncorhynchus tshawytscha (Walbaum in Artedi, 1792): U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, FL, https://nas.er.usgs.gov/queries/FactSheet.aspx?speciesID=920, Revision Date: 12/20/2019, Peer Review Date: 6/26/2014, Access Date: 5/18/2020	Medium
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	Fuller, P., G. Jacobs, M. Cannister, J. Larson, and A. Fusaro, 2020, Oncorhynchus tshawytscha (Walbaum in Artedi, 1792): U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, FL, https://nas.er.usgs.gov/queries/FactSheet.aspx?speciesID=920, Revision Date: 12/20/2019, Peer Review Date: 6/26/2014, Access Date: 5/18/2020	Medium
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	Farmed and no adverse impacts (Species Fact Sheet: Oncorhynchus tshawytscha (Walbaum, 1792). FAO. Archived from the original on 3 April 2020.).	Low
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	No	no data available	Low
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	Personal opinion	Low
		//Ecology			
		able (or persistence) traits			
		Is it likely that the taxon will be poisonous or pose other risks to human health?		Chinook salmon is harmless (Fishbase)	Medium
	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	Fuller, P., G. Jacobs, M. Cannister, J. Larson, and A. Fusaro, 2020, Oncorhynchus tshawytscha (Walbaum in Artedi, 1792): U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, FL, https://nas.er.usgs.gov/queries/FactSheet.aspx?speciesID=920, Revision Date: 12/20/2019, Peer Review Date: 6/26/2014, Access Date: 5/18/2020	Medium
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	No	Low
	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	The freshwater streams are relatively deep with course gravel. The water must be cool, under 14 C for maximum survival, and fast flowing (Scott, C. 2003. "Oncorhynchus tshawytscha" (On- line), Animal Diversity Web. Accessed May, 18, 2020 at https://animaldiversity.org/accounts/Oncorhynchus tshawytscha/).	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	The taxon can will is no effect on the food-web structure/function in the aquatic ecosystem.	Low
	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes	The taxon will not have an adverse impact on ecosystem services in the RA area.	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	Yes, the taxon may be a host or vector of known pests and infectious agents endemic to RA area. Because in every area exist infectious agents and pests.	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	Rauque, C., Viozzi, G., Flores, V., Vega, R., Waicheim, A., & Salgado-Maldonado, G. (2018). Helminth parasites of alien freshwater fishes in Patagonia (Argentina). International journal for parasitology. Parasites and wildlife, 7(3), 369–379	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 : 150 cm TL (Fishbase)	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	Froese & Pauly 2020	Medium
24	4.11		No	Supply of marine derived nutrients to headwaters (Soto D, Arismendi I, Di Prinzio C, Jara F (2007) Establishment of Chinook Salmon (Oncorhynchus tshawytscha) in Pacific basins of Southern South America and its potential ecosystem implications. Rev Chil Hist Nat 80:81–98	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)?	No	Establishments of populations in new areas are very rare (CABI 2019).	Medium
5. R	Resourc	ce exploitation			
		Is the taxon likely to consume threatened or protected native taxa in the RA area?	Yes	It is possible that it consume endangered and protected native taxa in the RA area. If there are protected taxa in the RA area will consume them, whether or not the taxon is endangered.	Medium
27	5.02	Is the taxon likely to sequester food resources (including nutrients) to the	Not applicable	not applicable	Very high
6 R	Reprodu	detriment of native taxa in the RA area?			
	6.01	Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response	No	Froese & Pauly 2020	Medium
29	6.02	to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)?	No	Chinook salmon can't produce viable gametes in the RA area. (Crawford SS, Muir AM (2008) Global introductions of salmon and trout in the genus Oncorhynchus: 1870–2007. Reviews in Fish Biology and Fisheries 18: 313– 344)	Medium
30	6.03	Is the taxon likely to hybridise naturally with	No	No	Low
31	6.04	native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction?	No	No	Low
32	6.05	To she taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	Yes	Walbaum in Artedi, 1792): U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, FL, https://nas.er.usgs.gov/queries/FactSheet.aspx?speciesID=920, Revision Date: 12/20/2019, Peer Review Date: 6/26/2014, Access Date: 5/18/2020	Medium
33	6.06	Is the taxon known (or likely) to produce a large number of propagules or offspring	Yes	Froese & Pauly 2020	Medium
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?	2	Spawns for the first time at 2-7 years. (Froese & Pauly 2020)	Medium
		al mechanisms	T		
35	7.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable	One	Fishing (CABI, 2019)	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)?	No	That vector/pathway can't bring taxon in protected 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 adaptations	Low
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	Crawford SS, Muir AM (2008) Global introductions of salmon and trout in the genus Oncorhynchus: 1870–2007. Reviews in Fish Biology and Fisheries 18: 313– 344	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	Crawford SS, Muir AM (2008) Global introductions of salmon and trout in the genus Oncorhynchus: 1870–2007. Reviews in Fish Biology and Fisheries 18: 313– 344	Medium
40	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	No	Crawford SS, Muir AM (2008) Global introductions of salmon and trout in the genus Oncorhynchus: 1870–2007. Reviews in Fish Biology and Fisheries 18: 313– 344	Medium
41	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No	Crawford SS, Muir AM (2008) Global introductions of salmon and trout in the genus Oncorhynchus: 1870–2007. Reviews in Fish Biology and Fisheries 18: 313–344	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 a high rate of spread of taxa. Eg. if a fertilized individual enters a new area by any means of expansion.	Low
	ù.	unintentional or intentional) likely to be	No	Personal opinion	Modium
47	7 00		No		Medium
	7.09 Foleran	Is dispersal of the taxon density dependent? ce attributes			
8. 7	oleran	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?	No	Personal opinion	Medium
<u>8. 7</u> 44 45	oleran	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	Personal opinion Personal opinion	Medium Medium

47	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	No	COSEWIC 2006. COSEWIC assessment and status report on the chinook salmon Oncorhynchus tshawytscha (Okanagan population) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vii + 41 pp.	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	Anadromous species (Froese & Pauly 2020)	Medium
49	8.06	Are there effective natural enemies (predators) of the taxon present in the RA	Yes	Piscivorous fish and birds	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	The risks of entry into the RA area is no change. Maybe because of human impact, but not because of climate change.	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	Crawford SS, Muir AM (2008) Global introductions of salmon and trout in the genus Oncorhynchus: 1870–2007. Reviews in Fish Biology and Fisheries 18: 313– 344), it is a cold water species so no change with 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?	No change	Crawford SS, Muir AM (2008) Global introductions of salmon and trout in the genus Oncorhynchus: 1870–2007. Reviews in Fish Biology and Fisheries 18: 313– 344), it is a cold water species so no change with climate 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	Future potential impacts on biodiversity and ecological status will not 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	The future potential impacts on ecosystem structure and function will not 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	The future potential impacts on ecosystem services and socio- economic factors will not change.	Medium

Statistics	
Scores	
BRA	12.0
BRA Outcome	-
BRA+CCA	12.0
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	3.0
4. Undesirable (or persistence) traits	5.0
5. Resource exploitation	5.0
6. Reproduction	-2.0
7. Dispersal mechanisms	-4.0
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	3 5 5
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	5
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	36 12
<i>4. Undesirable (or persistence) traits</i> <i>5. Resource exploitation</i>	36 12 2
4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction	36 12 2
4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms	36 12 2 7 9
4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes	36 12 2 7 9 6
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
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
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
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	36 12 2 7 9 6 6 6 7
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
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	36 12 2 7 9 6 6 6 7
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 9 6 6 6 7
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 Thresholds	36 12 2 7 9 6 6 6 7
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 Commercial Environmental Species or population nuisance traits Thresholds BRA	36 12 2 7 9 6 6 6 6 7
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 Thresholds	36 12 2 7 9 6 6 6 6 7

BRA+CCA	-
Confidence	
BRA+CCA	0.47
BRA	0.47
CCA	0.50
Date and Time	
18/05/20	020 08:05:37

Taxon and Assessor details						
Category	Fishes and Lampreys (freshwater)					
Taxon name	Salmo labrax					
Common name	Black Sea salmon					
Assessor	Ana Marić					
Risk screening context						
Reason and socio-economic benefits						
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS					
Taxonomy						
Native range						
Introduced range						
LIRI						

			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	1. http://aquatres.scientificwebjournals.com/en/download/article- file/1265953. Chemical composition of the Black Sea trout (Salmo labrax Pallas, 1814): A comparative study. 2020. Ekrem Cem Çankırılıgil , Nermin Berik, 2. Variation in the Timing of Spawning of the Black Sea Brown Trout Salmo trutta labrax Pallas under Artificial and Natural Conditions. 2011. A. A. Makhrova, V. S. Artamonovaa, V. S. Sumarokovb, A. N. Pashkovb, S. I. Deshetrikush M. V. Carabayan and G. A. Kichnend	High
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	Reshetnikovb. M. V. Ganchenkoc. and S. A. Kulvand Naredbao merama za ocuvanje i zastitu ribljeg fonda. 2009.	High
	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	A handbook of freshwater invasive species. Robert A. Francis. 2012.	Very 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	Dfb KG climate	Very high
5	2.02	What is the quality of the climate matching data?	High	https://climatch.cp1.agriculture.gov.au/climatch.jsp 4 light green	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	DIVERSITY OF BROWN TROUT, SALMO TRUTTA (ACTINOPTERYGII: SALMONIFORMES: SALMONIDAE), IN THE DANUBE RIVER BASIN OF CROATIA REVEALED BY MITOCHONDRIAL DNA Tamara KANJUH 1*, Ana MARIĆ1, Marina PIRIA2, Ivan ŠPELIĆ2, Ivana MAGUIRE3, and Predrag SIMONOVIĆ. The taxon is not in captivity, but yet not in Adriatic basin in RA area.	High
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	Intentional unprofessional stocking.	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	BROWN TROUT'S POPULATIONS GENETIC DIVERSITY USING MITOCHONDRIAL MARKERS IN RELATIVELY SIMILAR GEOGRAPHICAL AND ECOLOGICAL CONDITIONS – A CARPATHIAN CASE STUDY Gina-Oana POPA *, Miad KHALAF **, Andreea DUDU ***, Angela CURTEAN-BĂNĂDUC ****, Doru BĂNĂDUC *****, Sergiu Emil GEORGESCU ***** and Marieta COSTACHE****** 2013.	Very high
3. I	nvasive	e elsewhere			
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	Genetic variation among trout in the River Neretva basin, Bosnia and Herzegovina 2006. A. RAZPET, S. SUS [*] NIK, T. JUG AND A. SNOJ* Diversity of Brown trout Salmo cf. trutta in the River Danube Basin of Western Balkans as Assessed from the Structure of Their Mitochondrial Control Region Haplotypes1 2017. P. Simonovića, *, A. Tošića, D. Škraba Jurlinaa, V. Nikolića, M. Piriab. T. Tomlianovićb. N. Špremb. D. Mrdakc. D. Miloševićc. A.	High
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	No	Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin. 646 pp. https://www.fishbase.de/summary/Salmo-	High
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	https://www.fishbase.de/summary/Salmo-labrax.html Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin. 646 pp.	Very high
	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem services?	No	Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin. 646 pp. Not evaluated elsewhere. But are there any consequences of stocking in 19th century? Diversity of Brown trout Salmo cf. trutta in the River Danube Basin of Western Balkans as Assessed from the Structure of Their Mitochondrial Control Region Haplotypes1 P. Simonovića, *, A. Tošića, D. Škraba Jurlinaa. V. Nikolića. M. Piriab, T. Tomlianovićb, N. Špremb. D.	High
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof,	High
		//Ecology			
		able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health?	No	Not toxic.	Very high
	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	Genetic variation among trout in the River Neretva basin, Bosnia and Herzegovina. 2006. A. RAZPET, S. SUS [*] NIK, T. JUG AND A. SNOJ*	Medium
	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	Not a 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	Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin. 646 p	Very high

			T		1
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	Salmonids are top predators. S. trutta, its relative is one of 100 most invasive species	Medium
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	Mostly impacts other species and congeneras. A Handbook of Global Freshwater Invasive Species. Frencis. 2012	High
20	4.07	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and	Yes	Close relative to S. trutta and other salmonids so probably yes	High
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	No	Basins are in close proximity so probably no.	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	Not applicable	Not in captivity.	High
23	4.10	released from captivity? Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g.	Yes	https://dergipark.org.tr/en/download/article-file/141678 TJFAS	Very 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 patient burg?	No	Salmo trutta changes productivity in intorduced streams but DA is not that competitive?	High
	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	Tosic et al. 2016.	Very high
		e exploitation	I		Г. :
26	5.01	Is the taxon likely to consume threatened or protected native taxa in the RA area?	Yes	Feeds on invertebrates, fish and crustaceans: Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin. 646 p	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	For S. trutta RIP is:	High
6. F	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	Characteristics of the Hatchery-Reared Black Sea Salmon Salmo trutta labrax. 2007. V. Ya. Nikandrov and N. I. Shindavina For S. trutta definitly	High
29	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	Genetic variation among trout in the River Neretva basin, Bosnia and Herzegovina A. RAZPET, S. SUSi NIK, T. JUG AND A. SNOJ*	High
30	6.03	Is the taxon likely to hybridise naturally with native taxa?	Yes	Genetic variation among trout in the River Neretva basin, Bosnia and Herzegovina A. RAZPET, S. SUSI NIK, T. JUG AND A. SNOJ*	Very high
31	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	No	Characteristics of the Hatchery-Reared Black Sea Salmon Salmo trutta labrax. 2007 V. Ya. Nikandrov and N. I. Shindavina	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 specialist incubators.	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	Fecundity and egg size of three salmonid species (Oncorhynchus mykiss, Salmo labrax, Salvelinus fontinalis) cultured at the same farm condition in north-eastern, Turkey. Author(s) : SerezlÍ, R. ; Guzel, S. ; Kocabas, M. 2010	High
34	6.07	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	2	Characteristics of the Hatchery-Reared Black Sea Salmon Salmo trutta labrax. 2007. V. Ya. Nikandrov and N. I. Shindavina	Very high
7. E	Dispersa	al mechanisms			
		How many potential internal vectors/pathways could the taxon use to	One	Unprofesional stocking	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	Genetic variation among trout in the River Neretva basin, Bosnia and Herzegovina. 2007 A. RAZPET, S. SUS [°] NIK, T. JUG AND A. SNO1*	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 adaptation.	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	Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin. 646 pp.	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	Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin. 646 pp.	High
40	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	Yes	Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof,	Very high
41	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No	Eggs dont have attaching adaptation.	Very high
42	7.08	Is dispersed in the KA area by other alimitals? 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	If intention it can be very rapid.	High
43	7.09		Yes	Partial migratority is	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	No	Salmonids are very sensitive to reduced oxigen levels	Very 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	Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin. 646 pp.	High

46		Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	No	No efficant pisticides for eradication.	High
47	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	No	Maybe floods?	High
48		Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	Yes	Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin. 646 pp.	High
		Are there effective natural enemies (predators) of the taxon present in the RA e change	Yes	Same as for S.trutta. S. obtusirostis	Very high
		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	Same latitude for both basins. Professional judgement.	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?	No change	Professional judgement.	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?	No change	Professional judgement.	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?	No change	Professional judgement.	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	Professional judgement.	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?	No change	Professional judgement.	Very high

Statistics	
Scores	
BRA	23.0
BRA Outcome	-
BRA+CCA	23.0
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	16.0
4. Undesirable (or persistence) traits	4.0
5. Resource exploitation	7.0
6. Reproduction	4.0
7. Dispersal mechanisms	2.0
8. Tolerance attributes	-1.0
C. Climate change	0.0
9. Climate change	0.0
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
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 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 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 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 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 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 9 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 Species or population nuisance traits	13 3 5 5 36 12 2 7 9 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 5

BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.86
BRA	0.84
CCA	1.00
Date and Time	

12/05/2021 20:02:04

Taxon and Assessor details						
Category	Fishes and Lampreys (freshwater)					
Taxon name	Salmo labrax					
Common name	Black Sea salmon					
Assessor	Ivan Špelić					
Risk screening context						
Reason and socio-economic benefits						
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS					
Taxonomy						
Native range						
Introduced range						
URL						

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
1. L		ication/Cultivation	1		1
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	Reared in hatcheries (Nikandrov, V.Y., Shindavina, N.I., 2007. Characteristics of the hatchery-reared Black Sea salmon Salmo trutta labrax. Journal of Ichthyology 47, 184–193 doi:10.1134/s0032945207020063; Ramazan Serezli, Senol Guzel and Mehmet Kocabas, 2010. Fecundity and Egg Size of Three Salmonid Species (Oncorhynchus mykiss, Salmo labrax, Salvelinus fontinalis) Cultured at the Same Farm Condition in North-Eastern. Turkev. Journal of Animal and Veterinary	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	Nikandrov, V.Y., Shindavina, N.I., 2007. Characteristics of the hatchery-reared Black Sea salmon Salmo trutta labrax. Journal of Ichthyology 47, 184–193 doi:10.1134/s0032945207020063	Very high
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	Salmo trutta complex in general (CABI).	Very 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?	Low	Estimated using Climatch, low number of points in the target area, only 6.	Low
5	2.02	What is the quality of the climate matching data?	Low	Estimated using Climatch, low number of points in the target area, only 6.	Very high
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	Gacka river in Croatia (debatable if introduced or native as a consequence of historical hydrologic changes) (Jadan, M., Čož-Rakovac, R., Topić Popović, N., & Strunjak-Perović, I. (2007). Presence of unexpected phylogenetic lineages of brown trout Salmo trutta L. in Gacka River, Croatia. Aquaculture Research, 38(15), 1682–1685. doi:10.1111/j.1365-2109.2007.01832.x).	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?		Already present (Jadan, M., Čož-Rakovac, R., Topić Popović, N., & Strunjak-Perović, I. (2007). Presence of unexpected phylogenetic lineages of brown trout Salmo trutta L. in Gacka River, Croatia. Aquaculture Research, 38(15), 1682–1685. doi:10.1111/j.1365-2109.2007.01832.x).	Very 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)?	Not applicable	Already present (Jadan, M., Čož-Rakovac, R., Topić Popović, N., & Strunjak-Perović, I. (2007). Presence of unexpected phylogenetic lineages of brown trout Salmo trutta L. in Gacka River, Croatia. Aquaculture Research, 38(15), 1682–1685. doi:10.1111/j.1365- 2109.2007.01832.x).	Very high
<i>3.</i> 1		e elsewhere	14		
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	Gacka river (debatable) (Jadan, M., Čož-Rakovac, R., Topić Popović, N., & Strunjak-Perović, I. (2007). Presence of unexpected phylogenetic lineages of brown trout Salmo trutta L. in Gacka River, Croatia. Aquaculture Research, 38(15), 1682–1685. doi:10.1111/i.1365-2109.2007.01832.x).	Medium
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	No	Not documented.	High
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	Not documented	High
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	No	Not documented.	High
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	Not documented.	High
		//Ecology			
		able (or persistence) traits	1		
		Is it likely that the taxon will be poisonous or pose other risks to human health?		Harmless (Sa-a, Pascualita in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021)).	Very high
	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	If biology and ecology are presumably similar to other invasive Salmo trutta lineages (belonging to the same brown trout complex). Salmo trutta has been implicated in reducing native fish populations (especially other salmonids) through predation, displacement, and food competition; S. trutta introductions may have eliminated or reduced several Plecoptera and Trichoptera species in streams in Victoria, Australia (CABI, 2021. Salmo trutta[original text by Sunil Siriwardena]. In: Invasive Species Compendium. Wallingford. UK: CAB International.	Medium
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	No parasitic behaviour (Kotellat & Freyhof 2008).	Very high

17	1 4 9 1		T		
	4.04	Is the taxon adaptable in terms of climatic	No	For Salmo trutta: they prefer cold, well-oxygenated upland waters	Medium
		and other environmental conditions, thus enhancing its potential persistence if it has		although their tolerance limits are lower than those of rainbow trout and favors large streams in the mountainous areas with	
		invaded or could invade the RA area?		adequate cover in the form of submerged rocks, undercut banks,	
				and overhanging vegetation (Froese, R. and D. Pauly. Editors.	
				2019.FishBase. World Wide Web electronic publication.	
				www.fishbase.org, (12/2019). Salmo labrax is distributed along	
				the coasts of the Black and Azov Seas, and also in the rivers	
				emptying into the seas (Lațiu, C., Cocan, D., Uiuiu, P., Ihuț, A.,	
				Nicula, S.A., Constantinescu, R., Mireşan, V., 2020. The Black Sea	
				Trout, Salmo labrax Pallas, 1814 (Pisces: Salmonidae) in Romanian Waters. Bulletin of University of Agricultural Sciences	
				and Veterinary Medicine Cluj-Napoca. Animal Science and	
				Biotechnologies 77 9 doi:10.15835/buasymcn-ash:2020.0017)	
18	4.05	Is the taxon likely to disrupt food-web	Yes	Nystrom, P.; McIntosh, A. R. (2003): Are impacts of an exotic	Medium
		structure/function in aquatic ecosystems if it		predator on a stream food web influenced by disturbance history?	
		has invaded or is likely to invade the RA		Oecologia (2003) 136:279–288. DOI 10.1007/s00442-003-1250-3	
19	4.06	area? Is the taxon likely to exert adverse impacts	Yes	(for Salmo trutta). For Salmo trutta: brown trout have been implicated in reducing	Medium
	1.00	on ecosystem services in the RA area?	105	native fish populations (especially other salmonids) through	i iculuiii
				predation, displacement, food competition and hybridization	
				(Global Invasive Species Database (2020) Species profile: Salmo	
				trutta. Downloaded from	
				http://www.iucngisd.org/gisd/speciesname/Salmo+trutta on 25-	
20	4.07	Is it likely that the taxon will host, and/or	Yes	Salmo trutta is susceptible to pathogens and parasites (Cultured	Medium
		act as a vector for, recognised pests and infectious agents that are endemic in the RA		Aquatic Species Information Programme. Salmo trutta. Cultured Aquatic Species Information Programme. Text by Vandeputte, M.	
		area?		& Labbé, L. In: FAO Fisheries Division [online]. Rome. Updated .	
				[Cited 24 May 2021].), so most likely S. labrax is also susceptible	
_				as a part of brown trout complex.	
21	4.08	Is it likely that the taxon will host, and/or	Yes	Salmo trutta is susceptible to pathogens and parasites (Cultured	Medium
		act as a vector for, recognised pests and		Aquatic Species Information Programme. Salmo trutta. Cultured	
		infectious agents that are absent from (novel		Aquatic Species Information Programme. Text by Vandeputte, M.	
		to) the RA area?		& Labbé, L. In: FAO Fisheries Division [online]. Rome. Updated .	
				[Cited 24 May 2021].), so most likely S. labrax is also susceptible	
22	4.09	Is it likely that the taxon will achieve a body	Yes	as a part of brown trout complex. 80 cm (Sa-a, Pascualita in Froese, R. and D. Pauly. Editors.	Very high
		size that will make it more likely to be		2021.FishBase. World Wide Web electronic publication.	· · · / · · · j··
		released from captivity?		www.fishbase.org, (02/2021)).	
23	4.10	Is the taxon capable of sustaining itself in a	Yes	There are anadromous, lacustrine and resident forms. At the sea,	Very high
		range of water velocity conditions (e.g.		it occurs along coasts at depths of up to 50 m. Undertakes	
		versatile in habitat use)?		migration to hill streams. Resident part of populations live in	
				streams and uppermost reaches with fast current, cold clear water	
				and stone or gravel bottom (Sa-a, Pascualita in Froese, R. and D.	
				Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021)).	
24	4.11	Is it likely that the taxon's mode of existence	No	Resident populations live in habitats with hard substrate, ecology	High
		(e.g. excretion of by-products) or behaviours		does not imply such impacts (Sa-a, Pascualita in Froese, R. and D.	_
		(e.g. feeding) will reduce habitat quality for		Pauly. Editors. 2021. FishBase. World Wide Web electronic	
		native taxa?		publication. www.fishbase.org, (02/2021)) and it was never	
25	4.12	To the transmitter to the production of the later	N	documented.	Ma dissa
25	4.12	Is the taxon likely to maintain a viable population even when present in low	No	No evidence, resilience very Low, minimum population doubling time more than 14 years (Sa-a, Pascualita in Froese, R. and D.	Medium
		densities (or persisting in adverse conditions			
5. I		by way of a dormant form)?		Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021)).	
		ce exploitation		publication. www.fishbase.org, (02/2021)).	
	<i>Resourc</i> 5.01	ce exploitation Is the taxon likely to consume threatened or	Yes	publication. www.fishbase.org, (02/2021)). Small specimens feed on aquatic and terrestrial invertebrates,	Medium
		ce exploitation	Yes	publication. www.fishbase.org, (02/2021)). Small specimens feed on aquatic and terrestrial invertebrates, while adults feed on invertebrates and fish (Lațiu, C., Cocan, D.,	Medium
		ce exploitation Is the taxon likely to consume threatened or	Yes	bublication. www.fishbase.org, (02/2021)). Small specimens feed on aquatic and terrestrial invertebrates, while adults feed on invertebrates and fish (Lațiu, C., Cocan, D., Uiuiu, P., Ihuț, A., Nicula, S.A., Constantinescu, R., Mireșan, V.,	Medium
		ce exploitation Is the taxon likely to consume threatened or	Yes	publication. www.fishbase.org, (02/2021)). Small specimens feed on aquatic and terrestrial invertebrates, while adults feed on invertebrates and fish (Laţiu, C., Cocan, D., Uiuiu, P., Ihuţ, A., Nicula, S.A., Constantinescu, R., Mireşan, V., 2020. The Black Sea Trout, Salmo labrax Pallas, 1814 (Pisces:	Medium
		ce exploitation Is the taxon likely to consume threatened or	Yes	bublication. www.fishbase.org, (02/2021)). Small specimens feed on aquatic and terrestrial invertebrates, while adults feed on invertebrates and fish (Lațiu, C., Cocan, D., Uiuiu, P., Ihuţ, A., Nicula, S.A., Constantinescu, R., Mireşan, V., 2020. The Black Sea Trout, Salmo labrax Pallas, 1814 (Pisces: Salmonidae) in Romanian Waters. Bulletin of University of	Medium
26	5.01	ce exploitation Is the taxon likely to consume threatened or		publication. www.fishbase.org, (02/2021)). Small specimens feed on aquatic and terrestrial invertebrates, while adults feed on invertebrates and fish (Lațiu, C., Cocan, D., Uiuiu, P., Ihuţ, A., Nicula, S.A., Constantinescu, R., Mireşan, V., 2020. The Black Sea Trout, Salmo labrax Pallas, 1814 (Pisces: Salmonidae) in Romanian Waters. Bulletin of University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca. Animal Science and Biotechnologies 77, 9. doi:10.15835/buasymcn-	
26		ce exploitation Is the taxon likely to consume threatened or protected native taxa in the RA area? Is the taxon likely to sequester food		publication. www.fishbase.org, (02/2021)). Small specimens feed on aquatic and terrestrial invertebrates, while adults feed on invertebrates and fish (Lațiu, C., Cocan, D., Uiuiu, P., Ihuţ, A., Nicula, S.A., Constantinescu, R., Mireşan, V., 2020. The Black Sea Trout, Salmo labrax Pallas, 1814 (Pisces: Salmonidae) in Romanian Waters. Bulletin of University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca. Animal	Medium Very high
26	5.01	Is the taxon likely to consume threatened or protected native taxa in the RA area?		publication. www.fishbase.org, (02/2021)). Small specimens feed on aquatic and terrestrial invertebrates, while adults feed on invertebrates and fish (Lațiu, C., Cocan, D., Uiuiu, P., Ihuţ, A., Nicula, S.A., Constantinescu, R., Mireşan, V., 2020. The Black Sea Trout, Salmo labrax Pallas, 1814 (Pisces: Salmonidae) in Romanian Waters. Bulletin of University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca. Animal Science and Biotechnologies 77, 9. doi:10.15835/buasymcn-	
26	5.01	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?		publication. www.fishbase.org, (02/2021)). Small specimens feed on aquatic and terrestrial invertebrates, while adults feed on invertebrates and fish (Lațiu, C., Cocan, D., Uiuiu, P., Ihuţ, A., Nicula, S.A., Constantinescu, R., Mireşan, V., 2020. The Black Sea Trout, Salmo labrax Pallas, 1814 (Pisces: Salmonidae) in Romanian Waters. Bulletin of University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca. Animal Science and Biotechnologies 77, 9. doi:10.15835/buasymcn-	
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26 27 5. <i>1</i> 28 29	5.01 5.02 6.01 6.02 6.03	cce 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 hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to	Not applicable	 publication. www.fishbase.org, (02/2021)). Small specimens feed on aquatic and terrestrial invertebrates, while adults feed on invertebrates and fish (Lațiu, C., Cocan, D., Uiuiu, P., Ihuţ, A., Nicula, S.A., Constantinescu, R., Mireşan, V., 2020. The Black Sea Trout, Salmo labrax Pallas, 1814 (Pisces: Salmonidae) in Romanian Waters. Bulletin of University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca. Animal Science and Biotechnologies 77, 9., doi:10.15835/buasvmcn-No data for calculation. No evidence, not documented for brown trout complex. Established a self-sustainable population in the Gacka river in Croatia (debatable if introduced or native and consequence of historical hydrologic changes) (Jadan, M., Čož-Rakovac, R., Topić Popović, N., & Strunjak-Perović, I. (2007). Presence of unexpected phylogenetic lineages of brown trout Salmo trutta L. in Gacka River, Croatia. Aquaculture Research, 38(15), 1682–1685. doi:10.1111/i.1365-2109.2007.01832.x.). Buj I, Ivić L, Raguz L, Caleta M, Marčić Z, Duplić A, Zanella D, Tomašić A, Horvatić S, Karlović R and Mustafić P (2019). Trouts in karstic watersheds – diversity, origin and perspective. Front. Mar. Sci. Conference Abstract: XVI European Congress of Ichthyology. doi: 10.3389/conf.fmars.2019.07.00114 Not documented (Nikandrov, V.Y., Shindavina, N.I., 2007. Characteristics of the hatchery-reared Black Sea salmon Salmo trutta labrax. Journal of Ichthyology 47, 184–193 	Very high Medium Medium High
26 27 <u>5. /</u> 28 29 30	5.01 5.02 6.01 6.02 6.03	cce 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 hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction?	Not applicable	 publication. www.fishbase.org, (02/2021)). Small specimens feed on aquatic and terrestrial invertebrates, while adults feed on invertebrates and fish (Laţiu, C., Cocan, D., Uiuiu, P., Ihuţ, A., Nicula, S.A., Constantinescu, R., Mireşan, V., 2020. The Black Sea Trout, Salmo labrax Pallas, 1814 (Pisces: Salmonidae) in Romanian Waters. Bulletin of University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca. Animal Science and Biotechnologies 77, 9 doi:10.15835/buasvmcn-No data for calculation. No evidence, not documented for brown trout complex. Established a self-sustainable population in the Gacka river in Croatia (debatable if introduced or native and consequence of historical hydrologic changes) (Jadan, M., Čož-Rakovac, R., Topić Popović, N., & Strunjak-Perović, I. (2007). Presence of unexpected phylogenetic lineages of brown trout Salmo trutta L. in Gacka River, Croatia. Aquaculture Research, 38(15), 1682–1685. doi:10.1111/i.1365-2109.2007.01832x.). Buj I, Ivić L, Raguz L, Caleta M, Marčić Z, Duplić A, Zanella D, Tomašić A, Horvatić S, Karlović R and Mustafić P (2019). Trouts in karstic watersheds – diversity, origin and perspective. Front. Mar. Sci. Conference Abstract: XVI European Congress of Ichthyology. doi: 10.3389/conf.fmars.2019.07.00114 Not documented (Nikandrov, V.Y., Shindavina, N.I., 2007. Characteristics of the hatchery-reared Black Sea salmon Salmo trutta labrax. Journal of Ichthyology 47, 184–193 doi:10.1134/s0032945207020063). 	Very high Medium Medium High Very high
26 27 <u>5. /</u> 28 29 30	5.01 5.02 6.01 6.02 6.03	cce 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 hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to	Not applicable	 publication. www.fishbase.org, (02/2021)). Small specimens feed on aquatic and terrestrial invertebrates, while adults feed on invertebrates and fish (Lațiu, C., Cocan, D., Uiuiu, P., Ihuţ, A., Nicula, S.A., Constantinescu, R., Mireşan, V., 2020. The Black Sea Trout, Salmo labrax Pallas, 1814 (Pisces: Salmonidae) in Romanian Waters. Bulletin of University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca. Animal Science and Biotechnologies 77, 9., doi:10.15835/buasvmcn-No data for calculation. No evidence, not documented for brown trout complex. Established a self-sustainable population in the Gacka river in Croatia (debatable if introduced or native and consequence of historical hydrologic changes) (Jadan, M., Čož-Rakovac, R., Topić Popović, N., & Strunjak-Perović, I. (2007). Presence of unexpected phylogenetic lineages of brown trout Salmo trutta L. in Gacka River, Croatia. Aquaculture Research, 38(15), 1682–1685. doi:10.1111/i.1365-2109.2007.01832.x.). Buj I, Ivić L, Raguz L, Caleta M, Marčić Z, Duplić A, Zanella D, Tomašić A, Horvatić S, Karlović R and Mustafić P (2019). Trouts in karstic watersheds – diversity, origin and perspective. Front. Mar. Sci. Conference Abstract: XVI European Congress of Ichthyology. doi: 10.3389/conf.fmars.2019.07.00114 Not documented (Nikandrov, V.Y., Shindavina, N.I., 2007. Characteristics of the hatchery-reared Black Sea salmon Salmo trutta labrax. Journal of Ichthyology 47, 184–193 	Very high Medium Medium High

	1				I
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	680-15014 eggs per female (Nikandrov, V.Y., Shindavina, N.I., 2007. Characteristics of the hatchery-reared Black Sea salmon Salmo trutta labrax. Journal of Ichthyology 47, 184–193 doi:10.1134/s0032945207020063).	Very high
	6.07	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	2	Females are mature at 2 years (Nikandrov, V.Y., Shindavina, N.I., 2007. Characteristics of the hatchery-reared Black Sea salmon Salmo trutta labrax. Journal of Ichthyology 47, 184–193 doi:10.1134/s0032945207020063).	High
		al mechanisms	0		
35	7.01	How many potential internal vectors/pathways could the taxon use to	One	Uncontrolled introductions by anglers (personal opinion).	Low
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	If introduced to streams connected to water bodies within protected areas.	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 the likelihood of dispersal?	No	No such adaptations.	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 data for spawning substrate for this species but other species from brown trout complex deposit eggs in redds between gravel (Luna, Susan M. in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021))	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?	No	The fry stay near to the redd until they are 5-7 cm long (Aksungur, M., Zengin, M., Tabak, İ., Aksungur, N., & Alkan, A. (2011). Migration Characteristics of the Black Sea Trout (Salmo trutta labrax, Pallas, 1814) in the Eastern Black Sea Coasts and Streams. Turkish Journal of Fisheries and Aquatic Sciences, 11, 623-630. http://doi.org/10.4194/1303-2712-v11 4 17).	Medium
40	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	Yes	Undertakes migration to hill streams. Resident part of populations live in streams and uppermost reaches with fast current, cold clear water and stone or gravel bottom. Spawns in upper reaches with fast current (Luna, Susan M. in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021)).	High
41	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No	No data for spawning substrate for this species but other species from brown trout complex deposit eggs in redds between gravel (Luna, Susan M. in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021))	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	Uncontrolled introductions by anglers (personal opinion).	Low
43	7.09		No	Not documented.	Low
	1	ce attributes			b
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	Personal observation.	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	No	No specific info but closely related Salmo trutta requires cold, well oxygenated upland waters (Luna, Susan M. in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021)).	Medium
46	8.03		No	Not allowed in the RA area.	Very high
47	1	the wild with chemical, biological, or other			very nigh
	8.04		No	Damming hinders most returning adults to reach spawning sites (Luna, Susan M. in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication.	High
48	8.04	the wild with chemical, biological, or other agents/means? Is the taxon likely to tolerate or benefit from	No Yes	(Luna, Susan M. in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. Anadromous (Luna, Susan M. in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication.	
49	8.05 8.06	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		(Luna, Susan M. in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. Anadromous (Luna, Susan M. in Froese, R. and D. Pauly. Editors.	High
49 C. (8.05 8.06	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	Yes	(Luna, Susan M. in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. Anadromous (Luna, Susan M. in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021)). Piscivorous fish, birds and mammals (personal observation,	High Very high
49 C. (9. (8.05 8.06 Climate	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 conditions, are the risks of entry into the RA area posed by the taxon likely to increase,	Yes Yes	(Luna, Susan M. in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. Anadromous (Luna, Susan M. in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021)). Piscivorous fish, birds and mammals (personal observation,	High Very high
49 <u>9. (</u> 50	8.05 8.06 Climate	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 conditions, are the risks of entry into the RA	Yes Yes	(Luna, Susan M. in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. Anadromous (Luna, Susan M. in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021)). Piscivorous fish, birds and mammals (personal observation, personal communication).	High Very high Very high

	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	Lower	Trout (brown trout complex) are cold-water fish, they are particularly vulnerable to the effects of global warming, including increasing water temperatures and decreasing flow rates, future changes will impact the populations of trout, especially in the Mediterranean, because of the future water scarcity conditions (Carosi, A., Ghetti, L., Padula, R., Lorenzoni, M., 2020. Population status and ecology of the Salmo trutta complex in an Italian river basin under multiple anthropogenic pressures. Ecology and Evolution 10, 7320–7333 doi:10.1002/ece3.6457). As waters warm, cold water species with lower "thermal niches" become competitively disadvantaged with respect to other species for which the warmer temperatures are optimal (Magnuson, J.J., L.B. Crowder, and P.A. Medvick. 1979. Temperature as an ecological	Medium
54	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Lower	Trout (brown trout complex) are cold-water fish, they are particularly vulnerable to the effects of global warming, including increasing water temperatures and decreasing flow rates, future changes will impact the populations of trout, especially in the Mediterranean, because of the future water scarcity conditions (Carosi, A., Ghetti, L., Padula, R., Lorenzoni, M., 2020. Population status and ecology of the Salmo trutta complex in an Italian river basin under multiple anthropogenic pressures. Ecology and Evolution 10, 7320–7333. doi:10.1002/ece3.6457). As waters warm, cold water species with lower "thermal niches" become competitively disadvantaged with respect to other species for which the warmer temperatures are optimal (Magnuson, J.J., L.B. Crowder, and P.A. Medvick. 1979. Temperature as an ecological	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	Trout (brown trout complex) are cold-water fish, they are particularly vulnerable to the effects of global warming, including increasing water temperatures and decreasing flow rates, future changes will impact the populations of trout, especially in the Mediterranean, because of the future water scarcity conditions (Carosi, A., Ghetti, L., Padula, R., Lorenzoni, M., 2020. Population status and ecology of the Salmo trutta complex in an Italian river basin under multiple anthropogenic pressures. Ecology and Evolution 10, 7320–7333 doi:10.1002/ece3.6457). As waters warm, cold water species with lower "thermal niches" become competitively disadvantaged with respect to other species for which the warmer temperatures are optimal (Magnuson, J.J., L.B. Crowder, and P.A. Medvick. 1979. Temperature as an ecological resource. Amer. Zool. 19:331-343.). In this case, adverse impact is recognized as reducing the number of native fish species, especially other Salmonids. With future conditions, both native and introduced Salmonids are predicted to experience reductions	Low

Statistics	
Scores	
BRA	17.0
BRA Outcome	
BRA+CCA	9.0
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	6.0
5. Resource exploitation	5.0
6. Reproduction	1.0
7. Dispersal mechanisms	-1.0
8. Tolerance attributes	-1.0
C. Climate change	-8.0
9. Climate change	-8.0
Answered Questions	
Total	55
A. Biogeography/Historical 1. Domestication/Cultivation	13
2. Climate, distribution and introduction risk	3 5 5 36
3. Invasive elsewhere	5
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	
6. Reproduction	2 7 9 6 6
7. Dispersal mechanisms	9
8. Tolerance attributes	6
C. Climate change	6
9. Climate change	6
Sectors affected	
Commercial	5 4
Environmental	4
Species or population nuisance traits	3
Thresholds	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.69
BRA CCA	0.71 0.54

Date and Time 27/05/2021 23:33:49

Faxon and Assessor details						
Category	Fishes and Lampreys (freshwater)					
Taxon name	Salmo labrax					
Common name	Black Sea salmon					
Assessor	Tamara Kanjuh					
Risk screening context						
Reason and socio-economic benefits						
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS					
Taxonomy						
Native range						
Introduced range						
URL						

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
		ication/Cultivation	1		
		Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	For conserving the unique representative of salmonids—the Black Sea salmon Salmo trutta labrax—its hatchery rearing was initiated in 1998 at the Adler trout hatchery farm (Northern Caucasia) (Nikandrov&Shindavina, 2007).	High
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	For conserving the unique representative of salmonids—the Black Sea salmon Salmo trutta labrax—its hatchery rearing was initiated in 1998 at the Adler trout hatchery farm (Northern Caucasia) (Nikandrov&Shindavina, 2007).	High
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	No	No information found.	Medium
2. (Climate	, distribution and introduction risk			
4	2.01		High	Dfa, Dfb (Köppen-Geiger climate classification system)	High
5	2.02	What is the quality of the climate matching data?	High	Köppen-Geiger climate classification system	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	Translocated to the Adriatic basin.	Medium
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	Intentional stocking.	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	Yes	Translocated in Adriatic basin.	High
		and intentional introductions)?			
<u>3. 1</u> 9	<i>nvasiv</i> 3.01	e elsewhere Has the taxon become naturalised	No	No information found.	Low
_		(established viable populations) outside its	110	No momation round.	-
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	Food competition, hybridization	Medium
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	No information found.	Low
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	No	No informtion found.	Low
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	No information found.	Low
B. I	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	Harmless (https://www.fishbase.de/summary/Salmo-labrax.html)	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 information found.	Low
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	The taxon is not a parasite.	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?	No	The taxon is sensitive to environmental conditions.	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 information found.	Low
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	No information found.	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 information found.	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?	No	No information found.	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	No information found.	Low
23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)?	No	The taxon is sensitive to environmental conditions.	Medium
24	4.11		No	No information found.	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	It has anadromous and potamodromous forms (Cărăușu, 1952; Svetovidov, 1984; Vasilieva, 2003; Kottelat&Freyhof, 2007).	Medium
		e exploitation Is the taxon likely to consume threatened or protected native taxa in the RA area?	Yes	Parrs and resident adults feed on aquatic and terrestrial invertebrates. Anadromous and large lacustrine individuals prey mostly on fish and large crustaceans (K&F, 2007).	Low
		Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?	No	No information found.	Low
	eprodu 6.01	<i>uction</i> Is the taxon likely to exhibit parental care	No	No parental care.	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 information found.	Medium
30	6.03	Is the taxon likely to hybridise naturally with native taxa?	Yes	Hybridization with S.trutta (Kottelat&Fryhof, 2007).	Medium
31	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	No	No information found.	Medium
32	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	No	No information found.	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	Presumably like other salmonids.	Medium
34	6.07	How many time units (days, months, years) does the taxon require to reach the age-at-	4	Presumably like other salmonids.	Medium
		first-reproduction? al mechanisms			
35	7.01	How many potential internal vectors/pathways could the taxon use to	One	Intentional stocking.	Medium
36	7.02	disperse within the RA area (with suitable	Yes	Intentional stocking.	Medium
30	7.02	taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)?	Tes		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	Not known.	Medium
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 as eggs, but could as juveniles.	Medium
20	7.05	(for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to	Yes	Not as eggs, but could as juveniles.	Medium
	7.05	occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?	103		neulum
40	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	No	No information found.	Low
41	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No	No information found.	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	Intentional translocations.	Medium
43	7.09	unintentional or intentional) likely to be Is dispersal of the taxon density dependent?	No	No information found.	Low
8. 7	oleran	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	The taxon does not survive out of water.	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	The taxon is sensitive to environmental changes.	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 information found.	Medium
47	8.04	agents/means? Is the taxon likely to tolerate or benefit from	No	The taxon is sensitive to environmental changes.	Medium
48	8.05	environmental/human disturbance? Is the taxon able to tolerate salinity levels that are higher or lower than those found in	No	The taxon is sensitive to environmental changes.	Medium
49	8.06	its usual environment? Are there effective natural enemies	Yes	As for other salmonids.	Medium
с. с	Climat _'	(predators) of the taxon present in the RA e change			
9. C	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	The taxon is sensitive to environmental changes.	Medium
51	9.02	decrease or not change? Under the predicted future climatic conditions, are the risks of establishment	Decrease	The taxon is sensitive to environmental changes.	Medium
52	9.03	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	Decrease	The taxon is sensitive to environmental changes.	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	The taxon is sensitive to environmental changes.	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 taxon is sensitive to environmental changes.	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 taxon is sensitive to environmental changes.	Medium

Statistics

Scores	
BRA	6.0
BRA Outcome	-
BRA+CCA	-6.0
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	1.0
4. Undesirable (or persistence) traits	0.0
5. Resource exploitation	5.0
6. Reproduction	1.0
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 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 6
7. Dispersal mechanisms	9
8. Tolerance attributes	6
C. Climate change	6
9. Climate change	6
Sectors affected	
Sectors anected	
Commercial	7
	<u>7</u> 2
Commercial	7 2 - <u>1</u> 2
Commercial Environmental	7 2 -12
Commercial Environmental	7 2 -12
Commercial Environmental Species or population nuisance traits	7 2 -12

	BRA+CCA	-
Confidence		
	BRA+CCA	0.47
	BRA	0.46
	CCA	0.50
Date and Time		

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Taxon and Assessor details	xon and Assessor details						
Category	Fishes and Lampreys (freshwater)						
Taxon name	Salmo labrax						
Common name	Black Sea salmon						
Assessor	Tena Radocaj						
Risk screening context							
Reason and socio-economic benefits							
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS						
Taxonomy							
Native range							
Introduced range							
URL							

			Response	Justification (references and/or other information)	Confidence
A. E	Biogeo	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	Midilli, A., Kucuk, H., & Dincer, I. (2012). Environmental and sustainability aspects of a recirculating aquaculture system. Environmental Progress & Sustainable Energy, 31(4), 604-611.	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	It is harvested for human consumption, and for sport fishing. (Freyhof, J. 2013. Salmo labrax. The IUCN Red List of Threatened Species 2013)	Very high
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	Salmo trutta (Fishbase)	High
2 (limate	, distribution and introduction risk			
	2.01	How similar are the climatic conditions of the	Medium	The similarity between climatic conditions RA area and native	Medium
		Risk Assessment (RA) area and the taxon's native range?		range is high. I use climatch.	
5	2.02	What is the quality of the climate matching data?	Medium	Distribution Map of IUCN and Climatch	Medium
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	S. labrax is present outside of captivity in the RA area. (Buj, I., Raguž, L., Marčić, Z., Ćaleta, M., Duplić, A., Zanella, D., & Karlović, R. (2021). Plitvice Lakes National park harbors ancient, yet endangered diversity of trout (genus Salmo). Journal of	Medium
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	Not applicable	S. labrax is present in the RA area.	Very high
8	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA	Not applicable	S. labrax is present in the RA area.	Very high
		area in the near future (e.g. unintentional and intentional introductions)?			
		e elsewhere	1.4		1.
9		Has the taxon become naturalised (established viable populations) outside its native range?	Yes	& Karlović, R. (2021). Plitvice Lakes National park harbors ancient, yet endangered diversity of trout (genus Salmo). Journal of Applied Ichthyology, 37(1), 20-37.	Low
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	No	No evidence, but probably they compete with native fish species.	Low
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	No evidence	Low
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	No	Maybe can reducing native fish populations (especially other salmonids) through predation, displacement, and food competition	Low
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	No evidence	Low
B. E	Biology	//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	S. labrax is harmless (Fishbase)	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 evidence	Low
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in	No	No	Medium
17	4.04	the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus	Yes	Buj, I., Raguž, L., Marčić, Z., Ćaleta, M., Duplić, A., Zanella, D., & Karlović, R. (2021). Plitvice Lakes National park harbors	Medium
		enhancing its potential persistence if it has invaded or could invade the RA area?		ancient, yet endangered diversity of trout (genus Salmo). Journal of Applied Ichthyology, 37(1), 20-37.	
18	4.05	Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it	No	No evidence (May In some places, trout populations have outgrown native fish populations so rapidly that native fish have	Low
19	4.06	has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts	No	been forced out). S. labrax no adverse impacts in the RA area.	Medium
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 infectious agents that are endemic in the RA	Yes	Savas, H., Altinok, I., Cakmak, E., & Firidin, S. (2006). Isolation of Renibacterium salmoninarum from cultured Black Sea salmon (Salmo trutta labrax): first report in Turkey. BULLETIN-EUROPEAN	Medium
21	4.08	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?	Yes	ASSOCIATION OF FISH PATHOLOGISTS, 26(6), 238. Savas, H., Altinok, I., Cakmak, E., & Firidin, S. (2006). Isolation of Renibacterium salmoninarum from cultured Black Sea salmon (Salmo trutta labrax): first report in Turkey. BULLETIN-EUROPEAN ASSOCIATION OF FISH PATHOLOGISTS, 26(6), 238.	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	80.0 cm SL (Fishbase)	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	Resident part of populations in streams and uppermost reaches with fast current, cold clear water and stone or gravel bottom. (Freyhof, J. 2013. Salmo labrax. The IUCN Red List of Threatened	High

		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 evidence	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	Freyhof, J. 2013. Salmo labrax. The IUCN Red List of Threatened Species 2013	Medium
		e exploitation Is the taxon likely to consume threatened or	Yes	Parrs and resident adults feed on aquatic and terrestrial	High
	0.01	protected native taxa in the RA area?		invertebrates. Anadromous and large lacustrine individuals prey mostly on fish and large crustaceans. (Fishbase)	
27	5.02	Is the taxon likely to sequester food resources (including nutrients) to the	Not applicable	Not applicable	Very high
5. R	eprodu	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?	No	Fishbase	Medium
9	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	Buj, I., Raguž, L., Marčić, Z., Ćaleta, M., Duplić, A., Zanella, D., & Karlović, R. (2021). Plitvice Lakes National park harbors ancient, yet endangered diversity of trout (genus Salmo). Journal of Applied Ichthyology, 37(1), 20-37.	Very high
		Is the taxon likely to hybridise naturally with native taxa?	Yes	LAȚIU, C., COCAN, D., UIUIU, P., IHUȚ, A., NICULA, S. A., CONSTANTINESCU, R., & MIREȘAN, V. (2020). The Black Sea Trout, Salmo labrax Pallas, 1814 (Pisces: Salmonidae) in Romanian Waters. Bulletin UASVM Animal Science and	Low
81	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	No	No evidence	Low
32	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	Yes	Resident part of populations in streams and uppermost reaches with fast current, cold clear water and stone or gravel bottom. Spawns in upper reaches with fast current (Freyhof, J. 2013. Salmo labrax. The IUCN Red List of Threatened Species 2013)	Low
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	Fishbase	Low
84	6.07	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	2	between 2 and 4 years old (Cakmak, E., Firidin, S., Duzgunes, Z. D., & Parlak, R. (2019). The age-dependent reproductive performance of 4th generation Black Sea Trout (Salmo labrax Pallas, 1814) Females. Turkish Journal of Fisheries and Aquatic	High
7. D	ispersa	al mechanisms		Failas, 1014) Females. Turkish Journal of Fishenes and Aquatic	
		How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable	>1	1. human influence 2. natural spread via natural and manmade watercourses	Medium
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	Buj, I., Raguž, L., Marčić, Z., Ćaleta, M., Duplić, A., Zanella, D., & Karlović, R. (2021). Plitvice Lakes National park harbors ancient, yet endangered diversity of trout (genus Salmo). Journal of Applied Ichthyology, 37(1), 20-37.	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	Fishbase	Very high
88	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	Freyhof, J. 2013. Salmo labrax. The IUCN Red List of Threatened Species 2013	Low
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	Freyhof, J. 2013. Salmo labrax. The IUCN Red List of Threatened Species 2013	Low
0	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	Yes	Fishbase	High
1	7.07	Are propagules or eggs of the taxon likely to	No	Freyhof, J. 2013. Salmo labrax. The IUCN Red List of Threatened	High
2	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	Yes	Species 2013 There is the possibility of a high rate of dispersal of taxa. E.g. when a fertilized individual enters a new area by some kind of dispersal.	Low
		unintentional or intentional) likely to be Is dispersal of the taxon density dependent?	No	No	Medium
		ce attributes	Ne	Kettelet M and 1 Franks 6 2007 Hardback 5	Medium
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 cycle?	No	Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin	Medium
5	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	Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin	Medium
6	8.03	Can the taxon be controlled or eradicated in the wild with chemical, biological, or other	No	Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin	Very high
7	8.04	agents/means? Is the taxon likely to tolerate or benefit from environmental/human disturbance?	No	damming, most returning adults are unable to reach spawning sites. The resident populations are less impacted by the dams	Very 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	(Freyhof, J. 2013. Salmo labrax. The IUCN Red List of Threatened 17 (Cakmak, E., Firidin, S., Duzgunes, Z. D., & Parlak, R. (2019). The age-dependent reproductive performance of 4th generation Black Sea Trout (Salmo labrax Pallas, 1814) Females. Turkish Journal of Fisheries and Aquatic Sciences, 19(6), 496-502).	Low
9	8.06	Are there effective natural enemies	Yes	Catfish, Zander	Medium
	limate	(predators) of the taxon present in the RA e change			
- C		change			

50	9.01	Under the predicted future climatic	Not applicable	S. labrax is present in the RA area.	Very 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	Comte, L., Buisson, L., Daufresne, M., & Grenouillet, G. (2013).	Low
		conditions, are the risks of establishment		Climate-induced changes in the distribution of freshwater fish:	
		posed by the taxon likely to increase,		observed and predicted trends. Freshwater Biology, 58(4), 625-	
		decrease or not change?		639.	
52	9.03	Under the predicted future climatic	Decrease	Comte, L., Buisson, L., Daufresne, M., & Grenouillet, G. (2013).	Low
		conditions, are the risks of dispersal within		Climate-induced changes in the distribution of freshwater fish:	
		the RA area posed by the taxon likely to		observed and predicted trends. Freshwater Biology, 58(4), 625-	
		increase, decrease or not change?		639.	
53	9.04	Under the predicted future climatic	No change	Comte, L., Buisson, L., Daufresne, M., & Grenouillet, G. (2013).	Low
		conditions, what is the likely magnitude of		Climate-induced changes in the distribution of freshwater fish:	
		future potential impacts on biodiversity		observed and predicted trends. Freshwater Biology, 58(4), 625-	
		and/or ecological integrity/status?		639.	
54	9.05	Under the predicted future climatic	No change	Comte, L., Buisson, L., Daufresne, M., & Grenouillet, G. (2013).	Low
		conditions, what is the likely magnitude of		Climate-induced changes in the distribution of freshwater fish:	
		future potential impacts on ecosystem		observed and predicted trends. Freshwater Biology, 58(4), 625-	
		structure and/or function?		639.	
55	9.06	Under the predicted future climatic	No change	Comte, L., Buisson, L., Daufresne, M., & Grenouillet, G. (2013).	Low
		conditions, what is the likely magnitude of		Climate-induced changes in the distribution of freshwater fish:	
		future potential impacts on ecosystem		observed and predicted trends. Freshwater Biology, 58(4), 625-	
		services/socio-economic factors?		639.	

1.5		

Scores	
BRA	17.5
BRA Outcome	-
BRA+CCA	13.5
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	6.5
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	1.5
B. Biology/Ecology	11.0
4. Undesirable (or persistence) traits	5.0
5. Resource exploitation	5.0
6. Reproduction	0.0
7. Dispersal mechanisms	2.0
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	5 5
3. Invasive elsewhere	36
B. Biology/Ecology 4. Undesirable (or persistence) traits	12
5. Resource exploitation	
6. Reproduction	2 7 9
7. Dispersal mechanisms	/
8. Tolerance attributes	6
C. Climate change	6
9. Climate change	6
Sectors affected	0
Commercial	6
Environmental	6
Species or population nuisance traits	6
Thresholds	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.55
BRA	0.57

	BKA	0.57
	CCA	0.38
Date and Time		
	19/05/202	1 12:31:27

Taxon and Assessor details	xon and Assessor details						
Category	Fishes and Lampreys (freshwater)						
Taxon name	Salmo letnica						
Common name	Ohrid trout						
Assessor	Ana Marić						
Risk screening context	Risk screening context						
Reason and socio-economic benefits							
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS						
Taxonomy							
Native range							
Introduced range							
URL							

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
1. L 1		ication/Cultivation Has the taxon been the subject of	Voc	http://www.foo.org/fichon/countrisates/page_monderis/s-	Vory high
l		domestication (or cultivation) for at least 20 generations?	Yes	http://www.fao.org/fishery/countrysector/naso_macedonia/en	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	Historical demography of brown trout (Salmo trutta) in the Adriatic drainage including the putative S. letnica endemic to Lake Ohrid. Simona Susnik a,b, Ales [×] Snoj b, Iain F. Wilson c, Danilo Mrdak d, Steven Weiss. 2007.	Very high
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	A handbook of aquatic freshwater species. Francis 2012.	Very high
2. (Climate,	, distribution and introduction risk	1		
4		How similar are the climatic conditions of the	High	19	Very high
		Risk Assessment (RA) area and the taxon's native range?			
5	2.02	What is the quality of the climate matching data?	Medium	Climach - no adequate points.	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	Deterioration of the fish-species assemblage due to the human impact and the pike introduction as a measure for restoration of the Vlasinsko Reservoir (Serbia, Yugoslavia). Simonovic. 2000.	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	Stocking. Deterioration of the fish-species assemblage due to the human impact and the pike introduction as a measure for restoration of the Vlasinsko Reservoir (Serbia, Yugoslavia).	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	Lake Ohrid is in close proximity. Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin. 646 pp.	High
3. I	nvasive	e elsewhere			
9		Has the taxon become naturalised (established viable populations) outside its native range?	Yes	Deterioration of the fish-species assemblage due to the human impact and the pike introduction as a measure for restoration of the Vlasinsko Reservoir (Serbia, Yugoslavia). Simonovic. 2000.	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or	No	Deterioration of the fish-species assemblage due to the human impact and the pike introduction as a measure for restoration of	Medium
11	3.03	commercial taxa? In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	the Vlasinsko Reservoir (Serbia, Yugoslavia). Simonovic. 2000. Deterioration of the fish-species assemblage due to the human impact and the pike introduction as a measure for restoration of the Vlasinsko Reservoir (Serbia, Yugoslavia). Simonovic. 2000.	Very high
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem services?	No	Deterioration of the fish-species assemblage due to the human impact and the pike introduction as a measure for restoration of the Vlasinsko Reservoir (Serbia, Yugoslavia). Simonovic. 2000.	Very high
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	Deterioration of the fish-species assemblage due to the human impact and the pike introduction as a measure for restoration of the Vlasinsko Reservoir (Serbia, Yugoslavia). Simonovic. 2000.	High
B. I	Biology	//Ecology			
4. L	Indesir	able (or persistence) traits			
		Is it likely that the taxon will be poisonous or pose other risks to human health?		Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof,	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	Deterioration of the fish-species assemblage due to the human impact and the pike introduction as a measure for restoration of the Vlasticke Personal (Sethia Vuenclavia). Simpaouic 2000	Medium
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	the Vlasinsko Reservoir (Serbia, Yugoslavia). Simonovic. 2000. Caarnivorus. Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin. 646 pp.	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	Deterioration of the fish-species assemblage due to the human impact and the pike introduction as a measure for restoration of the Vlasinsko Reservoir (Serbia, Yugoslavia). Simonovic. 2000.	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	Deterioration of the fish-species assemblage due to the human impact and the pike introduction as a measure for restoration of the Vlasinsko Reservoir (Serbia, Yuqoslavia). Simonovic. 2000.	Medium
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	Deterioration of the fish-species assemblage due to the human impact and the pike introduction as a measure for restoration of the Vlasinsko Reservoir (Serbia, Yugoslavia). Simonovic. 2000.	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	Deterioration of the fish-species assemblage due to the human impact and the pike introduction as a measure for restoration of the Vlasinsko Reservoir (Serbia, Yugoslavia). Simonovic. 2000.	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	No	Occurrence of parasitic ciliates (Protozoa) on perch (Perca fluviatilis) in Lake Vlasinsko Vera P. Nikolic & Predrag D. Simonovic. 1996	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	Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin. 646 pp.	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	Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin. 646 pp.	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	Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin. 646 pp.	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	http://solair.eunet.rs/~vlaxym/Vlasinsko%20jezero.htm	High
		e exploitation			
26	5.01	Is the taxon likely to consume threatened or protected native taxa in the RA area?	Yes	Deterioration of the fish-species assemblage due to the human impact and the pike introduction as a measure for restoration of the Vlasinsko Reservoir (Serbia, Yugoslavia). Simonovic. 2000.	High
7	5.02	Is the taxon likely to sequester food resources (including nutrients) to the	No	http://solair.eunet.rs/~vlaxym/Vlasinsko%20jezero.htm	High
5. R	Reprodu	detriment of native taxa in the RA area?			
	6.01	Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?	Yes	No data.	Medium
9	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	http://solair.eunet.rs/~vlaxym/Vlasinsko%20jezero.htm	High
0	6.03	Is the taxon likely to hybridise naturally with native taxa?	Yes	Historical demography of brown trout (Salmo trutta) in the Adriatic drainage including the putative S. letnica endemic to Lake Ohrid Simona Sus [*] nik a,b, Ales [*] Snoj b, Iain F. Wilson c, Danilo Mrdak d, Steven Weiss a. 2007	High
	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	No	Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof,	High
32	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	No	Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin. 646 pp.	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	Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin. 646 pp.	High
84	6.07	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	6	Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin. 646 pp.	Very high
'. C	Dispersa	al mechanisms			
5	7.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable	One	Stocking. Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin. 646 pp.	Very high
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	Deterioration of the fish-species assemblage due to the human impact and the pike introduction as a measure for restoration of the Vlasinsko Reservoir (Serbia, Yugoslavia). Simonovic. 2000.	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 the likelihood of dispersal?	No	Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin. 646 pp.	Very high
8	7.04	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules	No	Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof,	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	Berlin. 646 pp. Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin. 646 pp.	High
0	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	Yes	Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof,	High
1	7.07	Are propagules or eggs of the taxon likely to	No	No attachable structures	Very high
2	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	http://solair.eunet.rs/~vlaxym/Vlasinsko%20jezero.htm	High
3	7.09	unintentional or intentional) likely to be Is dispersal of the taxon density dependent?	No	http://solair.eunet.rs/~vlaxym/Vlasinsko%20jezero.htm	High
. T	oleran	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 cvcle?	No	THE IMPACT OF ENVIRONMENTAL CONDITIONS ON GROWTH AND DEVELOPMENT OF SALMO LETNICA SMOLT Viola Prifti1 & Arefi Cake 2017	Very high
5	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	THE IMPACT OF ENVIRONMENTAL CONDITIONS ON GROWTH AND DEVELOPMENT OF SALMO LETNICA SMOLT Viola Prifti1 & Arefi Cake2	Very 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	Not applicable	THE IMPACT OF ENVIRONMENTAL CONDITIONS ON GROWTH AND DEVELOPMENT OF SALMO LETNICA SMOLT Viola Prifti1 & Arefi	Very high
7	8.04	agents/means? Is the taxon likely to tolerate or benefit from	No	Cake2 CHANGES IN THE SPAWNING ECOLOGY OF THE LAKE OHRID TPOLIT. Salmo lotnica (Karaman) Zoran SPIRKOV/KI	Very high
8	8.05	environmental/human disturbance? Is the taxon able to tolerate salinity levels that are higher or lower than those found in its complexities and the second	Yes	TROUT, Salmo letnica (Karaman) Zoran SPIRKOVSKI Probably, anadromous relatives	High
9	8.06	its usual environment? Are there effective natural enemies (predators) of the taxon present in the RA area?	Yes	Deterioration of the fish-species assemblage due to the human impact and the pike introduction as a measure for restoration of the Vlasinsko Reservoir (Serbia, Yugoslavia). Simonovic. 2000.	High
	i .	uicu.	1	Tene viasinsko reservon (Servia, rugoslavia), simonovic, 2000.	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	CHANGES IN THE SPAWNING ECOLOGY OF THE LAKE OHRID TROUT, Salmo letnica (Karaman) Zoran SPIRKOVSKI	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	CHANGES IN THE SPAWNING ECOLOGY OF THE LAKE OHRID TROUT, Salmo letnica (Karaman) Zoran SPIRKOVSKI	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	CHANGES IN THE SPAWNING ECOLOGY OF THE LAKE OHRID TROUT, Salmo letnica (Karaman) Zoran SPIRKOVSKI	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	CHANGES IN THE SPAWNING ECOLOGY OF THE LAKE OHRID TROUT, Salmo letnica (Karaman) Zoran SPIRKOVSKI	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	CHANGES IN THE SPAWNING ECOLOGY OF THE LAKE OHRID TROUT, Salmo letnica (Karaman) Zoran SPIRKOVSKI	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	CHANGES IN THE SPAWNING ECOLOGY OF THE LAKE OHRID TROUT, Salmo letnica (Karaman) Zoran SPIRKOVSKI	High

- 5	ta	H	sti	1

	Scores
18.0	BRA
-	BRA Outcome
8.0	BRA+CCA
-	BRA+CCA Outcome
	Score partition
7.0	A. Biogeography/Historical
4.0	1. Domestication/Cultivation
1.0	2. Climate, distribution and introduction risk
2.0	3. Invasive elsewhere
11.0	B. Biology/Ecology
5.0	4. Undesirable (or persistence) traits
5.0	5. Resource exploitation
3.0	6. Reproduction
-1.0	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
3	1. Domestication/Cultivation
5	2. Climate, distribution and introduction risk
	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
2	Commercial
2	Environmental
5	Species or population nuisance traits
	Thresholds
-	BRA
-	BRA+CCA
	Confidence
0.82	BRA+CCA

BRA	+CCA	0.82
	BRA	0.83
	CCA	0.75
Date and Time		
15,	/05/2021 1	9:47:19

Taxon and Assessor details	
Category	Fishes and Lampreys (freshwater)
Taxon name	Salmo letnica
Common name	Ohrid trout
Assessor	Ivan Špelić
Risk screening context	
Reason and socio-economic benefits	
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS
Taxonomy	
Native range	
Introduced range	
URL	

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
<u>1. l</u>		ication/Cultivation	Voc	National Aquacultura Costar Overview Albania National	Vony high
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	National Aquaculture Sector Overview. Albania. National Aquaculture Sector Overview Fact Sheets. Text by Cobani, M. In: FAO Fisheries Division [online]. Rome. Updated . [Cited 5 May	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	Fuller, P. and Daniel, W.M., 2021, Salmo letnica (Karaman, 1924): U.S. Geological Survey, Nonindigenous Aquatic Species Database, Harvested for aquaculture purposes (Gainesville, FL, https://nas.er.usgs.gov/queries/factsheet.aspx?SpeciesID=925, Revision Date: 7/11/2019, Peer Review Date: 7/11/2019, Access Date: 5/5/2021)	Very high
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	Salmo trutta (CABI, fishbase).	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	Climatch software, calculated as in https://dpipwe.tas.gov.au/Documents/Risk%20assessment%20me thodology_wildlife%20imports%20August%202017.pdf	
5	2.02	What is the quality of the climate matching data?	Low	No meteorological stations near lake Ohrid, based on two stations in vicinity (Climatch).	Very high
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	Vlasinsko lake in Serbia, no recent evidence of establishment (https://www.fws.gov/fisheries/ans/erss/uncertainrisk/ERSS- Salmo-letnica-final-May2018.pdf).	Low
7	2.04	How many potential vectors could the taxon use to enter in the RA area?		Already present.	Low
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)?	Not applicable	Already present.	Low
3. I	3.01	e elsewhere	Vec	Fuller (2018) shows an established perulation of C latrice at	High
9	5.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	Fuller (2018) shows an established population of S. letnica at Pathfinder Reservoir in Natrona County, Wyoming (https://www.fws.gov/fisheries/ans/erss/uncertainrisk/ERSS- Salmo-letnica-final-May2018.pdf)	High
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	Hybridization with native species (Zenetos, A., MA. Pancucci- Papadopoulou, S. Zogaris, E. Papastergiadou, L. Vardakas, K. Aligizaki, and A. N. Economou. 2009. Aquatic alien species in Greece (2009): tracking sources, patterns and effects on the ecosystem. Journal of Biological ResearchThessaloniki 12:135-	High
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	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 (Fuller, P. and Daniel, W.M., 2021, Salmo letnica (Karaman, 1924): U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, FL, https://nas.er.usgs.gov/queries/factsheet.aspx?SpeciesID=925, Revision Date: 7/11/2019, Peer Review Date: 7/11/2019, Access Date: 5/17/2021).	Low
	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem services?	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 (Fuller, P. and Daniel, W.M., 2021, Salmo letnica (Karaman, 1924): U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, FL, https://nas.er.usgs.gov/queries/factsheet.aspx?SpeciesID=925, Revision Date: 7/11/2019, Peer Review Date: 7/11/2019, Access Date: 5/17/2021).	Low
		In the taxon's introduced range, are there known adverse socio-economic impacts?	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 (Fuller, P. and Daniel, W.M., 2021, Salmo letnica (Karaman, 1924): U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, FL, https://nas.er.usgs.gov/queries/factsheet.aspx?SpeciesID=925, Revision Date: 7/11/2019, Peer Review Date: 7/11/2019, Access Date: 5/17/2021).	Low
		y/Ecology			
		able (or persistence) traits Is it likely that the taxon will be poisonous or	No	Harmless (Froese, R. and D. Pauly. Editors. 2021.FishBase. World	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)?	No	Wide Web electronic publication. www.fishbase.org, (02/2021)). 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 (Fuller, P. and Daniel, W.M., 2021, Salmo letnica (Karaman, 1924): U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, FL, https://nas.er.usgs.gov/queries/factsheet.aspx?SpeciesID=925, Revision Date: 7/11/2019, Peer Review Date: 7/11/2019, Access Date: 5/17/2021).	Low

16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in	No	No parasitic behaviour (Kottelat & Freyhof 2008).	Very high
17	4.04	the RA area? Is the taxon adaptable in terms of climatic	No	Not much data, only lacustrine forms, probably not tolerant to	Low
		and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?		high temperatures as most salmonids.	
.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 area?	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 (Fuller, P. and Daniel, W.M., 2021, Salmo letnica (Karaman, 1924): U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, FL, https://nas.er.usgs.gov/queries/factsheet.aspx?SpeciesID=925, Revision Date: 7/11/2019, Peer Review Date: 7/11/2019, Access Date: 5/17/2021).	Low
9	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	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 (Fuller, P. and Daniel, W.M., 2021, Salmo letnica (Karaman, 1924): U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, FL, https://nas.er.usgs.gov/queries/factsheet.aspx?SpeciesID=925, Revision Date: 7/11/2019, Peer Review Date: 7/11/2019, Access Date: 5/17/2021).	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	Yes	Susceptible to parasites: https://www.fws.gov/fisheries/ans/erss/uncertainrisk/ERSS- Salmo-letnica-final-May2018.pdf	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	Yes	Susceptible to parasites: https://www.fws.gov/fisheries/ans/erss/uncertainrisk/ERSS- Salmo-letnica-final-May2018.pdf	High
	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	76 cm, 6,5 kg (Torres, Armi G. in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021))	Very high
	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)?	No	Only lacustrine forms (Torres, Armi G. in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021).	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	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 (Fuller, P. and Daniel, W.M., 2021, Salmo letnica (Karaman, 1924): U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, FL, https://nas.er.usgs.gov/queries/factsheet.aspx?SpeciesID=925, Revision Date: 7/11/2019, Peer Review Date: 7/11/2019, Access Date: 5/17/2021).	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	Low resilience and high vulnerability (Torres, Armi G. in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021).	Medium
5. R	Resourc	ce exploitation			
26	5.01	Is the taxon likely to consume threatened or protected native taxa in the RA area?	Yes	Adults feed on zooplankton and fish (Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin. 646 pp.).	Medium
27	5.02	Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?	Not applicable	No data for calculation.	Very high
_	Reprodu	ıction			
28	6.01	Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?	Yes	Janković, D. and M. Raspopović (1960). Ohridska pastrmka (Salmo letnica typicus K.) pod promenjenim uslovima u Vlasinskom baražnom iezeru. Archives of Biological Sciences. 12.	High
9	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	Janković, D. and M. Raspopović (1960). Ohridska pastrmka (Salmo letnica typicus K.) pod promenjenim uslovima u	High
30	6.03	Is the taxon likely to hybridise naturally with native taxa?	Yes	Vlasinskom baražnom jezeru. Archives of Biological Sciences, 12, Hybrids with congeners found in Greece (Zenetos, A., MA. Pancucci-Papadopoulou, S. Zogaris, E. Papastergiadou, L. Vardakas, K. Aligizaki, and A. N. Economou. 2009. Aquatic alien species in Greece (2009): tracking sources, patterns and effects on the ecosystem. Journal of Biological ResearchThessaloniki	Medium
31	6.04	Is the taxon likely to be hermaphroditic or to	No	No records for this species or congeners.	Very high
2	6.05	display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features)	No	Spawns in littoral and sublittoral areas (Kottelat, M., and J. Freyhof. 2007. Handbook of European freshwater fishes.	Medium
3	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	Publications Kottelat, Cornol, Switzerland.). 2500-3900 eggs per female (Janković, D. and M. Raspopović (1960). Ohridska pastrmka (Salmo letnica typicus K.) pod promenjenim uslovima u Vlasinskom baražnom jezeru. Archives of Biological Sciences, 12, 117-122.).	High
	6.07	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	2	2-3 years in Vlasinsko lake where introduced, 5-6 years in native area (Janković, D. and M. Raspopović (1960). Ohridska pastrmka (Salmo letnica typicus K.) pod promenjenim uslovima u Vlasinskom baražnom jezeru. Archives of Biological Sciences, 12,	Medium
		al mechanisms	One	Introduction for angling purposes	Low
	7.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable	One	Introduction for angling purposes.	Low
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 further dispersions in the last 60 years.	
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 adaptations.	Very high

38				-	
	7.04	Is natural dispersal of the taxon likely to	No	No evidence, no historical examples on self-dispersion.	Medium
		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	No	No evidence, no historical examples on self-dispersion.	Medium
		occur as larvae/juveniles (for animals) or as			
		fragments/seedlings (for plants) in the RA			
4.0	7.06	area?			
40	7.06	Are older life stages of the taxon likely to	No	Migrations within lake (could it be interpreted as migration?)	High
4.1	7.07	migrate in the RA area for reproduction?	NI-		Ma di una
41	7.07	Are propagules or eggs of the taxon likely to	No	No evidence, no historical examples on such dispersion.	Medium
42	7.08	be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the	Not applicable	No such dispersal.	Very high
42	7.08	vectors/pathways mentioned in the previous	Not applicable	No such dispersal.	very nign
		seven questions (35–41; i.e. both			
		unintentional or intentional) likely to be			
43	7.09	Is dispersal of the taxon density dependent?	No	No evidence on any historical dispersal except human	High
_		ce attributes	110		
	8.01	Is the taxon able to withstand being out of	No	Vulnerable species (Fishbase), sensitive as other congeners.	Very high
		water for extended periods (e.g. minimum of			-, 5
	1	one or more hours) at some stage of its life			
		cycle?			
45	8.02	Is the taxon tolerant of a wide range of	No	High vulnerability (fishbase). The Ohrid trout faces extinction in	Very high
	1	water quality conditions relevant to that		its native lakes due to pollution (Fuller, P. and Daniel, W.M.,	_
		taxon? [In the Justification field, indicate the		2021, Salmo letnica (Karaman, 1924): U.S. Geological Survey,	
		relevant water quality variable(s) being		Nonindigenous Aquatic Species Database, Gainesville, FL,	
		considered.]		https://nas.er.usgs.gov/queries/factsheet.aspx?SpeciesID=925,	
				Revision Date: 7/11/2019, Peer Review Date: 7/11/2019, Access	
				Date: 5/17/2021).	
46	8.03	Can the taxon be controlled or eradicated in	Not applicable	Not allowed.	Very high
		the wild with chemical, biological, or other			
47	0.04	agents/means?			
47	8.04	Is the taxon likely to tolerate or benefit from	No	Threatened by habitat destruction	Very high
		environmental/human disturbance?		(https://www.fws.gov/fisheries/ans/erss/uncertainrisk/ERSS-	
18	8.05	Is the taxon able to tolerate salinity levels	No	Salmo-letnica-final-May2018.pdf), vulnerable. No info, sensitive lacustrine species.	Medium
40	0.05	that are higher or lower than those found in	NO	No mio, sensitive lacustime species.	Medium
		its usual environment?			
49	8.06	Are there effective natural enemies		Piscivorous mammals and birds (personal opinion).	Medium
	0.00		Yes	(personal opinion)	
<u> </u>			Yes		i iculuii
U. 1	Climate	(predators) of the taxon present in the RA e change	Yes		
		(predators) of the taxon present in the RA	Yes		
9. ((predators) of the taxon present in the RA e change	Yes No change	No self-dispersion noted, only indrotuction by human.	Very high
9. (Climate	(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		No self-dispersion noted, only indrotuction by human.	
9. (Climate	(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,		No self-dispersion noted, only indrotuction by human.	
<u>9. (</u> 50	<u>Climate</u> 9.01	(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?	No change		Very high
<u>9. (</u> 50	Climate	(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		Not as sensitive to high temperatures, critical thermal maximum	
<u>9. (</u> 50	<u>Climate</u> 9.01	(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	No change	Not as sensitive to high temperatures, critical thermal maximum set at 29 deg. Celsius (Mackey, T., C.T. Hasler, and E.C. Enders.	Very high
<u>9. (</u> 50	<u>Climate</u> 9.01	(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,	No change	Not as sensitive to high temperatures, critical thermal maximum set at 29 deg. Celsius (Mackey, T., C.T. Hasler, and E.C. Enders. 2019. Summary of Temperature Metrics for Aquatic Invasive Fish	Very high
<u>9. (</u> 50 51	9.01	(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?	No change No change	Not as sensitive to high temperatures, critical thermal maximum set at 29 deg. Celsius (Mackey, T., C.T. Hasler, and E.C. Enders. 2019. Summary of Temperature Metrics for Aquatic Invasive Fish Species in the Prairie Region. Can. Tech. Rep. Fish. Aquat. Sci.	Very high Medium
<u>9. (</u> 50 51	<u>Climate</u> 9.01	(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	No change	Not as sensitive to high temperatures, critical thermal maximum set at 29 deg. Celsius (Mackey, T., C.T. Hasler, and E.C. Enders. 2019. Summary of Temperature Metrics for Aquatic Invasive Fish Species in the Prairie Region. Can. Tech. Rep. Fish. Aquat. Sci. Dispersion dependent on human introductions in suitable	Very high
<u>9. (</u> 50 51	9.01	(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	No change No change	Not as sensitive to high temperatures, critical thermal maximum set at 29 deg. Celsius (Mackey, T., C.T. Hasler, and E.C. Enders. 2019. Summary of Temperature Metrics for Aquatic Invasive Fish Species in the Prairie Region. Can. Tech. Rep. Fish. Aquat. Sci. Dispersion dependent on human introductions in suitable lacustrine habitats. Not as sensitive to high temperatures, critical	Very high Medium
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Statistics	
Scores	
BRA	13.0
BRA Outcome	-
BRA+CCA	13.0
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	2.0
4. Undesirable (or persistence) traits	2.0
5. Resource exploitation	5.0
6. Reproduction	4.0
7. Dispersal mechanisms	-5.0
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 7
6. Reproduction	7
7. Dispersal mechanisms	9
8. Tolerance attributes	6
C. Climate change	6
9. Climate change	6
Sectors affected	
Commercial	8
Environmental	5
Species or population nuisance traits	1
Thresholds	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.61
BRA	0.63
CCA	0.46
Date and Time	

Taxon and Assessor details					
Category	Fishes and Lampreys (freshwater)				
Taxon name	Salmo letnica				
Common name	Ohrid trout				
Assessor	Tamara Kanjuh				
Risk screening context					
Reason and socio-economic benefits					
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS				
Taxonomy					
Native range					
Introduced range					
URL					

			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 domestication (or cultivation) for at least 20 generations?	Yes	Fisheries: commercial; aquaculture: commercial; gamefish: yes (Froese&Pauly, 2017)	High
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	Fisheries: commercial; aquaculture: commercial; gamefish: yes (Froese&Pauly, 2017)	High
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	No	No information found.	Low
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	High	Dfa, Dfb (Köppen-Geiger climate classification system)	High
5	2.02	native range? What is the quality of the climate matching data?	High	Köppen-Geiger climate classification system	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	Lake Ohrid trout, Salmo letnica (Karaman, 1924), was heavily and repeatedly stocked from a hatchery into the Vlasina Lake in Southern Serbia in 1950s and 1960s [] (Janković&Raspopović	High
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	Intentional stocking.	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	The lake Vlasina (Piria et al., 2017)	High
3. I		e elsewhere			
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	No	Since the late 1960s, roe was reintroduced almost every year, since it seems that this species did not naturalize in the reservoir, despite its fast growth and great yield (Piria et al., 2017).	High
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	[] the main problem is the risk of hybridization with the native Prespa trout Salmo peristericus Karaman, 1938 (Perdikaris et al., 2010).	Medium
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	No information found.	Low
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	No	No information found.	Low
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	No informtion found.	Low
		y/Ecology			
		able (or persistence) traits Is it likely that the taxon will be poisonous or	No	Harmless (Froese&Pauly, 2017)	High
	4.02	pose other risks to human health? Is it likely that the taxon will smother one or	Yes	[] the introduction of Salmo trutta and Salmo letnica to Greek	Medium
		more native taxa (that are not threatened or protected)?		freshwaters (where different Salmo species exist) has resulted in harmful hybridizations that may prove detrimental to the native trout species in the long term (Crivelli et al., 1997; Economou et	
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	No information found.	Low
17	4.04	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has	No	No information found.	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	No	No information found.	Low
19	4.06	has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts	No	No information found.	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 information found.	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	No	No information found.	Low
22	4.09	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	No information found.	Low
23	4.10	released from captivity? Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g.	No	No information found.	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	No	No information found.	Low

25	4.12	Is the taxon likely to maintain a viable	No	No information found.	Low
		population even when present in low			
		densities (or persisting in adverse conditions			
	205-	by way of a dormant form)?	l		l
		ce exploitation Is the taxon likely to consume threatened or	No	No information found.	Low
.0	5.01	protected native taxa in the RA area?	140		LOW
77	5.02	Is the taxon likely to sequester food	No	No information found.	Low
- '	5.02	resources (including nutrients) to the			2011
		detriment of native taxa in the RA area?	<u> </u>		
	Reprodu	uction			
28	6.01	Is the taxon likely to exhibit parental care	No	No information found.	Medium
		and/or to reduce age-at-maturity in response			
		to environmental conditions?			
29	6.02		No	It is not known whether this species hybridizes with the native	Low
		or propagules (in the RA area)?		brown trout, but from the regular roe imports over a long-term	
				period, it appears that letnica trout were feral there and diminished after the cessation of reservoir stocking (Piria et al.,	
30	6.03	Is the taxon likely to hybridise naturally with	No	[] the introduction of Salmo trutta and Salmo letnica to Greek	Medium
	0.00	native taxa?		freshwaters (where different Salmo species exist) has resulted in	i iouiuiii
				harmful hybridizations that may prove detrimental to the native	
				trout species in the long term (Crivelli et al., 1997; Economou et	
				al., 2007). Also, it is not known whether this species hybridizes	
_	-			with the native brown trout in Vlasinsko jezero (Piria et al., 2017).	
51	6.04	Is the taxon likely to be hermaphroditic or to	No	No information found.	Low
5	6 05	display asexual reproduction?	No	No information found	Law
>2	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features)	No	No information found.	Low
		to complete its life cycle?			
33	6.06	Is the taxon known (or likely) to produce a	No	No information found.	Low
, ,	0.00	large number of propagules or offspring	110		2000
		within a short time span (e.g. < 1 year)?			
34	6.07	How many time units (days, months, years)	5	Attains first sexual maturity at 5-6 years (Froese&Pauly, 2017).	High
		does the taxon require to reach the age-at-		, , , , , , , , , ,	-
		first-reproduction?			
		al mechanisms	i		1
5	7.01	How many potential internal	One	Intentional stocking.	Low
		vectors/pathways could the taxon use to			
6	7.02	disperse within the RA area (with suitable	Vac	Introduction to Viscing Jaka (Dirig at al. 2017)	Low
00	7.02	Will any of these vectors/pathways bring the taxon in close proximity to one or more	Yes	Introduction to Vlasina lake (Piria et al., 2017).	Low
		protected areas (e.g. MCZ, MPA, SSSI)?			
37	7.03	Does the taxon have a means of actively	No	No information found.	Low
		attaching itself to hard substrata (e.g. ship			
		hulls, pilings, buoys) such that it enhances			
		the likelihood of dispersal?			
38	7.04	Is natural dispersal of the taxon likely to	No	No information found.	Low
		occur as eggs (for animals) or as propagules			
	7 05	(for plants: seeds, spores) in the RA area?		Disconsist on investite	
59	7.05	Is natural dispersal of the taxon likely to	Yes	Dispersion as juvenile.	Low
		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	Non-migratory species.	Low
		migrate in the RA area for reproduction?		5 · · / · · · · ·	
11	7.07		No	No information found.	Low
		be dispersed in the RA area by other animals?			
12	7.08	Is dispersal of the taxon along any of the	Yes	Intentional stocking.	Low
		vectors/pathways mentioned in the previous			
		seven questions (35–41; i.e. both			
17	7.09	unintentional or intentional) likely to be	No	No information found.	Low
		Is dispersal of the taxon density dependent? ce attributes	No		ILOW
		Is the taxon able to withstand being out of	No	The taxon cannot survive out of the water.	Low
	2.01	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	No	The taxon is sensitive to environmental changes.	Low
		water quality conditions relevant to that			
		taxon? [In the Justification field, indicate the			
10	0.00	relevant water quality variable(s) being	No	No information found	Low
16	8.03	Can the taxon be controlled or eradicated in	No	No information found.	Low
10		the wild with chemical biological and the			
10		the wild with chemical, biological, or other			1
	8.04	agents/means?	No	Threatened by habitat destruction overfishing and introduction of	Hiah
	8.04	agents/means? Is the taxon likely to tolerate or benefit from	No	Threatened by habitat destruction, overfishing and introduction of new species (Crivelli, 1996).	High
17	8.04 8.05	agents/means?	No	Threatened by habitat destruction, overfishing and introduction of new species (Crivelli, 1996). The taxon is sensitive to environmental conditions.	High Low
17		agents/means? Is the taxon likely to tolerate or benefit from environmental/human disturbance?	-	new species (Crivelli, 1996).	5
17 18	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?	_	new species (Crivelli, 1996).	5
17 18		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	_	new species (Crivelli, 1996).	5
17 18 19	8.05 8.06	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 (predators) of the taxon present in the RA	No	new species (Crivelli, 1996). The taxon is sensitive to environmental conditions.	Low
7 8 9	8.05 8.06	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 (predators) of the taxon present in the RA e change	No	new species (Crivelli, 1996). The taxon is sensitive to environmental conditions.	Low
.7 8 9 . (8.05 8.06 Climate	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 change	No	new species (Crivelli, 1996). The taxon is sensitive to environmental conditions. No information found.	Low
.7 8 9 . (8.05 8.06	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 (predators) of the taxon present in the RA e change Under the predicted future climatic	No	new species (Crivelli, 1996). The taxon is sensitive to environmental conditions.	Low
.7 8 9 . (8.05 8.06 Climate	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 conditions, are the risks of entry into the RA	No	new species (Crivelli, 1996). The taxon is sensitive to environmental conditions. No information found.	Low
17 18 19 0. (8.05 8.06 Climate	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 conditions, are the risks of entry into the RA area posed by the taxon likely to increase,	No	new species (Crivelli, 1996). The taxon is sensitive to environmental conditions. No information found.	Low
17 18 19 2. (0. (50	8.05 8.06 Climate 9.01	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 Conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?	No No No change	new species (Crivelli, 1996). The taxon is sensitive to environmental conditions. No information found. The taxon is sensitive to environmental changes.	Low
17 18 19 2. (0. (50	8.05 8.06 Climate	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 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	new species (Crivelli, 1996). The taxon is sensitive to environmental conditions. No information found.	Low
17 18 19 <u>. (</u> 50	8.05 8.06 Climate 9.01	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 conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?	No No No change	new species (Crivelli, 1996). The taxon is sensitive to environmental conditions. No information found. The taxon is sensitive to environmental changes.	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	The taxon is sensitive to environmental changes.	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	The taxon is sensitive to environmental changes.	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	The taxon is sensitive to environmental changes.	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	The taxon is sensitive to environmental changes.	Low

a , b	
Statistics	
Scores	0.0
BRA	0.0
BRA Outcome BRA+CCA	-
BRA+CCA BRA+CCA Outcome	0.0
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	-5.0
4. Undesirable (or persistence) traits	0.0
5. Resource exploitation	0.0
6. Reproduction	-2.0
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	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	
6 Depreduction	/
6. Reproduction	0
7. Dispersal mechanisms	9
7. Dispersal mechanisms 8. Tolerance attributes	36 12 2 7 9 6 6
7. Dispersal mechanisms 8. Tolerance attributes C. Climate change	6
7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change	
7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected	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 Commercial Environmental	6 6 9
7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial	6 6 9
7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial Environmental	6 6 9

Inresnolas	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.36
BRA	0.38
CCA	0.25
Date and Time	
31/05/2	021 20:51:48

Taxon and Assessor details					
Category	Fishes and Lampreys (freshwater)				
Taxon name	Salmo letnica				
Common name	Ohrid trout				
Assessor	Tena Radocaj				
Risk screening context					
Reason and socio-economic benefits					
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS				
Taxonomy					
Native range					
Introduced range					
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	Yes	Fisheries: commercial; aquaculture: commercial; gamefish: yes (Fishbase)	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	gamefish: yes (Fishbase)	Low
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	Salmo trutta	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	Medium	The similarity between climatic conditions RA area and native range is medium. I use climatch.	Very high
5	2.02	native range? What is the quality of the climate matching data?	Medium	Distribution Map of IUCN and Climatch	Medium
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	S. letnica is present outside of captivity in the RA area. (Piria et al., 2018)	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	Not applicable	S. letnica is present in the RA area.	Very high
8	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA	Not applicable	S. letnica is present in the RA area.	Very high
		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 (established viable populations) outside its native range?	Yes	Greece (Perdikaris, C., Gouva, E., & Paschos, I. (2010). Alien fish and crayfish species in Hellenic freshwaters and aquaculture.	Medium
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or	No	Reviews in Aquaculture, 2(3), 111-120). No evidence, but probably they compete with native fish species.	Low
11	3.03	commercial taxa? In the taxon's introduced range, are there	No	No evidence	High
12	3.04	known adverse impacts to aquaculture? In the taxon's introduced range, are there known adverse impacts to ecosystem	No	No evidence	Low
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	No evidence	Low
В. В	Biology	y/Ecology			
		able (or persistence) traits			
14					
		Is it likely that the taxon will be poisonous or pose other risks to human health?	Yes	S. letnica is harmless (Fishbase)	Very high
	4.01 4.02	Is it likely that the taxon will be poisonous or	Yes	S. letnica is harmless (Fishbase) No evidence	Very high Low
15		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			
15 16	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	No	No evidence	Low
15 16	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	No	No evidence No S. macedonicus will be adaptable to climatic and other environmental conditions. (Kanjuh, T., Tomić, S., Marić, A.,	Low
15 16	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	No	No evidence No S. macedonicus will be adaptable to climatic and other environmental conditions. (Kanjuh, T., Tomić, S., Marić, A., Jurlina, D. Š., Nikolić, V., & Simonović, P. Trout Salmo spp.(Salmoniformes: Salmonidae) Molecular Diversity in Streams	Low
15 16 17	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	No	No evidence No S. macedonicus will be adaptable to climatic and other environmental conditions. (Kanjuh, T., Tomić, S., Marić, A., Jurlina, D. Š., Nikolić, V., & Simonović, P. Trout Salmo	Low
15 16 17 18	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	No No Yes	No evidence No S. macedonicus will be adaptable to climatic and other environmental conditions. (Kanjuh, T., Tomić, S., Marić, A., Jurlina, D. Š., Nikolić, V., & Simonović, P. Trout Salmo spp.(Salmoniformes: Salmonidae) Molecular Diversity in Streams on the Southern Slopes of the Stara Planina Mts. in Serbia)	Low Medium
15 16 17 18	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?	No Yes No Yes	No evidence No S. macedonicus will be adaptable to climatic and other environmental conditions. (Kanjuh, T., Tomić, S., Marić, A., Jurlina, D. Š., Nikolić, V., & Simonović, P. Trout Salmo spp. (Salmoniformes: Salmonidae) Molecular Diversity in Streams on the Southern Slopes of the Stara Planina Mts. in Serbia) No evidence S. letnica no adverse impacts in the RA area.	Low Medium Low Low
15 16 17 18	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	No Yes No	No evidence No S. macedonicus will be adaptable to climatic and other environmental conditions. (Kanjuh, T., Tomić, S., Marić, A., Jurlina, D. Š., Nikolić, V., & Simonović, P. Trout Salmo spp.(Salmoniformes: Salmonidae) Molecular Diversity in Streams on the Southern Slopes of the Stara Planina Mts. in Serbia) No evidence S. letnica no adverse impacts in the RA area. Blazhekovikj-Dimovska, D., Stojanovski, S., & Hristovski, N. (2013). PARASITE FAUNA OF ENDEMIC FISHES (Salmo letnica Karaman, 1924 and Salmo ohridanus Steindachner 1892) FROM	Low Medium Low
15 16 17 18 19 20	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 area? Is it likely that the taxon will host, and/or	No Yes No Yes	No evidence No S. macedonicus will be adaptable to climatic and other environmental conditions. (Kanjuh, T., Tomić, S., Marić, A., Jurlina, D. Š., Nikolić, V., & Simonović, P. Trout Salmo spp.(Salmoniformes: Salmonidae) Molecular Diversity in Streams on the Southern Slopes of the Stara Planina Mts. in Serbia) No evidence S. letnica no adverse impacts in the RA area. Blazhekovikj-Dimovska, D., Stojanovski, S., & Hristovski, N. (2013). PARASITE FAUNA OF ENDEMIC FISHES (Salmo letnica Karaman, 1924 and Salmo ohridanus Steindachner 1892) FROM LAKE OHRID (MACEDONIA). Natura Montenegrina, 12(3-4), 761- Blazhekovikj-Dimovska, D., Stojanovski, S., & Hristovski, N.	Low Medium Low Low
15 16 17 18 19 20	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 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	No Yes No Yes Yes	No evidence No S. macedonicus will be adaptable to climatic and other environmental conditions. (Kanjuh, T., Tomić, S., Marić, A., Jurlina, D. Š., Nikolić, V., & Simonović, P. Trout Salmo spp.(Salmoniformes: Salmonidae) Molecular Diversity in Streams on the Southern Slopes of the Stara Planina Mts. in Serbia) No evidence S. letnica no adverse impacts in the RA area. Blazhekovikj-Dimovska, D., Stojanovski, S., & Hristovski, N. (2013). PARASITE FAUNA OF ENDEMIC FISHES (Salmo letnica Karaman, 1924 and Salmo ohridanus Steindachner 1892) FROM LAKE OHRID (MACEDONIA). Natura Montenegrina, 12(3-4), 761- Blazhekovikj-Dimovska, D., Stojanovski, S., & Hristovski, N. (2013). PARASITE FAUNA OF ENDEMIC FISHES (Salmo letnica Karaman, 1924 and Salmo ohridanus Steindachner 1892) FROM	Low Medium Low Low Very high
15 16 17 18 19 20 21	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 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	No Yes No Yes Yes	No evidence No S. macedonicus will be adaptable to climatic and other environmental conditions. (Kanjuh, T., Tomić, S., Marić, A., Jurlina, D. Š., Nikolić, V., & Simonović, P. Trout Salmo spp.(Salmoniformes: Salmonidae) Molecular Diversity in Streams on the Southern Slopes of the Stara Planina Mts. in Serbia) No evidence S. letnica no adverse impacts in the RA area. Blazhekovikj-Dimovska, D., Stojanovski, S., & Hristovski, N. (2013). PARASITE FAUNA OF ENDEMIC FISHES (Salmo letnica Karaman, 1924 and Salmo ohridanus Steindachner 1892) FROM LAKE OHRID (MACEDONIA). Natura Montenegrina, 12(3-4), 761- Blazhekovikj-Dimovska, D., Stojanovski, S., & Hristovski, N. (2013). PARASITE FAUNA OF ENDEMIC FISHES (Salmo letnica	Low Medium Low Low Very high
15 16 17 18 19 20 21 22	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 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	No Yes Yes Yes Yes	No evidence No S. macedonicus will be adaptable to climatic and other environmental conditions. (Kanjuh, T., Tomić, S., Marić, A., Jurlina, D. Š., Nikolić, V., & Simonović, P. Trout Salmo spp.(Salmoniformes: Salmonidae) Molecular Diversity in Streams on the Southern Slopes of the Stara Planina Mts. in Serbia) No evidence S. letnica no adverse impacts in the RA area. Blazhekovikj-Dimovska, D., Stojanovski, S., & Hristovski, N. (2013). PARASITE FAUNA OF ENDEMIC FISHES (Salmo letnica Karaman, 1924 and Salmo ohridanus Steindachner 1892) FROM LAKE OHRID (MACEDONIA). Natura Montenegrina, 12(3-4), 761- Blazhekovikj-Dimovska, D., Stojanovski, S., & Hristovski, N. (2013). PARASITE FAUNA OF ENDEMIC FISHES (Salmo letnica Karaman, 1924 and Salmo ohridanus Steindachner 1892) FROM LAKE OHRID (MACEDONIA). Natura Montenegrina, 12(3-4), 761-	Low Medium Low Low Very high
15 16 17 18 19 20 21 22 23	4.02 4.03 4.04 4.05 4.06 4.07 4.08 4.09	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 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? Is the taxon capable of sustaining itself in a	No No Yes No Yes Yes Yes	No evidence No S. macedonicus will be adaptable to climatic and other environmental conditions. (Kanjuh, T., Tomić, S., Marić, A., Jurlina, D. Š., Nikolić, V., & Simonović, P. Trout Salmo spp.(Salmoniformes: Salmonidae) Molecular Diversity in Streams on the Southern Slopes of the Stara Planina Mts. in Serbia) No evidence S. letnica no adverse impacts in the RA area. Blazhekovikj-Dimovska, D., Stojanovski, S., & Hristovski, N. (2013). PARASITE FAUNA OF ENDEMIC FISHES (Salmo letnica Karaman, 1924 and Salmo ohridanus Steindachner 1892) FROM LAKE OHRID (MACEDONIA). Natura Montenegrina, 12(3-4), 761- Blazhekovikj-Dimovska, D., Stojanovski, S., & Hristovski, N. (2013). PARASITE FAUNA OF ENDEMIC FISHES (Salmo letnica Karaman, 1924 and Salmo ohridanus Steindachner 1892) FROM LAKE OHRID (MACEDONIA). Natura Montenegrina, 12(3-4), 761- Max length : 76.0 cm TL (Fishbase)	Low Medium Low Low Very high Very high Medium

	1				
25	4.12	Is the taxon likely to maintain a viable	No	No evidence	Low
	1	population even when present in low densities (or persisting in adverse conditions			
		by way of a dormant form)?			
		ce exploitation			
6	5.01	Is the taxon likely to consume threatened or	Yes	Adults prey fish, mainly Alburnus scoranza. (Fishbase)	Medium
	5.02	protected native taxa in the RA area?		Net evel-) (am think
27	5.02	Is the taxon likely to sequester food resources (including nutrients) to the	Not applicable	Not applicable	Very high
		detriment of native taxa in the RA area?			
5. F	Reprod				
28	6.01	Is the taxon likely to exhibit parental care	No	No evidence	Low
		and/or to reduce age-at-maturity in response			
29	6.02	to environmental conditions? Is the taxon likely to produce viable gametes	Yes	Piria et al., 2018	Low
.9	0.02	or propagules (in the RA area)?	Tes	rind et al., 2010	LOW
30	6.03	Is the taxon likely to hybridise naturally with	Yes	The risk of hybridization with the native Prespa trout Salmo	Very high
		native taxa?		peristericus (Perdikaris, C., Gouva, E., & Paschos, I. (2010). Alien	
				fish and crayfish species in Hellenic freshwaters and aquaculture.	
> 1	6.04	Is the tayon likely to be howmanby-aditie or to	No	Reviews in Aquaculture, 2(3), 111-120).	Law
51	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	NO	No evidence	Low
32	6.05	Is the taxon dependent on the presence of	No	No evidence	Low
		another taxon (or specific habitat features)			
		to complete its life cycle?			
33	6.06	Is the taxon known (or likely) to produce a	No	U.S. Fish and Wildlife Service, May 2011 Revised, October 2017,	Low
	1	large number of propagules or offspring within a short time span (e.g. < 1 year)?		May 2018 Web Version, 5/17/2018	
34	6.07	within a short time span (e.g. < 1 year)? How many time units (days, months, years)	5	Attains first sexual maturity at 5-6 years (Fishbase)	Very high
		does the taxon require to reach the age-at-	-		,
		first-reproduction?			
		al mechanisms			
35	7.01	How many potential internal	>1	1. human influence 2. natural spread via natural and manmade	Medium
		vectors/pathways could the taxon use to disperse within the RA area (with suitable		watercourses	
36	7.02	Will any of these vectors/pathways bring the	Yes	Human influence	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	No	No adaptions	Low
		attaching itself to hard substrata (e.g. ship			
		hulls, pilings, buoys) such that it enhances the likelihood of dispersal?			
38	7.04	Is natural dispersal of the taxon likely to	No	No	Low
		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	Kottelat, M. and J. Freyhof, 2007. Handbook of European	Low
		occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA		freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin.	
		area?			
10	7.06	Are older life stages of the taxon likely to	Yes	Kottelat, M. and J. Freyhof, 2007. Handbook of European	Low
		migrate in the RA area for reproduction?		freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin.	
11	7.07	Are propagules or eggs of the taxon likely to	No	No evidence	Low
12	7.08	be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the	Yes	There is the possibility of a high rate of dispersal of taxa. E.g.	Medium
τ∠	7.00	vectors/pathways mentioned in the previous	165	when a fertilized individual enters a new area by some kind of	Medium
		seven questions (35–41; i.e. both		dispersal.	
		unintentional or intentional) likely to be			
	7.09	Is dispersal of the taxon density dependent?	No	No evidence	Low
		the tay on the suithstand heing out of	Ne	No	Law
+4	8.01	Is the taxon able to withstand being out of water for extended periods (e.g. minimum of	No	No	Low
	1	one or more hours) at some stage of its life			
		cycle?			
15	8.02	Is the taxon tolerant of a wide range of	No	Sensitive species	Low
	1	water quality conditions relevant to that			
	1	taxon? [In the Justification field, indicate the			
46	8.03	relevant water quality variable(s) being Can the taxon be controlled or eradicated in	No	No evidence	Low
.0	0.05	the wild with chemical, biological, or other			2000
		agents/means?			
17	8.04	Is the taxon likely to tolerate or benefit from	No	habitat destruction (Fishabse)	Low
40	0.05	environmental/human disturbance?	NI-	For the first	1
ъх	8.05	Is the taxon able to tolerate salinity levels	No	Freshwater fish	Low
10					1
		that are higher or lower than those found in			
	8.06		Yes	Catfish, Zander, Pike	High
19		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	Catfish, Zander, Pike	High
19 C. (Climat	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 te change	Yes	Catfish, Zander, Pike	High
19 C. (9. (Climat Climate	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			
19 C. (9. (Climat	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 Change Under the predicted future climatic		Catfish, Zander, Pike S. letnica is present in the RA area.	High Very high
19 C. (9. (Climat Climate	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 change Under the predicted future climatic conditions, are the risks of entry into the RA			
19 C. (Climat Climate	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 Change Under the predicted future climatic			
9 . (. (Climat Climate	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 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		S. letnica is present in the RA area. Comte, L., Buisson, L., Daufresne, M., & Grenouillet, G. (2013).	
9 . (. (Climate Climate 9.01	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 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	Not applicable	S. letnica is present in the RA area. Comte, L., Buisson, L., Daufresne, M., & Grenouillet, G. (2013). Climate-induced changes in the distribution of freshwater fish:	Very high
9 . (. (Climate Climate 9.01	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 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,	Not applicable	S. letnica is present in the RA area. Comte, L., Buisson, L., Daufresne, M., & Grenouillet, G. (2013). Climate-induced changes in the distribution of freshwater fish: observed and predicted trends. Freshwater Biology, 58(4), 625-	Very high
9 50	Climat <i>Climate</i> 9.01 9.02	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 te change 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?	Not applicable Decrease	S. letnica is present in the RA area. Comte, L., Buisson, L., Daufresne, M., & Grenouillet, G. (2013). Climate-induced changes in the distribution of freshwater fish: observed and predicted trends. Freshwater Biology, 58(4), 625- 639.	Very high Medium
9 50	Climate Climate 9.01	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 c 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 establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic	Not applicable	S. letnica is present in the RA area. Comte, L., Buisson, L., Daufresne, M., & Grenouillet, G. (2013). Climate-induced changes in the distribution of freshwater fish: observed and predicted trends. Freshwater Biology, 58(4), 625- 639. Comte, L., Buisson, L., Daufresne, M., & Grenouillet, G. (2013).	Very high
19 <u>50</u> 50	Climat <i>Climate</i> 9.01 9.02	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 te change 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?	Not applicable Decrease	S. letnica is present in the RA area. Comte, L., Buisson, L., Daufresne, M., & Grenouillet, G. (2013). Climate-induced changes in the distribution of freshwater fish: observed and predicted trends. Freshwater Biology, 58(4), 625- 639.	Very high 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	Comte, L., Buisson, L., Daufresne, M., & Grenouillet, G. (2013). Climate-induced changes in the distribution of freshwater fish: observed and predicted trends. Freshwater Biology, 58(4), 625- 639.	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	Comte, L., Buisson, L., Daufresne, M., & Grenouillet, G. (2013). Climate-induced changes in the distribution of freshwater fish: observed and predicted trends. Freshwater Biology, 58(4), 625- 639.	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	Comte, L., Buisson, L., Daufresne, M., & Grenouillet, G. (2013). Climate-induced changes in the distribution of freshwater fish: observed and predicted trends. Freshwater Biology, 58(4), 625- 639.	Medium

Statistics	
Scores	
BRA	16.5
BRA Outcome	-
BRA+CCA	12.5
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	6.5
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	1.5
B. Biology/Ecology	10.0
4. Undesirable (or persistence) traits	6.0
5. Resource exploitation	5.0
6. Reproduction	1.0
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
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 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 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 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 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 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
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
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

BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.50
BRA	0.49
CCA	0.58
Date and Time	

19/05/2021 12:29:45

Faxon and Assessor details					
Category	Fishes and Lampreys (freshwater)				
Taxon name	Salmo macedonicus				
Common name	Macedonian trout				
Assessor	Ana Marić				
Risk screening context					
Reason and socio-economic benefits					
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS				
Taxonomy					
Native range					
Introduced range					
URL					

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical	_		_
<u>1. 1</u> 1		ication/Cultivation Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	Aleksandar SAVESKI, Tatjana KALEVSKA,Viktorija STAMATOVSKA, Dragan DAMJANOVSKI, 2017. CHEMICAL COMPOSITION AND ENERGY VALUE IN THE MEAT OF THE MACEDONIAN AND OHRID TROUT. Journal of Faculty of Food Engineering, Ştefan cel Mare University of Suceava, Romania Volume XVI, Issue 1- 2017, pag. 40 - 46	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	http://www.fao.org/fishery/countrysector/naso_macedonia/en in FYRM http://extwprlegs1.fao.org/docs/pdf/srb153883.pdf u Srbiji moze preko 25cm	High
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	http://www.iucngisd.org/gisd/100_worst.php A handbook of global freshwater invasive speies. 2012. Robert A. Francis	Very high
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?	High	Dfb, Csb and Bsk in FYRM. Dfb is the same for all analysed countries.From 22 stations selected 11 are in same climate region (orange), five in red and 2,2,2, in light orange, yellow and light green. 16 matches are in FYRM near Kumanovo, 6 near Skopje and none near Strumica using Climatch.	High
5	2.02	What is the quality of the climate matching data?	Medium	DAta from Climatch were used	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	Predrag SIMONOVIĆ, Zoran VIDOVIĆ, Ana TOŠIĆ, Dubravka ŠKRABA, Jelena ČANAK-ATLAGIĆ, and Vera NIKOLIĆ. 2015. RISKS TO STOCKS OF NATIVE TROUT OF THE GENUS SALMO (ACTINOPTERYGII: SALMONIFORMES: SALMONIDAE) OF SERBIA AND ANAGEMENT FOR THEIR RECOVERY	High
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	Intentional, unproffesional stocking	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	RISKS TO STOCKS OF NATIVE TROUT OF THE GENUS SALMO (ACTINOPTERYGII: SALMONIFORMES: SALMONIDAE) OF SERBIA AND MANAGEMENT FOR THEIR RECOVERY Predrag SIMONOVIÆ1*, Zoran VIDOVIÆ2, Ana TOŠIÆ1, Dubravka ŠKRABA1, Jelena ÈANAK-ATLAGIÆ1, and Vera NIKOLIC 2015	Low
3. 1	-	e elsewhere			
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	Predrag SIMONOVIĆ, Zoran VIDOVIĆ, Ana TOŠIĆ, Dubravka ŠKRABA, Jelena ČANAK-ATLAGIĆ, and Vera NIKOLIĆ. 2015. RISKS TO STOCKS OF NATIVE TROUT OF THE GENUS SALMO (ACTINOPTERYGII: SALMONIFORMES: SALMONIDAE) OF SERBIA AND MANAGEMENT FOR THEIR RECOVERY	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	No	RISKS TO STOCKS OF NATIVE TROUT OF THE GENUS SALMO (ACTINOPTERYGII: SALMONIFORMES: SALMONIDAE) OF SERBIA AND MANAGEMENT FOR THEIR RECOVERY Predrag SIMONOVIÆ1*, Zoran VIDOVIÆ2, Ana TOŠIÆ1, Dubravka ŠKRABA1, Jelena ÈANAK-ATLAGIÆ1, and Vera NIKOLIÆ1	Medium
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	RISKS TO STOCKS OF NATIVE TROUT OF THE GENUS SALMO (ACTINOPTERYGII: SALMONIFORMES: SALMONIDAE) OF SERBIA AND MANAGEMENT FOR THEIR RECOVERY Predrag SIMONOVIÆ1*, Zoran VIDOVIÆ2, Ana TOŠIÆ1, Dubravka ŠKRABA1, Jelena ÈANAK-ATLAGIÆ1, and Vera NIKOLIÆ1 2015	High
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem services?	No	RISKS TO STOCKS OF NATIVE TROUT OF THE GENUS SALMO (ACTINOPTERYGII: SALMONIFORMES: SALMONIDAE) OF SERBIA AND MANAGEMENT FOR THEIR RECOVERY Predrag SIMONOVIÆ1*, Zoran VIDOVIÆ2, Ana TOŠIÆ1, Dubravka ŠKRABA1, Jelena ÈANAK-ATLAGIÆ1, and Vera NIKOLIÆ1 2015	High
		In the taxon's introduced range, are there known adverse socio-economic impacts?	No	RISKS TO STOCKS OF NATIVE TROUT OF THE GENUS SALMO (ACTINOPTERYGII: SALMONIFORMES: SALMONIDAE) OF SERBIA AND MANAGEMENT FOR THEIR RECOVERY Predrag SIMONOVIÆ1*, Zoran VIDOVIÆ2, Ana TOŠIÆ1, Dubravka ŠKRABA1, Jelena ÈANAK-ATLAGIÆ1, and Vera NIKOLIÆ1	High
		y/Ecology			
		able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health?	No	Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof,	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	RISKS TO STOCKS OF NATIVE TROUT OF THE GENUS SALMO (ACTINOPTERYGII: SALMONIFORMES: SALMONIDAE) OF SERBIA AND MANAGEMENT FOR THEIR RECOVERY Predrag SIMONOVIÆ1*, Zoran VIDOVIÆ2, Ana TOŠIÆ1, Dubravka ŠKRABA1, Jelena ÈANAK-ATLAGIÆ1, and Vera NIKOLIÆ1 2015	High
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 but it is 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 invaded or could invade the RA area?	Yes	Since its relatives are very adaptable.	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	Macedonian trout is top predator in native ecosystem.	High
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	RISKS TO STOCKS OF NATIVE TROUT OF THE GENUS SALMO (ACTINOPTERYGII: SALMONIFORMES: SALMONIDAE) OF SERBIA AND MANAGEMENT FOR THEIR RECOVERY Predrag SIMONOVIÆ1*, Zoran VIDOVIÆ2, Ana TOŠIÆ1, Dubravka ŠKRABA1, Jelena ÈANAK-ATLAGIÆ1, and Vera NIKOLIÆ1 2015. Its relatives are.	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	Is similar to her relatives in RA area.	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	Probably.	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	Larger fish can easily escape from fish farms, but there are no fish farms of AdSalmo in Serbia. RISKS TO STOCKS OF NATIVE TROUT OF THE GENUS SALMO (ACTINOPTERYGII: SALMONIFORMES: SALMONIDAE) OF SERBIA AND MANAGEMENT FOR THEIR RECOVERY Predrag SIMONOVIÆ1*, Zoran VIDOVIÆ2, Ana TOŠIÆ1, Dubravka ŠKRABA1, Jelena ÈANAK-ATLAGIÆ1, and Vera NIKOLIÆ1 2015	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	Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin. 646 pp.	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	Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin. 646 pp.	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)?	No	MANAGEMENT FOR THEIR RECOVERY Predrag SIMONOVIÆ1*, Zoran VIDOVIÆ2, Ana TOŠIÆ1, Dubravka ŠKRABA1, Jelena ÈANAK-ATLAGIÆ1, and Vera NIKOLIÆ1 2015. Her relatives are.	Medium
-		e exploitation Is the taxon likely to consume threatened or	Yes	Kottelat, M. and J. Freyhof, 2007. Handbook of European	Very high
	5.02	protected native taxa in the RA area? Is the taxon likely to sequester food resources (including nutrients) to the	No	freshwater fishes. Publications Kottelat, Cornol and Freyhof, No data for RIP calculation. Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat,	Medium
		detriment of native taxa in the RA area?		Cornol and Freyhof, Berlin. 646 pp.	
	Reprodu 6.01	Is the taxon likely to exhibit parental care	Yes	https://onlinelibrary.wiley.com/doi/epdf/10.1111/j.1095-	High
		and/or to reduce age-at-maturity in response to environmental conditions?		8649.2009.02380.x za S. trutta i S. salar	
29	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	RISKS TO STOCKS OF NATIVE TROUT OF THE GENUS SALMO (ACTINOPTERYGII: SALMONIFORMES: SALMONIDAE) OF SERBIA AND MANAGEMENT FOR THEIR RECOVERY	Very high
30	6.03	Is the taxon likely to hybridise naturally with native taxa?	Yes	RISKS TO STOCKS OF NATIVE TROUT OF THE GENUS SALMO (ACTINOPTERYGII: SALMONIFORMES: SALMONIDAE) OF SERBIA AND MANAGEMENT FOR THEIR RECOVERY	High
31	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	No	Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof,	Medium
32	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features)	No	Da li je ovde potrebna referenca? Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications	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	Kottelat, Cornol and Freyhof, Berlin. 646 pp. S obzirom na spoljašnje oplodjenje jeste. Nije precizirano koji je to broj jaja. Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof,	High
-	6.07	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	2	Berlin. 646 pp. https://www.researchgate.net/profile/J-Labee- Lund/publication/237183660_Variation_within_and_between_River s_in_Adult_Size_and_Sea_Age_at_Maturity_of_Anadromous_Brow n_Trout_Salmo_trutta/links/5677c0d308ae502c99d525e2/Variatio n-within-and-between-Rivers-in-Adult-Size-and-Sea-Age-at- Maturity-of-Anadromous-Brown-Trout-Salmo-trutta.pdf 2-3 years kottelat and Freyhof za S. trutta	High
		al mechanisms How many potential internal	One	By unprofesional stocking?	Medium
36	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	Probably SSSI.	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 structures.	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	Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin. 646 pp.	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	Maybe, but in the associated streams.	High
	7.06	Are older life stages of the taxon likely to	Yes	S. trutta has migratory individuas and s. macedonicus perhapes	Medium
40		migrate in the RA area for reproduction?			

	7.08	Is dispersal of the taxon along any of the	Yes	If dispersed by humen is likely 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	Probably, partial mygratory behaviour in brown trout is density dependent.	Medium
8. 1	oleran	ce attributes			
44	8.01	Is the taxon able to withstand being out of	No	Brown trout wont survive these conditions.	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	No	Trout preferes cold, fast and oxigenated water, but we have seen	Medium
		water quality conditions relevant to that		it in different streams, as well	
		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	It is very difficult with fish species.	High
		the wild with chemical, biological, or other			
		agents/means?			
47	8.04	Is the taxon likely to tolerate or benefit from	No	Probably floods can spread some individuals. Check	Medium
		environmental/human disturbance?			
48	8.05	Is the taxon able to tolerate salinity levels	Yes	Some populations of S. trutta are partly migratory, probably it	Medium
		that are higher or lower than those found in		stands for macedonicus as well.	
40	8.06	its usual environment? Are there effective natural enemies	N	Other fish service and set have been Kathelet M and J French f) (aux a la i a la
49	8.06		Yes	Other fish species can eat trout eggs. Kottelat, M. and J. Freyhof,	Very high
		(predators) of the taxon present in the RA area?		2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin. 646 pp.	
	limat	e change		Kottelat, Comor and Preynor, Benni, 646 pp.	
		e change			
-					
		Under the predicted future climatic	No change	Probably since macedonian trout prefers a little warmer climate.	Medium
		Under the predicted future climatic conditions, are the risks of entry into the RA	No change	Probably since macedonian trout prefers a little warmer climate.	Medium
			No change	Probably since macedonian trout prefers a little warmer climate.	Medium
		conditions, are the risks of entry into the RA	No change	Probably since macedonian trout prefers a little warmer climate.	Medium
51	9.02	conditions, are the risks of entry into the RA area posed by the taxon likely to increase,	No change Increase	Probably since macedonian trout prefers a little warmer climate. She is establiseh already, a little more similar climate can only	Medium
51		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		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,		She is establiseh already, a little more similar climate can only	
	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?	Increase	She is establiseh already, a little more similar climate can only increase establishement	Medium
		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		She is establiseh already, a little more similar climate can only	
	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 dispersal within	Increase	She is establiseh already, a little more similar climate can only increase establishement	Medium
	9.02	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	She is establiseh already, a little more similar climate can only increase establishement	Medium
52	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 dispersal within the RA area posed by the taxon likely to increase, decrease or not change?	Increase No change	She is establiseh already, a little more similar climate can only increase establishement Dispersal would be the same - human influenced.	Medium
52	9.02	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	Increase	She is establiseh already, a little more similar climate can only increase establishement Dispersal would be the same - human influenced. If she establish population as a top predator it could impact	Medium
52	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 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 No change	She is establiseh already, a little more similar climate can only increase establishement Dispersal would be the same - human influenced.	Medium
52	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 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 No change	She is establiseh already, a little more similar climate can only increase establishement Dispersal would be the same - human influenced. If she establish population as a top predator it could impact	Medium
52	9.02 9.03 9.04	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 No change Higher	She is establiseh already, a little more similar climate can only increase establishement Dispersal would be the same - human influenced. If she establish population as a top predator it could impact biodiversity more.	Medium Medium Medium
52	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 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 No change	She is establiseh already, a little more similar climate can only increase establishement Dispersal would be the same - human influenced. If she establish population as a top predator it could impact	Medium
52	9.02 9.03 9.04	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 No change Higher	She is establiseh already, a little more similar climate can only increase establishement Dispersal would be the same - human influenced. If she establish population as a top predator it could impact biodiversity more.	Medium Medium Medium
52	9.02 9.03 9.04	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 No change Higher	She is establiseh already, a little more similar climate can only increase establishement Dispersal would be the same - human influenced. If she establish population as a top predator it could impact biodiversity more.	Medium Medium Medium
52 53 54	9.02 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 No change Higher Higher	She is establiseh already, a little more similar climate can only increase establishement Dispersal would be the same - human influenced. If she establish population as a top predator it could impact biodiversity more. Same as for the previous question.	Medium Medium Medium Medium
52 53 54	9.02 9.03 9.04	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 structure and/or function? Under the predicted future climatic	Increase No change Higher	She is establiseh already, a little more similar climate can only increase establishement Dispersal would be the same - human influenced. If she establish population as a top predator it could impact biodiversity more.	Medium Medium Medium
52 53 54	9.02 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 No change Higher Higher	She is establiseh already, a little more similar climate can only increase establishement Dispersal would be the same - human influenced. If she establish population as a top predator it could impact biodiversity more. Same as for the previous question.	Medium Medium Medium Medium

Statistics	
Scores	
BRA	23.0
BRA Outcome	-
BRA+CCA	31.0
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	16.0
4. Undesirable (or persistence) traits	6.0
5. Resource exploitation	5.0
6. Reproduction	4.0
7. Dispersal mechanisms	2.0
8. Tolerance attributes	-1.0
C. Climate change	8.0
9. Climate change	8.0
Answered Questions	
Total	55
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 2 7 9
5. Resource exploitation	2
6. Reproduction	7
7. Dispersal mechanisms	
8. Tolerance attributes	6
C. Climate change	6
9. Climate change	6
Sectors affected	
Commercial	7
	11
Environmental Species or population nuisance traits	11

Thresholds	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.69
BRA	0.71
CCA	0.50
Date and Time	
16/05/20	021 21:45:56

Faxon and Assessor details						
Category	Fishes and Lampreys (freshwater)					
Taxon name	Salmo macedonicus					
Common name	Macedonian trout					
Assessor	Ivan Špelić					
Risk screening context						
Reason and socio-economic benefits						
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS					
Taxonomy						
Native range						
Introduced range						
URL						

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
1. L	Domest	ication/Cultivation			
	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	https://sgp.undp.org/spacial-itemid-projects-landing-page/spacial- itemid-project-search-results/spacial-itemid-project- detailpage.html?view=projectdetail&id=15129	Medium
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	For restocking purposes, as brood stock (https://sgp.undp.org/spacial-itemid-projects-landing- page/spacial-itemid-project-search-results/spacial-itemid-project- detailpage.html?view=projectdetail&id=15129).	Medium
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	Salmo trutta (CABI).	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	Climatch, low number of source points (only three).	Low
5	2.02	What is the quality of the climate matching data?	Low	Climatch, low number of source points (only three).	Very high
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	River Jerma in Serbia (Danube basin) (Simonović, P., 2015. Risks to stocks of native trout of the genus Salmo (Actinopterygii: Salmoniformes: Salmonidae) of Serbia and management for their recovery. Acta Ichthyologica et Piscatoria 45, 161–173 doi:10.3750/aip2015.45.2.06).	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	Not applicable	Already present (Škraba Jurlina, D., Marić, A., Mrdak, D., Kanjuh, T., Špelić, I., Nikolić, V., Piria, M., Simonović, P., 2020. Alternative Life-History in Native Trout (Salmo spp.) Suppresses the Invasive Effect of Alien Trout Strains Introduced Into Streams in the Western Part of the Balkans. Frontiers in Ecology and Evolution 8 doi:10.3389/fevo.2020.00188; Simonović, P., 2015. Risks to stocks of native trout of the genus Salmo (Actinopterygii: Salmoniformes: Salmonidae) of Serbia and management for their recoverv. Acta Ichthyologica et Piscatoria 45. 161–173	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)?	Not applicable	Already present (Škraba Jurlina, D., Marić, A., Mrdak, D., Kanjuh, T., Špelić, I., Nikolić, V., Piria, M., Simonović, P., 2020. Alternative Life-History in Native Trout (Salmo spp.) Suppresses the Invasive Effect of Alien Trout Strains Introduced Into Streams in the Western Part of the Balkans. Frontiers in Ecology and Evolution 8 doi:10.3389/fevo.2020.00188; Simonović, P., 2015. Risks to stocks of native trout of the genus Salmo (Actinopterygii: Salmoniformes: Salmonidae) of Serbia and management for their recovery. Acta Ichthyologica et Piscatoria 45, 161–173.	Very high
3. I	nvasive	e elsewhere			
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	Jerma river in Serbia (Škraba Jurlina, D., Marić, A., Mrdak, D., Kanjuh, T., Špelić, I., Nikolić, V., Piria, M., Simonović, P., 2020. Alternative Life-History in Native Trout (Salmo spp.) Suppresses the Invasive Effect of Alien Trout Strains Introduced Into Streams in the Western Part of the Balkans. Frontiers in Ecology and Evolution 8 doi:10.3389/fevo.2020.00188; Simonović, P., 2015. Risks to stocks of native trout of the genus Salmo (Actinopterygii: Salmoniformes: Salmonidae) of Serbia and management for their recovery. Acta Ichthyologica et Piscatoria 45161–173.	Medium
	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	Hybridization with native species (Škraba Jurlina, D., Marić, A., Mrdak, D., Kanjuh, T., Špelić, I., Nikolić, V., Piria, M., Simonović, P., 2020. Alternative Life-History in Native Trout (Salmo spp.) Suppresses the Invasive Effect of Alien Trout Strains Introduced Into Streams in the Western Part of the Balkans. Frontiers in Ecology and Evolution 8. doi:10.3389/fevo.2020.00188).	High
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	No documented evidence.	High
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	No	No documented impacts.	High
L3	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	No documented impacts.	High
<u>B.</u>	Biology	//Ecology			
		able (or persistence) traits			
		Is it likely that the taxon will be poisonous or pose other risks to human health?	No	Harmless (Torres, Armi G. in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021)).	Very high

15	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or	Yes	Biology and ecology are presumably similar to other invasive Salmo trutta lineages (belonging to the same brown trout	Medium
		protected)?		complex). Salmo trutta has been implicated in reducing native fish	
				populations (especially other salmonids) through predation,	
				displacement, and food competition; S. trutta introductions may	
				have eliminated or reduced several Plecoptera and Trichoptera	
				species in streams in Victoria, Australia (CABI, 2021. Salmo trutta[original text by Sunil Siriwardena]. In: Invasive Species	
				Compendium, Wallingford, UK: CAB International.	
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	No parasitic behavior within genus.	Very high
17	4.04	Is the taxon adaptable in terms of climatic	No	For Salmo trutta from the same species complex: they prefer cold,	High
		and other environmental conditions, thus		well-oxygenated upland waters although their tolerance limits are	
		enhancing its potential persistence if it has		lower than those of rainbow trout and favors large streams in the	
		invaded or could invade the RA area?		mountainous areas with adequate cover in the form of submerged	
				rocks, undercut banks, and overhanging vegetation (Froese, R. and D. Pauly. Editors. 2019.FishBase. World Wide Web electronic	
				publication. www.fishbase.org, (12/2019). Salmo macedonicus is	
				present only in upper Vardar drainage in Macedonia and in Jerma	
				river in Serbia where it was introduced (Torres, Armi G. in Froese,	
				R. and D. Pauly. Editors. 2021.FishBase. World Wide Web	
				electronic publication. www.fishbase.org, (02/2021); Simonović,	
				P., 2015. Risks to stocks of native trout of the genus Salmo	
				(Actinopterygii: Salmoniformes: Salmonidae) of Serbia and	
				management for their recovery. Acta Ichthyologica et Piscatoria	
18	4.05	Is the taxon likely to disrupt food-web	Yes	Nystrom, P.; McIntosh, A. R. (2003): Are impacts of an exotic	Medium
		structure/function in aquatic ecosystems if it		predator on a stream food web influenced by disturbance history?	
		has invaded or is likely to invade the RA area?		Oecologia (2003) 136:279–288. DOI 10.1007/s00442-003-1250-3 (for Salmo trutta in the same species complex).	
19	4.06	Is the taxon likely to exert adverse impacts	Yes	For Salmo trutta in the same species complex).	Medium
		on ecosystem services in the RA area?		have been implicated in reducing native fish populations	
				(especially other salmonids), which could be more attractive for	
				fishing, through predation, displacement, food competition and	
				hybridization (Global Invasive Species Database (2020) Species	
				profile: Salmo trutta. Downloaded from http://www.iucngisd.org/gisd/speciesname/Salmo+trutta on 25-	
20	4.07	Is it likely that the taxon will host, and/or	Yes	Salmo trutta is susceptible to pathogens and parasites (Cultured	Medium
		act as a vector for, recognised pests and		Aquatic Species Information Programme. Salmo trutta. Cultured	
		infectious agents that are endemic in the RA area?		Aquatic Species Information Programme. Text by Vandeputte, M. & Labbé, L. In: FAO Fisheries Division [online]. Rome. Updated .	
				[Cited 24 May 2021].), so most likely S. macedonicus is also	
				susceptible as a part of the brown trout complex.	
21	4.08	Is it likely that the taxon will host, and/or	Yes	Salmo trutta is susceptible to pathogens and parasites (Cultured	Medium
		act as a vector for, recognised pests and infectious agents that are absent from (novel		Aquatic Species Information Programme. Salmo trutta. Cultured Aquatic Species Information Programme. Text by Vandeputte, M.	
		to) the RA area?		& Labbé, L. In: FAO Fisheries Division [online]. Rome. Updated .	
				[Cited 24 May 2021].), so most likely S. macedonicus is also	
				susceptible as a part of the brown trout complex.	
22	4.09	Is it likely that the taxon will achieve a body	Yes	Size to 40 cm (Torres, Armi G. in Froese, R. and D. Pauly. Editors.	Very high
		size that will make it more likely to be released from captivity?		2021.FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021)).	
23	4.10	Is the taxon capable of sustaining itself in a	No	Inhabits stretches with swift water, rapids and small waterfalls	Medium
		range of water velocity conditions (e.g.		(Torres, Armi G. in Froese, R. and D. Pauly. Editors.	
		versatile in habitat use)?		2021.FishBase. World Wide Web electronic publication.	
24	4.11	Is it likely that the taxon's mode of existence	No	www.fishbase.org, (02/2021)). Lives in habitats usually associated with hard substrate, ecology	High
-+	7.11	(e.g. excretion of by-products) or behaviours	110	does not imply such impacts (Torres, Armi G. in Froese, R. and D.	ngn
		(e.g. feeding) will reduce habitat quality for		Pauly. Editors. 2021.FishBase. World Wide Web electronic	
		native taxa?		publication. www.fishbase.org, (02/2021)) and it was never	
25	4.12	Is the taxon likely to maintain a viable	No	Not documented.	Low
		population even when present in low densities (or persisting in adverse conditions			
		by way of a dormant form)?			
		e exploitation	No.		
26	5.01	Is the taxon likely to consume threatened or protected native taxa in the RA area?	Yes	No information on diet. As a part of the brown trout complex, smaller specimens most likely feed on invertebrates and larger	Low
27	5.02	Is the taxon likely to sequester food	Not applicable	No data for calculation.	Very high
		resources (including nutrients) to the			
5, 1	Reprodu	detriment of native taxa in the RA area?		l	
		Is the taxon likely to exhibit parental care	No	No such observations within Salmo trutta complex.	High
		and/or to reduce age-at-maturity in response			
0	6.02	to environmental conditions? Is the taxon likely to produce viable gametes	Yes	Established in river Jerma in Serbia (Simonović, P., 2015. Risks to	Very high
29	0.02	or propagules (in the RA area)?	165	stocks of native trout of the genus Salmo (Actinopterygii:	very nign
				Salmoniformes: Salmonidae) of Serbia and management for their	
				recovery. Acta Ichthyologica et Piscatoria 45, 161–173	
				doi:10.3750/aip2015.45.2.06; Škraba Jurlina, D., Marić, A.,	
		1	1	Mrdak, D., Kanjuh, T., Špelić, I., Nikolić, V., Piria, M., Simonović,	
				P., 2020. Alternative Life-History in Native Trout (Salmo spp.)	

30	6.03	Is the taxon likely to hybridise naturally with	Yes	Simonović, P., 2015. Risks to stocks of native trout of the genus	Very high
50	0.05	native taxa?		Salmoi (Actinopterygii: Salmoniformes: Salmonidae) of Serbia and management for their recovery. Acta Ichthyologica et Piscatoria 45, 161–173 doi:10.3750/aip2015.45.2.06; Škraba Jurlina, D., Marić, A., Mrdak, D., Kanjuh, T., Špelić, I., Nikolić, V., Piria, M.,	very nigh
				Simonović, P., 2020. Alternative Life-History in Native Trout (Salmo spp.) Suppresses the Invasive Effect of Alien Trout Strains Introduced Into Streams in the Western Part of the Balkans.	
31	6.04	<i>i i</i>	No	Frontiers in Ecology and Evolution 8 No such observations within Salmo trutta complex.	High
32	6.05	display asexual reproduction? Is the taxon dependent on the presence of	Yes	No information for this species, most likely similar to S. trutta	Low
		another taxon (or specific habitat features) to complete its life cycle?		from the same complex: Spawns in rivers and streams with swift current, usually characterized by downward movement of water into gravel (Froese & Pauly 2019).	
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	Similar to other taxons of the brown trout complex.	Medium
34	6.07	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	1	No information, other taxons in brown trout complex are usually mature in 1-2 years.	Low
		al mechanisms	L.		1
35	7.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable habitats nearby)?	One	Introduction for angling (stocking) (Kanjuh T., S. Tomić, A. Marić, D. Š. Jurlina, V. Nikolić & P. Simonović 2021. Trout Salmo spp. (Salmoniformes: Salmonidae) Molecular Diversity in Streams on the Southern Slopes of the Stara Planina Mts. in Serbia. Acta Zool.	Medium
36	7.02	Will any of these vectors/pathways bring the	No	Bulg., in press). For years present just in one river in Serbia with occasional	Low
		taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)?		occurences in rivers downstream (Kanjuh T., S. Tomić, A. Marić, D. Š. Jurlina, V. Nikolić & P. Simonović 2021. Trout Salmo spp. (Salmoniformes: Salmonidae) Molecular Diversity in Streams on the Southern Slopes of the Stara Planina Mts. in Serbia. Acta Zool.	
				Bulg., in press).	
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 adaptations.	Very high
38	7.04	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules	No	Not documented, other taxons in the brown trout complex deposit eggs in redds between gravel.	Low
39	7.05	(for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to	Yes	Present in Jerma, spreading in the River Nišava downstream and	Low
		occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?		entering into large tributaries such as the River Temštica (personal observations), with the occasional reports of catches even in the city of Niš, more than 100 km downstream (Kanjuh T., S. Tomić, A. Marić, D. Š. Jurlina, V. Nikolić & P. Simonović 2021. Trout Salmo spp. (Salmoniformes: Salmonidae) Molecular Diversity in Streams on the Southern Slopes of the Stara Planina	
40	7.06	Are older life stages of the taxon likely to	No	Mts. in Serbia. Acta Zool. Bulg in press). Not certain if it is the No evidence, resident life history (Kottelat & Freyhof 2008).	Medium
41	7.07	migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to	No	Not documented, other taxons in the brown trout complex deposit	Low
12	7.08	be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the	Yes	eggs in redds between gravel. Stocking, natural dispersal.	High
+2	7.08	vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be	Tes	Stocking, natural dispersal.	ingn
43	7.09	Is dispersal of the taxon density dependent?	Yes	Present in Jerma, spreading in the River Nišava downstream and entering into large tributaries such as the River Temštica	Low
				(personal observations), with the occasional reports of catches even in the city of Niš, more than 100 km downstream (Kanjuh T., S. Tomić, A. Marić, D. Š. Jurlina, V. Nikolić & P. Simonović 2021. Trout Salmo spp. (Salmoniformes: Salmonidae) Molecular	
				Diversity in Streams on the Southern Slopes of the Stara Planina Mts. in Serbia. Acta Zool. Bulg., in press). Not certain if it is the	
8. T		ce attributes	I	result of density dependent dispersion.	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?	No	Sensitive species, most likely similar to other taxons in brown trout complex.	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	No specific info but closely related Salmo trutta requires cold, well oxygenated upland waters (Luna, Susan M. in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic	Medium
46	8.03	relevant water quality variable(s) being Can the taxon be controlled or eradicated in	No	publication. www.fishbase.org, (02/2021)). Not allowed in RA area.	Very high
		the wild with chemical, biological, or other agents/means?			
+/	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	No	Crivelli, A.J. 2006. Salmo macedonicus. The IUCN Red List of Threatened Species 2006: e.T61361A12467912. https://dx.doi.org/10.2305/IUCN.UK.2006.RLTS.T61361A1246791 2.en. Downloaded on 28 May 2021.	Medium
	8.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in	No	Only freshwater resident population (Kottelat & Freyhof 2008).	Medium
48		-			
49	8.06	its usual environment? Are there effective natural enemies (predators) of the taxon present in the RA e change	Yes	Piscivorous birds, fish and mammals are known predators of trouts.	High

50	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA	Not applicable	Already present.	Very high
		area posed by the taxon likely to increase, decrease or not change?			
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	Trout (brown trout complex) are cold-water fish, they are particularly vulnerable to the effects of global warming, including increasing water temperatures and decreasing flow rates, future changes will reduce the number of potential habitats because of the future water scarcity conditions (Carosi, A., Ghetti, L., Padula, R., Lorenzoni, M., 2020. Population status and ecology of the Salmo trutta complex in an Italian river basin under multiple	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	anthropogenic pressures. Ecology and Evolution 10. 7320–7333 Trout (brown trout complex) are cold-water fish, they are particularly vulnerable to the effects of global warming, including increasing water temperatures and decreasing flow rates, future changes will reduce the number of potential habitats because of the future water scarcity conditions (Carosi, A., Ghetti, L., Padula, R., Lorenzoni, M., 2020. Population status and ecology of the Salmo trutta complex in an Italian river basin under multiple anthropogenic pressures. Ecology and Evolution 10. 7320–7333	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	Trout (brown trout complex) are cold-water fish, they are particularly vulnerable to the effects of global warming, including increasing water temperatures and decreasing flow rates, future changes will impact the populations of trout because of the future water scarcity conditions (Carosi, A., Ghetti, L., Padula, R., Lorenzoni, M., 2020. Population status and ecology of the Salmo trutta complex in an Italian river basin under multiple anthropogenic pressures. Ecology and Evolution 10, 7320–7333 doi:10.1002/ece3.6457). As waters warm, cold water species with lower "thermal niches" become competitively disadvantaged with respect to other species for which the warmer temperatures are optimal (Magnuson, J.J., L.B. Crowder, and P.A. Medvick. 1979. Temperature as an ecological resource. Amer. Zool. 19:331-343.)	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	Trout (brown trout complex) are cold-water fish, they are particularly vulnerable to the effects of global warming, including increasing water temperatures and decreasing flow rates, future changes will impact the populations of trout because of the future water scarcity conditions (Carosi, A., Ghetti, L., Padula, R., Lorenzoni, M., 2020. Population status and ecology of the Salmo trutta complex in an Italian river basin under multiple anthropogenic pressures. Ecology and Evolution 10, 7320–7333 doi:10.1002/ece3.6457). As waters warm, cold water species with lower "thermal niches" become competitively disadvantaged with respect to other species for which the warmer temperatures are optimal (Magnuson, J.J., L.B. Crowder, and P.A. Medvick. 1979. Temperature as an ecological resource Amer. Zool. 19:331-343.)	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	Trout (brown trout complex) are cold-water fish, they are particularly vulnerable to the effects of global warming, including increasing water temperatures and decreasing flow rates, future changes will impact the populations of trout, because of the future water scarcity conditions (Carosi, A., Ghetti, L., Padula, R., Lorenzoni, M., 2020. Population status and ecology of the Salmo trutta complex in an Italian river basin under multiple anthropogenic pressures. Ecology and Evolution 10, 7320–7333 doi:10.1002/ece3.6457). As waters warm, cold water species with lower "thermal niches" become competitively disadvantaged with respect to other species for which the warmer temperatures are optimal (Magnuson, J.J., L.B. Crowder, and P.A. Medvick. 1979. Temperature as an ecological resource. Amer. Zool. 19:331-343.). In this case, adverse impact is recognized as reducing the number of native fish species, especially other Salmonids. With future conditions, both native and introduced Salmonids are predicted to avapariance reductions in suitable babitate co-relative impact will	Low

Statistics	
Scores	
BRA	18.0
BRA Outcome	-
BRA+CCA	10.0
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	7.0
4. Undesirable (or persistence) traits	5.0
5. Resource exploitation	5.0
6. Reproduction	2.0
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	36
4. Undesirable (or persistence) traits	12

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
3	Environmental
0	Species or population nuisance traits
	Thresholds
_	
-	Thresholds
-	Thresholds
	Thresholds BRA BRA+CCA
- - 0.63 0.64	Thresholds BRA BRA+CCA Confidence

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axon and Assessor details				
Category	Fishes and Lampreys (freshwater)			
Taxon name	Salmo macedonicus			
Common name	Macedonian trout			
Assessor	Tamara Kanjuh			
Risk screening context				
Reason and socio-economic benefits				
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS			
Taxonomy				
Native range				
Introduced range				
URL				

A. Biogeography/Historical 1. Conversion/Cultivation Yes At the beginning the Macedonia fishery was present in takes, but after the Second World War, there was a fas development of the aquaculture (Hristovskik Stevanov At the beginning the Macedonia fishery was present in lakes, but after the Second World War, there was a fas development of the aquaculture (Hristovskik Stevanov At the beginning the Macedonia fishery was present in lakes, but after the Second World War, there was a fas development of the aquaculture (Hristovskik Stevanov Varieties, Sub-Taxa or conspenses) 2 Conste, distribution and introduction risk Presson the ston have invasive races, No No Information found. 2 Conste, distribution and introduction risk Presson the ston have singer and the taxono's native range? 2 Conste, distribution and introduction risk Presson the ston have singer and the taxon's native range? 2 2.02 Have similar are the climatic conditions of the High Kppen-Geiger climate classification system data? 2 2.02 Have taxon already present outside of captivity in the RA area? Yes Macedonian trout of the AD haplogroup were recorded in the Raver 2: 2 2.04 Have many potential vectors could the taxon One Aquacuture (Simonović et al., 2021) 2 2.05 Is to taxon contendor to the A area? Is to taxon's introduced range, are there known andares impase	ation) (Confidence
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23 4.10 Is the taxon capable of sustaining itself in a No No information found.	L	Low
range of water velocity conditions (e.g.	L	Low
versatile in habitat use)? No 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 found.	L	Low

25	1 .		I		
	4.12	Is the taxon likely to maintain a viable	Yes	· ·· · · ···, · · · · · · · · · · · · ·	Medium
		population even when present in low		Jerma is that it naturalised and revealed the strong invasive	
		densities (or persisting in adverse conditions by way of a dormant form)?		character (Simonović et al., 2015).	
5 F	Resourc	ce exploitation			
		Is the taxon likely to consume threatened or	No	No information found.	Low
-		protected native taxa in the RA area?			
7	5.02	Is the taxon likely to sequester food	No	No information found.	Low
		resources (including nutrients) to the			
		detriment of native taxa in the RA area?			
	Reprodu				1
8	6.01	Is the taxon likely to exhibit parental care	No	No information found.	Low
		and/or to reduce age-at-maturity in response			
~	6.00	to environmental conditions?			
9	6.02	Is the taxon likely to produce viable gametes	Yes	The current ecosystem status of the Macedonian trout in the River	High
		or propagules (in the RA area)?		Jerma is that it naturalised and revealed the strong invasive	
0	6.03	Is the taxon likely to hybridise naturally with	Yes	character (Simonović et al., 2015). Introduction of the tentative Macedonian trout Salmo macedonicus	Medium
0	0.05	native taxa?	165	of the AD lineage was also detected in a native population of the	Medium
				tentative S. labrax. In almost all recipient nonmigratory trout	
				populations, a cross-breeding between native and introduced trout	
				was detected by heterozygosity in either only the LDH-C nuclear	
		locus or the LDH-C and specific microsatellite loci (Škraba et al.,			
1	6.04	Is the taxon likely to be hermaphroditic or to	No	No information found.	Medium
	<u> </u>	display asexual reproduction?	l		
2	6.05	Is the taxon dependent on the presence of	No	No information found.	Low
		another taxon (or specific habitat features)			
2	6.06	to complete its life cycle? Is the taxon known (or likely) to produce a	No	No information found.	Low
ر	0.00	large number of propagules or offspring	110		2000
		within a short time span (e.g. < 1 year)?			
4	6.07	How many time units (days, months, years)	3	As there is no exact data, it is assumed that, like other members	Low
·		does the taxon require to reach the age-at-	-	of the genus Salmo, the range of age at sexual or reproductive	
		first-reproduction?		maturity is 1 to 10 years (animaldiversity.org)	
. E)ispers	al mechanisms			
		How many potential internal	>1	Intentional restocking, escape from aquaculture, spreading	Medium
		vectors/pathways could the taxon use to		through water body connections (Simonović et al., 2021).	
		disperse within the RA area (with suitable			
6	7.02	Will any of these vectors/pathways bring the	No	No information found.	Low
		taxon in close proximity to one or more			
7	7.03	protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively	No	No information found.	Low
/	7.03	attaching itself to hard substrata (e.g. ship	NO		LOW
		hulls, pilings, buoys) such that it enhances			
		the likelihood of dispersal?			
8	7.04	Is natural dispersal of the taxon likely to	No	No information found.	Low
		occur as eggs (for animals) or as propagules			
		(for plants: seeds, spores) in the RA area?			
9	7.05	Is natural dispersal of the taxon likely to	Yes	spreading in the River Nišava downstream and entering into	High
		occur as larvae/juveniles (for animals) or as		large tributaries such as the River Temštica (personal	
		fragments/seedlings (for plants) in the RA		observations), with the occasional reports of catches even in the	
_	7.00	area? Are older life stages of the taxon likely to	NI-	city of Niš, more than 100 km downstream (Simonović et al., No information found.	1
0	7.06		No	No information found.	Low
1	7.07	migrate in the RA area for reproduction?	No		
1	7.07	migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to	No	No information found.	Low
		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?			
	7.07 7.08	migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to		No information found. Escape from aquaculture.	Low Low
		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			
2	7.08	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	Escape from aquaculture.	
2	7.08	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?			
2 3 . 7	7.08 7.09 Toleran	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	Escape from aquaculture. No information found.	Low
2 3	7.08 7.09 Toleran	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	Escape from aquaculture.	Low
2 3 . 7	7.08 7.09 Toleran	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	Escape from aquaculture. No information found.	Low
2	7.08 7.09 Toleran	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	Escape from aquaculture. No information found.	Low
2 3 4	7.08 7.09 <i>Foleran</i> 8.01	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	Escape from aquaculture. No information found. No information found.	Low Low
2 3 4	7.08 7.09 Toleran	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	Escape from aquaculture. No information found. No information found. As no information is available, it is assumed that like most species	Low
2 3 . 7 4	7.08 7.09 <i>Foleran</i> 8.01	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	Escape from aquaculture. No information found. No information found. As no information is available, it is assumed that like most species of the genus Salmonidae, S. macedonicus sensitive to water	Low Low
2 3 . 7 4	7.08 7.09 <i>Foleran</i> 8.01	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	Escape from aquaculture. No information found. No information found. As no information is available, it is assumed that like most species	Low Low
2 3 . 7 4	7.08 7.09 <i>Foleran</i> 8.01	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	Escape from aquaculture. No information found. No information found. As no information is available, it is assumed that like most species of the genus Salmonidae, S. macedonicus sensitive to water	Low Low
2 3 2.7 4	7.08 7.09 <i>Foleran</i> 8.01 8.02	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	Escape from aquaculture. No information found. No information found. As no information is available, it is assumed that like most species of the genus Salmonidae, S. macedonicus sensitive to water quality and requires cold, clean, well oxygenated water.	Low Low Low
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2 3 . 7 4 5 6 7	7.08 7.09 7.09 8.01 8.01 8.02 8.03 8.03	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 No No No	Escape from aquaculture. No information found. No information found. As no information is available, it is assumed that like most species of the genus Salmonidae, S. macedonicus sensitive to water quality and requires cold, clean, well oxygenated water. No information found. No information found.	Low Low Low Low Low
2 3 4 5 6 7 8	7.08 7.09 6/eran 8.01 8.02 8.03 8.03 8.04 8.05	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 its usual environment?	Yes No No No No	Escape from aquaculture. No information found. No information found. As no information is available, it is assumed that like most species of the genus Salmonidae, S. macedonicus sensitive to water quality and requires cold, clean, well oxygenated water. No information found. No information found. No information found. No information found.	Low Low Low Low Low Low
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2 3 .7 4 5 6 7 8 9 0	7.08 7.09 6leran 8.01 8.02 8.03 8.04 8.05 8.06 Climate 9.01	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? 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?	Yes No No No No No No No No Change	Escape from aquaculture. Escape from aquaculture. No information found. No information found. As no information is available, it is assumed that like most species of the genus Salmonidae, S. macedonicus sensitive to water quality and requires cold, clean, well oxygenated water. No information found. No information found. No information found. Similar to other species of the Salmonidae family, S. macedonicus does not tolerate extreme changes and is particularly sensitive to water temperature and oxygen saturation.	Low Low Low Low Low Low 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	Similar to other species of the Salmonidae family, S. macedonicus does not tolerate extreme changes and is particularly sensitive to water temperature and oxygen saturation.	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	Similar to other species of the Salmonidae family, S. macedonicus does not tolerate extreme changes and is particularly sensitive to water temperature and oxygen saturation.	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	Similar to other species of the Salmonidae family, S. macedonicus does not tolerate extreme changes and is particularly sensitive to water temperature and oxygen saturation.	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	Similar to other species of the Salmonidae family, S. macedonicus does not tolerate extreme changes and is particularly sensitive to water temperature and oxygen saturation.	Low

Statistics	
Scores	
BRA	9.0
BRA Outcome	-
BRA+CCA	9.0
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	0.0
4. Undesirable (or persistence) traits	1.0
5. Resource exploitation	0.0
6. Reproduction	2.0
7. Dispersal mechanisms	-1.0
8. Tolerance attributes	-2.0
C. Climate change	0.0
9. Climate change	0.0
Answered Questions	
Total	55 13
A. Biogeography/Historical 1. Domestication/Cultivation	
2. Climate, distribution and introduction risk	3 5 36 12 2 7 9 6 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	10
Environmental	0
Species or population nuisance traits	2
Thresholds	
Thresholds	

BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.35
BRA	0.37
CCA	0.25
Date and Time	
28/05/20	021 09.07.01

Faxon and Assessor details					
Category	Fishes and Lampreys (freshwater)				
Taxon name	Salmo macedonicus				
Common name	Macedonian trout				
Assessor	Tena Radocaj				
Risk screening context	Risk screening context				
Reason and socio-economic benefits					
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS				
Taxonomy					
Native range					
Introduced range					
URL					

			Response	Justification (references and/or other information)	Confidence
		ography/Historical			
		tication/Cultivation	1		1.
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	No	No evidence	Low
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	Probably (angling)	Low
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	Salmo trutta (Fishbase)	High
2. (Climate	e, distribution and introduction risk			
4	2.01		High	The similarity between climatic conditions RA area and native	Medium
		Risk Assessment (RA) area and the taxon's native range?		range is high. I use climatch.	
5	2.02	What is the quality of the climate matching data?	Medium	Distribution Map and Climatch	Medium
6	2.03	Is the taxon already present outside of captivity in the RA area?	No	S. macedonicus is not present in the RA area.	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	>1	Stocking and waterways	Medium
8	2.05	Is the taxon currently found in close	Yes	Kanjuh, T., Tomić, S., Marić, A., Jurlina, D. Š., Nikolić, V., &	High
1	1	proximity to, and likely to enter into, the RA		Simonović, P. Trout Salmo spp.(Salmoniformes: Salmonidae)	
1		area in the near future (e.g. unintentional and intentional introductions)?	1	Molecular Diversity in Streams on the Southern Slopes of the Stara Planina Mts. in Serbia.	
3. 1	nvasiv	e elsewhere			1
9	1	Has the taxon become naturalised	Yes	Kanjuh, T., Tomić, S., Marić, A., Jurlina, D. Š., Nikolić, V., &	Low
		(established viable populations) outside its native range?		Simonović, P. Trout Salmo spp.(Salmoniformes: Salmonidae) Molecular Diversity in Streams on the Southern Slopes of the	
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or	No	No evidence, but probably they compete with native fish species.	Low
11	3.03	commercial taxa? In the taxon's introduced range, are there	No	No evidence	Low
10	2.04	known adverse impacts to aquaculture?			
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	No	Competition (no evidence)	Low
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	No evidence	Low
B. I	Biology	v/Ecology			
		1/ LOOID4Y			
4. L		rable (or persistence) traits			
	Indesir	<i>rable (or persistence) traits</i> Is it likely that the taxon will be poisonous or	No	S. macedonicus is harmless	Low
14	Indesir	rable (or persistence) traits	No	S. macedonicus is harmless No evidence	Low
14 15	<i>Jndesir</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)?	No	No evidence	Low
14 15	<i>Indesir</i> 4.01	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			
14 15 16	<u>Indesir</u> 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?	No	No evidence	Low
14 15 16	<i>Jndesir</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	No	No evidence No S. macedonicus will be adaptable to climatic and other	Low
14 15 16	<u>Indesir</u> 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?	No	No evidence	Low
14 15 16	<u>Indesir</u> 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	No	No evidence No S. macedonicus will be adaptable to climatic and other environmental conditions. (Kanjuh, T., Tomić, S., Marić, A.,	Low
14 15 16 17	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?	No No Yes	No evidence No S. macedonicus will be adaptable to climatic and other environmental conditions. (Kanjuh, T., Tomić, S., Marić, A., Jurlina, D. Š., Nikolić, V., & Simonović, P. Trout Salmo spp.(Salmoniformes: Salmonidae) Molecular Diversity in Streams on the Southern Slopes of the Stara Planina Mts. in Serbia)	Low Low Low
14 15 16 17	<u>Indesir</u> 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 invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it	No	No evidence No S. macedonicus will be adaptable to climatic and other environmental conditions. (Kanjuh, T., Tomić, S., Marić, A., Jurlina, D. Š., Nikolić, V., & Simonović, P. Trout Salmo spp.(Salmoniformes: Salmonidae) Molecular Diversity in Streams	Low
14 15 16 17 18	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	No No Yes No	No evidence S. macedonicus will be adaptable to climatic and other environmental conditions. (Kanjuh, T., Tomić, S., Marić, A., Jurlina, D. Š., Nikolić, V., & Simonović, P. Trout Salmo spp.(Salmoniformes: Salmonidae) Molecular Diversity in Streams on the Southern Slopes of the Stara Planina Mts. in Serbia) Competition with native species	Low Low Low
14 15 16 17 18	4.01 4.02 4.03 4.04 4.05 4.06	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?	No No Yes	No evidence No S. macedonicus will be adaptable to climatic and other environmental conditions. (Kanjuh, T., Tomić, S., Marić, A., Jurlina, D. Š., Nikolić, V., & Simonović, P. Trout Salmo spp.(Salmoniformes: Salmonidae) Molecular Diversity in Streams on the Southern Slopes of the Stara Planina Mts. in Serbia)	Low Low Low
14 15 16 17 18	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 nade the RA Is the taxon likely to exert adverse impacts	No No Yes No	No evidence S. macedonicus will be adaptable to climatic and other environmental conditions. (Kanjuh, T., Tomić, S., Marić, A., Jurlina, D. Š., Nikolić, V., & Simonović, P. Trout Salmo spp.(Salmoniformes: Salmonidae) Molecular Diversity in Streams on the Southern Slopes of the Stara Planina Mts. in Serbia) Competition with native species	Low Low Low
14 15 16 17 18 19 20	Indesir 4.01 4.02 4.03 4.04 4.05 4.06 4.07	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	No No Yes No Yes	No evidence No S. macedonicus will be adaptable to climatic and other environmental conditions. (Kanjuh, T., Tomić, S., Marić, A., Jurlina, D. Š., Nikolić, V., & Simonović, P. Trout Salmo spp.(Salmoniformes: Salmonidae) Molecular Diversity in Streams on the Southern Slopes of the Stara Planina Mts. in Serbia) Competition with native species S. macedonicus no adverse impacts in the RA area. Yes, the taxon may be a host or vector of known pests and infectious agents endemic to RA area. Because in every area exist infectious agents and pests.	Low Low Low Low Low Medium
14 15 16 17 18 19 20	4.01 4.02 4.03 4.04 4.05 4.06	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 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 No Yes No	No evidence No S. macedonicus will be adaptable to climatic and other environmental conditions. (Kanjuh, T., Tomić, S., Marić, A., Jurlina, D. Š., Nikolić, V., & Simonović, P. Trout Salmo spp.(Salmoniformes: Salmonidae) Molecular Diversity in Streams on the Southern Slopes of the Stara Planina Mts. in Serbia) Competition with native species S. macedonicus no adverse impacts in the RA area. Yes, the taxon may be a host or vector of known pests and infectious agents and pests. Yes, the taxon may be a host or vector of known pests and	Low Low Low Low Low
14 15 16 17 18 19 20	Indesir 4.01 4.02 4.03 4.04 4.05 4.06 4.07	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	No No Yes No Yes	No evidence No S. macedonicus will be adaptable to climatic and other environmental conditions. (Kanjuh, T., Tomić, S., Marić, A., Jurlina, D. Š., Nikolić, V., & Simonović, P. Trout Salmo spp.(Salmoniformes: Salmonidae) Molecular Diversity in Streams on the Southern Slopes of the Stara Planina Mts. in Serbia) Competition with native species S. macedonicus no adverse impacts in the RA area. Yes, the taxon may be a host or vector of known pests and infectious agents endemic to RA area. Because in every area exist infectious agents and pests.	Low Low Low Low Low Medium
14 15 16 17 18 19 20 21	Indesir 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?	No Yes No Yes Yes	No evidence No S. macedonicus will be adaptable to climatic and other environmental conditions. (Kanjuh, T., Tomić, S., Marić, A., Jurlina, D. Š., Nikolić, V., & Simonović, P. Trout Salmo spp.(Salmoniformes: Salmonidae) Molecular Diversity in Streams on the Southern Slopes of the Stara Planina Mts. in Serbia) Competition with native species S. macedonicus no adverse impacts in the RA area. Yes, the taxon may be a host or vector of known pests and infectious agents and pests. Yes, the taxon may be a host or vector of known pests and infectious agents endemic to RA area. Because in every area exist infectious agents endemic to RA area. Because in every area exist infectious agents and pests.	Low Low Low Low Medium Medium
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14 15 16 17 18 20 21 22	Indesir 4.01 4.02 4.03 4.04 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 dexert 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?	No No Yes No Yes Yes Yes	No evidence No S. macedonicus will be adaptable to climatic and other environmental conditions. (Kanjuh, T., Tomić, S., Marić, A., Jurlina, D. Š., Nikolić, V., & Simonović, P. Trout Salmo spp.(Salmoniformes: Salmonidae) Molecular Diversity in Streams on the Southern Slopes of the Stara Planina Mts. in Serbia) Competition with native species S. macedonicus no adverse impacts in the RA area. Yes, the taxon may be a host or vector of known pests and infectious agents endemic to RA area. Because in every area exist infectious agents endemic to RA area. Because in every area exist infectious agents and pests. Yes, the taxon may be a host or vector of known pests and infectious agents endemic to RA area. Because in every area exist infectious agents and pests. 40.0 cm SL (Fishbase)	Low Low Low Low Low Medium Medium Very high
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14 15 16 17 18 20 21 22 22 23	Indesir 4.01 4.02 4.03 4.04 4.05 4.06 4.07 4.08 4.09 4.10	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 invaded or is likely to avert 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? 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	No No Yes No Yes Yes Yes Yes	No evidence No S. macedonicus will be adaptable to climatic and other environmental conditions. (Kanjuh, T., Tomić, S., Marić, A., Jurlina, D. Š., Nikolić, V., & Simonović, P. Trout Salmo spp.(Salmoniformes: Salmonidae) Molecular Diversity in Streams on the Southern Slopes of the Stara Planina Mts. in Serbia) Competition with native species S. macedonicus no adverse impacts in the RA area. Yes, the taxon may be a host or vector of known pests and infectious agents endemic to RA area. Because in every area exist infectious agents endemic to RA area. Because in every area exist infectious agents and pests. Yes, the taxon may be a host or vector of known pests and infectious agents and pests. Yes, the taxon may be a host or vector of known pests and infectious agents and pests. 40.0 cm SL (Fishbase) Inhabits stretches with swift water, rapids and small waterfalls (Fishbase)	Low Low Low Low Very high Very high
14 15 16 17 18 20 21 22 22 23	Indesir 4.01 4.02 4.03 4.04 4.05 4.06 4.07 4.08 4.09 4.10	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 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 absent from (novel to) the RA area? Is it likely that the taxon will nost, 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 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	No No Yes No Yes Yes Yes Yes	No evidence No S. macedonicus will be adaptable to climatic and other environmental conditions. (Kanjuh, T., Tomić, S., Marić, A., Jurlina, D. Š., Nikolić, V., & Simonović, P. Trout Salmo spp.(Salmoniformes: Salmonidae) Molecular Diversity in Streams on the Southern Slopes of the Stara Planina Mts. in Serbia) Competition with native species S. macedonicus no adverse impacts in the RA area. Yes, the taxon may be a host or vector of known pests and infectious agents endemic to RA area. Because in every area exist infectious agents endemic to RA area. Because in every area exist infectious agents and pests. Yes, the taxon may be a host or vector of known pests and infectious agents and pests. Yes, the taxon may be a host or vector of known pests and infectious agents and pests. 40.0 cm SL (Fishbase) Inhabits stretches with swift water, rapids and small waterfalls (Fishbase)	Low Low Low Low Very high Very high

25	4.12	Is the taxon likely to maintain a viable	No	No evidence	Low
5	7.12	population even when present in low	110		LOW
	1	densities (or persisting in adverse conditions			
	Resourc	by way of a dormant form)? ce exploitation			
		Is the taxon likely to consume threatened or	Yes	No evidence (personal opinion-yes)	Low
		protected native taxa in the RA area?			
7	5.02	Is the taxon likely to sequester food	Not applicable	Not applicable	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 and/or to reduce age-at-maturity in response	No	No evidence	Low
		to environmental conditions?			
9	6.02	Is the taxon likely to produce viable gametes	Yes	S. macedonicus can produce viable gamete in the RA area.	Medium
~	6.02	or propagules (in the RA area)?	No	No. o	1
U	6.03	Is the taxon likely to hybridise naturally with native taxa?	No	No evidence	Low
1	6.04	Is the taxon likely to be hermaphroditic or to	No	No	Low
2	6.05	display asexual reproduction?	No	No	Low
2	0.05	Is the taxon dependent on the presence of another taxon (or specific habitat features)	INO	NO	LOW
		to complete its life cycle?			
3	6.06	Is the taxon known (or likely) to produce a	No	No evidence	Low
		large number of propagules or offspring within a short time span (e.g. < 1 year)?			
4	6.07	How many time units (days, months, years)	2	2?	Low
		does the taxon require to reach the age-at-			
	Disners	first-reproduction?		l	
		How many potential internal	>1	1. human influence 2. natural spread via natural and manmade	High
		vectors/pathways could the taxon use to		watercourses	
6	7.02	disperse within the RA area (with suitable Will any of these vectors/pathways bring the	Yes	Human influence	Low
5		taxon in close proximity to one or more			
_	7.00	protected areas (e.g. MCZ, MPA, SSSI)?			
1	7.03	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship	No	No adaptions	Low
		hulls, pilings, buoys) such that it enhances			
		the likelihood of dispersal?			
8	7.04	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules	No	No evidence	Low
		(for plants: seeds, spores) in the RA area?			
9	7.05	Is natural dispersal of the taxon likely to	Yes	Probably yes	Low
		occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA			
		area?			
0	7.06	Are older life stages of the taxon likely to	Yes	Yes	Low
1	7 07	migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to	No	NI-	1
1	7.07	be dispersed in the RA area by other animals?	No	No	Low
2	7.08	Is dispersal of the taxon along any of the	Yes	There is the possibility of a high rate of dispersal of taxa. E.g.	Low
		vectors/pathways mentioned in the previous		when a fertilized individual enters a new area by some kind of	
		seven questions (35-41; i.e. both unintentional or intentional) likely to be		dispersal.	
3	7.09		Yes	No evidence	Low
		ce attributes			
4	8.01	Is the taxon able to withstand being out of water for extended periods (e.g. minimum of	No	Sensitive species	High
		one or more hours) at some stage of its life			
-	0.07	cycle?	N	Demonstration	
5	8.02	Is the taxon tolerant of a wide range of water quality conditions relevant to that	No	Personal opinion	Low
		taxon? [In the Justification field, indicate the			
~	0.07	relevant water quality variable(s) being			
6	8.03	Can the taxon be controlled or eradicated in the wild with chemical, biological, or other	No	No evidence	Low
_		agents/means?			
7	8.04	Is the taxon likely to tolerate or benefit from	No	Future habitat loss, water abstraction, and water pollution.	High
		environmental/human disturbance?		(Crivelli, A.J. 2006. Salmo macedonicus. The IUCN Red List of Threatened Species 2006)	
8	8.05	Is the taxon able to tolerate salinity levels	No	Freshwater fish	Low
		that are higher or lower than those found in			
0	8.06	its usual environment? Are there effective natural enemies	Yes	Catfish, Zander, Pike	Medium
3	0.00	(predators) of the taxon present in the RA	100		meululli
		e change		·	
	<i>Climate</i> 9.01	change	No change	Comto I. Buiecon I. Daufacene M. 9. Constantillat. C. (2012)	Modium
J	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA	No change	Comte, L., Buisson, L., Daufresne, M., & Grenouillet, G. (2013). Climate-induced changes in the distribution of freshwater fish:	Medium
		area posed by the taxon likely to increase,		observed and predicted trends. Freshwater Biology, 58(4), 625-	
1	0.02	decrease or not change?	Daar	639.	
1	9.02	Under the predicted future climatic conditions, are the risks of establishment	Decrease	Comte, L., Buisson, L., Daufresne, M., & Grenouillet, G. (2013). Climate-induced changes in the distribution of freshwater fish:	Low
		posed by the taxon likely to increase,		observed and predicted trends. Freshwater Biology, 58(4), 625-	
		decrease or not change?	-	639.	
_	-	Under the predicted future elimetic	Decrease	Comte, L., Buisson, L., Daufresne, M., & Grenouillet, G. (2013).	Low
2	9.03	Under the predicted future climatic	200.0000	Climate-induced changes in the distribution of freehunter fich.	
2	9.03	conditions, are the risks of dispersal within the RA area posed by the taxon likely to		Climate-induced changes in the distribution of freshwater fish: observed and predicted trends. Freshwater Biology, 58(4), 625-	

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	Comte, L., Buisson, L., Daufresne, M., & Grenouillet, G. (2013). Climate-induced changes in the distribution of freshwater fish: observed and predicted trends. Freshwater Biology, 58(4), 625- 639.	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	Comte, L., Buisson, L., Daufresne, M., & Grenouillet, G. (2013). Climate-induced changes in the distribution of freshwater fish: observed and predicted trends. Freshwater Biology, 58(4), 625- 639.	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	Comte, L., Buisson, L., Daufresne, M., & Grenouillet, G. (2013). Climate-induced changes in the distribution of freshwater fish: observed and predicted trends. Freshwater Biology, 58(4), 625- 639.	Low

Statistics	
Scores	
BRA	14.0
BRA Outcome	-
BRA+CCA	10.0
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	9.0
4. Undesirable (or persistence) traits	5.0
5. Resource exploitation	5.0
6. Reproduction	0.0
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
A. Biogeography/Historical 1. Domestication/Cultivation	13
A. Biogeography/Historical	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	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	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 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 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	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 Commercial	13 3 5 5 36 12 2 7 9 6 6 6 6 6 4
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 6 6 6 6 6 6 6 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 9 6 6 6 6 6 4
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 6 6 6 6 6 6 6 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 9 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6

BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.39
BRA	0.40
CCA	0.29

Date and Time 19/05/2021 12:30:19

Faxon and Assessor details					
Category	Fishes and Lampreys (freshwater)				
Taxon name	Salmo obtusirostris				
Common name	soft-muzzled trout				
Assessor	Ana Marić				
Risk screening context					
Reason and socio-economic benefits					
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS				
Taxonomy					
Native range					
Introduced range					
URL					

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
		ication/Cultivation	1		
		Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	http://www.musicar.rs/vrste-riba-koje-se-gaje-u-ribnjacima/ Artificial breeding of Neretva softmouth trout (Salmo obtusirostris oxyrhincus Heckel, 1851). Handžar, D. ; Jažić, A. ; Spasojević, P. 2015 but maybenot for 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	Službene novine Federacije BiH", br. 63/05 PRAVILNIK O NAČINU, ALATIMA I SREDSTVIMA KOJIMA SE OBAVLJA RIBOLOV	High
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	A handbook of global freshwater invasive species. Frencis. 2012.	Very high
2 (limate	, distribution and introduction risk			
	2.01		High	Its the same latitude and area.	High
5	2.02	What is the quality of the climate matching data?	High	https://climatch.cp1.agriculture.gov.au/climatch.jsp	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	ZRnovnica	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	>1	Stocking and escape from fish farms.	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	Genetic variation among trout in the River Neretva basin, Bosnia and Herzegovina A. RAZPET, S. SUS [*] NIK, T. JUG AND A. SNOJ. 2006	High
3. I	nvasive	e elsewhere			
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	Genetic composition of the Jadro softmouth trout following translocation into a new habitat. Ales Snoj Æ Andrej Razpet Æ Tea Tomljanovic ÆTomislav Treer Æ Simona Susnik. 2007	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	No	Genetic composition of the Jadro softmouth trout following translocation into a new habitat. Ales Snoj,Andrej Razpet, Tea Tomljanovic, Tomislav Treer,imona Susnik. 2007	Very high
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	Genetic composition of the Jadro softmouth trout following translocation into a new habitat. Ales Snoj, Andrej Razpet, Tea Tomljanovic, Tomislav Treer, imona Susnik. 2007	Very high
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem services?	No	Genetic composition of the Jadro softmouth trout following translocation into a new habitat. Ales Snoj, Andrej Razpet, Tea Tomljanovic, Tomislav Treer, imona Susnik. 2007	Very high
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	Genetic composition of the Jadro softmouth trout following translocation into a new habitat. Ales Snoj,Andrej Razpet, Tea Tomljanovic, Tomislav Treer,imona Susnik. 2007	Very high
B. I	Biology	//Ecology			
		able (or persistence) traits	1		
		Is it likely that the taxon will be poisonous or pose other risks to human health?	No	Handbook of European Freshwater Fishes. 2007. Kottelat and Freyhof	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	Genetic composition of the Jadro softmouth trout following translocation into a new habitat. Ales Snoj, Andrej Razpet, Tea Tomljanovic, Tomislav Treer, imona Susnik. 2007	Very high
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	Handbook of European Freshwater Fishes. 2007. Kottelat and Freyhof	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	Note on the growth of endemic soft muzzled trout Salmothymus obtusirostris translocated into Dalmatian river. Treer et al. 2003	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	Genetic composition of the Jadro softmouth trout following translocation into a new habitat. Ales Snoj,Andrej Razpet, Tea Tomljanovic, Tomislav Treer,imona Susnik. 2007	Very high
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	Genetic composition of the Jadro softmouth trout following translocation into a new habitat. Ales Snoj, Andrej Razpet, Tea Tomljanovic, Tomislav Treer, imona Susnik. 2007	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	Handbook of European Freshwater Fishes. 2007. Kottelat and Freyhof	Very 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?	No	It is the very close, practicly same area	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	From farms.	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	Ecologically acceptable flows definition for the Žrnovnica River (Croatia) Ognjen Bonacci Mladen Kerovec Tanja Roje-Bonacci 1998	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 native taxa?	No	Ecologically acceptable flows definition for the Żrnovnica River (Croatia) Ognjen Bonacci Mladen Kerovec Tanja Roje-Bonacci 1998	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)?	Yes	Genetic composition of the Jadro softmouth trout following translocation into a new habitat. Ales Sonj,Andrej Razpet, Tea Tomljanovic, Tomislav Treer,imona Susnik. 2007	Very high
		e exploitation			
5	5.01	Is the taxon likely to consume threatened or	Yes	Handbook of European Freshwater Fishes. 2007. Kottelat and	Very high
7	5.02	protected native taxa in the RA area?	No	Freyhof) (aux biab
	5.0Z	Is the taxon likely to sequester food resources (including nutrients) to the	-	Genetic composition of the Jadro softmouth trout following translocation into a new habitat. Ales Snoj, Andrej Razpet, Tea	Very high
		detriment of native taxa in the RA area?		Tomljanovic, Tomislav Treer, imona Susnik. 2007	
	Reprodu				
3	6.01	Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?	No	No data	Medium
9	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	Treer, T., Aničić, I., Safner, R., Odak, T. & Piria, M. (2003): Note on the growth of endemic soft-muzzled trout Salmothymus obtusirostris translocated into a Dalmatian river. Biologia, Bratislava, section Zoology 58, 999–1001	Very high
)	6.03	Is the taxon likely to hybridise naturally with native taxa?	Yes	Genetic composition of the Jadro softmouth trout following translocation into a new habitat. Ales Snoj, Andrej Razpet, Tea Tomljanovic, Tomislav Treer, imona Susnik. 2007	Very high
	6.04	Is the taxon likely to be hermaphroditic or to	No	Handbook of European Freshwater Fishes. 2007. Kottelat and	Very high
2	6.05	display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features)	No	Freyhof Handbook of European Freshwater Fishes. 2007. Kottelat and Freyhof	Very high
		to complete its life cycle?			
3	6.06	Is the taxon known (or likely) to produce a large number of propagules or offspring	Yes	Handbook of European Freshwater Fishes. 2007. Kottelat and Freyhof	High
4	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?	2	Handbook of European Freshwater Fishes. 2007. Kottelat and Freyhof	Medium
. [Dispersa	Inst-reproduction?	I		
		How many potential internal vectors/pathways could the taxon use to	>1	Stocking,escape	Medium
5	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	Its near the sea area	High
7	7.03	protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively	No	Handbook of European Freshwater Fishes. 2007. Kottelat and	Very high
		attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal?		Freyhof	
8	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	Spawning behaviour and the softmouth trout dilemma. 2014. Manu Esteve, Deborah Ann McLennan, John Andrew Zablocki, Gašper Pustovrh, Ignacio Doadrio	Very high
9	7.05	Is natural dispersal of the taxon likely to	Yes	Spawning behaviour and the softmouth trout dilemma. 2014.	Medium
		occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?		Manu Esteve, Deborah Ann McLennan, John Andrew Zablocki, Gašper Pustovrh, Ignacio Doadrio	
0	7.06	Are older life stages of the taxon likely to	Yes	Note on the growth of endemic soft muzzled trout Salmothymus	High
	7.07	migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to	No	obtusirostris translocated into Dalmatian river. Treer et al. 2003 can only eat them	Very high
2	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	No	Genetic composition of the Jadro softmouth trout following translocation into a new habitat. Ales Sonj,Andrej Razpet, Tea	High
2	7.00	seven questions (35–41; i.e. both unintentional or intentional) likely to be	No	Tomljanovic, Tomislav Treer,imona Susnik. 2007	High
	7.09	Is dispersal of the taxon density dependent?	No	Genetic composition of the Jadro softmouth trout following translocation into a new habitat. Ales Snoj, Andrej Razpet, Tea Tomljanovic, Tomislav Treer, imona Susnik. 2007	High
		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	Ecologically acceptable flows definition for the Žrnovnica River (Croatia) Ognjen Bonacci Mladen Kerovec Tanja Roje-Bonacci 1998	Very high
5	8.02	cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that	No	Ecologically acceptable flows definition for the Žrnovnica River (Croatia) Ognjen Bonacci Mladen Kerovec Tanja Roje-Bonacci	Very high
_	0 07	taxon? [In the Justification field, indicate the relevant water quality variable(s) being	Not applicable	1998	Vorihist
,	8.03	Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	Not applicable		Very high
			No	Ecologically acceptable flows definition for the Žrnovnica River (Croatia) Ognjen Bonacci Mladen Kerovec Tanja Roje-Bonacci	Very high
7	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?			
7	8.04 8.05	environmental/human disturbance? Is the taxon able to tolerate salinity levels that are higher or lower than those found in	Yes	Ecologically acceptable flows definition for the Žrnovnica River (Croatia) Ognjen Bonacci Mladen Kerovec Tanja Roje-Bonacci 1998 anadromous relatives	High
7 8 9	8.05 8.06	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		High Very high
7 8 9	8.05 8.06	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		(Croatia) Ognjen Bonacci Mladen Kerovec Tanja Roje-Bonacci 1998 anadromous relatives	
7 8 9	8.05 8.06 Climate	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 change	Yes	(Croatia) Ognjen Bonacci Mladen Kerovec Tanja Roje-Bonacci 1998 anadromous relatives Egg eaters and mamals	Very high
	8.05 8.06 Climate	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		(Croatia) Ognjen Bonacci Mladen Kerovec Tanja Roje-Bonacci 1998 anadromous relatives	

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	Ecologically acceptable flows definition for the Žrnovnica River (Croatia) Ognjen Bonacci Mladen Kerovec Tanja Roje-Bonacci 1998	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?	Decrease	Ecologically acceptable flows definition for the Žrnovnica River (Croatia) Ognjen Bonacci Mladen Kerovec Tanja Roje-Bonacci 1998	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?	Lower	Ecologically acceptable flows definition for the Žrnovnica River (Croatia) Ognjen Bonacci Mladen Kerovec Tanja Roje-Bonacci 1998	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	Ecologically acceptable flows definition for the Žrnovnica River (Croatia) Ognjen Bonacci Mladen Kerovec Tanja Roje-Bonacci 1998	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	Ecologically acceptable flows definition for the Žrnovnica River (Croatia) Ognjen Bonacci Mladen Kerovec Tanja Roje-Bonacci 1998	Very high

Statistics Scores BRA 20.0 BRA Outcome 10.0 BRA+CCA BRA+CCA Outcome Score partition A. Biogeography/Historical 8.0 1. Domestication/Cultivation 4.0 2. Climate, distribution and introduction risk 2.0 2.0 **12.0** 3. Invasive elsewhere 4. Undesirable (or persistence) traits 4.0 5. Resource exploitation 5.0 6. Reproduction 3.0 7. Dispersal mechanisms 1.0 8. Tolerance attributes C. Climate change -1.0 **-10.0** -10.0 9. Climate change Answered Questions Total 55 A. Biogeography/Historical 1. Domestication/Cultivation 13 3 2. Climate, distribution and introduction risk 5 3. Invasive elsewhere 5 B. Biology/Ecology 36 4. Undesirable (or persistence) traits 12 2 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 9 8. Tolerance attributes 6 C. Climate change 6 6 9. Climate change Sectors affected Commercial 4 Environmental 4 Species or population nuisance traits 6 Thresholds BRA

BRA+CCA	-
Confidence	
BRA+CCA	0.88
BRA	0.87
CCA	0.96
Date and Time	
15/05/2	021 11:25:16

Faxon and Assessor details					
Category	Fishes and Lampreys (freshwater)				
Taxon name	Salmo obtusirostris				
Common name	soft-muzzled trout				
Assessor	Ivan Špelić				
Risk screening context					
Reason and socio-economic benefits					
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS				
Taxonomy					
Native range					
Introduced range					
URL					

			Response	Justification (references and/or other information)	Confidence
Α.Ι	Biogeo	graphy/Historical			
		ication/Cultivation	1		
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	There is a project of artificial spawning of one subspecies,ongoing for 13 years (http://moreikrs.hr/projekti-detalji/A/1).	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	For artificial spawning (http://moreikrs.hr/projekti-detalji/A/1).	Very high
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	Salmo trutta (CABI).	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	Same country and same basin (Adriatic basin in Croatia).	Very high
5	2.02	What is the quality of the climate matching data?	High	Within the same region and basin.	Very high
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	Tomljanović, T. (2014). Endemska mekousna pastrva solinka (Salmo obtusirostris salonitana). Tusculum, 7 (1), 215-224. Preuzeto s https://hrcak.srce.hr/128484	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	Not applicable	Already present.	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)?	Not applicable	Already present.	Very high
3. I	nvasive	e elsewhere			
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	River Žrnovnica in Croatia (Tomljanović, T. (2014). Endemska mekousna pastrva solinka (Salmo obtusirostris salonitana). Tusculum, 7 (1), 215-224. Preuzeto s	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	No	There was no fish present prior to stocking of Žrnovnica (Tomljanović, T. (2014). Endemska mekousna pastrva solinka (Salmo obtusirostris salonitana). Tusculum, 7 (1), 215-224. Preuzeto s https://hrcak.srce.hr/128484).	Very high
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	No recorded adverse impacts on aquaculture in the area.	Medium
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	No	Positive impacts because it is attractive species for angling (pers. comm.).	Medium
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	No adverse impact (Tomljanović, T. (2014). Endemska mekousna pastrva solinka (Salmo obtusirostris salonitana). Tusculum, 7 (1), 215-224. Preuzeto s https://hrcak.srce.hr/128484).	Very high
B. I	Bioloay	//Ecology		213-224. Fleuzeto's https://iitak.site.ii/120404/.	
		able (or persistence) traits			
14	4.01	Is it likely that the taxon will be poisonous or pose other risks to human health?	No	Harmless (Cruz, Tess in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021)).	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	Not documented for any species.	Medium
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	No parasitic behaviour.	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	Sensitive to water temperatures over 20 deg Celsius, low oxygen levels and pollution (Tomljanović, T. (2014). Endemska mekousna pastrva solinka (Salmo obtusirostris salonitana). Tusculum, 7 (1), 215-224. Preuzeto s https://hrcak.srce.hr/128484).	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	Not documented in literature.	Medium
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	Not documented in introduced area, not likely due to species ecology.	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	Most likely susceptible to parasites and pathogens as other congeners (personal opinion).	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	Most likely susceptible to parasites and pathogens as other congeners (Szczembara, A. 2011. "Gyrodactylus salaris" (On-line), Animal Diversity Web. Accessed May 19, 2021 at https://animaldiversity.org/accounts/Gyrodactylus_salaris/, personal opinion).).	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	Size to 70 cm (Cruz, Tess in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021)).	Very high

		water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being		Endemska mekousna pastrva solinka (Salmo obtusirostris salonitana). Tusculum, 7 (1), 215-224. Preuzeto s https://hrcak.srce.hr/128484).	
	8.01	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	Sensitive species as most Salmonius. Sensitive to any kind of pollution (Tomljanović, T. (2014).	Very high
		ce attributes Is the taxon able to withstand being out of	No	salonitana). Tusculum, 7 (1), 215-224. Preuzeto s Sensitive species as most Salmonids.	Very high
3	7.09	unintentional or intentional) likely to be Is dispersal of the taxon density dependent?	No	Very restricted distribution, no documented dispersion except when introduced by human (Žrnovnica) (Tomljanović, T. (2014). Endemska mekousna pastrva solinka (Salmo obtusirostris	High
<u> </u>	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	Introductions for angling.	Very high
		be dispersed in the RA area by other animals?		(2014). Endemska mekousna pastrva solinka (Salmo obtusirostris salonitana). Tusculum, 7 (1), 215-224. Preuzeto s	
	7.00	Are propagules or eggs of the taxon likely to Are propagules or eggs of the taxon likely to	No	2021.FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021)). Eggs deposited in redds on gravel substrate (Tomljanović, T.	Medium
	7.06	occur 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	when introduced by human (Žrnovnica) (Tomljanović, T. (2014). Endemska mekousna pastrva solinka (Salmo obtusirostris salonitana). Tusculum, 7 (1), 215-224. Preuzeto s Non-migratory (Cruz, Tess in Froese, R. and D. Pauly. Editors.	Very high
Ð	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	(2014). Endemska mekousna pastrva solinka (Salmo obtusirostris salonitana). Tusculum, 7 (1), 215-224. Preuzeto s Very restricted distribution, no documented dispersion except	Medium
3	7.04	hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to	No	Eggs deposited in redd on gravel supstrate (Tomljanović, T.	Medium
7	7.03	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship	No	introduced in protected areas far from native range. No such adaptations.	Very high
5	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	Already present as native in suitable habitats in some protected areas (Tomljanović, T. (2014). Endemska mekousna pastrva solinka (Salmo obtusirostris salonitana). Tusculum, 7 (1), 215- 224. Preuzeto s https://hrcak.srce.hr/128484), not expected to be	Low
		How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable	One	Introductions for angling (personal opinion).	Low
D) ispersa	al mechanisms		ירכטבכט 5 וונוטג.//וויכמג.גונפ.ווו/ 120404	I
ł	6.07	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	3	Tomljanović, T. (2014). Endemska mekousna pastrva solinka (Salmo obtusirostris salonitana). Tusculum, 7 (1), 215-224. Preuzeto s https://hrcak.srce.hr/128484	High
		large number of propagules or offspring within a short time span (e.g. < 1 year)?		female (CEPF FINAL PROJECT COMPLETION REPORT: Education of the public on sustainable water use and the protection of endemic fish in the Neretva River Valley. https://www.cepf.net/sites/default/files/sg60922-final-report.pdf).	
	6.06	another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a	Yes	(2014). Endemska mekousna pastrva solinka (Salmo obtusirostris salonitana). Tusculum, 7 (1), 215-224. Preuzeto s Fecundity of Neretva lineage was determined to be 2000 eggs per	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 Yes	No such adaptations described in literature. Gravel substrate in highly oxygenated streams (Tomljanović, T.	High High
0	6.03	Is the taxon likely to hybridise naturally with native taxa?	Yes	Hybridizing with brown trout in Žrnovnica, so most likely able to hybridize with all lineages of brown trout (Tomljanović, T. (2014). Endemska mekousna pastrva solinka (Salmo obtusirostris salonitana). Tusculum, 7 (1), 215-224. Preuzeto s	Very high
9	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	Already stablished and spawning in Žrnovnica river where it is translocated (Cruz, Tess in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021)).	Very high
8	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 adaptations or behaviours documented.	Medium
. P	eprodu	detriment of native taxa in the RA area?			
7	5.02	Is the taxon likely to sequester food resources (including nutrients) to the	Not applicable	publication. www.fishbase.org, (02/2021))	Very high
	5.01	Is the taxon likely to consume threatened or protected native taxa in the RA area?	No	Not likely, feeds on invertebrates (Cruz, Tess in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic	High
. R	esourc	population even when present in low densities (or persisting in adverse conditions by way of a dormant form)? e exploitation		populations in some areas (http://moreikrs.hr/projekti- detalji/A/1).	
5	4.12	(e.g. feeding) will reduce habitat quality for native taxa? Is the taxon likely to maintain a viable	No	Web electronic publication. www.fishbase.org, (02/2021); Tomljanović, T. (2014). Endemska mekousna pastrva solinka (Salmo obtusirostris salonitana). Tusculum, 7 (1), 215-224. Preuzeto s https://hrcak.srce.hr/128484). Not documented, sensitive and usually restocked to maintain	Medium
4	4.11	Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours	No	mekousna pastrva solinka (Salmo obtusirostris salonitana). Tusculum, 7 (1), 215-224. Preuzeto s Not likely due to species ecology and preffered habitat (Cruz, Tess in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide	High
		Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)?	No	Found only in flowing water with temperature lower than 20 deg C and high oxygen levels (Cruz, Tess in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021); Tomljanović, T. (2014). Endemska mekousna pastrva solinka (Salmo obtusirostris salonitana).	High

46	8.03	Can the taxon be controlled or eradicated in	Not applicable	Not allowed.	Very high
	0.00	the wild with chemical, biological, or other			i ci y mgn
		agents/means?			
47	8.04	Is the taxon likely to tolerate or benefit from	No	Endangered because of the habitat degradation, embakment and	Very high
		environmental/human disturbance?		fragmentation (Very restricted distribution, no documented	
				dispersion except when introduced by human (Žrnovnica)	
				(Tomljanović, T. (2014). Endemska mekousna pastrva solinka	
				(Salmo obtusirostris salonitana). Tusculum, 7 (1), 215-224.	
10	8.05	Is the taxon able to tolerate salinity levels	No	Preuzeto s https://hrcak.srce.hr/128484).). Only freshwater (Very restricted distribution, no documented	High
40	0.05	that are higher or lower than those found in	NO	dispersion except when introduced by human (Žrnovnica)	riigii
		its usual environment?		(Tomljanović, T. (2014). Endemska mekousna pastrva solinka	
				(Salmo obtusirostris salonitana). Tusculum, 7 (1), 215-224.	
				Preuzeto s https://hrcak.srce.hr/128484).).	
49	8.06	Are there effective natural enemies	Yes	Piscivorous birds and mammals (otters) (personal opinion).	Medium
		(predators) of the taxon present in the RA			
C. (Climate	e change			
		change	1		1
50	9.01	Under the predicted future climatic	Not applicable	Already present.	Very high
		conditions, are the risks of entry into the RA			
		area posed by the taxon likely to increase,			
E 1	9.02	decrease or not change? Under the predicted future climatic	Decrease	Temperatures over 20 deg. Celsius are lethal (Very restricted	Hiah
21	9.02	conditions, are the risks of establishment	Decrease	distribution, no documented dispersion except when introduced by	5
		posed by the taxon likely to increase,		human (Žrnovnica) (Tomljanović, T. (2014). Endemska mekousna	
		decrease or not change?		pastrva solinka (Salmo obtusirostris salonitana). Tusculum, 7 (1),	
				215-224. Preuzeto s https://hrcak.srce.hr/128484).). Predicted	
				decrease in suitable habitats for freshwater species (COMTE, L.,	
				BUISSON, L., DAUFRESNE, M. and GRENOUILLET, G. (2013),	
				Climate-induced changes in the distribution of freshwater fish:	
				observed and predicted trends. Freshwater Biology, 58: 625-639.	
				https://doi.org/10.1111/fwb.12081).	
52	9.03	Under the predicted future climatic	Decrease	Temperatures over 20 deg. Celsius are lethal (Very restricted	High
		conditions, are the risks of dispersal within		distribution, no documented dispersion except when introduced by	
		the RA area posed by the taxon likely to		human (Žrnovnica) (Tomljanović, T. (2014). Endemska mekousna	
		increase, decrease or not change?		pastrva solinka (Salmo obtusirostris salonitana). Tusculum, 7 (1),	
				215-224. Preuzeto s https://hrcak.srce.hr/128484).). Predicted	
				decrease in suitable habitats for freshwater species (COMTE, L.,	
				BUISSON, L., DAUFRESNE, M. and GRENOUILLET, G. (2013),	
				Climate-induced changes in the distribution of freshwater fish:	
				observed and predicted trends. Freshwater Biology, 58: 625-639. https://doi.org/10.1111/fwb.12081).	
53	9.04	Under the predicted future climatic	No change	No recognized impact so no possible change expected under less	High
		conditions, what is the likely magnitude of		suitable climatic conditions.	5
		future potential impacts on biodiversity			
		and/or ecological integrity/status?			
54	9.05	Under the predicted future climatic	No change	No recognized impact so no possible change expected under less	High
		conditions, what is the likely magnitude of		suitable climatic conditions.	
		future potential impacts on ecosystem			
		structure and/or function?			
55	9.06	Under the predicted future climatic	No change	No recognized impact so no possible change expected under less	High
		conditions, what is the likely magnitude of		suitable climatic conditions.	
		future potential impacts on ecosystem			
		services/socio-economic factors?			

Statistics	
Scores	
BRA	2.0
BRA Outcome	-
BRA+CCA	-2.0
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	-5.0
4. Undesirable (or persistence) traits	2.0
5. Resource exploitation	0.0
6. Reproduction	1.0
7. Dispersal mechanisms	-4.0
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	12 2 7 9 6
8. Tolerance attributes	
C. Climate change	6
9. Climate change	6
Sectors affected	
Commercial	5
Environmental	0

Species or population nuisance traits	-5
Thresholds	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.78
BRA	0.78
CCA	0.79
Date and Time	
21/05/20	21 23:24:21

axon and Assessor details					
Category	Fishes and Lampreys (freshwater)				
Taxon name	Salmo obtusirostris				
Common name	soft-muzzled trout				
Assessor	Tamara Kanjuh				
Risk screening context					
Reason and socio-economic benefits					
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS				
Taxonomy					
Native range					
Introduced range					
URL					

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
		ication/Cultivation	¥	Fishering, severally severalish and (fishbase in) This calls	Madium
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	Fisheries: commercial; gamefish: yes (fishbase.in) This only gregarious trout in the Adriatic Sea drainage area of Montenegro is of the yet unknown potential for fish farming, which is	Medium
2	1.02	To the taxon hanvested in the wild and likely	Yes	necessary to investigate (Mrdak et al., 2012).	Medium
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	res	Fisheries: commercial; gamefish: yes (fishbase.in)	Medium
3	1.03	Does the taxon have invasive races,	No	No information found.	Low
2 (limata	varieties, sub-taxa or congeners?			
2. C		, distribution and introduction risk How similar are the climatic conditions of the	High	Dfa, Dfb (Köppen-Geiger climate classification system)	High
7	2.01	Risk Assessment (RA) area and the taxon's native range?	Ingn	Dia, Dio (Roppen-Geiger climate classification system)	i ligit
5	2.02	What is the quality of the climate matching data?	High	Köppen-Geiger climate classification system	High
6	2.03	Is the taxon already present outside of	Yes	River Žrnovnica (Kottelat&Freyhof, 2007)	Medium
7	2.04	captivity in the RA area? How many potential vectors could the taxon	One	Intentional introduction (Treer et al., 2005)	Medium
0	2.05	use to enter in the RA area?	V	Taken durand and ankabilaha diferen Januar ka Ženaurai an durianana	11:
8	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA	Yes	Introduced and established from Jardo to Żrnovnica drainages (Croatia) around 1960 (Kottelat&Freyhof, 2007; Treer et al.,	High
		area in the near future (e.g. unintentional		2005).	
		and intentional introductions)?	<u> </u>		
	7	e elsewhere	Voc	Introduced and established from lands to Zanaunica designation	High
9	3.01	Has the taxon become naturalised (established viable populations) outside its	Yes	Introduced and established from Jardo to Żrnovnica drainages (Croatia) around 1960 (Kottelat&Freyhof, 2007; Treer et al.,	High
10	3.02	In the taxon's introduced range, are there	No	No information found.	Low
1		known adverse impacts to wild stocks or			
1.1	2.02	commercial taxa?	Ne	Ne information formed	Law
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	No information found.	Low
12	3.04	In the taxon's introduced range, are there	No	No information found.	Low
	2.65	known adverse impacts to ecosystem			
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	No information found.	Low
B. I	Biology	v/Ecology		 	
4. L	Indesir	able (or persistence) traits			
14	4.01	Is it likely that the taxon will be poisonous or	No	Harmless (fishbase.in)	High
15	4.02	pose other risks to human health? Is it likely that the taxon will smother one or	No	No information found.	Low
		more native taxa (that are not threatened or protected)?			
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	No information found.	Low
17	4.04	Is the taxon adaptable in terms of climatic	No	As the result of the very limited distribution and endangerments	Low
1		and other environmental conditions, thus		in its native river Jadro (Povrž et al., 1990; Mrakovčić et al.,	
		enhancing its potential persistence if it has		1995), which flows through the suburb of the biggest Dalmatian	
		invaded or could invade the RA area?		city, this subspecies was sometimes considered extinct (Crivelli, 1995). However, the remains of the population are still present in	
				the upper part of the river .	
18	4.05	Is the taxon likely to disrupt food-web	No	No information found.	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 information found.	Low
2.2	4.67	on ecosystem services in the RA area?			
20	4.07	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and	No	No information found.	Low
		infectious agents that are endemic in the RA			
21	4.08	Is it likely that the taxon will host, and/or	No	No information found.	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	No information found.	Low
		size that will make it more likely to be			
22	4 10	released from captivity?	Vec	The Diver Žrnovnice has high flows and water quality so that it is	Medium
23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g.	Yes	The River Żrnovnica has high flows and water quality so that it is used for drinking water (Bonacci et al., 1998).	medium
		versatile in habitat use)?			
	4.11	Is it likely that the taxon's mode of existence	No	No information found.	Low
24					
24		(e.g. excretion of by-products) or behaviours			
24		(e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa?			

25		F			1
	4.12	Is the taxon likely to maintain a viable	Yes	However, following the rumors that there is still soft-muzzled	Medium
		population even when present in low		trout in the Zeta River, we managed to find one population at the	
		densities (or persisting in adverse conditions		locality of the village of Tunjevo (N 42°37' 912"; E 019°01' 016")	
		by way of a dormant form)?		that was still the only one known and with the ultimately small number of specimens (Sušnik et al. 2007)	
5. F	Resourc	ce exploitation		Inumber of specimens (Sushik et al. 2007)	
			No	No information found.	Low
		protected native taxa in the RA area?			
27	5.02	Is the taxon likely to sequester food	No	No information found.	Low
		resources (including nutrients) to the			
		detriment of native taxa in the RA area?			
	Reprodu				T.
28	6.01	Is the taxon likely to exhibit parental care	No	No information found.	Low
		and/or to reduce age-at-maturity in response			
20	6.02	to environmental conditions? Is the taxon likely to produce viable gametes	Yes	Established in River Žrnovnica (Kottelat&Freyhof, 2007)	Medium
25	0.02	or propagules (in the RA area)?	103		neurum
30	6.03		No	Neighbour-Joining Tree of individuals showed strong soft-muzzled	High
		native taxa?		genotype grouping among all samples and no hybrids among soft-	5
				muzzled and other trout genotypes (Mrdak et al., 2012).	
31	6.04	Is the taxon likely to be hermaphroditic or to	No	No information found.	Low
		display asexual reproduction?			
32	6.05	Is the taxon dependent on the presence of	No	No information found.	Medium
		another taxon (or specific habitat features)			
22	6.06	to complete its life cycle?	No	No. information formal	1.000
33	6.06	Is the taxon known (or likely) to produce a	No	No information found.	Low
		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	Following the example of other species of the genus Salmo.	Medium
- '	,	does the taxon require to reach the age-at-	-		
		first-reproduction?			
7. L		al mechanisms			
35	7.01	How many potential internal	One	Intentional restocking (Treer et al., 2005)	Low
		vectors/pathways could the taxon use to			
. ·		disperse within the RA area (with suitable			
36	7.02	, , , , ,	No	No information found.	Low
		taxon in close proximity to one or more			
27	7.03	protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively	No	No information found.	Low
57	7.05	attaching itself to hard substrata (e.g. ship	NO		LOW
		hulls, pilings, buoys) such that it enhances			
		the likelihood of dispersal?			
38	7.04	Is natural dispersal of the taxon likely to	No	Dispersion could occur in the juvenile stage.	Low
		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	Dispersion could occur in the juvenile stage.	Low
		occur as larvae/juveniles (for animals) or as			
		fragments/seedlings (for plants) in the RA			
40	7.06	area?	No	Non-migratory (fishbase.in)	Low
40	7.00	Are older life stages of the taxon likely to	No	Non-migratory (Instibase.in)	Low
	1	migrate in the BA area for reproduction?			
41	7 07	migrate in the RA area for reproduction?	No	No information found	Low
41	7.07	Are propagules or eggs of the taxon likely to	No	No information found.	Low
	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No Yes	No information found. Intentional restocking (Treer et al., 2005)	Low Medium
		Are propagules or eggs of the taxon likely to			
		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			
42	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	Yes	Intentional restocking (Treer et al., 2005)	Medium
42	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?			
42 43 8. 7	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? ce attributes	Yes	Intentional restocking (Treer et al., 2005) No information found.	Medium
42 43 8. 7	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? ce attributes Is the taxon able to withstand being out of	Yes	Intentional restocking (Treer et al., 2005)	Medium
42 43 8. 7	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	Yes	Intentional restocking (Treer et al., 2005) No information found.	Medium
42 43 8. 7	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	Yes	Intentional restocking (Treer et al., 2005) No information found.	Medium
42 43 8. 7 44	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	Yes	Intentional restocking (Treer et al., 2005) No information found.	Medium
42 43 8. 7 44	7.08 7.09 <u>Foleran</u> 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?	Yes No	Intentional restocking (Treer et al., 2005) No information found. The taxon cannot live out of the water.	Medium Low
42 43 8. 7 44	7.08 7.09 <u>Foleran</u> 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	Yes No	Intentional restocking (Treer et al., 2005) No information found. The taxon cannot live out of the water.	Medium Low
42 43 8. 1 44 45	7.08 7.09 Toleran 8.01 8.02	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	Intentional restocking (Treer et al., 2005) No information found. The taxon cannot live out of the water. The taxon is very sensitive to environmental changes.	Medium Low Low
42 43 8. 1 44 45	7.08 7.09 <u>Foleran</u> 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>ice 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	Intentional restocking (Treer et al., 2005) No information found. The taxon cannot live out of the water.	Medium Low
42 43 8. 1 44 45	7.08 7.09 Toleran 8.01 8.02	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>ice 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	Intentional restocking (Treer et al., 2005) No information found. The taxon cannot live out of the water. The taxon is very sensitive to environmental changes.	Medium Low Low
42 43 8.1 44 45 45	7.08 7.09 Toleran 8.01 8.02 8.03	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 No No	Intentional restocking (Treer et al., 2005) No information found. The taxon cannot live out of the water. The taxon is very sensitive to environmental changes. No information found.	Medium Low Low Low
42 43 8.1 44 45 45	7.08 7.09 Toleran 8.01 8.02	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	Intentional restocking (Treer et al., 2005) No information found. The taxon cannot live out of the water. The taxon is very sensitive to environmental changes.	Medium Low Low
42 43 8. 1 44 45 45 46 47	7.08 7.09 7.09 8.01 8.01 8.02 8.03 8.04	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	Intentional restocking (Treer et al., 2005) No information found. The taxon cannot live out of the water. The taxon is very sensitive to environmental changes. No information found. The taxon is very sensitive to environmental changes.	Medium Low Low Low Low
42 43 8. 1 44 45 45 46 47	7.08 7.09 Toleran 8.01 8.02 8.03	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 albe to tolerate salinity levels	Yes No No No	Intentional restocking (Treer et al., 2005) No information found. The taxon cannot live out of the water. The taxon is very sensitive to environmental changes. No information found.	Medium Low Low Low
42 43 8. 1 44 45 45 46 47	7.08 7.09 7.09 8.01 8.01 8.02 8.03 8.04	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	Intentional restocking (Treer et al., 2005) No information found. The taxon cannot live out of the water. The taxon is very sensitive to environmental changes. No information found. The taxon is very sensitive to environmental changes.	Medium Low Low Low Low
42 43 44 45 46 47 48	7.08 7.09 7.09 8.01 8.01 8.02 8.03 8.04	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 <i>relevant water quality variable(s) being</i> Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Is the taxon able to tolerate salinity levels that are higher or lower than those found in	Yes No No No No	Intentional restocking (Treer et al., 2005) No information found. The taxon cannot live out of the water. The taxon is very sensitive to environmental changes. No information found. The taxon is very sensitive to environmental changes.	Medium Low Low Low Low
42 43 8.1 44 45 45 46 47 48 49	7.08 7.09 Coleran 8.01 8.02 8.03 8.04 8.05 8.06	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 its usual environment? Are there effective natural enemies (predators) of the taxon present in the RA	Yes No No No No	Intentional restocking (Treer et al., 2005) No information found. The taxon cannot live out of the water. The taxon is very sensitive to environmental changes. No information found. The taxon is very sensitive to environmental changes. The taxon is very sensitive to environmental changes.	Medium Low Low Low Low Low Low
42 43 8.1 44 45 45 46 47 48 49 C. C	7.08 7.09 7.09 7.09 8.01 8.01 8.02 8.03 8.04 8.05 8.06 Climat	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>ice 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 its usual environment? Are there effective natural enemies (predators) of the taxon present in the RA e change	Yes No No No No	Intentional restocking (Treer et al., 2005) No information found. The taxon cannot live out of the water. The taxon is very sensitive to environmental changes. No information found. The taxon is very sensitive to environmental changes. The taxon is very sensitive to environmental changes.	Medium Low Low Low Low Low Low
42 43 8. 1 44 45 45 46 47 48 49 9. (7.08 7.09 7.09 7.09 8.01 8.01 8.02 8.03 8.04 8.05 8.06 Climat	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 its usual environment? Are there effective natural enemies (predators) of the taxon present in the RA e change	Yes No No No No No	Intentional restocking (Treer et al., 2005) No information found. The taxon cannot live out of the water. The taxon is very sensitive to environmental changes. No information found. The taxon is very sensitive to environmental changes. The taxon is very sensitive to environmental changes. No information found.	Medium Low
42 43 8. 1 44 45 45 46 47 48 49 9. (7.08 7.09 7.09 7.09 8.01 8.01 8.02 8.03 8.04 8.05 8.06 Climat	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 taxen be controlled or eradicated in its usual environment? Are there effective natural enemies (predators) of the taxon present in the RA e change Under the predicted future climatic	Yes No No No No	Intentional restocking (Treer et al., 2005) No information found. The taxon cannot live out of the water. The taxon is very sensitive to environmental changes. No information found. The taxon is very sensitive to environmental changes. The taxon is very sensitive to environmental changes.	Medium Low Low Low Low Low Low
42 43 8. 1 44 45 45 46 47 48 49 9. (7.08 7.09 7.09 7.09 8.01 8.01 8.02 8.03 8.04 8.05 8.06 Climat	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? 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 conditions, are the risks of entry into the RA	Yes No No No No No	Intentional restocking (Treer et al., 2005) No information found. The taxon cannot live out of the water. The taxon is very sensitive to environmental changes. No information found. The taxon is very sensitive to environmental changes. The taxon is very sensitive to environmental changes. No information found.	Medium Low
42 43 8. 1 44 45 45 46 47 48 49 9. (7.08 7.09 7.09 7.09 8.01 8.01 8.02 8.03 8.04 8.05 8.06 Climat	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>ice 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 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 conditions, are the risks of entry into the RA area posed by the taxon likely to increase,	Yes No No No No No	Intentional restocking (Treer et al., 2005) No information found. The taxon cannot live out of the water. The taxon is very sensitive to environmental changes. No information found. The taxon is very sensitive to environmental changes. The taxon is very sensitive to environmental changes. No information found.	Medium Low
42 43 8.7 44 45 46 47 48 49 C. (9. (50)	7.08 7.09 7.09 7.09 8.01 8.02 8.03 8.04 8.05 8.06 201 8.06 201	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 its usual environment? 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?	Yes No No No No No No No change	Intentional restocking (Treer et al., 2005) No information found. The taxon cannot live out of the water. The taxon is very sensitive to environmental changes. No information found. The taxon is very sensitive to environmental changes. The taxon is very sensitive to environmental changes. No information found. The taxon is very sensitive to environmental changes. The taxon is very sensitive to environmental changes. The taxon is very sensitive to environmental changes.	Medium Low
42 43 8.7 44 45 46 47 48 49 C. (9. (50)	7.08 7.09 7.09 7.09 8.01 8.01 8.02 8.03 8.04 8.05 8.06 Climat	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 its usual environment? 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	Yes No No No No No	Intentional restocking (Treer et al., 2005) No information found. The taxon cannot live out of the water. The taxon is very sensitive to environmental changes. No information found. The taxon is very sensitive to environmental changes. The taxon is very sensitive to environmental changes. No information found.	Medium Low
42 43 8.7 44 45 46 47 48 49 C. (9. (50)	7.08 7.09 7.09 7.09 8.01 8.02 8.03 8.04 8.05 8.06 201 8.06 201	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? Is the taxon be to lolerate 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 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	Yes No No No No No No No change	Intentional restocking (Treer et al., 2005) No information found. The taxon cannot live out of the water. The taxon is very sensitive to environmental changes. No information found. The taxon is very sensitive to environmental changes. The taxon is very sensitive to environmental changes. No information found. The taxon is very sensitive to environmental changes. The taxon is very sensitive to environmental changes. The taxon is very sensitive to environmental changes.	Medium Low
42 43 8.7 44 45 46 47 48 49 C. (9. (50)	7.08 7.09 7.09 7.09 8.01 8.02 8.03 8.04 8.05 8.06 201 8.06 201	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 its usual environment? Are there effective natural enemies (predators) of the taxon present in 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?	Yes No No No No No No No change	Intentional restocking (Treer et al., 2005) No information found. The taxon cannot live out of the water. The taxon is very sensitive to environmental changes. No information found. The taxon is very sensitive to environmental changes. The taxon is very sensitive to environmental changes. No information found. The taxon is very sensitive to environmental changes. The taxon is very sensitive to environmental changes. The taxon is very sensitive to environmental changes.	Medium Low
42 43 8. 1 44 45 45 46 47 48 49 C. (9. (5 0 51	7.08 7.09 7.09 8.01 8.02 8.03 8.04 8.05 8.06 Climate 9.01 9.02	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 its usual environment? Are there effective natural enemies (predators) of the taxon present in the RA e change <i>change</i> 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?	Yes No No No No No No change	Intentional restocking (Treer et al., 2005) No information found. The taxon cannot live out of the water. The taxon is very sensitive to environmental changes. No information found. The taxon is very sensitive to environmental changes. The taxon is very sensitive to environmental changes. No information found. The taxon is very sensitive to environmental changes. The taxon is very sensitive to environmental changes. The taxon is very sensitive to environmental changes.	Medium Low
42 43 8. 1 44 45 45 46 47 48 49 C. (9. (5 0 51	7.08 7.09 7.09 7.09 8.01 8.02 8.03 8.04 8.05 8.06 201 8.06 201	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 its usual environment? Are there effective natural enemies (predators) of the taxon present in 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?	Yes No No No No No No No change	Intentional restocking (Treer et al., 2005) No information found. The taxon cannot live out of the water. The taxon is very sensitive to environmental changes. No information found. The taxon is very sensitive to environmental changes. The taxon is very sensitive to environmental changes. No information found. The taxon is very sensitive to environmental changes. The taxon is very sensitive to environmental changes. The taxon is very sensitive to environmental changes.	Medium Low
42 43 8. 1 44 45 45 46 47 48 49 C. (9. (5 0 51	7.08 7.09 7.09 8.01 8.02 8.03 8.04 8.05 8.06 Climate 9.01 9.02	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 its usual environment? Are there effective natural enemies (predators) of the taxon present in 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 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?	Yes No No No No No No change	Intentional restocking (Treer et al., 2005) No information found. The taxon cannot live out of the water. The taxon is very sensitive to environmental changes. No information found. The taxon is very sensitive to environmental changes. The taxon is very sensitive to environmental changes. No information found. The taxon is very sensitive to environmental changes. The taxon is very sensitive to environmental changes. The taxon is very sensitive to environmental changes.	Medium 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	The taxon is very sensitive to environmental changes.	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	The taxon is very sensitive to environmental changes.	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	The taxon is very sensitive to environmental changes.	Low

Statistics

Scores	
BRA	2.0
BRA Outcome	-
BRA+CCA	2.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	5.0
1. Domestication/Cultivation	2.0
2. Climate, distribution and introduction risk	1.0
<i>3. Invasive elsewhere</i>	2.0
B. Biology/Ecology	-3.0
4. Undesirable (or persistence) traits	1.0
5. Resource exploitation	0.0
6. Reproduction	0.0
7. Dispersal mechanisms	-2.0
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. Invasive elsewhere	5
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	
6. Reproduction	2
7. Dispersal mechanisms	
8. Tolerance attributes	9
C. Climate change	6
9. Climate change	6
Sectors affected	0
Commercial	5
Environmental	0
Species or population nuisance traits	-1
	-
Thresholds	
BRA	_
BRA+CCA	
Confidence	
BRA+CCA	0.35
BRATCCA	0.36
CCA	0.30
CCA	0.23

0.35
0.36
0.25
021 00:13:04

Faxon and Assessor details					
Category	Fishes and Lampreys (freshwater)				
Taxon name	Salmo obtusirostris				
Common name	soft-muzzled trout				
Assessor	Tena Radocaj				
Risk screening context					
Reason and socio-economic benefits					
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS				
Taxonomy					
Native range					
Introduced range					
URL					

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
		ication/Cultivation	1		
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	Fisheries: commercial; gamefish: yes (Fishbase)	High
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	Fishbase	Medium
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	Salmo trutta (Fishbase)	Very high
2. C	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 similarity between climatic conditions RA area and native range is high. I use climatch.	High
5	2.02	What is the quality of the climate matching data?	Medium	Climatch	Medium
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	Tomljanović, T. (2014). Endemska mekousna pastrva solinka (Salmo obtusirostris salonitana). Tusculum, 7 (1), 215-224	Very high
/	2.04	How many potential vectors could the taxon use to enter in the RA area?		S. obtusirostris is present in the RA area.	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)?	Not applicable	S. obtusirostris is present in the RA area.	Very high
3. I	nvasive	e elsewhere			
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	River Žrnovnica in Croatia (Tomljanović, T. (2014). Endemska mekousna pastrva solinka (Salmo obtusirostris salonitana). Tusculum, 7 (1), 215-224.	High
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	No	No evidence	Low
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	No evidence	Low
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	No	No evidence	Low
13	3.05	In the taxon's introduced range, are there	No	No evidence	Low
B F	Siology	known adverse socio-economic impacts?			
		able (or persistence) traits			
14	4.01	Is it likely that the taxon will be poisonous or pose other risks to human health?		Harmless	Low
15	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	No	No evidence	Low
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	No evidence	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?	No	Tomljanović, T. (2014). Endemska mekousna pastrva solinka (Salmo obtusirostris salonitana). Tusculum, 7 (1), 215-224.	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 evidence	Low
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	No 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	Yes	Yes, the taxon may be a host or vector of known pests and infectious agents endemic to RA area. Because in every area exist infectious agents and pests.	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	Yes, the taxon may be a host or vector of known pests and infectious agents endemic to RA area. Because in every area exist infectious agents and pests.	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	70.0 cm SL (Fishbase)	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	Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin. 646 pp	Low
24	4.11	1	No	Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin. 646 pp	Low

25	4.12	Is the taxon likely to maintain a viable	No	Kottelat, M. and J. Freyhof, 2007. Handbook of European	Low
		population even when present in low		freshwater fishes. Publications Kottelat, Cornol and Freyhof,	
		densities (or persisting in adverse conditions		Berlin. 646 pp	
ŀ	Resourc	by way of a dormant form)?			
			No	Kottelat, M. and J. Freyhof, 2007. Handbook of European	Low
		protected native taxa in the RA area?		freshwater fishes. Publications Kottelat, Cornol and Freyhof,	
7	5.02	Is the taxon likely to sequester food	Not applicable	Not applicable	Very high
		resources (including nutrients) to the detriment of native taxa in the RA area?			
ŀ	Reprodu				
		Is the taxon likely to exhibit parental care	No	Kottelat, M. and J. Freyhof, 2007. Handbook of European	Medium
		and/or to reduce age-at-maturity in response		freshwater fishes. Publications Kottelat, Cornol and Freyhof,	
	6.02	to environmental conditions? Is the taxon likely to produce viable gametes	Yes	Berlin. 646 pp Kottelat, M. and J. Freyhof, 2007. Handbook of European	High
9	0.02	or propagules (in the RA area)?	res	freshwater fishes. Publications Kottelat, Cornol and Freyhof,	nigii
5	6.03	Is the taxon likely to hybridise naturally with	Yes	Hybridizing with brown trout in Žrnovnica, (Tomljanović, T.	Very high
		native taxa?		(2014). Endemska mekousna pastrva solinka (Salmo obtusirostris	
_	6.04			salonitana). Tusculum, 7 (1), 215-224).	
L	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	No	No evidence	Low
2	6.05	Is the taxon dependent on the presence of	Yes	Gravel substrate in highly oxygenated streams (Tomljanović, T.	Medium
		another taxon (or specific habitat features)		(2014). Endemska mekousna pastrva solinka (Salmo obtusirostris	
		to complete its life cycle?		salonitana). Tusculum, 7 (1), 215-224.	
3	6.06	Is the taxon known (or likely) to produce a	Yes	Tomljanović, T. (2014). Endemska mekousna pastrva solinka	High
		large number of propagules or offspring within a short time span (e.g. < 1 year)?		(Salmo obtusirostris salonitana). Tusculum, 7 (1), 215-224.	
1	6.07	How many time units (days, months, years)	3	Tomljanović, T. (2014). Endemska mekousna pastrva solinka	High
		does the taxon require to reach the age-at-		(Salmo obtusirostris salonitana). Tusculum, 7 (1), 215-224.	
-	Diam	first-reproduction?	l		
	Dispers 7.01	al mechanisms How many potential internal	One	Human influence	Very high
'	1.01	vectors/pathways could the taxon use to	one		very mgn
_		disperse within the RA area (with suitable			
5	7.02	Will any of these vectors/pathways bring the	No	No	Low
		taxon in close proximity to one or more			
,	7.03	protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively	No	No adaptations	High
	7.05	attaching itself to hard substrata (e.g. ship			ingii
		hulls, pilings, buoys) such that it enhances			
_		the likelihood of dispersal?			-
3	7.04	Is natural dispersal of the taxon likely to	No	Tomljanović, T. (2014). Endemska mekousna pastrva solinka	Low
		occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?		(Salmo obtusirostris salonitana). Tusculum, 7 (1), 215-224.	
)	7.05	Is natural dispersal of the taxon likely to	No	Tomljanović, T. (2014). Endemska mekousna pastrva solinka	Low
		occur as larvae/juveniles (for animals) or as		(Salmo obtusirostris salonitana). Tusculum, 7 (1), 215-224.	
		fragments/seedlings (for plants) in the RA			
1	7.06	area? Are older life stages of the taxon likely to	No	Tomljanović, T. (2014). Endemska mekousna pastrva solinka	Low
	7.00	migrate in the RA area for reproduction?		(Salmo obtusirostris salonitana). Tusculum, 7 (1), 215-224.	LOW
L	7.07	Are propagules or eggs of the taxon likely to	No	Tomljanović, T. (2014). Endemska mekousna pastrva solinka	Low
_		be dispersed in the RA area by other animals?		(Salmo obtusirostris salonitana). Tusculum, 7 (1), 215-224.	
2	7.08	Is dispersal of the taxon along any of the	Yes	Tomljanović, T. (2014). Endemska mekousna pastrva solinka (Salmo obtusirostris salonitana). Tusculum, 7 (1), 215-224.	Medium
		vectors/pathways mentioned in the previous seven questions (35–41; i.e. both		(Salino oblusirostris salointana). Tusculuin, 7 (1), 215-224.	
		unintentional or intentional) likely to be			
3	7.09	Is dispersal of the taxon density dependent?	No	Tomljanović, T. (2014). Endemska mekousna pastrva solinka	Low
	T ((Salmo obtusirostris salonitana). Tusculum, 7 (1), 215-224.	
		ce attributes Is the taxon able to withstand being out of	No	Tomljanović, T. (2014). Endemska mekousna pastrva solinka	Low
¢.	0.01	water for extended periods (e.g. minimum of		(Salmo obtusirostris salonitana). Tusculum, 7 (1), 215-224.	2011
		one or more hours) at some stage of its life			
	-	cycle?			
5	8.02	Is the taxon tolerant of a wide range of	No	Tomljanović, T. (2014). Endemska mekousna pastrva solinka	Low
		water quality conditions relevant to that taxon? [In the Justification field, indicate the		(Salmo obtusirostris salonitana). Tusculum, 7 (1), 215-224.	
		relevant water quality variable(s) being			
;	8.03	Can the taxon be controlled or eradicated in	No	Not applicable	Very high
		the wild with chemical, biological, or other			
,	8.04	agents/means? Is the taxon likely to tolerate or benefit from	No	Tomljanović, T. (2014). Endemska mekousna pastrva solinka	Low
	0.04	environmental/human disturbance?		(Salmo obtusirostris salonitana). Tusculum, 7 (1), 215-224.	2000
3	8.05	Is the taxon able to tolerate salinity levels	No	Tomljanović, T. (2014). Endemska mekousna pastrva solinka	Low
		that are higher or lower than those found in		(Salmo obtusirostris salonitana). Tusculum, 7 (1), 215-224.	
	0.07	its usual environment?	Vec	Catfish Dika	High
'	8.06	Are there effective natural enemies (predators) of the taxon present in the RA	Yes	Catfish, Pike	High
(Climat	e change			
(Climate	change			
	9.01	Under the predicted future climatic	Not applicable	It is present in the RA area	Very high
		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	Comte, L., Buisson, L., Daufresne, M., & Grenouillet, G. (2013).	Low
		conditions, are the risks of establishment		Climate-induced changes in the distribution of freshwater fish:	
	1	posed by the taxon likely to increase,		observed and predicted trends. Freshwater Biology, 58(4), 625-	
		decrease or not change?		639.	
	0.07		0		
	9.03	Under the predicted future climatic	Decrease	Comte, L., Buisson, L., Daufresne, M., & Grenouillet, G. (2013).	Low
	9.03		Decrease	Comte, L., Buisson, L., Daufresne, M., & Grenouillet, G. (2013). Climate-induced changes in the distribution of freshwater fish: observed and predicted trends. Freshwater Biology, 58(4), 625-	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	Comte, L., Buisson, L., Daufresne, M., & Grenouillet, G. (2013). Climate-induced changes in the distribution of freshwater fish: observed and predicted trends. Freshwater Biology, 58(4), 625- 639.	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	Comte, L., Buisson, L., Daufresne, M., & Grenouillet, G. (2013). Climate-induced changes in the distribution of freshwater fish: observed and predicted trends. Freshwater Biology, 58(4), 625- 639.	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	Comte, L., Buisson, L., Daufresne, M., & Grenouillet, G. (2013). Climate-induced changes in the distribution of freshwater fish: observed and predicted trends. Freshwater Biology, 58(4), 625- 639.	Medium

Statistics	
Scores	
BRA	2.0
BRA Outcome	-
BRA+CCA	-2.0
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	-5.0
4. Undesirable (or persistence) traits	2.0
5. Resource exploitation	0.0
6. Reproduction	1.0
7. Dispersal mechanisms	-4.0
8. Tolerance attributes	-4.0
C. Climate change	-4.0
9. Climate change	-4.0
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
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 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 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 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 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 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 9. Climate change 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 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 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 Species or population nuisance traits	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 2 7 7 9 6 6 6 6 6 6 5 5 0 0 -5

BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.50
BRA	0.49
CCA	0.50
Date and Time	
02/06/2	021 07:39:34

Taxon and Assessor details	axon and Assessor details					
Category	Fishes and Lampreys (freshwater)					
Taxon name	Salmo salar					
Common name	Atlantic salmon					
Assessor	Ana Marić					
Risk screening context						
Reason and socio-economic benefits						
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS					
Taxonomy						
Native range						
Introduced range						
URL						

			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?	Yes	Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin. 646 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	Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof,	Very high
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	A handbook of global freshwater invasive species. Frencis. 2012. Salmo trutta	Very high
2. (Climate				
4	2.01	How similar are the climatic conditions of the	Medium	There is a wide range of native dispersal of S.salar 35-70 lat but	Medium
		Risk Assessment (RA) area and the taxon's native range?		only small variations in water temperature. 11 in yellow no 5 in target region, 14 matcher, 5 of 23 with high compatibility	
5	2.02	What is the quality of the climate matching data?	Medium	Climach used, Worldclim sample available points - 23 target points selected.	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	No	Horizon species	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	Intentional - aquaculture	High
8	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA	No	In 1986 S.salar was experimentaly aquacultured. not succesful.	Very high
1		area in the near future (e.g. unintentional			
2 .		and intentional introductions)?	L		
	<i>nvasive</i> 3.01	e elsewhere Has the taxon become naturalised	Yes	Kottelat, M. and J. Freyhof, 2007. Handbook of European	Very high
9	5.01	(established viable populations) outside its	Tes	freshwater fishes. Publications Kottelat, Cornol and Freyhof,	very nigh
10	3.02	In the taxon's introduced range, are there	Yes	The contribution of Atlantic salmon (Salmo salar L.) enhancement	Very high
1		known adverse impacts to wild stocks or		to a sustainable resource. 1997 J. A. Ritter	
<u> </u>	a -:	commercial taxa?			
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	no, it is rather contra. One species with two biologies: Atlantic salmon (Salmo salar) in the wild and in aquaculture 1998 Mart R.	High
12	3.04	In the taxon's introduced range, are there	Yes	Environmental issues in Chilean salmon farming: a reviewRenato	High
1		known adverse impacts to ecosystem services?		A. Qui~nones1,2, Marcelo Fuentes2, Rodrigo M. Montes1, Doris Soto1and Jorge Le□on-Mu~noz. 2019.	-
13	3.05	In the taxon's introduced range, are there	No	Environmental issues in Chilean salmon farming: a reviewRenato	High
		known adverse socio-economic impacts?		A. Qui~nones1,2, Marcelo Fuentes2, Rodrigo M. Montes1, Doris	
B I	Piology	//Ecology		Soto1and Jorge Le□on-Mu~noz. 2019	
		able (or persistence) traits			
		Is it likely that the taxon will be poisonous or pose other risks to human health?	No	Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof,	Very high
15	4.02	Is it likely that the taxon will smother one or	No	Incidence and impacts of escaped farmed Atlantic salmon Salmo	High
		more native taxa (that are not threatened or protected)?		salar in nature Eva B. Thorstad, Ian A. Fleming, Philip McGinnity, Doris Soto, Vidar Wennevik & Fred Whoriskey. 2008.	
16	4.03	Are there any threatened or protected taxa	No	Not a 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	Kottelat, M. and J. Freyhof, 2007. Handbook of European	High
		and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?		freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin. 646 pp.	
18	4.05	Invade or could invade the KA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it	No	Incidence and impacts of escaped farmed Atlantic salmon Salmo salar in nature Eva B. Thorstad, Ian A. Fleming, Philip McGinnity,	High
1		has invaded or is likely to invade the RA		Doris Soto, Vidar Wennevik & Fred Whoriskey. 2008.	
19	4.06	Is the taxon likely to exert adverse impacts	Yes	The contribution of Atlantic salmon (Salmo salar L.) enhancement	High
20	4.07	on ecosystem services in the RA area? Is it likely that the taxon will host, and/or	Yes	to a sustainable resource. 1997. J. A. Ritter Ecology of Atlantic Salmon and Brown Trout. jonsson and jonsson.	Medium
20	4.07	act as a vector for, recognised pests and	162	2011	
21	4.08	infectious agents that are endemic in the RA Is it likely that the taxon will host, and/or	Yes	Ecology of Atlantic Salmon and Brown Trout. jonsson and jonsson.	Very high
~ 1	1.00	act as a vector for, recognised pests and		2011	very mgn
Í		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	Yes	Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof,	High
22	4.10	released from captivity?	Vac	Berlin. 646 pp.	High
23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g.	Yes	Stream channel experiments on downstream movement of recently emerged trout, Salmo trutta L. and salmon, S. salar L.—I.	High
Í		versatile in habitat use)?		Effect of four different water velocity treatments upon dispersal	
Í		,		rate. D. T. Crisp M. A. Hurley. 1991.	
i		The first state of the state of	No	Kottelat, M. and J. Freyhof, 2007. Handbook of European	High
24	4.11		NU		ingn
24	4.11	(e.g. excretion of by-products) or behaviours	NO	freshwater fishes. Publications Kottelat, Cornol and Freyhof,	i ngin
24	4.11				, ng n

	4.12	Is the taxon likely to maintain a viable population even when present in low	No	Incidence and impacts of escaped farmed Atlantic salmon Salmo salar in nature Eva B. Thorstad, Ian A. Fleming, Philip McGinnity,	Very high
		densities (or persisting in adverse conditions by way of a dormant form)?		Doris Soto, Vidar Wennevik & Fred Whoriskey. 2008.	
	1	e exploitation	I		T
5	5.01	Is the taxon likely to consume threatened or protected native taxa in the RA area?	Yes	Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof,	High
7	5.02	Is the taxon likely to sequester food resources (including nutrients) to the	Yes	Incidence and impacts of escaped farmed Atlantic salmon Salmo salar in nature Eva B. Thorstad, Ian A. Fleming, Philip McGinnity,	High
_		detriment of native taxa in the RA area?		Doris Soto, Vidar Wennevik & Fred Whoriskey. 2008. at juvenile	
	Reprodu	Is the taxon likely to exhibit parental care	Yes	Life history variation and growth rate thresholds for maturity in	Very high
.0	0.01	and/or to reduce age-at-maturity in response to environmental conditions?	Tes	Atlantic salmon, Salmo salar. Jeffrey A. Hutchings and Megan E.B. Jones. 1997. Ecology of Atlantic Salmon and Brown Trout. jonsson	very nigh
9	6.02	Is the taxon likely to produce viable gametes	Yes	and jonsson. 2011 There is climate overlap so probably yes.	High
30	6.03	or propagules (in the RA area)? Is the taxon likely to hybridise naturally with	Yes	Kottelat, M. and J. Freyhof, 2007. Handbook of European	Very high
31	6.04	native taxa? Is the taxon likely to be hermaphroditic or to	No	freshwater fishes. Publications Kottelat, Cornol and Freyhof, Kottelat, M. and J. Freyhof, 2007. Handbook of European	High
	C 05	display asexual reproduction?	N	freshwater fishes. Publications Kottelat, Cornol and Freyhof,	Marris biala
52	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features)	No	Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof,	Very high
33	6.06	to complete its life cycle? Is the taxon known (or likely) to produce a	Yes	Berlin. 646 pp. Ecology of Atlantic Salmon and Brown Trout. jonsson and jonsson.	Very high
,,,	0.00	large number of propagules or offspring within a short time span (e.g. < 1 year)?	163	2011	very nigh
34	6.07	How many time units (days, months, years)	2	Life history variation and growth rate thresholds for maturity in	High
		does the taxon require to reach the age-at- first-reproduction?		Atlantic salmon, Salmo salar. Jeffrey A. Hutchings and Megan E.B. Jones. 1998	
		al mechanisms	<u></u>	Intentional stocking and unintentional assess from fish for	High
2	7.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable	>1	Intentional stocking and unintentional escape from fish farms	High
36	7.02	Will any of these vectors/pathways bring the	Yes	Probably, S.salar is anadromous fish.	Medium
		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 such structures.	Very high
		attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances			
38	7.04	the likelihood of dispersal? Is natural dispersal of the taxon likely to	No	Kottelat, M. and J. Freyhof, 2007. Handbook of European	High
	7.01	occur as eggs (for animals) or as propagules	110	freshwater fishes. Publications Kottelat, Cornol and Freyhof,	ingn
20	7.05	(for plants: seeds, spores) in the RA area?	Vac	Berlin. 646 pp.	High
59	7.05	Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as	Yes	Stream channel experiments on downstream movement of recently emerged trout, Salmo trutta L. and salmon, S. salar L.—I.	High
		fragments/seedlings (for plants) in the RA		Effect of four different water velocity treatments upon dispersal	
10	7.06	area? Are older life stages of the taxon likely to	Yes	rate. D. T. Crisp M. A. Hurley. 1991. Stream channel experiments on downstream movement of	High
10	7.00	migrate in the RA area for reproduction?		recently emerged trout, Salmo trutta L. and salmon, S. salar L.–I. Effect of four different water velocity treatments upon dispersal rate. D. T. Crisp M. A. Hurley. 1991. Kottelat, M. and J. Freyhof,	gi
				2007. Handbook of European freshwater fishes. Publications	
11	7.07	Are propagules or eggs of the taxon likely to	No	Kottelat, Cornol and Freyhof, Berlin. 646 pp. More likely to be eaten.	High
		be dispersed in the RA area by other animals?			5
12	7.08	Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven guestions (35–41; i.e. both	Yes	Intentional and unintentional.	High
		unintentional or intentional) likely to be			
	7.09	Is dispersal of the taxon density dependent?	Yes	Ecology of Atlantic Salmon and Brown Trout. jonsson and jonsson. 2011	High
		ce attributes Is the taxon able to withstand being out of	No	Very sensitive to reduced oxigen levels. Kottelat, M. and J.	High
+4	0.01	water for extended periods (e.g. minimum of	No	Freyhof, 2007. Handbook of European freshwater fishes.	High
_		one or more hours) at some stage of its life cycle?		Publications Kottelat, Cornol and Freyhof, Berlin. 646 pp.	
15	8.02	Is the taxon tolerant of a wide range of	No	Kottelat, M. and J. Freyhof, 2007. Handbook of European	Very high
		water quality conditions relevant to that taxon? [In the Justification field, indicate the		freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin. 646 pp.	
16	8.03	relevant water quality variable(s) being Can the taxon be controlled or eradicated in	No	There is no selective ichtiocid. Kottelat, M. and J. Freyhof, 2007.	Very high
	5.55	the wild with chemical, biological, or other		Handbook of European freshwater fishes. Publications Kottelat,	. cr, mgn
7	8.04	agents/means? Is the taxon likely to tolerate or benefit from	No	Cornol and Freyhof, Berlin. 646 pp. Kottelat, M. and J. Freyhof, 2007. Handbook of European	High
18	8.05	environmental/human disturbance? Is the taxon able to tolerate salinity levels	Yes	freshwater fishes. Publications Kottelat, Cornol and Freyhof, Anadromous species. Kottelat, M. and J. Freyhof, 2007. Handbook	High
rO	0.05	that are higher or lower than those found in	105	of European freshwater fishes. Publications Kottelat, Cornol and	nign
19	8.06	its usual environment? Are there effective natural enemies	Yes	Freyhof, Berlin. 646 pp. Probably egg eaters and some mamals. Kottelat, M. and J.	Very high
		(predators) of the taxon present in the RA area?		Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin. 646 pp.	, 5
		e change			·
Э. С	<i>limate</i> 9.01	Under the predicted future climatic	Decrease	Ecology of Atlantic Salmon and Brown Trout. jonsson and jonsson.	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	Ecology of Atlantic Salmon and Brown Trout. jonsson and jonsson. 2011	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	Ecology of Atlantic Salmon and Brown Trout. jonsson and jonsson. 2011	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	Ecology of Atlantic Salmon and Brown Trout. jonsson and jonsson. 2011	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	Ecology of Atlantic Salmon and Brown Trout. jonsson and jonsson. 2011	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	Ecology of Atlantic Salmon and Brown Trout. jonsson and jonsson. 2011	High

Statistics Scores BRA 28.5 **BRA Outcome** 26.5 BRA+CCA BRA+CCA Outcome Score partition A. Biogeography/Historical 11.5 1. Domestication/Cultivation 4.0 2. Climate, distribution and introduction risk 0.0 7.5 **17.0** 3. Invasive elsewhere 4. Undesirable (or persistence) traits 4.0 5. Resource exploitation 7.0 4.0 3.0 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change -1.0 -2.0 9. Climate change ·2.0 Answered Questions Total 55 13 A. Biogeography/Historical 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 2 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 9 8. Tolerance attributes 6 C. Climate change 6 6 9. Climate change Sectors affected Commercial 8 Environmental 10 Species or population nuisance traits 12 Thresholds

BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.81
BRA	0.83
CCA	0.67
Date and Time	
13/05/2	021 15:00:53

Taxon and Assessor details	axon and Assessor details					
Category	Fishes and Lampreys (freshwater)					
Taxon name	Salmo salar					
Common name	Atlantic salmon					
Assessor	Ivan Špelić					
Risk screening context						
Reason and socio-economic benefits						
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS					
Taxonomy						
Native range						
Introduced range						
URL						

			Response	Justification (references and/or other information)	Confidence
_		graphy/Historical			
_	1	ication/Cultivation			I
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	Cultured Aquatic Species Information Programme. Salmo salar. Cultured Aquatic Species Information Programme. Text by Jones, M. In: FAO Fisheries Division [online]. Rome. Updated . [Cited 19 May 2021].	Very high
2		Is the taxon harvested in the wild and likely to be sold or used in its live form?	No	Wild salmon is harvested for consumption (Liu, Y., Olaf Olaussen, J., & Skonhoft, A. (2011). Wild and farmed salmon in Norway—A review. Marine Policy, 35(3), 413–418. doi:10.1016/j.marpol.2010.11.007), broodstock in aquaculture are selected from already farmed stock (Cultured Aquatic Species Information Programme. Salmo salar. Cultured Aquatic Species Information Programme. Text by Jones, M. In: FAO Fisheries Division [online]. Rome. Updated . [Cited 19 Mav 2021].).	Medium
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	Salmo trutta (CABI).	Very high
2. (, distribution and introduction risk			
4		How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range?	Medium	Climatch, using methodology in https://dpipwe.tas.gov.au/Documents/Risk%20assessment%20me thodology_wildlife%20imports%20August%202017.pdf	Medium
5	2.02	What is the quality of the climate matching data?	Medium	Climatch	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	Drava in Croatia (Piria, M., Simonović, P., Kalogianni, E., Vardakas, L., Koutsikos, N., Zanella, D., Ristovska, M., Apostolou, Apostolos, Adrović, Avdul, Mrdak, D. & Tarkan. Ali Serhan et al. (2018) Alien freshwater fish species in the Balkans— Vectors and pathways of introduction. Fish and fisheries, 19, 138-169.) but unconfirmed in recent times.	Low
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	Not applicable	Already listed as present in Croatia, but a while ago and not recently confirmed (Piria, M., Simonović, P., Kalogianni, E., Vardakas, L., Koutsikos, N., Zanella, D., Ristovska, M., Apostolou, Apostolos, Adrović, Avdul, Mrdak, D. & Tarkan. Ali Serhan et al. (2018) Alien freshwater fish species in the Balkans— Vectors and pathways of introduction. Fish and fisheries, 19, 138-169.).	Low
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)?	Not applicable	Already listed as present in Croatia, but a while ago and not recently confirmed (Piria, M., Simonović, P., Kalogianni, E., Vardakas, L., Koutsikos, N., Zanella, D., Ristovska, M., Apostolou, Apostolos, Adrović, Avdul, Mrdak, D. & Tarkan. Ali Serhan et al. (2018) Alien freshwater fish species in the Balkans— Vectors and pathwavs of introduction. Fish and fisheries, 19, 138-169.).	Low
3. I	nvasive	e elsewhere			
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	CABI, Fuller, P., M. Neilson, K. Dettloff, A. Fusaro, and R. Sturtevant, 2021, Salmo salar Linnaeus, 1758: U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, FL, https://nas.er.usgs.gov/queries/factsheet.aspx?SpeciesID=926, Revision Date: 9/12/2019, Peer Review Date: 1/26/2016, Access Date: 5/19/2021	High
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	Fuller, P., M. Neilson, K. Dettloff, A. Fusaro, and R. Sturtevant, 2021, Salmo salar Linnaeus, 1758: U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, FL, https://nas.er.usgs.gov/queries/factsheet.aspx?SpeciesID=926, Revision Date: 9/12/2019, Peer Review Date: 1/26/2016, Access Date: 5/19/2021	High
		In the taxon's introduced range, are there known adverse impacts to aquaculture?	Yes	Fuller, P., M. Neilson, K. Dettloff, A. Fusaro, and R. Sturtevant, 2021, Salmo salar Linnaeus, 1758: U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, FL, https://nas.er.usgs.gov/queries/factsheet.aspx?SpeciesID=926, Revision Date: 9/12/2019, Peer Review Date: 1/26/2016, Access Date: 5/19/2021	High
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem services?	No	Positive economic/livelihood impact (CABI, 2021. Salmo salar [original text by Sunil Siriwardena]. In: Invasive Species Compendium. Wallingford, UK: CAB International.	Medium
	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	Positive economic/livelihood impact (CABI, 2021. Salmo salar [original text by Sunil Siriwardena]. In: Invasive Species Compendium. Wallingford, UK: CAB International.	Medium
_		//Ecology			
		able (or persistence) traits			1
14	4.01	Is it likely that the taxon will be poisonous or pose other risks to human health?	No	Harmless (Luna, Susan M. in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021)).	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	There was documented competition between salmon and both steelhead trout and rainbow trout (Fuller, P., M. Neilson, K. Dettloff, A. Fusaro, and R. Sturtevant, 2021, Salmo salar Linnaeus, 1758: U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, FL, https://nas.er.usgs.gov/queries/factsheet.aspx?SpeciesID=926, Revision Date: 9/12/2019, Peer Review Date: 1/26/2016, Access Date: 5/19/2021) but not with native species of the RA area.	Low
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	No parasitic behaviour.	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	Temperate; 2°C - 9°C; found in rivers where temperature rises above 10° C for about 3 months per year and does not exceed 20° C for more than a few weeks in summer (preferred temperatures 4-12°C) (Luna, Susan M. in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021)).	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	No evidence for similar impacts.	Medium
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	No documented adverse impacts in any area ((CABI, 2021. Salmo salar [original text by Sunil Siriwardena]. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc.)).	High
	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 area?	Yes	Susceptible to pathogens and parasites (Global Invasive Species Database (2021) Species profile: Salmo salar. Downloaded from http://www.iucngisd.org/gisd/species.php?sc=376 on 21-05- 2021.; CABI, 2021. Salmo salar [original text by Sunil Siriwardena]. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc.)	Very 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	Susceptible to pathogens and parasites (Global Invasive Species Database (2021) Species profile: Salmo salar. Downloaded from http://www.iucngisd.org/gisd/species.php?sc=376 on 21-05- 2021.; CABI, 2021. Salmo salar [original text by Sunil Siriwardena]. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc.)	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	150 cm, 46,8 kg (Luna, Susan M. in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021)).	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	Lacustrine (landlocked) and riverine populations (Luna, Susan M. in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021)).	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?	No	Possible for this species in aquaculture but not documented for introductions in the wild (Global Invasive Species Database (2021) Species profile: Salmo salar. Downloaded from http://www.iucngisd.org/gisd/species.php?sc=376 on 21-05-	High
		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 documented.	Low
	<u>esourc</u> 5.01	e exploitation Is the taxon likely to consume threatened or protected native taxa in the RA area?	Yes	Juveniles feed mainly on aquatic insects, mollusks, crustaceans and fish; adults at sea feed on squids, shrimps, and fish (Luna, Susan M. in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. www.fishbase.org. (High
27	5.02	Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?	Not applicable		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?	No	Renzi, V. 1999. "Salmo salar" (On-line), Animal Diversity Web. Accessed May 21, 2021 at https://animaldiversity.org/accounts/Salmo_salar/	High
29	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	No	The likelihood of S. salar establishing reproducing populations in introduced habitats is extremely low. Over 130 attempts to introduce Atlantic salmon across 32 states in the United States, over 60 attempts in British Columbia, Canada, several attempts in Tasmania, and numerous attempts in Chile have all failed (Global Invasive Species Database (2021) Species profile: Salmo salar. Downloaded from	High
30	6.03	Is the taxon likely to hybridise naturally with native taxa?	No	Hybridizes with brown trouts but it is very unlikely for S. salar to establish a spawning population in the RA area (Global Invasive Species Database (2021) Species profile: Salmo salar. Downloaded from http://www.iucngisd.org/gisd/species.php?sc=376 on 21-05-	High
	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	No	Not documented in literature.	Very high
	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	Yes	Spawning migration into freshwater lasts from June to November. Spawns at 6-10°C in gravel river areas far upstream with moderate to fast-flowing, well-oxygenated waters and a succession of riffles and pools. The female selects a site where the gravel is of the right size and of sufficient depth (0.1 to 0.3 m) and water depth is around 0.5-3 m (Luna, Susan M. in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021)).	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)	No 3	Not expected to spawn in the RA area (Global Invasive Species Database (2021) Species profile: Salmo salar. Downloaded from http://www.iucngisd.org/gisd/species.php?sc=376 on 21-05- Luna, Susan M. in Froese, R. and D. Pauly. Editors.	High High
34		does the taxon require to reach the age-at-		2021.FishBase. World Wide Web electronic publication.	

35	7.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable	>1	Escape from aquaculture (not yet allowed but in the process), introduction for angling (not likely).	Low
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	If situated near streams entering protected areas.	Low
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 such adaptations.	Very high
8	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	Fertilized eggs sink into the redd and are covered with a layer of gravel (0.1-0.3 m) (Luna, Susan M. in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021)).	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	At the southern end of their range, many reach a length of 12-15 cm, transform into smolts and are ready for migration in spring of the first year after hatching (Luna, Susan M. in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021)).	High
0	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	Yes	Anadromous (Luna, Susan M. in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021)).	Very high
1	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No	Fertilized eggs sink into the redd and are covered with a layer of gravel (0.1-0.3 m) (Luna, Susan M. in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021)).	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	Introductions, escapes.	Low
		Is dispersal of the taxon density dependent?	No	Not documented, migratory species.	Medium
		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 documented, sensitive species.	Very 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	Sensitive to pollution, coldwater species (Renzi, V. 1999. "Salmo salar" (On-line), Animal Diversity Web. Accessed May 21, 2021 at https://animaldiversity.org/accounts/Salmo_salar/).	Very high
6	8.03	Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	No	Not allowed.	Very high
7	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	No	Habitat destruction, denial of access to spawning grounds by dams and other obstructions are causing declinig numbers (Renzi, V. 1999. "Salmo salar" (On-line), Animal Diversity Web. Accessed May 21, 2021 at	Very 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	Anadromous (Luna, Susan M. in Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021)).	Very high
	8.06	Are there effective natural enemies (predators) of the taxon present in the RA e change	Yes	Piscivore fish and mammals (CABI).	High
		e change			
0	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?	Not applicable	Already present (?).	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	The likelihood of S. salar establishing reproducing populations in introduced habitats is extremely low. Over 130 attempts to introduce Atlantic salmon across 32 states in the United States, over 60 attempts in British Columbia, Canada, several attempts in Tasmania, and numerous attempts in Chile have all failed. Most likely not able to establish viable populations even under current conditions (Global Invasive Species Database (2021) Species profile: Salmo salar. Downloaded from http://www.iucngisd.org/gisd/species.php?sc=376 on 21-05-	Medium
2	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 chance?	No change	Possible dispersal mediated by human, not under influence of climate change.	Low
3	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	Decreased activity and increased mortality in southern areas of native distribution (Jonsson, B., Jonsson, N., 2009. A review of the likely effects of climate change on anadromous Atlantic salmonSalmo salarand brown trout Salmo trutta, with particular reference to water temperature and flow. Journal of Fish Biology 75, 2381–2447 doi:10.1111/j.1095-8649.2009.02380.x) so this effects could only be emphasized in RA area if introduced.	Medium
4	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Lower	Decreased activity and increased mortality in southern areas of native distribution (Jonsson, B., Jonsson, N., 2009. A review of the likely effects of climate change on anadromous Atlantic salmonSalmo salarand brown trout Salmo trutta, with particular reference to water temperature and flow. Journal of Fish Biology 75, 2381–2447 doi:10.1111/j.1095-8649.2009.02380.x) so this effects could only be emohasized in RA area if introduced.	Medium
	9.06	Under the predicted future climatic	No change	No likely impacts under current conditions (CABI) so no change	Medium
5		conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?		expected (personal opinion).	

Statistics

Scores	
BRA	16.5
BRA Outcome	-
BRA+CCA	12.5
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	10.5
1. Domestication/Cultivation	2.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	7.5
B. Biology/Ecology	6.0
4. Undesirable (or persistence) traits	3.0
5. Resource exploitation	5.0
6. Reproduction	-3.0
7. Dispersal mechanisms	2.0
8. Tolerance attributes	-1.0
C. Climate change	-4.0
9. Climate change	-4.0
Answered Questions	
Total	55
A. Biogeography/Historical 1. Domestication/Cultivation	13 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
6. Reproduction	2
7. Dispersal mechanisms	9
8. Tolerance attributes	6
C. Climate change	6
9. Climate change	6
Sectors affected	
Commercial	10
Environmental	2
Species or population nuisance traits	5
Thresholds	
	_
BRA	
BRA BRA+CCA	-

 BRA+CCA

 Confidence
 BRA+CCA
 0.70

 BRA
 0.73
 CCA
 0.42

 Date and Time
 21/05/2021 14:42:38
 21/05/2021 14:42:38

Taxon and Assessor details				
Category	Fishes and Lampreys (freshwater)			
Taxon name	Salmo salar			
Common name	Atlantic salmon			
Assessor	Tamara Kanjuh			
Risk screening context				
Reason and socio-economic benefits				
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS			
Taxonomy				
Native range				
Introduced range				
URL				

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
		ication/Cultivation			
		Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	Since the early 1970s, and for more than 12 generations, Atlantic salmon have been subject to domestication and directional selection for economically important traits (Perry WB et al., 2019).	Very high
2		Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	Atlantic salmon is hunted in the wild for commercial and recreational purposes (https://www.fisheries.noaa.gov/species/atlantic-salmon-	Very high
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	Commonly expressed concerns surrounding escaped Atlantic salmon include competition with native salmon, predation, disease transfer, hybridization, and colonization (https://wdfw.wa.gov/species-habitats/invasive/salmo-	High
2. (Climate.	, distribution and introduction risk		Thttps://wdiw.wa.gov/species-habitats/hivasive/samo-	
4	2.01	How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range?	Medium	Dfa, Dfb (Köppen-Geiger climate classification system)	Medium
5		What is the quality of the climate matching data?	High	Köppen-Geiger climate classification system	High
6		Is the taxon already present outside of captivity in the RA area?	Yes	Krka estaury, Drava and Sava River (Piria et al., 2016).	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	Aquaculture (Piria et al., 2016).	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)? e elsewhere	Yes	Krka estaury, Drava and Sava River (Piria et al., 2016).	High
<i>3. 1</i> 9		Has the taxon become naturalised	Yes	successful seed introduction and naturalization were reported in	High
_		(established viable populations) outside its native range?		the upper parts of the River Krka in central Slovenia (Stanković et al., 2015).	5
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	Concerns have been raised over the negative impacts of its farming on native fish populations and the surrounding environment. Transmission of disease and hybridization with wild populations are of particular concern (cabi.org). Jonsson and Jonsson (2006) concluded that as a result of ecological interaction and through density-dependent mechanisms, cultured fish may displace wild conspecifics to some extent, increase their mortality, and decrease their growth rate, adult size, reproductive output.	Very high
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	Yes	Rapid increases in production have led to falling prices, which in turn have put increasing pressures on producers to limit costs. Significant future expansion of the industry may rely on the development of offshore sites, since most of the available suitable inshore sites are already in use, and because of increasing antagonism towards, and regulation over, further expansion in sheltered areas	Very high
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	No	No information found.	Low
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	No information found.	Low
B. I	Biology	//Ecology			
4. L	Indesira	able (or persistence) traits			
		Is it likely that the taxon will be poisonous or pose other risks to human health?	No	No information found.	Low
15	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	Effect on wild fish of escapees, through the spread of diseases, competition for food, space, and breeding partners, and genetic introgression. Transmission of ectoparasites (especially sea lice, which are species of copepod in the genera Lepeophtheirus and Caligus) from farmed fish to wild fish causing increased mortality in the latter, especially of migrating smolts (https://www.cabi.org/isc/datasheet/65307#tosummaryOfInvasive ness).	Very high
16		Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	No information found.	Very high
17	4.04	Its 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	Species with complex life cycles where habitat requirements change through ontogeny are particularly susceptible to climate change owing to the multiple climate-related drivers at each life stage (see Graham and Harrod 2009 and examples within). This is particularly relevant for anadromous salmonids, where the complexity of their life cycle means that the fish will be affected by multiple climate-related drivers at each life stage in both	Medium

26 27	5.01 5.02	re 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	No	No information found. Escaped farmed salmon occur on feeding grounds in the Atlantic Ocean and seem to consume similar food resources as wild salmon. It is unlikely that availability of food in the Atlantic Ocean limits Atlantic salmon production, and food competition from escaped farmed salmon is unlikely to be strong (Thorstad. 2008).	Low High
		Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response	No	There is no parental investment beyond spawning (https://animaldiversity.org/accounts/Salmo_salar/).	High
29	6.02	, , , , , , , , , , , , , , , , , , , ,	No	No information found.	Low
30	6.03	or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa?	Yes	Brown trout coexist with Atlantic salmon in many watersheds throughout their distribution range. Evidence from rivers in Norway and Scotland suggest that escaped farmed salmon hybridize with brown trout more frequently than their wild conspecifics (Youngson et al. 1993, Hindar & Balstad 1994).	Very high
	1				
	6.04 6.05	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	Atlantic salmon have similar environmental conditions as other salmonid species to maintain optimal health (Novak, 2014).	Medium High
32		display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features)		No information found. Atlantic salmon have similar environmental conditions as other salmonid species to maintain optimal health (Novak, 2014). Salmo salar is an iteroparous species. Female fecundity varies considerably both within and among salmon populations, as both egg number and size increase with body size (reviewed in Fleming [1996]). However, relative fecundity (i.e. eggs per kilogram body weight) varies much less (typically 1 200-2 000) and inversely	
32 33 34	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)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	No	No information found. Atlantic salmon have similar environmental conditions as other salmonid species to maintain optimal health (Novak, 2014). Salmo salar is an iteroparous species. Female fecundity varies considerably both within and among salmon populations, as both egg number and size increase with body size (reviewed in Fleming [1996]). However, relative fecundity (i.e. eggs per kilogram body	High
32 33 34 7. [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)? How many time units (days, months, years) does the taxon require to reach the age-at-	No Yes	No information found. Atlantic salmon have similar environmental conditions as other salmonid species to maintain optimal health (Novak, 2014). Salmo salar is an iteroparous species. Female fecundity varies considerably both within and among salmon populations, as both egg number and size increase with body size (reviewed in Fleming [1996]). However, relative fecundity (i.e. eggs per kilogram body weight) varies much less (typically 1 200-2 000) and inversely with fish size (i.e. smaller fish have more eggs per kg than larger Atlantic salmon show high diversity in age of maturity and may mature as parr, one- to five-sea-winter fish, and in rare instances,	High High
32 33 34 <u>7. [</u>	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? 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 Yes 3	No information found. Atlantic salmon have similar environmental conditions as other salmonid species to maintain optimal health (Novak, 2014). Salmo salar is an iteroparous species. Female fecundity varies considerably both within and among salmon populations, as both egg number and size increase with body size (reviewed in Fleming [1996]). However, relative fecundity (i.e. eggs per kilogram body weight) varies much less (typically 1 200-2 000) and inversely with fish size (i.e. smaller fish have more eqgs per kg than larger Atlantic salmon show high diversity in age of maturity and may mature as parr, one- to five-sea-winter fish, and in rare instances, at older sea ages (Klemetsen et al., 2003).	High High Very high
32 33 34 <u>7. [</u> 35	6.05 6.06 6.07 0ispers. 7.01	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 Yes 3	No information found. Atlantic salmon have similar environmental conditions as other salmonid species to maintain optimal health (Novak, 2014). Salmo salar is an iteroparous species. Female fecundity varies considerably both within and among salmon populations, as both egg number and size increase with body size (reviewed in Fleming [1996]). However, relative fecundity (i.e. eggs per kilogram body weight) varies much less (typically 1 200-2 000) and inversely with fish size (i.e. smaller fish have more eggs per kg than larger Atlantic salmon show high diversity in age of maturity and may mature as parr, one- to five-sea-winter fish, and in rare instances, at older sea ages (Klemetsen et al., 2003). Agriculture and sport fishing.	High High Very high Medium
32 33 34 <u>7. [</u> 35 36 37	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)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship	No Yes 3 >1 Yes	No information found. Atlantic salmon have similar environmental conditions as other salmonid species to maintain optimal health (Novak, 2014). Salmo salar is an iteroparous species. Female fecundity varies considerably both within and among salmon populations, as both egg number and size increase with body size (reviewed in Fleming [1996]). However, relative fecundity (i.e. eggs per kilogram body weight) varies much less (typically 1 200-2 000) and inversely with fish size (i.e. smaller fish have more eggs per kg than larger Atlantic salmon show high diversity in age of maturity and may mature as parr, one- to five-sea-winter fish, and in rare instances, at older sea ages (Klemetsen et al., 2003). Agriculture and sport fishing. Krka River (Piria et al., 2016).	High High Very high Medium High
32 33 34 <u>7. []</u> 35 36 37 38	6.05 6.06 6.07 7.01 7.02 7.03	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 3 >1 Yes No	No information found. Atlantic salmon have similar environmental conditions as other salmonid species to maintain optimal health (Novak, 2014). Salmo salar is an iteroparous species. Female fecundity varies considerably both within and among salmon populations, as both egg number and size increase with body size (reviewed in Fleming [1996]). However, relative fecundity (i.e. eggs per kilogram body weight) varies much less (typically 1 200-2 000) and inversely with fish size (i.e. smaller fish have more eqgs per kg than larger Atlantic salmon show high diversity in age of maturity and may mature as parr, one- to five-sea-winter fish, and in rare instances, at older sea ages (Klemetsen et al., 2003). Agriculture and sport fishing. Krka River (Piria et al., 2016). No information found.	High High Very high Medium High Low
32 33 34 <u>7. [</u> 35 36 37 38 39	6.05 6.06 6.07 0ispers. 7.01 7.02 7.03	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?	No Yes 3 >1 Yes No	No information found. Atlantic salmon have similar environmental conditions as other salmonid species to maintain optimal health (Novak, 2014). Salmo salar is an iteroparous species. Female fecundity varies considerably both within and among salmon populations, as both egg number and size increase with body size (reviewed in Fleming [1996]). However, relative fecundity (i.e. eggs per kilogram body weight) varies much less (typically 1 200-2 000) and inversely with fish size (i.e. smaller fish have more eggs per kg than larger Atlantic salmon show high diversity in age of maturity and may mature as parr, one- to five-sea-winter fish, and in rare instances, at older sea ages (Klemetsen et al., 2003). Agriculture and sport fishing. Krka River (Piria et al., 2016). No information found. No information found.	High High Very high Medium High Low
32 33 34 35 36 37 38 39 40	6.05 6.06 6.07 7.01 7.02 7.03 7.04 7.05	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)? 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 migrate in the RA area for reproduction? Are older life stages of the taxon likely to migrate in the RA area for reproduction?	No Yes 3 >1 Yes No Yes	No information found. Atlantic salmon have similar environmental conditions as other salmonid species to maintain optimal health (Novak, 2014). Salmo salar is an iteroparous species. Female fecundity varies considerably both within and among salmon populations, as both egg number and size increase with body size (reviewed in Fleming [1996]). However, relative fecundity (i.e. eggs per kilogram body weight) varies much less (typically 1 200-2 000) and inversely with fish size (i.e. smaller fish have more eqgs per kq than larger Atlantic salmon show high diversity in age of maturity and may mature as parr, one- to five-sea-winter fish, and in rare instances, at older sea ages (Klemetsen et al., 2003). Agriculture and sport fishing. Krka River (Piria et al., 2016). No information found. No information found. Natural dispersal of the taxon could occur in the juvenile stage (OESD, 2017).	High High Very high Medium High Low Low
32 33 34 <u>7. [</u> 35 36 37 38 38 39 40 41	6.05 6.06 6.07 7.01 7.02 7.03 7.04 7.05	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)? 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 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 Yes No No No No No	No information found. Atlantic salmon have similar environmental conditions as other salmonid species to maintain optimal health (Novak, 2014). Salmo salar is an iteroparous species. Female fecundity varies considerably both within and among salmon populations, as both egg number and size increase with body size (reviewed in Fleming [1996]). However, relative fecundity (i.e. eggs per kilogram body weight) varies much less (typically 1 200-2 000) and inversely with fish size (i.e. smaller fish have more eqgs per kg than larger Atlantic salmon show high diversity in age of maturity and may mature as parr, one- to five-sea-winter fish, and in rare instances, at older sea ages (Klemetsen et al., 2003). Agriculture and sport fishing. Krka River (Piria et al., 2016). No information found. Natural dispersal of the taxon could occur in the juvenile stage (OESD, 2017). No information found.	High High Very high Medium High Low Low Medium

43	7.09	Is dispersal of the taxon density dependent?	No	No information found.	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 cvcle?	No	No information found.	Low
45	8.02	To be 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	Atlantic salmon require a minimum dissolved oxygen saturation level of 6mg/l. Dissolved oxygen below this threshold level result in depressed respiration (Novak, 2014).	High
46	8.03	Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	No	No information found.	High
47	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	No	No information found.	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	Atlantic salmon is anadromus species (https://www.cabi.org/isc/datasheet/65307).	High
49	8.06	Are there effective natural enemies (predators) of the taxon present in the RA	Yes	Birds, fish, mammals (OESD, 2017).	High
С. С	Climate	e change			
9. C	limate	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	The changes would not play a role in the introduction of taxa into RA.	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	Indirectly climate affects populations through, effects on their competitors, pathogens, predators and water quality, and has consequences for population viability and geographical distributions (Lehodey et al., 2006).	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	Indirectly climate affects populations through, effects on their competitors, pathogens, predators and water quality, and has consequences for population viability and geographical distributions (Lehodey et al., 2006).	Medium
		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 impact on ecosystem funtion.	Medium
	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 impact on ecosystem services.	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 impact on ecosystem services.	Medium

Statistics	
Scores	
BRA	16.0
BRA Outcome	-
BRA+CCA	10.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	10.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	5.0
B. Biology/Ecology	6.0
4. Undesirable (or persistence) traits	5.0
5. Resource exploitation	0.0
6. Reproduction	2.0
7. Dispersal mechanisms	0.0
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	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 6
8. Tolerance attributes	
C. Climate change	6
9. Climate change	6
Sectors affected	
Commercial	10
Environmental	2
Species or population nuisance traits	2
Thresholds	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.61
BRA	0.63

	CCA	0.50
		0.00
Date and	d Time	

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Taxon and Assessor details		
Category	Fishes and Lampreys (freshwater)	
Taxon name	Salmo salar	
Common name	Atlantic salmon	
Assessor	Tena Radocaj	
Risk screening context		
Reason and socio-economic benefits		
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS	
Taxonomy		
Native range		
Introduced range		
URL		

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
1. E		ication/Cultivation			
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	Fisheries: highly commercial; aquaculture: commercial; gamefish: yes (Fishbase)	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 Atlantic salmon is renowned among game fishermen and is a highly prized food fish. (Renzi, V. 1999. "Salmo salar" (On-line), Animal Diversity Web)	Very high
3	1.03	Does the taxon have invasive races,	No	No	Low
2 (limate	varieties, sub-taxa or congeners?			
		, distribution and introduction risk	Madium	The similarity between slimatic and division DA and antice	Madium
4	2.01	How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range?	Medium	The similarity between climatic conditions RA area and native range is medium. I use climatch.	Medium
5	2.02	What is the quality of the climate matching data?	Medium	Distribution Map and Climatch	Medium
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	Piria, M., Simonović, P., Kalogianni, E., Vardakas, L., Koutsikos, N., Zanella, D.,& Joy, M. K. (2018). Alien freshwater fish species in the Balkans–Vectors and pathways of introduction. Fish and fisheries, 19(1), 138-169.	Low
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	Not applicable	It is present	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)?	Not applicable	It is present	Low
3 1	nvacive	e elsewhere			
9	3.01	Has the taxon become naturalised	Yes	Introductions for angling and escapes from culture have led to the	Very high
-		(established viable populations) outside its native range?		establishment of wild populations in the north-east Pacific, Chile, Argentina and New Zealand (CABI, 2019)	, ,
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	S. salar that escape can wreak havoc on wild populations by spreading disease and parasites to, competing with, and hybridizing with native salmon and other fish. (Global Invasive Species Database (2021) Species profile: Salmo salar)	High
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	No evidence	Low
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem services?	Yes	Competition with native species; S. salar compete with wild populations and other native fishes for resources. (Global Invasive Species Database (2021) Species profile: Salmo salar)	Very high
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	It is also a highly desirable sport fish by anglers (FAO, 2009).	Low
R F	Riology	//Ecology			
		able (or persistence) traits			
		Is it likely that the taxon will be poisonous or pose other risks to human health?	No	Harmless (Fishbase)	Low
15	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or	No	No evidence	Low
16	4.03	protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	No evidence	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	S. salar will be adaptable to climatic and other environmental conditions	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	No information for the RA area, generally S. salar that escape can wreak havoc on wild populations by spreading disease and parasites to, competing with, and hybridizing with native salmon and other fish. (Global Invasive Species Database (2021) Species profile: Salmo salar)	Medium
	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	It will be a highly desirable sport fish for anglers (FAO, 2009).	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	Yes	Marcos-López, M., & Rodger, H. D. (2020). Amoebic gill disease and host response in Atlantic salmon (Salmo salar L.): A review. Parasite immunology, 42(8), e12766.	Medium
	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	Marcos-López, M., & Rodger, H. D. (2020). Amoebic gill disease and host response in Atlantic salmon (Salmo salar L.): A review. Parasite immunology, 42(8), e12766.	Medium
	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	150 cm TL (Fishbase)	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 lakes and rocky runs and pools of small to large rivers (Fishbase)	Low

6 5.01 7 5.02 . <u>Reprodu</u>	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)? ce 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? Is the taxon likely to exhibit parental care	No No Yes Not applicable	No evidence No evidence Juveniles feed mainly on aquatic insects, mollusks, crustaceans and fish; adults at sea feed on squids, shrimps, and fish (Fishbase) Not applicable	Low Low
. <u>Resourc</u> 6 5.01 7 5.02 . <u>Reprodu</u> 8 6.01 9 6.02	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>ce 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>	Yes	Juveniles feed mainly on aquatic insects, mollusks, crustaceans and fish; adults at sea feed on squids, shrimps, and fish (Fishbase)	
6 5.01 7 5.02 . <i>Reprodu</i> 8 6.01 9 6.02	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		and fish; adults at sea feed on squids, shrimps, and fish (Fishbase)	High
6 5.01 7 5.02 . <i>Reprodu</i> 8 6.01 9 6.02	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		and fish; adults at sea feed on squids, shrimps, and fish (Fishbase)	High
<u>. Reprodu</u> 8 6.01 9 6.02	Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area? uction	Not applicable		
<u>. Reprodu</u> 8 6.01 9 6.02	resources (including nutrients) to the detriment of native taxa in the RA area? uction	Not applicable	Not applicable	1
8 6.01 9 6.02	detriment of native taxa in the RA area? uction			Very high
8 6.01 9 6.02	uction			
8 6.01 9 6.02				
9 6.02	Is the taxon likely to exhibit parental care			
		No	There is no parental investment beyond spawning. (Renzi, V.	Low
	and/or to reduce age-at-maturity in response		1999. "Salmo salar" (On-line), Animal Diversity Web)	
	to environmental conditions?			
0 6.03	Is the taxon likely to produce viable gametes	Yes	Spawning migration into freshwater lasts from June to November.	Medium
0.03	or propagules (in the RA area)?	Yes	Spawns at 6-10°C (Fishbase). Natural reproduction (Fishbase)	High
	Is the taxon likely to hybridise naturally with native taxa?	res	Scribner, K. T., Page, K. S., & Bartron, M. L. (2000). Hybridization in freshwater fishes: a review of case studies and cytonuclear methods of biological inference. Reviews in Fish Biology and Fisheries, 10(3), 293-323.	nigii
1 6.04	Is the taxon likely to be hermaphroditic or to	No	No information	Low
	display asexual reproduction?			
2 6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features)	Yes	Requires specific temp and substrate for spawning	Low
3 6.06	to complete its life cycle? Is the taxon known (or likely) to produce a	No	On average, a female deposits 700-800 eggs per pound of her	Low
5 0.00	large number of propagules or offspring		body weight (Global Invasive Species Database (2021) Species	
	within a short time span (e.g. < 1 year)?		profile: Salmo salar)	
4 6.07	How many time units (days, months, years)	2	Species needs at least 2–3 years before reproducing. Z 1.4 - 4.4	Medium
	does the taxon require to reach the age-at-		years www.fishbase.org	
	first-reproduction?		· · · · · · · · · · · · · · · · · · ·	
Dispers	al mechanisms			
5 7.01	How many potential internal	>1	1. Escape from fish farm 2. Intentional release	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	No	No	Low
	taxon in close proximity to one or more			
	protected areas (e.g. MCZ, MPA, SSSI)?			
7 7.03	Does the taxon have a means of actively	No	No adaptations	Medium
	attaching itself to hard substrata (e.g. ship			
	hulls, pilings, buoys) such that it enhances the likelihood of dispersal?			
8 7.04	Is natural dispersal of the taxon likely to	No	The female then covers the eggs with gravel, using the same	Medium
5 7.01	occur as eggs (for animals) or as propagules		method used to create the redd. The eggs are buried in gravel at a	riculum
	(for plants: seeds, spores) in the RA area?		depth of about 12.7 to 25.4cm. (Global Invasive Species Database	
			(2021) Species profile: Salmo salar.)	
9 7.05	Is natural dispersal of the taxon likely to	Yes	Renzi, V. 1999. "Salmo salar" (On-line), Animal Diversity Web)	Medium
	occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?			
0 7.06	Are older life stages of the taxon likely to	Yes	Migratory species (Fishbase)	Medium
	migrate in the RA area for reproduction?			. ieuiuii
1 7.07	Are propagules or eggs of the taxon likely to	No	Fishbase	Low
	be dispersed in the RA area by other animals?			
2 7.08	Is dispersal of the taxon along any of the	Yes	Stocking, escape from fish farm	Medium
	vectors/pathways mentioned in the previous			
	seven questions (35–41; i.e. both			
2 7 00	unintentional or intentional) likely to be	Ne	Na avidance	Low
3 7.09	Is dispersal of the taxon density dependent?	No	No evidence	Low
	Is the taxon able to withstand being out of	No	Global Invasive Species Database (2021) Species profile: Salmo	Low
10.01	water for extended periods (e.g. minimum of	No	salar	Low
	one or more hours) at some stage of its life			
	cycle?			
5 8.02	Is the taxon tolerant of a wide range of	No	Sensitive species (Global Invasive Species Database (2021)	Medium
	water quality conditions relevant to that		Species profile: Salmo salar)	
	taxon? [In the Justification field, indicate the			
	relevant water quality variable(s) being	<u> </u>		
5 8.03	Can the taxon be controlled or eradicated in	No	No	Low
	the wild with chemical, biological, or other			
7 0 0 4	agents/means?	Ne	Clobal Investive Creation Database (2021) Carrier St. C. 1	Low
7 8.04	Is the taxon likely to tolerate or benefit from	No	Global Invasive Species Database (2021) Species profile: Salmo	Low
	environmental/human disturbance?	Voc	salar Global Invasive Species Database (2021) Species profile: Salmo	High
	Is the taxon able to tolerate salinity levels	Yes	Global Invasive Species Database (2021) Species profile: Salmo	High
	that are higher or lower than those found in its usual environment?		salar	
		1		Medium
8 8.05		Yes	Catfish nike	n icuiuiii
8.05	Are there effective natural enemies	Yes	Catfish, pike	
3 8.05 9 8.06	Are there effective natural enemies (predators) of the taxon present in the RA	Yes	Catfish, pike	
3 8.05 9 8.06	Are there effective natural enemies	Yes	Catfish, pike	
8.05 8.06 <u>Climate</u>	Are there effective natural enemies (predators) of the taxon present in the RA e change	Yes	Catfish, pike Human influence	Low
8 8.05 9 8.06	Are there effective natural enemies (predators) of the taxon present in the RA e change e change			

51	9.02	Under the predicted future climatic	Decrease	In contrast to rainbow trout, the thermal acclimation response of	Low
	1	conditions, are the risks of establishment		Atlantic salmon is more limited. The long-term consequence is	
		posed by the taxon likely to increase,		that climate change will continue to decimate wild populations of	
		decrease or not change?		this species. (Hittle, K. A., Kwon, E. S., & Coughlin, D. J. (2021).	
				Climate change and anadromous fish: How does thermal	
				acclimation affect the mechanics of the myotomal muscle of the	
				Atlantic salmon, Salmo salar?. Journal of Experimental Zoology	
				Part A: Ecological and Integrative Physiology).	
52	9.03	Under the predicted future climatic	Decrease	In contrast to rainbow trout, the thermal acclimation response of	Low
		conditions, are the risks of dispersal within		Atlantic salmon is more limited. The long-term consequence is	
		the RA area posed by the taxon likely to		that climate change will continue to decimate wild populations of	
		increase, decrease or not change?		this species. (Hittle, K. A., Kwon, E. S., & Coughlin, D. J. (2021).	
1				Climate change and anadromous fish: How does thermal	
1				acclimation affect the mechanics of the myotomal muscle of the	
				Atlantic salmon, Salmo salar?. Journal of Experimental Zoology	
				Part A: Ecological and Integrative Physiology).	
53	9.04	Under the predicted future climatic	Lower	In contrast to rainbow trout, the thermal acclimation response of	Low
		conditions, what is the likely magnitude of		Atlantic salmon is more limited. The long-term consequence is	
		future potential impacts on biodiversity		that climate change will continue to decimate wild populations of	
		and/or ecological integrity/status?		this species. (Hittle, K. A., Kwon, E. S., & Coughlin, D. J. (2021).	
				Climate change and anadromous fish: How does thermal	
				acclimation affect the mechanics of the myotomal muscle of the	
				Atlantic salmon, Salmo salar?. Journal of Experimental Zoology	
				Part A: Ecological and Integrative Physiology).	
54	9.05	Under the predicted future climatic	Lower	In contrast to rainbow trout, the thermal acclimation response of	Low
		conditions, what is the likely magnitude of		Atlantic salmon is more limited. The long-term consequence is	
	1	future potential impacts on ecosystem		that climate change will continue to decimate wild populations of	
1		structure and/or function?		this species. (Hittle, K. A., Kwon, E. S., & Coughlin, D. J. (2021).	
1				Climate change and anadromous fish: How does thermal	
	1			acclimation affect the mechanics of the myotomal muscle of the	
1				Atlantic salmon, Salmo salar?. Journal of Experimental Zoology	
E F	0.06	Under the predicted future climati-	Lower	Part A: Ecological and Integrative Physiology).	Law
55	9.06	Under the predicted future climatic	Lower	In contrast to rainbow trout, the thermal acclimation response of	Low
	1	conditions, what is the likely magnitude of		Atlantic salmon is more limited. The long-term consequence is	
1		future potential impacts on ecosystem		that climate change will continue to decimate wild populations of	
	1	services/socio-economic factors?		this species. (Hittle, K. A., Kwon, E. S., & Coughlin, D. J. (2021).	
1				Climate change and anadromous fish: How does thermal	
	1			acclimation affect the mechanics of the myotomal muscle of the	
1				Atlantic salmon, Salmo salar?. Journal of Experimental Zoology	
1	1			Part A: Ecological and Integrative Physiology).	

Statistics	
Scores	
BRA	21.5
BRA Outcome	-
BRA+CCA	13.5
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	10.5
1. Domestication/Cultivation	2.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	7.5
B. Biology/Ecology	11.0
4. Undesirable (or persistence) traits	6.0
5. Resource exploitation	5.0
6. Reproduction	0.0
7. Dispersal mechanisms	1.0
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 5 36
3. Invasive elsewhere	5
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	Z
6. Reproduction	/
· · · · · · · · · · · · · · · · · · ·	9
7. Dispersal mechanisms	6
<i>7. Dispersal mechanisms</i> <i>8. Tolerance attributes</i>	6
7. Dispersal mechanisms 8. Tolerance attributes C. Climate change	2 7 9 6 6
7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change	6 6 6
7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected	6
7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial	6 7
7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial Environmental	6
7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial	6 7
7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial Environmental	6 7

	BRA	-
	BRA+CCA	-
Confidence		
	BRA+CCA	0.45
	BRA	0.47
	CCA	0.25
Date and Time		
	01/06/20	021 18:19:51

Taxon and Assessor details	axon and Assessor details						
Category	Fishes and Lampreys (freshwater)						
Taxon name	Salmo trutta						
Common name	brown trout						
Assessor	Ana Marić						
Risk screening context							
Reason and socio-economic benefits							
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS						
Taxonomy							
Native range							
Introduced range							
URL							

			Response	Justification (references and/or other information)	Confidence
_		graphy/Historical			
		ication/Cultivation			
		Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	https://www.researchgate.net/publication/319344554_Diversity_of _brown_trout_Salmo_cf_trutta_in_the_River_Danube_basin_of_W estern_Balkans_as_assessed_from_the_structure_of_their_mitoch ondrial_Control_Region_haplotypes	
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	Effects of stocking on the genetic structure of Effects of stocking on the genetic structure of brown trout, Salmo trutta, in Central Europe Effects of stocking on the genetic structure of brown trout, Salmo trutta, in Central Europeinferred from mitochondrial and nuclear DNA markers 2012. Kohout et al.	Very high
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	No	Its invasive itself, other taxons are introduced no invasive*	Low
2. (, distribution and introduction risk	1		T
4	2.01	Risk Assessment (RA) area and the taxon's native range?	Medium	Near Bratislava 8, and France 6, 11 points in orange (Climatch)	Medium
5	2.02	What is the quality of the climate matching data?	Medium	Climatch +personal assesment	Medium
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	Risks to Stocks of Native Trout of the Genus Salmo (Actinîpterygii: Salmoniformes: Salmonidae) of Serbia and Management for their Recovery	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	>1	Stocking and escape fom fish ponds.	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	https://www.researchgate.net/publication/344114601_Diversity_of _brown_trout_Salmo_trutta_Actinopterygii_Salmoniformes_Salmo nidae_in_the_Danube_River_basin_of_Croatia_revealed_by_mitoc hondrial_DNA	High
3. I		e elsewhere	1		
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	INVASION BIOLOGY AND ECOLOGICAL IMPACTS OF INVASION BIOLOGY AND ECOLOGICAL IMPACTS OF BROWN TROUT Salmo trutta IN NEW ZEALAND Colin R. Townsend	Medium
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	INVASION BIOLOGY AND ECOLOGICAL IMPACTS OF INVASION BIOLOGY AND ECOLOGICAL IMPACTS OF BROWN TROUT Salmo trutta IN NEW ZEALAND Colin R. Townsend	Very high
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	A handbook of global freshwater invasive species. Francis. 2012	Medium
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	Yes	A handbook of global freshwater invasive species. Francis. 2012	Medium
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	Yes	A handbook of global freshwater invasive species. Francis. 2012	Medium
B. I	Biology	//Ecology			
		able (or persistence) traits	1		
		Is it likely that the taxon will be poisonous or pose other risks to human health?	No	Not toxic.	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	A handbook of global freshwater invasive species. Francis. 2012	Very high
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in	No	Not a parasite.	Very high
17	4.04	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	A review of the likely effects of climate change on anadromous Atlantic salmon Salmo salar and brown trout A review of the likely effects of climate change on anadromous Atlantic salmon Salmo salar and brown troutSalmo trutta, with particular reference to water temperature and flow. Jonsson and Jonsson 2009	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	A handbook of global freshwater invasive species. Francis. 2012	High
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes	A handbook of global freshwater invasive species. Francis. 2012	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	INVASION BIOLOGY AND ECOLOGICAL IMPACTS OF BROWN TROUT Salmo trutta IN NEW ZEALAND. Colin R. Townsend 1996.	Very 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	INVASION BIOLOGY AND ECOLOGICAL IMPACTS OF BROWN TROUT Salmo trutta IN NEW ZEALAND. Colin R. Townsend 1996.	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	INVASION BIOLOGY AND ECOLOGICAL IMPACTS OF BROWN TROUT Salmo trutta IN NEW ZEALAND. Colin R. Townsend 1996.	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	Ecology of brown trout and atlantic salmon. Jonsson and Jonsson 2011.	Very high

4.12 Is the tripopulation of the second se				
Populatidensitie Besource exploit 5 5.01 5 5.01 6 5.01 7 5.02 8 6.01 9 6.01 10 15 the train of	likely that the taxon's mode of existence . excretion of by-products) or behaviours . feeding) will reduce habitat quality for ve taxa?	Yes	A handbook of global freshwater invasive species. Francis. 2012	High
Resource exploit 5<01	e taxon likely to maintain a viable ulation even when present in low sities (or persisting in adverse conditions vay of a dormant form)?		Haplotype diversity of brown trout Salmo trutta (L.) in the broader Iron Gate area. 2016. Ana TOŠIĆ1,*, Dubravka ŠKRABA1, Vera NIKOLIĆ1, Jelena ČANAK ATLAGIĆ2, Danilo MRDAK3, Predrag SIMONOVIĆ1	Very high
Image protected protected (second (sec				
7 5.02 Is the taresourculation detrime <i>Reproduction</i> 3 6.01 Is the taresource 3 6.01 Is the taresource and/or to envire 3 6.01 Is the taresource and/or to envire 3 6.02 Is the taresource and/or to envire 4 6.02 Is the taresource and/or to envire 5 6.03 Is the taresource anothere 6 6.05 Is the taresource anothere 6 6.05 Is the taresource anothere 6 6.06 Is the taresource anothere 7 6.06 Is the taresource anothere 6 6.07 How maresource does the 6 7.01 How maresource does the 6 7.02 Will any taxon ire protectesource 7 7.03 Does the attachire hulls, pi the like attachire hulls, pi 1 1 nature occur ase (for plaid) 0 7.05 Is nature	· · · · · , · · · · · · · · · · · ·	Yes	A handbook of global freshwater invasive species. Francis. 2012	Very high
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3 6.01 Is the ta and/or to to environ and/or and/or to to environ and/or Is the ta and/or anative to environ Is the ta display 2 6.03 Is the ta another to comp another to comp b 6.06 Is the ta another to comp b 6.07 How ma does the high dispersal for the high for the high b 7.01 How ma vectors, disperse to comp c 7.03 Does th attachir hulls, pi taxon ir protected migrate a 7.04 Is natur occur as fragmer area? c 7.05 Is natur occur as fragmer area? c 7.06 Are olde migrate d 7.07 Is disper vectors, seven q uninten c 7.08 Is disper vectors, seven q uninten d 8.01<	iment of native taxa in the RA area?			
and/or fit and/or fit b 6.02 i is the transition of transiton of transition of transition of transit of transition of transit			· · · · · · · · · · · · · · · · · · ·	
a to envir b 6.02 Is the train attive to any any attive to any atttype a	ne taxon likely to exhibit parental care	Yes	A review of the likely effects of climate change on anadromous	High
Or propage 0 or propage 0 6.03 Is the transitive transite transitransitive transitive transite transitransitransi tran	'or to reduce age-at-maturity in response nvironmental conditions?		Atlantic salmon Salmo salar and brown trout A review of the likely effects of climate change on anadromous Atlantic salmon Salmo salar and brown trout Salmo trutta, with particular reference to water temperature and flow. 2009. Jonsson and Jonsson.	
0 6.03 Is the tanative tanatitanative tanative tanatitanative tanatitanative tanative tanative	, , ,		INVASION BIOLOGY AND ECOLOGICAL IMPACTS OF BROWN	Very high
1 6.04 Is the tridinglay 2 6.05 Is the tridinglay 2 6.05 Is the tridinglay 3 6.06 Is the tridinglay 4 6.07 How may does the tridinglay 5 7.01 How may does the tridinglay 6 7 How may does the tridinglay 6 7 How may does the tridinglay 6 7 10 6 7 How may vectors, disperse 6 7 7.03 Does the attaching hulls, pi the like 8 7 7.04 Is natur occur as fragmer area? 0 7.06 Are olde migrate area? 0 7.07 Is dispersed rectors, seven q uninten area? 1 7.07 Is disper vectors, seven q uninten area? 1 7.08 Is disper vectors, seven q uninten area? 1 7.09 Is disper vectors, seven q uninten area? 1 7.09 Is disper vectors, seven q uninten area? 1 S.01 Is the triding area of the wild area of the	ropagules (in the RA area)? ne taxon likely to hybridise naturally with		TROUT Salmo trutta IN NEW ZEALAND. 1996. Colin R. Townsend	High
display display 2 6.05 Is the t. another to comp 3 6.06 Is the t. large nu within a does the first-rep Dispersal mecha for first-rep Dispersal mecha does the vectors, dispersal 5 7.01 How ma vectors, dispersal 6 7 7 7.03 Dese th attachin hulls, pi taxon in nulls, pi taxon in coccur as fragmer area? 0 7.05 1 Is natur occur as fragmer area? 0 7.06 1 S atispe vectors, seven q uninten attachin hulls, pi the like 1 7.07 2 7.08 3 7.09 1 S dispe vectors, seven q uninten attachin hulls, pi the like 3 7.09 1 S dispe vectors, seven q uninten attachin hulls, pi the like 3 7.09 5 8.02 6 8.03 6 8.03 7 8.04 1 1 6 <t< td=""><td>ve taxa?</td><td></td><td>A handbook of global freshwater invasive species. Francis. 2012 Ecology of brown trout and atlantic salmon. Jonsson and Jonsson 2011. IUCN: Salmo trutta, Brown Trout Assessment by: Freyhof, J.</td><td>High</td></t<>	ve taxa?		A handbook of global freshwater invasive species. Francis. 2012 Ecology of brown trout and atlantic salmon. Jonsson and Jonsson 2011. IUCN: Salmo trutta, Brown Trout Assessment by: Freyhof, J.	High
2 6.05 Is the ta another to compresent to c	ne taxon likely to be hermaphroditic or to lay asexual reproduction?	No	Personal assesment	High
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within a within a does thin first-rep Dispersal mechanol of a 7 8 7 8 8 9 7 8 9 7 8 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	e taxon known (or likely) to produce a e number of propagules or offspring	Yes	INVASION BIOLOGY AND ECOLOGICAL IMPACTS OF BROWN TROUT Salmo trutta IN NEW ZEALAND. 1996. Colin R. Townsend	Very high
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Jospersal mecha Dispersal mecha G 7.01 How may vectorsy, disperse disperse disperse f 7.02 Will any taxon in protecter r 7.03 Does th attachin hulls, pi the like disperse disperse r 7.03 Does th attachin hulls, pi the like disperse	many time units (days, months, years)	2	The IUCN Red List of Threatened Species [™] ISSN 2307-8235	Very high
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disperse i disperse i Vill any taxon ir protecte i 7.02 Will any taxon ir protecte i Does th attachir hulls, pi i 7.03 Does th attachir hulls, pi i 7.04 Is natur occur as fragmer i 7.05 Is natur occur as fragmer i 7.07 Are proj be dispe i 7.07 Is dispe vectors/ seven q uninten i 7.09 Is dispe vectors/ seven q uninten i 8.01 Is the tr water fr one or r cycle? i 8.01 Is the tr water q taxon? relevant conside i 8.02 Is the tr water q taxon? i 8.03 Can the wild agents/ i 8.04 Is the tr that are	many potential internal ors/pathways could the taxon use to	~1	Stocking and aquaculture	High
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attachir hulls, pi the like attachir hulls, pi the like b 7.04 is natur occur as (for plai attachir hulls, pi the like attachir hulls, pi train			Maybe in Croatia for MPA In Serbia: Haplotype diversity of brown trout Salmo trutta (L.) in the broader Iron Gate area Ana TOŠIÆ1,*, Dubravka ŠKRABA1, Vera NIKOLIÆ1, Jelena ÈANAK	Medium
attachir hulls, pi the like attachir hulls, pi the like b 7.04 is natur occur as (for plai attachir hulls, pi the like attachir hulls, pi train			ATLAGIÆ2, Danilo MRDAK3, Predrag SIMONOVIÆ1	
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7.05 Is natur occur as fragmer area? 0 7.06 Are proj be disper vectors/ seven q uninten 2 7.08 1 5.07 7.09 Is disper vectors/ seven q uninten 3 7.09 4 8.01 4 8.01 5 8.02 5 8.02 6 8.03 Can the the wild agents/ 7 8.04 1 15 the ta water q taxon? relevant conside 6 8.03 Can the the wild agents/ 7 8.04 1 15 the ta that are	likelihood of dispersal? atural dispersal of the taxon likely to Ir as eggs (for animals) or as propagules	No	no evidance for no.	Medium
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migrate 1 7.07 Are projet jbe dispet 2 7.08 3 7.09 3 7.09 4 8.01 4 8.01 5 8.02 5 8.02 6 8.03 7 8.04 8 15 thet tr 4 8.01 8 15 thet tr 4 8.02 15 thet tr 4 8.03 2 7 8 8.04 15 thet tr 4 8.04	? older life stages of the taxon likely to	Yes	Brown Trout (Salmo trutta): A Technical Conservation	Very high
be disposed 2 7.08 2 7.08 3 7.09 3 7.09 4 8.01 1 Is disperven quurinten 4 8.01 5 8.02 5 8.02 6 8.03 6 8.03 6 8.02 8 15 the tr water quarts/ relevant 2 5 6 8.03 6 8.03 7 8.04 1 15 the tr environ 8 15 the tr environ 8 15 the tr environ	rate in the RA area for reproduction?		Assessment. Laura Belica1 with life cycle model by David	
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seven q uninten 3 7.09 Is dispering Tolerance attribution (and the second sec	spersal of the taxon along any of the	Yes	INVASION BIOLOGY AND ECOLOGICAL IMPACTS OF BROWN	High
3 7.09 Is disperimentation Tolerance attribution 4 8.01 Is the trip water for one or recycle? 5 8.02 Is the trip water quadratic trip trip trip trip trip trip trip trip	ors/pathways mentioned in the previous en questions (35-41; i.e. both tentional or intentional) likely to be		TROUT Salmo trutta IN NEW ZEALAND. 1996. Colin R. Townsend	
Tolerance attribut Tolerance attribut Is the ta Water for one or r cycle? Is the ta Water of taxon? relevant conside 6 8.03 Can the the wild agents/ 7 8.04 Is the ta 8.05 Is the tar environ	spersal of the taxon density dependent?	Yes	Somewhat, partal migratority. Ecology of brown trout and atlantic	High
Isolation Isolation			salmon. Jonsson and Jonsson 2011.	
 water fc one or r cycle? 8.02 Is the ta water q taxon? relevani 8.03 Can the wild agents/ 8.04 Is the ta environ 8.05 Can the the wild agents/ 8.04 Is the ta environ 8.05 Is the ta 		No	Prown trout can stand only few minutes out of the water	High
5 8.02 Is the tawater q water q taxon? relevant conside conside conside 6 8.03 Can the wild agents/ 7 8.04 Is the tawnon? 8 8.05 Is the tawnon? 3 8.05 Is the tawnon?	te taxon able to withstand being out of er for extended periods (e.g. minimum of or more hours) at some stage of its life	No	Brown trout can stand only few minutes out of the water.	High
 relevant conside 5 8.03 Can the the wild agents/ 7 8.04 Is the ta environ 8.05 Is the ta that are 	he taxon tolerant of a wide range of er quality conditions relevant to that	No	Ecology of brown trout and atlantic salmon. Jonsson and Jonsson 2011. But can tolerate some chemicals Arsenic	Medium
conside 6 8.03 Can the the wild agents/ 7 8.04 Is the tagents/ 8 .05 Is the tagent area	n? [In the Justification field, indicate the		accumulationinafreshwaterfishlivinginacontaminated	
5 8.03 Can the the wild agents/ 7 8.04 Is the ta environ 8 8.05 Is the ta that are	vant water quality variable(s) being sidered.1		riverofCorsica,France. 2009.Julia-LaurenceCulioli a, , SergeCalendini b, ChristopheMori a, AntoineOrsini a	
7 8.04 Is the ta environ 3 8.05 Is the ta that are	the taxon be controlled or eradicated in wild with chemical, biological, or other	No	A handbook of global freshwater invasive species. Francis. 2012 Cant be eradicated but less numbered	High
8 8.05 Is the ta that are	he taxon likely to tolerate or benefit from	No	Personal assesment. MAybe tolarate (Arsenic). IUCN red list	High
that are	ronmental/human disturbance?			Manus kir k
	ne taxon able to tolerate salinity levels are higher or lower than those found in usual environment?	Yes	yes, some individuals are anadromous. Ecology of brown trout and atlantic salmon. Jonsson and Jonsson 2011.	Very high
8.06 Are then (predate	there effective natural enemies dators) of the taxon present in the RA	Yes	Other fishes eat trout eggs. Lutra and Mustela. https://deepblue.lib.umich.edu/bitstream/handle/2027.42/141891/	Medium
area?			tafs0239.pdf?sequence=1	
Climate 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?	No change	Personal assesment	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	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	Prof. 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	Prof. 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	Prof 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	RA and their water habitats are not under big climaic change pressure.	Medium

Statistics	
Scores	
BRA	37.5
BRA Outcome	-
BRA+CCA	33.5
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	14.5
1. Domestication/Cultivation	2.0
2. Climate, distribution and introduction risk	2.0
3. Invasive elsewhere	10.5
B. Biology/Ecology	23.0
4. Undesirable (or persistence) traits	10.0
5. Resource exploitation	7.0
6. Reproduction	4.0
7. Dispersal mechanisms	3.0
8. Tolerance attributes	-1.0 - 4.0
C. Climate change 9. Climate change	-4.0
Answered Questions	-4.0
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	
6. Reproduction	2
7. Dispersal mechanisms	9
8. Tolerance attributes	6
C. Climate change	6
9. Climate change	6
Sectors affected	
Commercial	13
Environmental	8
Species or population nuisance traits	18
Thresholds	
BRA	-
BRA+CCA	-
Confidence	

BIG	
BRA+CCA	-
Confidence	
BRA+CCA	0.76
BRA	0.79
CCA	0.50
Date and Time	

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Taxon and Assessor details	axon and Assessor details						
Category	Fishes and Lampreys (freshwater)						
Taxon name	Salmo trutta						
Common name	brown trout						
Assessor	Ivan Špelić						
Risk screening context							
Reason and socio-economic benefits							
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS						
Taxonomy							
Native range							
Introduced range							
URL							

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
<u>1. [</u> 1		ication/Cultivation	Voc	For restocking of natural waters (angling) (Cultured Asu-ti-	Vory high
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	For restocking of natural waters (angling) (Cultured Aquatic Species Information Programme. Salmo trutta. Cultured Aquatic Species Information Programme. Text by Vandeputte, M. & Labbé, L. In: FAO Fisheries and Aquaculture Department [online]. Rome. Updated 1 January 2012. [Cited 25 February 2020].)	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	Restocking purposes (personal opinion).	Low
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	No	No such information.	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	Climatch 2020.	Medium
5	2.02	What is the quality of the climate matching data?	Medium	Climatch 2020.	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	Freyhof, J. 2011. Salmo trutta . The IUCN Red List of Threatened Species 2011: e.T19861A9050312. https://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T19861A9050312. en. Downloaded on 25 February 2020., Froese, R. and D. Pauly. Editors. 2019.FishBase. World Wide Web electronic publication. www.fishbase.org, (12/2019)	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	Not applicable	Already present (IUCN 2011).	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)?	Not applicable	Already present (IUCN 2011).	Very high
		e elsewhere	T		
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	IUCN 2011, Global Invasive Species Database (2020) Species profile: Salmo trutta. Downloaded from http://www.iucngisd.org/gisd/speciesname/Salmo+trutta on 25- 02-2020.	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 been implicated in reducing native fish populations (especially other salmonids) through predation, displacement, food competition and hybridization (Global Invasive Species Database (2020) Species profile: Salmo trutta. Downloaded from http://www.iucngisd.org/gisd/speciesname/Salmo+trutta on 25-	Very high
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	Farmed, no adverse impact (FAO rome 2005).	Very high
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem services?	Yes	Brown trout have been implicated in reducing native fish populations (especially other salmonids) through predation, displacement, food competition and hybridization (Global Invasive Species Database (2020) Species profile: Salmo trutta. Downloaded from http://www.iucngisd.org/gisd/speciesname/Salmo+trutta on 25-	Medium
	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	Yes	Brown trout have been implicated in reducing native fish populations (especially other salmonids) through predation, displacement, food competition and hybridization (Global Invasive Species Database (2020) Species profile: Salmo trutta. Downloaded from http://www.iucngisd.org/gisd/speciesname/Salmo+trutta on 25- 02-2020). Reducing numbers of maybe more attractive native	Low
		//Ecology able (or persistence) traits			
	4.01	Is it likely that the taxon will be poisonous or pose other risks to human health?	No	No risk for human health, listed as potential pest (Froese, R. and D. Pauly. Editors. 2019.FishBase. World Wide Web electronic publication. www.fishbase.org, (12/2019).	Very high
	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	publication. www.fishbase.org, (12/2019). Brown trout have been implicated in reducing native fish populations (especially other salmonids) through predation, displacement, food competition and hybridization (Global Invasive Species Database (2020) Species profile: Salmo trutta. Downloaded from http://www.iucngisd.org/gisd/speciesname/Salmo+trutta on 25-	Very high
	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	No such information	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	They prefer cold, well-oxygenated upland waters although their tolerance limits are lower than those of rainbow trout and favors large streams in the mountainous areas with adequate cover in the form of submerged rocks, undercut banks, and overhanging vegetation (Froese, R. and D. Pauly. Editors. 2019.FishBase. World Wide Web electronic publication. www.fishbase.org, (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	Nystrom, P.; McIntosh, A. R. (2003): Are impacts of an exotic predator on a stream food web influenced by disturbance history? Oecologia (2003) 136:279–288. DOI 10.1007/s00442-003-1250-3	High
9	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes	Brown trout have been implicated in reducing native fish populations (especially other salmonids) through predation, displacement, food competition and hybridization (Global Invasive Species Database (2020) Species profile: Salmo trutta. Downloaded from http://www.iucngisd.org/gisd/speciesname/Salmo+trutta on 25- 02-2020). Hybridization with maybe more attractive native species Salmo marmoratus (A. Razpet , S. Marić , T. Parapot , V. Nikolić & P. Simonović (2007) Re-evaluation of Salmo data by Gridelli ()—description of stocking, hybridization and repopulation in the River Soča basin. Italian Journal of Zoologv. 74:1. 63-70.	High
0	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 area?	Yes	Taxon is affected by several bacterial diseases. They are highly sensitive to furunculosis and BKD and may also moderately suffer from yersiniosis, rainbow trout fry syndrome and vibriosis. They also suffer from fungal and parasitic infections (FAO Rome 2005).	High
1	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	Taxon is affected by several bacterial diseases. They are highly sensitive to furunculosis and BKD and may also moderately suffer from yersiniosis, rainbow trout fry syndrome and vibriosis. They	High
2	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	also suffer from fungal and parasitic infections (FAO Rome 2005). Common length to 72 cm (Froese & Pauly 2019).	Very high
3	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	Found in streams, ponds, rivers and lakes (Froese & Pauly 2019).	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	Lives in habitats with mostly hard substrate (rock, gravel), prefers clear water (Froese & Pauly 2019).	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	No	No evidence	Low
F	Pesouro	by way of a dormant form)?			
	5.01	Is the taxon likely to consume threatened or protected native taxa in the RA area?	Yes	Juveniles feed mainly on aquatic and terrestrial insects; adults on mollusks, crustaceans and small fish (Froese & Pauly 2019) which may include threatened or protected taxa.	High
	5.02	Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?	Not applicable	No sufficient data for calculation.	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?	No	Spawning behaviour and life history well known, no such adaptations.	Very high
9	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	IUCN 2011	Very high
0	6.03	Is the taxon likely to hybridise naturally with native taxa?	Yes	A. Razpet , S. Marić , T. Parapot , V. Nikolić & P. Simonović (2007) Re-evaluation of Salmo data by Gridelli ()—description of stocking, hybridization and repopulation in the River Soča basin, Italian Journal of Zoology, 74:1, 63-70, DOI:	Very high
1	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	No	Well known	Very high
2	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	Yes	Spawns in rivers and streams with swift current, usually characterized by downward movement of water into gravel (Froese & Pauly 2019).	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	Each female produces about 10.000 eggs (Froese & Pauly 2019).	Very high
	6.07	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	1	FAO Rome 2005	Very high
		al mechanisms How many potential internal	>1	Restocking - angling purposes Escape from aquaculture	Medium
	7.02	vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the	Yes	May happen with restocking, altough native stock is used more	Low
		taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)?		and more.	
	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 adaptations.	Very high
8	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 covered with sand and gravel (Froese & Pauly 2019) but drift is recorded (Elliott, J.M. 1976: The downstream drifting of eggs of brown trout, Salmo trutta L. Journal of Fish Biology 45-50)	Medium
9	7.05	Is natural dispersal of the taxon likely to Yes Downstream drift (Lechner, A., Keckeis, H. & Humphries, P. occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Yes Downstream drift (Lechner, A., Keckeis, H. & Humphries, P. area? (2016). https://doi.org/10.1007/s11160-016-9437-v) (2016). https://doi.org/10.1007/s11160-016-9437-v)		High	
0	7.06	Are older life stages of the taxon likely to	Yes	Spawning migrations are common (Froese & Pauly 2019, Kottelat	High
	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?		& Freyhof 2007). Eggs in redd covered with sand or gravel (Kottelat & Freyhoff 2007).	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	Stocking, escape from aquaculture (personal opinion).	High

43	7.09	Is dispersal of the taxon density dependent?	No	Migrations occure even without increase in density (Shry Samuel J., McCallum Erin S., Alanärä Anders, Persson Lo, Hellström Gustav (2019): Energetic Status Modulates Facultative Migration in Brown Trout (Salmo trutta) Differentially by Age and Spatial Scale, Frontiers in Ecology and Evolution, 7, 411.	Low
8. 1	Folerand	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 cvcle?	No	Personal opinion, communication with anglers.	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 considered.]	No	Vulerable to low oxygen levels and pollution (Freyhof, J. 2011. Salmo trutta . The IUCN Red List of Threatened Species 2011: e.T19861A9050312. https://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T19861A9050312. en. Downloaded on 25 February 2020).	Very high
	8.03	Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	No	Not allowed	High
		Is the taxon likely to tolerate or benefit from environmental/human disturbance?	No	Personal opinion	Very high
		Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	Yes	Some populations are anadromous (Kottelat & Freyhof 2007, Froese & Pauly 2019).	Very high
		Are there effective natural enemies (predators) of the taxon present in the RA	Yes	Otters, piscivorous birds (personal communication).	High
		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?	Not applicable	Already present (IUCN 2011)	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	Predicted climatic effects are depletion of populations, increased threats of parasites, increased probability of droughts which has negative effects on populations (Jonsson, B.; Jonsson, N. (2009): A review of the likely effects of climate change on anadromous Atlantic salmon Salmo salar and brown trout Salmo trutta, with particular reference to water temperature and flow. Journal of Fish Biology 75, 2381–2447)	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	Predicted climatic effects are depletion of populations, increased threats of parasites, increased probability of droughts which has negative effects on populations (Jonsson, B.; Jonsson, N. (2009): A review of the likely effects of climate change on anadromous Atlantic salmon Salmo salar and brown trout Salmo trutta, with particular reference to water temperature and flow. Journal of Fish Biology 75, 2381–2447)	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?	Lower	Predicted climatic effects are depletion of populations, increased threats of parasites, increased probability of droughts which has negative effects on populations (Jonsson, B.; Jonsson, N. (2009): A review of the likely effects of climate change on anadromous Atlantic salmon Salmo salar and brown trout Salmo trutta, with particular reference to water temperature and flow. Journal of Fish Biology 75, 2381–2447)	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	Predicted climatic effects are depletion of populations, increased threats of parasites, increased probability of droughts which has negative effects on populations (Jonsson, B.; Jonsson, N. (2009): A review of the likely effects of climate change on anadromous Atlantic salmon Salmo salar and brown trout Salmo trutta, with particular reference to water temperature and flow. Journal of Fish Biology 75, 2381–2447)	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	Both populations of native salmonids and brown trout will decrease equally, so no magnified adverse impact is expected (personal opinion).	Low

Statistics	
Scores	
BRA	33.0
BRA Outcome	-
BRA+CCA	25.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	17.0
1. Domestication/Cultivation	2.0
2. Climate, distribution and introduction risk	1.0
<i>3. Invasive elsewhere</i>	14.0
B. Biology/Ecology	16.0
4. Undesirable (or persistence) traits	6.0
5. Resource exploitation	5.0
6. Reproduction	2.0
7. Dispersal mechanisms	4.0
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
<i>3. Invasive elsewhere</i>	
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	14
Environmental	8
Current of the second strength of the second strength of	-
Species or population nuisance traits	/
Species or population nuisance traits	/
Thresholds	/
	-
Thresholds	-
Thresholds BRA	-
Thresholds BRA BRA+CCA	
Thresholds BRA BRA+CCA Confidence	
Thresholds BRA BRA+CCA Confidence BRA+CCA	
Thresholds BRA BRA+CCA Confidence BRA+CCA BRA	0.82

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axon and Assessor details						
Category	Fishes and Lampreys (freshwater)					
Taxon name	Salmo trutta					
Common name	brown trout					
Assessor	Tamara Kanjuh					
Risk screening context						
Reason and socio-economic benefits						
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS					
Taxonomy						
Native range						
Introduced range						
URL						

			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 stocking of nonindigenous brown trout has been very extensive in Central Europe. It was initiated during the Austrian- Hungarian Empire in the 19th Century. For example, in 1862, eggs of brown trout were transported from Salzburg (Danube basin) to Nedošin (North Sea basin), where the stock was set up (http://www.vackuvchovpstruhu.estranky.cz) (Kohout et al.,	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	Brown trout is important for commercial fisheries and the species is a very popular target for angling. In several European countries it is one of the most important species for sport fisheries (Laikre	Very high
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	Brown trout (which includes almost all of its morphs and phylogenetic lineages) have been introduced into streams, rivers, reservoirs, and lakes and have been able to form self-sustaining populations in all of these environments (Belica, 2007).	Very high
2. (, distribution and introduction risk	r		
4	2.01	How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range?	Low	Dfa, Dfb (Köppen-Geiger climate classification system)	Medium
5	2.02	What is the quality of the climate matching data?	High	Köppen-Geiger climate classification system	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	Una River (Škraba et al., 2017), Kupčina River (Kanjuh et al., 2020)	High
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	>1	Taxon has been traditionally introduced via stocking programs. Fishfarm brown trout that are often formed from allochthonous or hybrid fish stocks are often deliberately released into natural waters and mixed with indigenous populations (Allendorf et al., 2001). Random restocking with farmed trout of non-native origin (Taggart&Ferguson, 1986). Bucket biologists have also been known to further propagate invasions (Burrill, 2014).	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	The presence of taxa has already been detected in the RA area (Simonović et al., 2017).	High
3. i	Invasiv	e elsewhere			
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	The rapid naturalization of brown trout and their success in forming selfsustaining populations throughout North America have been attributed in part to the increased genetic diversity of the mixed forms that were introduced (Behnke 2002).	High
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	The taxon hybridizes with native Danube trout, leading to the loss of intraspecific variability, following the introduction of alien strains and a change in genetic composition of native brown trout stock of Danube lineage (Simonović et al., 2014).	Very high
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	No information found.	Low
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	No	No information found.	Low
	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	No information found.	Low
		y/Ecology			
		able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health?	Yes	Potential pests (https://www.fishbase.se/summary/Salmo- trutta.html)	High
15	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	The taxon can suppress the native phylogenetic lineage (Apostolidis et al., 1997; Piria et al., 2019).	Very high
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	No information found.	Low
	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	The taxon is sensitive to changes in habitat conditions, so in the first place the water temperature must be optimal (Burrill, 2014).	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	No	No information found.	Low
	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes	Such difference in feeding strategy between brown trout of different lineages implies that brown trout of the AT lineage could be more attractive for fly fishing (Piria et al., 2019).	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 information found.	Low

<u> </u>	4.08				
21	4.00	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 information found.	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?	No	No information found.	Low
23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)?	No	The taxon is sensitive to changes in habitat conditions (Burrell, 2014).	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	The diet of the taxon may affect food availability (Piria et al., 2019).	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)?	No	No information found.	Low
5. R	Resourc	ce exploitation			
26	5.01	Is the taxon likely to consume threatened or protected native taxa in the RA area?	No	No information found.	Low
27	5.02	Is the taxon likely to sequester food resources (including nutrients) to the	Yes	Due to their diet, they can affect the availability of prey (Piria et al., 2019).	High
6 R	Reprodu	detriment of native taxa in the RA area?			
	6.01	Is the taxon likely to exhibit parental care	Yes	Parental care is certainly part of the taxon's life cycle	High
		and/or to reduce age-at-maturity in response		(https://animaldiversity.org/accounts/Salmo_trutta/).	
29	6.02	to environmental conditions? Is the taxon likely to produce viable gametes	Yes	Reproduction is uninterrupted, as well as hybridization with native	Very high
		or propagules (in the RA area)?		taxa (Marić et al., 2006; Simonović et al., 2017; Kanjuh et al.,	
30	6.03	Is the taxon likely to hybridise naturally with native taxa?	Yes	Restriction fragment length polymorphism, RFLP analysis showed that hybridization with the native Da lineage occurs (Tošić et al. 2016; Škraba et al., 2017). Reproduction is uninterrupted, as well as hybridization with native taxa (Marić et al., 2006; Simonović et al., 2017; Kanjuh et al., 2020)	Very high
31	6.04		No	No information found.	Low
32	6.05	display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features)	Yes	The taxon requires a gravelly spawning ground most often in fast waters (Simonović, 2001; Klemetsen, 1967; Sneider, 2000).	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 female lays from 500 to 30,000 eggs (Simonović, 2001).	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?	2	The taxon becomes fully mature after 2-3 years (Somme 1941).	High
7. C	Dispersa	al mechanisms			
35	7.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable habitats nearby)?	>1	Fishfarm specimens that are often formed from allochthonous or hybrid fish stocks are often deliberately released into natural waters and mixed with indigenous populations. Another pathway is random restocking in order to increase the number of fishery exploited populations (Allendorf et al., 2001). Introduction for	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_MDA_SSSI)2	Yes	sport fishing (Piria et al., 2017). Đerdap National Park (Tošić et al., 2016).	High
37	7.02	taxon in close proximity to one or 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		High Low
		taxon in close proximity to one or 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		Đerdap National Park (Tošić et al., 2016).	5
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 (for plants: seeds, spores) in the RA 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	Đerdap National Park (Tošić et al., 2016). No information found.	Low
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	No	Derdap National Park (Tošić et al., 2016). No information found. Natural spread of taxa by watercourse as juvenile. Natural spread of taxa by watercourse as juvenile. During the pre-spawning period, in early summer, brown trout were found to travel an average of 348 meters a day. During	Low
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 migrate in the RA area for reproduction?	No No	Đerdap National Park (Tošić et al., 2016). No information found. Natural spread of taxa by watercourse as juvenile. Natural spread of taxa by watercourse as juvenile. During the pre-spawning period, in early summer, brown trout	Low Medium 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?	No No Yes	 Đerdap National Park (Tošić et al., 2016). No information found. Natural spread of taxa by watercourse as juvenile. Natural spread of taxa by watercourse as juvenile. During the pre-spawning period, in early summer, brown trout were found to travel an average of 348 meters a day. During spawning they moved an average of 160 meters (Burrill, 2014). 	Low Medium Medium High
338 339 40 41 42 43	7.03 7.04 7.05 7.06 7.07 7.08 7.09	taxon in close proximity to one or 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?	No No Yes	Derdap National Park (Tošić et al., 2016). No information found. Natural spread of taxa by watercourse as juvenile. Natural spread of taxa by watercourse as juvenile. During the pre-spawning period, in early summer, brown trout were found to travel an average of 348 meters a day. During spawning they moved an average of 160 meters (Burrill, 2014). No information found.	Low Medium Medium High Low
38 39 40 41 42 43 <i>8. T</i>	7.03 7.04 7.05 7.06 7.07 7.08 7.09	taxon in close proximity to one or 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 Yes No Yes	Derdap National Park (Tošić et al., 2016). No information found. Natural spread of taxa by watercourse as juvenile. Natural spread of taxa by watercourse as juvenile. During the pre-spawning period, in early summer, brown trout were found to travel an average of 348 meters a day. During spawning they moved an average of 160 meters (Burrill, 2014). No information found. Escape from fish farm, introduction for sport fishing. No information found.	Low Medium Medium High Low Low
38 39 40 41 42 43 8. T	7.03 7.04 7.05 7.06 7.07 7.08 7.09	taxon in close proximity to one or 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 No Yes Yes	Derdap National Park (Tošić et al., 2016). No information found. Natural spread of taxa by watercourse as juvenile. Natural spread of taxa by watercourse as juvenile. During the pre-spawning period, in early summer, brown trout were found to travel an average of 348 meters a day. During spawning they moved an average of 160 meters (Burrill, 2014). No information found. Escape from fish farm, introduction for sport fishing.	Low Medium Medium High Low Low
38 39 40 41 42 42 43 8.77 44	7.03 7.04 7.05 7.06 7.07 7.08 7.09	taxon in close proximity to one or 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	No No Yes No Yes	Derdap National Park (Tošić et al., 2016). No information found. Natural spread of taxa by watercourse as juvenile. Natural spread of taxa by watercourse as juvenile. During the pre-spawning period, in early summer, brown trout were found to travel an average of 348 meters a day. During spawning they moved an average of 160 meters (Burrill, 2014). No information found. Escape from fish farm, introduction for sport fishing. No information found. The taxon cannot survive for a long period of time out of the	Low Medium Medium High Low Low

47	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	Yes	Anthropogenic impact is the most important factor endangering the taxon, both directly under the influence of fishing and restocking, and indirectly through the destruction of habitats that it inhabits (Crisp, 2000).	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 brown trout is well-known for its highly flexible life-cycle (Hansen, 2002).	Medium
49	8.06	Are there effective natural enemies	Yes	Humans, otters	Medium
		(predators) of the taxon present in the RA		(https://animaldiversity.org/accounts/Salmo_trutta/).	
		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?	Decrease	The egg stage would be clearly the most vulnerable life stage to any increase in temperature as a result of climate change. In a longterm study of a juvenile anadromous S. trutta population, summer drought led to increased mortality, especially for 1+ year fish (Elliott et al., 1997).	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	The egg stage would be clearly the most vulnerable life stage to any increase in temperature as a result of climate change. In a longterm study of a juvenile anadromous S. trutta population, summer drought led to increased mortality, especially for 1+ year fish (Elliott et al., 1997).	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	The egg stage would be clearly the most vulnerable life stage to any increase in temperature as a result of climate change. In a longterm study of a juvenile anadromous S. trutta population, summer drought led to increased mortality, especially for 1+ year fish (Elliott et al., 1997).	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	The egg stage would be clearly the most vulnerable life stage to any increase in temperature as a result of climate change. In a longterm study of a juvenile anadromous S. trutta population, summer drought led to increased mortality, especially for 1+ year fish (Elliott et al., 1997).	Medium
-	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	The egg stage would be clearly the most vulnerable life stage to any increase in temperature as a result of climate change. In a longterm study of a juvenile anadromous S. trutta population, summer drought led to increased mortality, especially for 1+ year fish (Elliott et al., 1997).	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 egg stage would be clearly the most vulnerable life stage to any increase in temperature as a result of climate change. In a longterm study of a juvenile anadromous S. trutta population, summer drought led to increased mortality, especially for 1+ year fish (Elliott et al., 1997).	Medium

Statistics	
Scores	
BRA	18.5
BRA Outcome	-
BRA+CCA	12.5
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	7.5
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	2.0
3. Invasive elsewhere	1.5
B. Biology/Ecology	11.0
4. Undesirable (or persistence) traits	4.0
5. Resource exploitation	2.0
6. Reproduction	2.0
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
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	13 3 5 5
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk	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	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 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	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 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	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 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 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. C. Climate change Sectors affected	13 3 5 5 36 12 2 7 9 6 6 6 6 8 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	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 9 6 6 6 6 6 8 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 7 9 6 6 6 6 6 8 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 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 8 8

BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.57
BRA	0.58
CCA	0.50
Date and Time	
28/05/2	021 09:06:41

axon and Assessor details						
Category	Fishes and Lampreys (freshwater)					
Taxon name	Salmo trutta					
Common name	brown trout					
Assessor	Tena Radocaj					
Risk screening context						
Reason and socio-economic benefits						
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS					
Taxonomy						
Native range						
Introduced range						
URL						

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
1. L	1	ication/Cultivation	1		
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	For angling purpose in almost all karstic rivers in mediteranean area. Together with atlantic form	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	primarily bred and stocked for recreational fishing (Global Invasive Species Database (2020) Species profile: Salmo trutta. Downloaded from http://www.iucngisd.org/gisd/species.php?sc=78 on 06-03-2020.)	Medium
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	atlantic haplotip	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	The similarity between climatic conditions RA area and native range is high. I use climatch.	Very high
5	2.02	What is the quality of the climate matching data?	High	The quality of the climate matching data is high.	Very high
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	Salmo trutta is present outside in captivity in the RA area.	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	None	S.trutta is present in RA area	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)?	Not applicable	S.trutta is present in RA area	Very high
<u>3. 1</u> 9		e elsewhere	Vac	The energies is found in Isoland and on the parthwest coast of	Vorschigh
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	The species is found in Iceland and on the northwest coast of Europe, along the Mediterranean and south to India. S. trutta has been introduced to appropriate streams all over the world (Animal Diversity Web, 2004) and today is found in rivers, lakes and coastal areas (Nova Scotia, 2004). (CABI)	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	They compete with native trout and other fish species, but they are not known to have been the cause of any species' extinction (Animal Diversity Web, 2004). (CABI)	Medium
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?	Yes	Salmo trutta has been implicated in reducing native fish populations (especially other salmonids) through predation, displacement, and food competition (Taylor et al., 1984). Another negative effect is their contribution to the lamprey population in many rivers. The increased lamprey populations since S. trutta were introduced have been considered as a negative impact on biodiversity (Animal Diversity Web. 2004). (CABI)	Medium
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	No data, personal opinion	Low
		//Ecology			
		able (or persistence) traits	la.		N/ 1 · 1
		Is it likely that the taxon will be poisonous or pose other risks to human health?		no	Very high
	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	Where brown trout have been introduced, they have had detrimental impacts on native fauna, and in many systems in North America, they have displaced or completely replaced native salmonids (Behnke 2002) Where brown trout have been introduced, they have had detrimental impacts on native fauna, and in many systems in North America, they have displaced or completely replaced native salmonids (Behnke 2002). 8Belica, L. (2007, April 26). Brown Trout (Salmo trutta): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: http://www.fs.fed.us/r2/projects/scp/assessments/ browntrout.pdf	High
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	no	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	Brown trout are well adapted for many environments, as has been demonstrated by their successful introduction to suitable cold-water systems worldwide. (Belica, L. (2007, April 26). Brown Trout (Salmo trutta): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: http://www.fs.fed.us/r2/projects/scp/assessments/ browntrout.pdf [date of access].	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	It may have a similar impact in the RA area (no data- personal opinion), as this species is found in many locations, encountering other native and introduced trout. In some places, brown trout populations have outgrown indigenous fish populations so rapidly that native fish have been forced out (Behnke 2002).	Low

	4.06	Is the taxon likely to exert adverse impacts	No	No impact on ecosystem services in RA area.	Low
0	4.07	on ecosystem services in the RA area?	Vac	Vac. the taxes may be a best or vester of lengue pasts and	Low
0	4.07	Is it likely that the taxon will host, and/or	Yes	Yes, the taxon may be a host or vector of known pests and	Low
		act as a vector for, recognised pests and		infectious agents endemic to RA area. Because in every area exist	
1	4.08	infectious agents that are endemic in the RA Is it likely that the taxon will host, and/or	Yes	infectious agents and pests. Some diseases that affect brown trout include a range of gill	Medium
1	4.00	act as a vector for, recognised pests and	103	ectoparasites (documented by Schisler et al. 1999), plestophera	nearann
		infectious agents that are absent from (novel		and epitheliocytis parasites (as reported by Kershner 1995 and	
		to) the RA area?		cited by Schrank 2004), and bacterial diseases such as	
				furunculosis (caused by Aeromonas salmonicida), enteric	
				redmouth (caused by Yersinia ruckeri), and bacterial kidney	
				disease (caused by Renibacterium salmoninarum) (Mitchum	
				1982). 8Belica, L. (2007, April 26). Brown Trout (Salmo trutta): a	
				technical conservation assessment. [Online]. USDA Forest Service,	
				Rocky Mountain Region. Available:	
				http://www.fs.fed.us/r2/projects/scp/assessments/ browntrout.ndf	
22	4.09	Is it likely that the taxon will achieve a body	Yes	It can grow to a standard length of 140 cm (Muus and Dahlström,	Very high
		size that will make it more likely to be		1967) (CABI)	
22	4.10	released from captivity? Is the taxon capable of sustaining itself in a	Yes	approximately 8 cm per s [0.26 ft. per s] and (up to 60 to 70 cm	Medium
	4.10	range of water velocity conditions (e.g.	103	per s [2.0 to 2.3 ft. per s])	nearann
		versatile in habitat use)?			
24	4.11	Is it likely that the taxon's mode of existence	Yes	Belica, L. (2007, April 26). Brown Trout (Salmo trutta): a	Low
		(e.g. excretion of by-products) or behaviours		technical conservation assessment. [Online]. USDA Forest Service,	
		(e.g. feeding) will reduce habitat quality for		Rocky Mountain Region. Available:	
		native taxa?		http://www.fs.fed.us/r2/projects/scp/assessments/browntrout.pdf	
	4.12		Ne	[date of access].)	Man 11.1
25	4.12	Is the taxon likely to maintain a viable	No	no	Very high
		population even when present in low densities (or persisting in adverse conditions			
		by way of a dormant form)?			
5. R	<i>lesour</i>	ce exploitation			
26	5.01	Is the taxon likely to consume threatened or	Yes	It is possible that it consume endangered and protected native	Low
		protected native taxa in the RA area?]	taxa in the RA area. If there are protected taxa in the RA area will	
7	5.02		Net englissels	consume them, whether or not the taxon is endangered.) (am think
27	5.02	Is the taxon likely to sequester food	Not applicable	NOT APPLICABLE	Very high
		resources (including nutrients) to the detriment of native taxa in the RA area?			
5. R	Reprodu				
28	6.01	Is the taxon likely to exhibit parental care	No	Belica, L. (2007, April 26). Brown Trout (Salmo trutta): a	Very high
		and/or to reduce age-at-maturity in response		technical conservation assessment. [Online]. USDA Forest Service,	
		to environmental conditions?		Rocky Mountain Region. Available:	
				http://www.fs.fed.us/r2/projects/scp/assessments/browntrout.pdf	
20	6.02	Is the taxon likely to produce viable gametes	Yes	[date of access].) Yes	High
29	0.02	or propagules (in the RA area)?	165		ingn
30	6.03	Is the taxon likely to hybridise naturally with	Yes	Hibidization with eg. Salmo marmoratus, Salmo obtusirostris in	Very high
		native taxa?		Jadro river (Snoj, A., Razpet, A., Tomljanović, T., Treer, T., &	
				Sušnik, S. (2007). Genetic composition of the Jadro softmouth	
				trout following translocation into a new habitat. Conservation	
31	6.04	Is the taxon likely to be hermaphroditic or to	No	(Belica, L. (2007, April 26). Brown Trout (Salmo trutta): a	Very high
		display asexual reproduction?		technical conservation assessment. [Online]. USDA Forest Service,	
				Rocky Mountain Region. Available: http://www.fs.fed.us/r2/projects/scp/assessments/browntrout.pdf	
				[date of access].)	
32	6.05				
		Is the taxon dependent on the presence of	No		Very high
	0.00	Is the taxon dependent on the presence of another taxon (or specific habitat features)	No	no (Belica, L. (2007, April 26). Brown Trout (Salmo trutta): a technical conservation assessment. [Online]. USDA Forest Service,	Very high
	0100		No	no (Belica, L. (2007, April 26). Brown Trout (Salmo trutta): a	Very high
	0.00	another taxon (or specific habitat features)	No	no (Belica, L. (2007, April 26). Brown Trout (Salmo trutta): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: http://www.fs.fed.us/r2/projects/scp/assessments/browntrout.pdf	Very high
		another taxon (or specific habitat features) to complete its life cycle?		no (Belica, L. (2007, April 26). Brown Trout (Salmo trutta): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: http://www.fs.fed.us/r2/projects/scp/assessments/browntrout.pdf [date of access].)	
33	6.06	another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a	No	no (Belica, L. (2007, April 26). Brown Trout (Salmo trutta): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: http://www.fs.fed.us/r2/projects/scp/assessments/browntrout.pdf [date of access].) No (Freyhof, J. 2011. Salmo trutta . The IUCN Red List of	Very high Very high
33		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 (Belica, L. (2007, April 26). Brown Trout (Salmo trutta): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: http://www.fs.fed.us/r2/projects/scp/assessments/browntrout.pdf [date of access].)	
	6.06	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 (Belica, L. (2007, April 26). Brown Trout (Salmo trutta): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: http://www.fs.fed.us/r2/projects/scp/assessments/browntrout.pdf [date of access].) No (Freyhof, J. 2011. Salmo trutta . The IUCN Red List of Threatened Species 2011)	Very high
		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)		no (Belica, L. (2007, April 26). Brown Trout (Salmo trutta): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: http://www.fs.fed.us/r2/projects/scp/assessments/browntrout.pdf [date of access].) No (Freyhof, J. 2011. Salmo trutta . The IUCN Red List of Threatened Species 2011) Resident trouts usually spawn for the first time at 2-3 years.	
	6.06	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 (Belica, L. (2007, April 26). Brown Trout (Salmo trutta): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: http://www.fs.fed.us/r2/projects/scp/assessments/browntrout.pdf [date of access].) No (Freyhof, J. 2011. Salmo trutta . The IUCN Red List of Threatened Species 2011)	Very high
34 7. <i>[</i>	6.06 6.07 Disperso	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 2	no (Belica, L. (2007, April 26). Brown Trout (Salmo trutta): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: http://www.fs.fed.us/r2/projects/scp/assessments/browntrout.pdf [date of access].) No (Freyhof, J. 2011. Salmo trutta . The IUCN Red List of Threatened Species 2011) Resident trouts usually spawn for the first time at 2-3 years. (Freyhof, J. 2011. Salmo trutta . The IUCN Red List of Threatened Species 2011.)	Very high Very high
34 7. <i>[</i>	6.06 6.07 Disperso	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	No	no (Belica, L. (2007, April 26). Brown Trout (Salmo trutta): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: http://www.fs.fed.us/r2/projects/scp/assessments/browntrout.pdf [date of access].) No (Freyhof, J. 2011. Salmo trutta . The IUCN Red List of Threatened Species 2011) Resident trouts usually spawn for the first time at 2-3 years. (Freyhof, J. 2011. Salmo trutta . The IUCN Red List of Threatened Species 2011.) 1. human impact 2. flooding 3. natural spread via natural and	Very high
34 7. <i>[</i>	6.06 6.07 Disperso	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>ial mechanisms</i> How many potential internal vectors/pathways could the taxon use to	No 2	no (Belica, L. (2007, April 26). Brown Trout (Salmo trutta): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: http://www.fs.fed.us/r2/projects/scp/assessments/browntrout.pdf [date of access].) No (Freyhof, J. 2011. Salmo trutta . The IUCN Red List of Threatened Species 2011) Resident trouts usually spawn for the first time at 2-3 years. (Freyhof, J. 2011. Salmo trutta . The IUCN Red List of Threatened Species 2011.)	Very high Very high
34 7 <u>. [</u> 35	6.06 6.07 Dispers. 7.01	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>Techanisms</i> How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable	No 2 >1	no (Belica, L. (2007, April 26). Brown Trout (Salmo trutta): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: http://www.fs.fed.us/r2/projects/scp/assessments/browntrout.pdf [date of access].) No (Freyhof, J. 2011. Salmo trutta . The IUCN Red List of Threatened Species 2011) Resident trouts usually spawn for the first time at 2-3 years. (Freyhof, J. 2011. Salmo trutta . The IUCN Red List of Threatened Species 2011.) 1. human impact 2. flooding 3. natural spread via natural and manmade watercourses	Very high Very high Medium
34 7 <u>. [</u> 35	6.06 6.07 Disperso	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	No 2	no (Belica, L. (2007, April 26). Brown Trout (Salmo trutta): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: http://www.fs.fed.us/r2/projects/scp/assessments/browntrout.pdf [date of access].) No (Freyhof, J. 2011. Salmo trutta . The IUCN Red List of Threatened Species 2011) Resident trouts usually spawn for the first time at 2-3 years. (Freyhof, J. 2011. Salmo trutta . The IUCN Red List of Threatened Species 2011.) 1. human impact 2. flooding 3. natural spread via natural and	Very high Very high Medium
34 7 <u>. [</u> 35	6.06 6.07 Dispers. 7.01	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 2 >1	no (Belica, L. (2007, April 26). Brown Trout (Salmo trutta): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: http://www.fs.fed.us/r2/projects/scp/assessments/browntrout.pdf [date of access].) No (Freyhof, J. 2011. Salmo trutta . The IUCN Red List of Threatened Species 2011) Resident trouts usually spawn for the first time at 2-3 years. (Freyhof, J. 2011. Salmo trutta . The IUCN Red List of Threatened Species 2011.) 1. human impact 2. flooding 3. natural spread via natural and manmade watercourses	Very high Very high Medium
34 7 <u>. [</u> 35 36	6.06 6.07 Dispers. 7.01	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	No 2 >1	no (Belica, L. (2007, April 26). Brown Trout (Salmo trutta): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: http://www.fs.fed.us/r2/projects/scp/assessments/browntrout.pdf [date of access].) No (Freyhof, J. 2011. Salmo trutta . The IUCN Red List of Threatened Species 2011) Resident trouts usually spawn for the first time at 2-3 years. (Freyhof, J. 2011. Salmo trutta . The IUCN Red List of Threatened Species 2011.) 1. human impact 2. flooding 3. natural spread via natural and manmade watercourses	Very high Very high Medium
34 7 <u>. [</u> 35 36	6.06 6.07 7.01 7.02	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)?	No 2 >1 Yes	no (Belica, L. (2007, April 26). Brown Trout (Salmo trutta): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: http://www.fs.fed.us/r2/projects/scp/assessments/browntrout.pdf [date of access].) No (Freyhof, J. 2011. Salmo trutta . The IUCN Red List of Threatened Species 2011) Resident trouts usually spawn for the first time at 2-3 years. (Freyhof, J. 2011. Salmo trutta . The IUCN Red List of Threatened Species 2011.) 1. human impact 2. flooding 3. natural spread via natural and manmade watercourses Some of the vectors may introduce a taxon into the protected area.	Very high Very high Medium Low
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34 7 <u>. [</u> 335 36	6.06 6.07 7.01 7.02 7.03	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?	No 2 >1 Yes No	no (Belica, L. (2007, April 26). Brown Trout (Salmo trutta): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: http://www.fs.fed.us/r2/projects/scp/assessments/browntrout.pdf [date of access].) No (Freyhof, J. 2011. Salmo trutta . The IUCN Red List of Threatened Species 2011) Resident trouts usually spawn for the first time at 2-3 years. (Freyhof, J. 2011. Salmo trutta . The IUCN Red List of Threatened Species 2011.) 1. human impact 2. flooding 3. natural spread via natural and manmade watercourses Some of the vectors may introduce a taxon into the protected area. Freyhof, J. 2011. Salmo trutta . The IUCN Red List of Threatened Species 2011	Very high Very high Medium Low Medium
34 7 <u> [</u> 35 36	6.06 6.07 7.01 7.02	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 2 >1 Yes	no (Belica, L. (2007, April 26). Brown Trout (Salmo trutta): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: http://www.fs.fed.us/r2/projects/scp/assessments/browntrout.pdf [date of access].) No (Freyhof, J. 2011. Salmo trutta . The IUCN Red List of Threatened Species 2011) Resident trouts usually spawn for the first time at 2-3 years. (Freyhof, J. 2011. Salmo trutta . The IUCN Red List of Threatened Species 2011.) 1. human impact 2. flooding 3. natural spread via natural and manmade watercourses Some of the vectors may introduce a taxon into the protected area. Freyhof, J. 2011. Salmo trutta . The IUCN Red List of Threatened Species 2011 Freyhof, J. 2011. Salmo trutta . The IUCN Red List of Threatened Species 2011	Very high Very high Medium Low
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34 7 <u>. [</u> 35 36 37	6.06 6.07 7.01 7.02 7.03	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?	No 2 >1 Yes No No	no (Belica, L. (2007, April 26). Brown Trout (Salmo trutta): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: http://www.fs.fed.us/r2/projects/scp/assessments/browntrout.pdf [date of access].) No (Freyhof, J. 2011. Salmo trutta . The IUCN Red List of Threatened Species 2011) Resident trouts usually spawn for the first time at 2-3 years. (Freyhof, J. 2011. Salmo trutta . The IUCN Red List of Threatened Species 2011.) 1. human impact 2. flooding 3. natural spread via natural and manmade watercourses Some of the vectors may introduce a taxon into the protected area. Freyhof, J. 2011. Salmo trutta . The IUCN Red List of Threatened Species 2011 Freyhof, J. 2011. Salmo trutta . The IUCN Red List of Threatened Species 2011	Very high Very high Medium Low Medium Very high
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34 7. [] 35 36 37 38	6.06 6.07 7.01 7.02 7.03	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>Tenchanisms</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	No 2 >1 Yes No No	no (Belica, L. (2007, April 26). Brown Trout (Salmo trutta): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: http://www.fs.fed.us/r2/projects/scp/assessments/browntrout.pdf [date of access].) No (Freyhof, J. 2011. Salmo trutta . The IUCN Red List of Threatened Species 2011) Resident trouts usually spawn for the first time at 2-3 years. (Freyhof, J. 2011. Salmo trutta . The IUCN Red List of Threatened Species 2011.) 1. human impact 2. flooding 3. natural spread via natural and manmade watercourses Some of the vectors may introduce a taxon into the protected area. Freyhof, J. 2011. Salmo trutta . The IUCN Red List of Threatened Species 2011 Freyhof, J. 2011. Salmo trutta . The IUCN Red List of Threatened Species 2011 (Freyhof, J. 2011. Salmo trutta . The IUCN Red List of Threatened Species 2011 (Freyhof, J. 2013. Salmo trutta . The IUCN Red List of Threatened Species 2013: e.T19861A9050312.	Very high Very high Medium Low Medium Very high
34 7 <u>. [</u> 35 36 37	6.06 6.07 7.01 7.02 7.03	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 2 >1 Yes No No	no (Belica, L. (2007, April 26). Brown Trout (Salmo trutta): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: http://www.fs.fed.us/r2/projects/scp/assessments/browntrout.pdf [date of access].) No (Freyhof, J. 2011. Salmo trutta . The IUCN Red List of Threatened Species 2011) Resident trouts usually spawn for the first time at 2-3 years. (Freyhof, J. 2011. Salmo trutta . The IUCN Red List of Threatened Species 2011.) 1. human impact 2. flooding 3. natural spread via natural and manmade watercourses Some of the vectors may introduce a taxon into the protected area. Freyhof, J. 2011. Salmo trutta . The IUCN Red List of Threatened Species 2011 Freyhof, J. 2011. Salmo trutta . The IUCN Red List of Threatened Species 2011 (Freyhof, J. 2011. Salmo trutta . The IUCN Red List of Threatened Species 2011	Very high Very high Medium Low Medium Very high
34 7 <u>[</u> 35 36 37 38	6.06 6.07 7.01 7.02 7.03	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? Tal 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 2 >1 Yes No No	no (Belica, L. (2007, April 26). Brown Trout (Salmo trutta): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: http://www.fs.fed.us/r2/projects/scp/assessments/browntrout.pdf [date of access].) No (Freyhof, J. 2011. Salmo trutta . The IUCN Red List of Threatened Species 2011) Resident trouts usually spawn for the first time at 2-3 years. (Freyhof, J. 2011. Salmo trutta . The IUCN Red List of Threatened Species 2011.) 1. human impact 2. flooding 3. natural spread via natural and manmade watercourses Some of the vectors may introduce a taxon into the protected area. Freyhof, J. 2011. Salmo trutta . The IUCN Red List of Threatened Species 2011 Freyhof, J. 2011. Salmo trutta . The IUCN Red List of Threatened Species 2011 (Freyhof, J. 2013. Salmo trutta . The IUCN Red List of Threatened Species 2013 (Freyhof, J. 2013. Salmo trutta. The IUCN Red List of Threatened Species 2013: e.T19861A9050312. http://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T19861A9050312.e	Very high Very high Medium Low Medium Very high
34 7 <u>[</u> 35 36 37 38	6.06 6.07 7.01 7.02 7.03 7.04 7.05	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 area?	No 2 >1 Yes No Yes	no (Belica, L. (2007, April 26). Brown Trout (Salmo trutta): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: http://www.fs.fed.us/r2/projects/scp/assessments/browntrout.pdf [date of access].) No (Freyhof, J. 2011. Salmo trutta . The IUCN Red List of Threatened Species 2011) Resident trouts usually spawn for the first time at 2-3 years. (Freyhof, J. 2011. Salmo trutta . The IUCN Red List of Threatened Species 2011.) 1. human impact 2. flooding 3. natural spread via natural and manmade watercourses Some of the vectors may introduce a taxon into the protected area. Freyhof, J. 2011. Salmo trutta . The IUCN Red List of Threatened Species 2011 Freyhof, J. 2011. Salmo trutta . The IUCN Red List of Threatened Species 2011 (Freyhof, J. 2013. Salmo trutta . The IUCN Red List of Threatened Species 2011 (Freyhof, J. 2013. Salmo trutta . The IUCN Red List of Threatened Species 2013: e.T19861A9050312. http://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T19861A9050312.e n)	Very high Very high Medium Low Medium Very high High
34 7. [] 35 36 37 38 39 40	6.06 6.07 7.01 7.02 7.03 7.04 7.05	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 area? Are older life stages of the taxon likely to	No 2 >1 Yes No Yes	no (Belica, L. (2007, April 26). Brown Trout (Salmo trutta): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: http://www.fs.fed.us/r2/projects/scp/assessments/browntrout.pdf [date of access].) No (Freyhof, J. 2011. Salmo trutta . The IUCN Red List of Threatened Species 2011) Resident trouts usually spawn for the first time at 2-3 years. (Freyhof, J. 2011. Salmo trutta . The IUCN Red List of Threatened Species 2011.) 1. human impact 2. flooding 3. natural spread via natural and manmade watercourses Some of the vectors may introduce a taxon into the protected area. Freyhof, J. 2011. Salmo trutta . The IUCN Red List of Threatened Species 2011 Freyhof, J. 2011. Salmo trutta . The IUCN Red List of Threatened Species 2011 (Freyhof, J. 2011. Salmo trutta . The IUCN Red List of Threatened Species 2011 (Freyhof, J. 2013. Salmo trutta. The IUCN Red List of Threatened Species 2013: e.T19861A9050312. http://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T19861A9050312.en) yes, (Freyhof, J. 2013. Salmo trutta. The IUCN Red List of	Very high Very high Medium Low Medium Very high High

42	7.08	Is dispersal of the taxon along any of the	Yes	There is a possibility of a high rate of spread of taxa. Eq. if a	Low
42	7.08	vectors/pathways mentioned in the previous	res	fertilized individual enters a new area by any means of expansion.	LOW
		seven questions (35–41; i.e. both		incluized individual enters a new area by any means of expansion.	
12	7.09	unintentional or intentional) likely to be Is dispersal of the taxon density dependent?	Yes	ves	Hiah
-		ace attributes	165	lyes	Ingn
		Is the taxon able to withstand being out of	No	no	Very high
	0.01	water for extended periods (e.g. minimum of	110		very nigh
		one or more hours) at some stage of its life			
		cycle?			
45	8.02	Is the taxon tolerant of a wide range of	No	The taxon no tolerant of a wide range of water quality.	Medium
43	0.02	water quality conditions relevant to that	NO	The taxon no tolerant of a wide range of water quality.	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	Not applicable	It is not regulated in Croatia	High
40	0.05	the wild with chemical, biological, or other	Not applicable		riigii
		, 5 ,			
47	8.04	agents/means? Is the taxon likely to tolerate or benefit from	No	Freyhof, J. 2011. Salmo trutta . The IUCN Red List of Threatened	Very high
7/	0.04	environmental/human disturbance?		Species 2011	very mgn
40	8.05	Is the taxon able to tolerate salinity levels	No	Freyhof, J. 2011. Salmo trutta . The IUCN Red List of Threatened	Very high
-10	5.05	that are higher or lower than those found in		Species 2011	very mgn
		its usual environment?		Sheries 2011	
10	8.06	Are there effective natural enemies	Yes	Esox lucius (CABI)	Medium
49	0.00	(predators) of the taxon present in the RA	165		neulum
C (Climat	e change			
		e change			
		Under the predicted future climatic	Not applicable	not applicable	Very 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	The risks of establishment S.trutta is decreased. Reason for that is	Medium
		conditions, are the risks of establishment		increased temperatures because its catch has dramatically	
		posed by the taxon likely to increase,		declined in several parts of Europe. (Réalis-Doyelle, E., Pasquet,	
		decrease or not change?		A., De Charleroy, D., Fontaine, P., & Teletchea, F. (2016). Strong	
				Effects of Temperature on the Early Life Stages of a Cold	
				Stenothermal Fish Species, Brown Trout (Salmo trutta L.). PloS	
				one. 11(5). e0155487.	
52	9.03	Under the predicted future climatic	Decrease	The risk of spread in the RA area is reduced. Temperatures are a	Medium
		conditions, are the risks of dispersal within		major problem therefore. (Réalis-Doyelle, E., Pasquet, A., De	
		the RA area posed by the taxon likely to		Charleroy, D., Fontaine, P., & Teletchea, F. (2016). Strong Effects	
		increase, decrease or not change?		of Temperature on the Early Life Stages of a Cold Stenothermal	
				Fish Species, Brown Trout (Salmo trutta L.). PloS one, 11(5),	
				e0155487. https://doi.org/10.1371/journal.pone.0155487)	
53	9.04	Under the predicted future climatic	Lower	Lower (Réalis-Doyelle, E., Pasquet, A., De Charleroy, D., Fontaine,	Low
		conditions, what is the likely magnitude of		P., & Teletchea, F. (2016). Strong Effects of Temperature on the	
	1	future potential impacts on biodiversity		Early Life Stages of a Cold Stenothermal Fish Species, Brown	
		,			1
		and/or ecological integrity/status?		Trout (Salmo trutta L.). PloS one, 11(5), e0155487.	
				https://doi.org/10.1371/journal.pone.0155487)	
54	9.05	Under the predicted future climatic	No change	https://doi.org/10.1371/journal.pone.0155487) It is likely to have a negative impact on the ecosystem and	Medium
54	9.05	Under the predicted future climatic conditions, what is the likely magnitude of	No change	https://doi.org/10.1371/journal.pone.0155487)	Medium
54	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem	No change	https://doi.org/10.1371/journal.pone.0155487) It is likely to have a negative impact on the ecosystem and	Medium
		Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?		https://doi.org/10.1371/journal.pone.0155487) It is likely to have a negative impact on the ecosystem and system functioning, regardless of the assumed population decline.	
	9.05	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	https://doi.org/10.1371/journal.pone.0155487) It is likely to have a negative impact on the ecosystem and	Medium 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		https://doi.org/10.1371/journal.pone.0155487) It is likely to have a negative impact on the ecosystem and system functioning, regardless of the assumed population decline.	
		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		https://doi.org/10.1371/journal.pone.0155487) It is likely to have a negative impact on the ecosystem and system functioning, regardless of the assumed population decline.	

Statistics	
Scores	
BRA	28.0
BRA Outcome	-
BRA+CCA	22.0
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	14.0
4. Undesirable (or persistence) traits	8.0
5. Resource exploitation	5.0
6. Reproduction	2.0
7. Dispersal mechanisms	3.0
8. Tolerance attributes	-4.0
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
3. Invasive elsewhere	5
B. Biology/Ecology	
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	9
Environmental	10
Species or population nuisance traits	6
Thresholds	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.70
BRA	0.72
CCA	0.54
Date and Time	
02/06/20	020 09:13:47

Faxon and Assessor details					
Category	Fishes and Lampreys (freshwater)				
Taxon name	Salvelinus alpinus				
Common name	Arctic charr				
Assessor	Ana Marić				
Risk screening context					
Reason and socio-economic benefits					
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS				
Taxonomy					
Native range					
Introduced range					
URL					

			Response	Justification (references and/or other information)	Confidence
_		graphy/Historical			
1. L		ication/Cultivation			N/ 1
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	Environmental conditions required for intensive farming of Arctic charr (Salvelinus alpinus (L.)) Bjørn-Steinar Sæther, Sten Ivar Siikavuopio & Malcolm Jobling. 2016 Status of arctic charr (Salvelinus alpinus) farming in Norway, Sweden and Iceland BS. Sæther, S. I. Siikavuopio, H. Thorarensen & E. Brännäs. 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	Status of arctic charr (Salvelinus alpinus) farming in Norway, Sweden and Iceland BS. Sæther, S. I. Siikavuopio, H. Thorarensen & E. Brännäs	High
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	S. fontinalis	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	FRESHWATER ALIEN FISH SPECIES INTRODUCED INTO CROATIA FOR AQUACULTURE AND CONSEQUENCES OF THEIR ESCAPES AND RELEASES IN INLAND WATERS Marina Piria1*, Divna Lukić1, Tatjana Boroša-Pecigoš2. 2016	High
5	2.02	What is the quality of the climate matching data?	Medium	FRESHWATER ALIEN FISH SPECIES INTRODUCED INTO CROATIA FOR AQUACULTURE AND CONSEQUENCES OF THEIR ESCAPES AND RELEASES IN INLAND WATERS Marina Piria1*, Divna Lukić1, Tatjana Boroša-Pecigoš2	Medium
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	RISKS TO STOCKS OF NATIVE TROUT OF THE GENUS SALMO (ACTINOPTERYGII: SALMONIFORMES: SALMONIDAE) OF SERBIA AND MANAGEMENT FOR THEIR RECOVERY Predrag SIMONOVIĆ1*, Zoran VIDOVIĆ2, Ana TOŠIĆ1, Dubravka ŠKRABA1, Jelena ČANAK- ATLAGIĆ1, and Vera NIKOLIĆ. 2015	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	RISKS TO STOCKS OF NATIVE TROUT OF THE GENUS SALMO (ACTINOPTERYGII: SALMONIFORMES: SALMONIDAE) OF SERBIA AND MANAGEMENT FOR THEIR RECOVERY Predrag SIMONOVIĆ1*, Zoran VIDOVIĆ2, Ana TOŠIĆ1, Dubravka ŠKRABA1, Jelena ČANAK- ATLAGIĆ1, and Vera NIKOLIĆ. 2015 stocking	
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	FRESHWATER ALIEN FISH SPECIES INTRODUCED INTO CROATIA FOR AQUACULTURE AND CONSEQUENCES OF THEIR ESCAPES AND RELEASES IN INLAND WATERS Marina Piria1*, Divna Lukić1, Tatjana Boroša-Pecigoš. 2016	High
3. 1	Invasive	e elsewhere			
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	FRESHWATER ALIEN FISH SPECIES INTRODUCED INTO CROATIA FOR AQUACULTURE AND CONSEQUENCES OF THEIR ESCAPES AND RELEASES IN INLAND WATERS Marina Piria1*, Divna Lukić1, Tatjana Boroša-Pecigoš. 2016	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	No	RISKS TO STOCKS OF NATIVE TROUT OF THE GENUS SALMO (ACTINOPTERYGII: SALMONIFORMES: SALMONIDAE) OF SERBIA AND MANAGEMENT FOR THEIR RECOVERY Predrag SIMONOVIĆ1*, Zoran VIDOVIĆ2, Ana TOŠIĆ1, Dubravka ŠKRABA1, Jelena ČANAK- ATLAGIĆ1, and Vera NIKOLIĆ. 2015 stocking	High
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	RISKS TO STOCKS OF NATIVE TROUT OF THE GENUS SALMO (ACTINOPTERYGII: SALMONIFORMES: SALMONIDAE) OF SERBIA AND MANAGEMENT FOR THEIR RECOVERY Predrag SIMONOVIĆ1*, Zoran VIDOVIĆ2, Ana TOŠIĆ1, Dubravka ŠKRABA1, Jelena ČANAK- ATLAGIĆ1, and Vera NIKOLIĆ. 2015 stocking	High
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem services?	No	RISKS TO STOCKS OF NATIVE TROUT OF THE GENUS SALMO (ACTINOPTERYGII: SALMONIFORMES: SALMONIDAE) OF SERBIA AND MANAGEMENT FOR THEIR RECOVERY Predrag SIMONOVIĆ1*, Zoran VIDOVIĆ2, Ana TOŠIĆ1, Dubravka ŠKRABA1, Jelena ČANAK- ATLAGIĆ1, and Vera NIKOLIĆ. 2015 stocking	High
		In the taxon's introduced range, are there known adverse socio-economic impacts?	No	RISKS TO STOCKS OF NATIVE TROUT OF THE GENUS SALMO (ACTINOPTERYGII: SALMONIFORMES: SALMONIDAE) OF SERBIA AND MANAGEMENT FOR THEIR RECOVERY Predrag SIMONOVIĆ1*, Zoran VIDOVIĆ2, Ana TOŠIĆ1, Dubravka ŠKRABA1, Jelena ČANAK- ATLAGIĆ1, and Vera NIKOLIĆ. 2015 stocking	High
		/Ecology			
		able (or persistence) traits	1		···· ·
		Is it likely that the taxon will be poisonous or pose other risks to human health?		RISKS TO STOCKS OF NATIVE TROUT OF THE GENUS SALMO (ACTINOPTERYGII: SALMONIFORMES: SALMONIDAE) OF SERBIA AND MANAGEMENT FOR THEIR RECOVERY Predrag SIMONOVIĆ1*, Zoran VIDOVIĆ2, Ana TOŠIĆ1, Dubravka ŠKRABA1, Jelena ČANAK- ATLAGIĆ1, and Vera NIKOLIĆ. 2015 stocking	High
	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	No	https://www.luontoportti.com/suomi/en/kalat/arctic-char	High
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	https://www.luontoportti.com/suomi/en/kalat/arctic-char	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	Environmental conditions required for intensive farming of Arctic charr (Salvelinus alpinus (L.)) Bjørn-Steinar Sæther, Sten Ivar Siikavuopio & Malcolm Jobling . 2016	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?	No	RISKS TO STOCKS OF NATIVE TROUT OF THE GENUS SALMO (ACTINOPTERYGII: SALMONIFORMES: SALMONIDAE) OF SERBIA AND MANAGEMENT FOR THEIR RECOVERY Predrag SIMONOVIĆ1*, Zoran VIDOVIĆ2, Ana TOŠIĆ1, Dubravka ŠKRABA1, Jelena ČANAK- ATLAGIĆ1, and Vera NIKOLIĆ. 2015	Medium
19	4.06	Is the taxon likely to exert adverse impacts	No	RISKS TO STOCKS OF NATIVE TROUT OF THE GENUS SALMO	High
		Is it likely that the taxon will host, and/or	No	(ACTINOPTERYGII: SALMONIFORMES: SALMONIDAE) OF SERBIA AND MANAGEMENT FOR THEIR RECOVERY Predrag SIMONOVIĆ1*, Zoran VIDOVIĆ2, Ana TOŠIĆ1, Dubravka ŠKRABA1, Jelena ČANAK- ATLAGIĆ1, and Vera NIKOLIĆ. 2015 stocking AS S. fontinalis	Medium
20	4.07	act as a vector for, recognised pests and infectious agents that are endemic in the RA	NO	AS 5. IUIUIIIdiis	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	Parasites as indicators of individual feeding specialization in Arctic charr during winter in northern Norway R Knudsen et al. 2016	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	Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin. 646 pp.	High
23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g.	No	Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof,	High
24	4.11	(e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for	No	Berlin. 646 pp. Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin. 646 pp.	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)?	No	FRESHWATER ALIEN FISH SPECIES INTRODUCED INTO CROATIA FOR AQUACULTURE AND CONSEQUENCES OF THEIR ESCAPES AND RELEASES IN INLAND WATERS Marina Piria1*, Divna Lukić1, Tatjana Boroša-Pecigoš 2016	Medium
5. F	Resourc	e exploitation			I
		Is the taxon likely to consume threatened or	Yes	Kottelat, M. and J. Freyhof, 2007. Handbook of European	High
27	5.02	protected native taxa in the RA area? Is the taxon likely to sequester food	Yes	freshwater fishes. Publications Kottelat, Cornol and Freyhof, Kottelat, M. and J. Freyhof, 2007. Handbook of European	High
27	5.02	resources (including nutrients) to the detriment of native taxa in the RA area?	Tes	Restwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin. 646 pp.	ngn
	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. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin. 646 pp.	High
29	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	Simonovic. Risks to stocks. 2015	Very high
30	6.03	Is the taxon likely to hybridise naturally with native taxa?	No	Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof,	Medium
31	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	No	Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof,	High
32	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features)	No	Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof,	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	Berlin. 646 pp. Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof,	High
	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?	2	Berlin. 646 pp. Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin. 646 pp.	High
	Dispersa 7.01	al mechanisms How many potential internal	One	Stocking Simonovic at al. Dicks to stocks, 2015	High
22	7.01	vectors/pathways could the taxon use to disperse within the RA area (with suitable	Ulle	Stocking Simonovic et al. Risks to stocks. 2015	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	FRESHWATER ALIEN FISH SPECIES INTRODUCED INTO CROATIA FOR AQUACULTURE AND CONSEQUENCES OF THEIR ESCAPES AND RELEASES IN INLAND WATERS Marina Piria1*, Divna Lukić1, Tatjana Boroša-Pecigoš 2016	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	Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin. 646 pp.	High
38	7.04	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules	No	Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof,	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	Berlin. 646 pp. Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin. 646 pp.	High
	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	Yes	Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof,	Very high
41	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No	https://www.luontoportti.com/suomi/en/kalat/arctic-char	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	https://www.luontoportti.com/suomi/en/kalat/arctic-char	Medium
	7.09	unintentional or intentional) likely to be Is dispersal of the taxon density dependent? ce attributes	Yes	Density-dependent diel activity in stream-dwelling Arctic charr Salvelinus alpinus A Fingerle, N Larranaga et al. 2016	High

44	8.01	Is the taxon able to withstand being out of	No	Kottelat, M. and J. Freyhof, 2007. Handbook of European	High
44	0.01	water for extended periods (e.g. minimum of	NO	freshwater fishes. Publications Kottelat, Cornol and Freyhof,	riigii
		one or more hours) at some stage of its life		Berlin. 646 pp.	
		cvcle?		Bernin: 040 pp.	
45	8.02	Is the taxon tolerant of a wide range of	No	Kottelat, M. and J. Freyhof, 2007. Handbook of European	Very high
43	0.02	water quality conditions relevant to that	NO	freshwater fishes. Publications Kottelat, Cornol and Freyhof,	very nigh
		taxon? [In the Justification field, indicate the		Berlin. 646 pp.	
		relevant water quality variable(s) being		вении. 646 рр.	
16	8.03	Can the taxon be controlled or eradicated in	No	https://www.luontoportti.com/suomi/en/kalat/arctic-char	Very high
40	0.05		NO	https://www.idontoportti.com/sdoni/en/kaiat/arctic-chai	very night
		the wild with chemical, biological, or other			
47	8.04	agents/means? Is the taxon likely to tolerate or benefit from	No	https://www.luontoportti.com/suomi/en/kalat/arctic-char	Very high
47	0.04		NO	https://www.huohtoportti.com/suohii/en/kalat/arctic-char	very nigh
40	0.05	environmental/human disturbance?	¥	Kathalah Muand J. Fusikafi 2007, Usudhashi af Fusikara) (aux a la la la
48	8.05	Is the taxon able to tolerate salinity levels	Yes	Kottelat, M. and J. Freyhof, 2007. Handbook of European	Very high
		that are higher or lower than those found in		freshwater fishes. Publications Kottelat, Cornol and Freyhof,	
		its usual environment?		Berlin. 646 pp.	
49	8.06	Are there effective natural enemies	Yes	Kottelat, M. and J. Freyhof, 2007. Handbook of European	Very high
		(predators) of the taxon present in the RA		freshwater fishes. Publications Kottelat, Cornol and Freyhof,	
		area?		Berlin. 646 pp. salmonid egg eaters, mammals	
		e change	_		
		e change	1		
50	9.01	Under the predicted future climatic	No change	Kottelat, M. and J. Freyhof, 2007. Handbook of European	High
		conditions, are the risks of entry into the RA		freshwater fishes. Publications Kottelat, Cornol and Freyhof,	
		area posed by the taxon likely to increase,		Berlin. 646 pp.	
		decrease or not change?			
51	9.02	Under the predicted future climatic	Decrease	Kottelat, M. and J. Freyhof, 2007. Handbook of European	High
		conditions, are the risks of establishment		freshwater fishes. Publications Kottelat, Cornol and Freyhof,	
		posed by the taxon likely to increase,		Berlin. 646 pp.	
		decrease or not change?			
52	9.03	Under the predicted future climatic	No change	Kottelat, M. and J. Freyhof, 2007. Handbook of European	High
		conditions, are the risks of dispersal within		freshwater fishes. Publications Kottelat, Cornol and Freyhof,	
		the RA area posed by the taxon likely to		Berlin. 646 pp.	
		increase, decrease or not change?			
53	9.04	Under the predicted future climatic	Lower	Kottelat, M. and J. Freyhof, 2007. Handbook of European	High
		conditions, what is the likely magnitude of		freshwater fishes. Publications Kottelat, Cornol and Freyhof,	
		future potential impacts on biodiversity		Berlin. 646 pp.	
		and/or ecological integrity/status?			
54	9.05	Under the predicted future climatic	No change	Kottelat, M. and J. Freyhof, 2007. Handbook of European	Medium
		conditions, what is the likely magnitude of		freshwater fishes. Publications Kottelat, Cornol and Freyhof,	
		future potential impacts on ecosystem		Berlin. 646 pp.	
		structure and/or function?			
55	9.06	Under the predicted future climatic	No change	Kottelat, M. and J. Freyhof, 2007. Handbook of European	High
		conditions, what is the likely magnitude of		freshwater fishes. Publications Kottelat, Cornol and Freyhof,	
		future potential impacts on ecosystem		Berlin. 646 pp.	
		services/socio-economic factors?			1

Statistics	
Scores	
BRA	15.5
BRA Outcome	-
BRA+CCA	11.5
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	6.5
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	1.5
B. Biology/Ecology	9.0
4. Undesirable (or persistence) traits	0.0
5. Resource exploitation	7.0
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
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	13
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk	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	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
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 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	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 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	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 4
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 4
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 6 6 6 6 6 6 4 4
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 6 6 6 6 6 6 4 4

-
-
0.78
0.79
0.71

Time 26/05/2021 16:49:41

Date and Time

axon and Assessor details				
Category	Fishes and Lampreys (freshwater)			
Taxon name	Salvelinus alpinus			
Common name	Arctic charr			
Assessor	Ivan Špelić			
Risk screening context				
Reason and socio-economic benefits				
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS			
Taxonomy				
Native range				
Introduced range				
URL				

			Response	Justification (references and/or other information)	Confidence
A.	Biogeo	graphy/Historical	-		
		ication/Cultivation			
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	S. alpinus has been commercially farmed since the early 90ths and today, the total production is 3000, 2300 and 700 tonnes/year in Iceland, Sweden and Norway, respectively. (4) (PDF) Arctic charr farming. Available from: https://www.researchgate.net/publication/277835864_Arctic_charr farming [accessed Mar 04 2020].	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	No	Restocking is done with farmed fish (Savari et al. 2017).	Low
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	Salvelinus fontinalis (CABI 2019).	High
2. (limate	, 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	Climatch 2020	Medium
5	2.02	What is the quality of the climate matching data?	Medium	Climatch 2020	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	Lenhardt, M., Markovic, G., Hegedis, A. et al. Non-native and translocated fish species in Serbia and their impact on the native ichthyofauna. Rev Fish Biol Fisheries 21, 407–421 (2011).	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	Not applicable	Already present.	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)?	Not applicable	Already present.	Very high
3. 1	nvasiv	e elsewhere			
9	3.01	Has the taxon become naturalised	Yes	Welcomme, R.L., 1988. International introductions of inland	Very high
10	3.02	(established viable populations) outside its In the taxon's introduced range, are there known adverse impacts to wild stocks or	Yes	aquatic species. FAO Fish. Tech. Pap. No. 294. 318: 115–119. U.S. Fish & Wildlife Service, Web Version, 1/31/2019: Arctic Char (Salvelinus alpinus). Ecological Risk Screening Summary	Low
11	3.03	commercial taxa? In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	Farmed in aquaculture (Froese & Pauly 2020), no adverse impact.	High
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem services?	No	There are no known negative impacts of arctic char on humans (Flack, M. 2019. "Salvelinus alpinus" (On-line), Animal Diversity Web. Accessed May 04, 2020 at https://animaldiversity.org/accounts/Salvelinus_alpinus/).	Medium
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	(Flack, M. 2019. "Salvelinus alpinus" (On-line), Animal Diversity Web. Accessed May 04, 2020 at https://animaldiversity.org/accounts/Salvelinus alpinus/).	Medium
B.	Biology	y/Ecology			1
		able (or persistence) traits			
14	4.01	Is it likely that the taxon will be poisonous or pose other risks to human health?	No	Harmless (Froese & Pauly 2020).	Very high
	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	No	It is typically found in cool or cold lakes with depauperate fish communities. In alpine or northern lakes, it is often the only fish species (U.S. Fish & Wildlife Service, Web Version, 1/31/2019: Arctic Char (Salvelinus alpinus). Ecological Risk Screening Summary). The impacts of this species are currently unknown (Pam Fuller, and Matt Neilson, 2020, Salvelinus alpinus (Linnaeus, 1758): U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, FL, https://nas.er.usgs.gov/queries/FactSheet.aspx?SpeciesID=935, Revision Date: 4/30/2012. Peer Review Date: 4/30/2012. Access	Low
	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	No parasitic behaviour.	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	Occurs in the sea along coasts, estuaries, rivers, and lakes with cold, clear water (Froese & Pauly 2020).	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	U.S. Fish & Wildlife Service, Web Version, 1/31/2019: Arctic Char (Salvelinus alpinus). Ecological Risk Screening Summary	Low
	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	There are no known negative impacts of arctic char on humans (Flack, M. 2019. "Salvelinus alpinus" (On-line), Animal Diversity Web. Accessed May 04, 2020 at https://animaldiversity.org/accounts/Salvelinus_alpinus/).	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	U.S. Fish & Wildlife Service, Web Version, 1/31/2019: Arctic Char (Salvelinus alpinus). Ecological Risk Screening Summary	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	Yes	U.S. Fish & Wildlife Service, Web Version, 1/31/2019: Arctic Char (Salvelinus alpinus). Ecological Risk Screening Summary	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	Maximum size 107 cm and 15 KG (Froese & Pauly 2020).	Very high
23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g.	Yes	Occurs in the sea along coasts, estuaries, rivers, and lakes with cold, clear water (Froese & Pauly 2020).	Very 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	No	Typical environment of the charr is oligotrophic and ultraoligotrophic lakes (U.S. Fish & Wildlife Service, Web Version, 1/31/2019: Arctic Char (Salvelinus alpinus). Ecological Risk	Low
25	4.12	native taxa? Is the taxon likely to maintain a viable population even when present in low	No	Screening Summary). No, minimum population doubling time 4.5 - 14 years (Froese & Pauly 2020).	Low
		densities (or persisting in adverse conditions by way of a dormant form)?			
5. R	lesourc	e exploitation			
		Is the taxon likely to consume threatened or protected native taxa in the RA area?	Yes	Flack, M. 2019. "Salvelinus alpinus" (On-line), Animal Diversity Web. Accessed May 04, 2020 at https://animaldiversity.org/accounts/Salvelinus_alpinus/	High
27	5.02	Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?	Not applicable	No data for calculation.	Very high
6. R	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	Froese & Pauly 2020.	Very high
29	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	Lenhardt, M., Markovic, G., Hegedis, A. et al. Non-native and translocated fish species in Serbia and their impact on the native ichthyofauna. Rev Fish Biol Fisheries 21, 407–421 (2011).	Very high
30	6.03	Is the taxon likely to hybridise naturally with native taxa?	No	Hybridization with Salmo trutta is possible in hatcheries but survival is low. No hybridization reported in nature (Hisar SA, Yanik T, Hisar O (2003). Hatchery and growth performance of trout pure breeds, Salvelinus alpinus and Salmo trutta fario, and their hybrid. The Israeli J. Aquaculture – Bamidgeh, 55(3): 154-	Low
31	6.04	Is the taxon likely to be hermaphroditic or to	No	Froese & Pauly 2020	Very high
32	6.05	display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features)	No	Froese & Pauly 2020.	High
33	6.06	to complete its life cycle? Is the taxon known (or likely) to produce a	Yes	Max 8065 eggs per female (Froese & Pauly 2020).	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) does the taxon require to reach the age-at- first-reproduction?	3	Minimum 3 years (Froese & Pauly 2020).	Medium
7. C	Dispersa	al mechanisms	1		
		How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable	One	Stocking for angling (U.S. Fish & Wildlife Service, Web Version, 1/31/2019: Arctic Char (Salvelinus alpinus). Ecological Risk Screening Summary).	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)?	No	Personal opinion.	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	No	No adaptations.	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	Could probably be established only in lakes (no current to disperse eggs), eggs covered in gravel (Froese & Pauly 2020, Flack, M. 2019. "Salvelinus alpinus" (On-line), Animal Diversity Web. Accessed May 04, 2020 at	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	Could probably be established only in lakes (no current to disperse juveniles).	Medium
	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	No	Migration in anadromous populations (Froese & Pauly 2020), highly unlikely in RA area.	High
41	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No	Eggs covered in redd (Froese & Pauly 2020).	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	Stocking.	High
	7.09 Tolerand	unintentional or intentional) likely to be	No	Not documented.	Medium
		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	Sensitive species (temperature and oxygen) (Froese & Pauly 2020).	Very high
			1		
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	No	Extremely sensitive to water pollution (Froese & Pauly 2020).	Very high

		Is the taxon likely to tolerate or benefit from environmental/human disturbance?	No	Typical environment of the charr is oligotrophic and ultraoligotrophic lakes (U.S. Fish & Wildlife Service, Web Version, 1/31/2019: Arctic Char (Salvelinus alpinus). Ecological Risk Screening Summary). Any type of human disturbance usually results in eutrophication (reservoirs, pollution).	Medium
48		Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	Yes	Anadromous species (Froese & Pauly 2020).	Very high
		Are there effective natural enemies (predators) of the taxon present in the RA e change	Yes	Piscivorous birds, otters (personal opinion).	Medium
		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?	Not applicable	Already present.	High
51		Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	Decrease	James D. Reist , Michael Power & J. Brian Dempson (2013): Arctic charr (Salvelinus alpinus): a case studyof the importance of understanding biodiversity and taxonomic issues in northern fishes, Biodiversity, 14:1, 45-56	High
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?	Decrease	James D. Reist , Michael Power & J. Brian Dempson (2013): Arctic charr (Salvelinus alpinus): a case studyof the importance of understanding biodiversity and taxonomic issues in northern fishes, Biodiversity, 14:1, 45-56	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	James D. Reist , Michael Power & J. Brian Dempson (2013): Arctic charr (Salvelinus alpinus): a case studyof the importance of understanding biodiversity and taxonomic issues in northern fishes, Biodiversity, 14:1, 45-56	High
54		Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Lower	James D. Reist , Michael Power & J. Brian Dempson (2013): Arctic charr (Salvelinus alpinus): a case studyof the importance of understanding biodiversity and taxonomic issues in northern fishes, Biodiversity, 14:1, 45-56	High
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 predicted impact in current conditions, no change under future conditions.	High

Statistics	
Scores	
BRA	14.0
BRA Outcome	-
BRA+CCA	6.0
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	5.0
4. Undesirable (or persistence) traits	4.0
5. Resource exploitation	5.0
6. Reproduction	1.0
7. Dispersal mechanisms	-4.0
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	13
1. Domestication/Cultivation 2. Climate, distribution and introduction risk	13
1. Domestication/Cultivation	13 3 5 5
1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology	13 3 5 5 36
1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere	13 3 5 5 36 12
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
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
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 5 36 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	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	13 3 5 5 36 12 2 7 7 9 6 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 7 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 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
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 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 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial Species or population nuisance traits	13 3 5 5 36 12 2 7 9 6 6 6 6 6 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 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 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 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial Species or population nuisance traits	13 3 5 5 36 12 2 7 9 6 6 6 6 6 7

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Taxon and Assessor details		
Category	Fishes and Lampreys (freshwater)	
Taxon name	Salvelinus alpinus	
Common name	Arctic charr	
Assessor	Tamara Kanjuh	
Risk screening context		
Reason and socio-economic benefits		
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS	
Taxonomy		
Native range		
Introduced range		
URL		

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
	1	ication/Cultivation		The first because interstation of the state	Manu Isiat
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	The first known introduction of charr in the Balkans likely dates back to 1928, when Salvelinus sp. from Italy was introduced to Krnsko Lake in Slovenia. The second introduction to Slovenia from Austria oc-curred in 1943 in Bohinj Lake for sport fishing purposes (Povž&Ocvirk. 1990).	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	Salvelinus alpinus is used for commercial purposes (https://www.fishbase.de/summary/Salvelinus-alpinus.html)	Very high
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	No	No information found.	Low
2. (Climate.	, distribution and introduction risk			
4	2.01	How similar are the climatic conditions of the	Low	Dfa, Dfb (Köppen-Geiger climate classification system)	Medium
		Risk Assessment (RA) area and the taxon's native range?			
5	2.02	What is the quality of the climate matching data?	High	Köppen-Geiger climate classification system	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	The Serbian literature refers to S. alpinus as an introduced species, first in Kokin Brod reservoir in 1943, then later in Vlasina Lake (Simonović, 2006).	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	Aquaculture (Piria et al., 2017)	Very high
8	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA	Yes	The taxon is found in the RA region (Piria et al., 2017)	Very high
		area in the near future (e.g. unintentional and intentional introductions)?			
3 1	nvasive	e elsewhere			
9	3.01	Has the taxon become naturalised	Yes	There are allegations that charr is very well adapted to	Medium
		(established viable populations) outside its		environmental conditions in RA (Vuković&Kosorić)	
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	Due to the diet, they can affect the availability of prey (Klementsen et al., 2003).	Low
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	No information found.	Low
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	No	No information found.	Low
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	No information found.	Low
B. I	Biology	//Ecology			
		able (or persistence) traits	1		1
		Is it likely that the taxon will be poisonous or pose other risks to human health?		There are no known negative impacts of arctic char on humans (Freyhof&kottelat, 2008).	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	Food competition.	Low
16	4.03	Are there any threatened or protected taxa	No	Arctic char are motile and natatorial	Very high
		that the non-native taxon would parasitise in		(https://animaldiversity.org/accounts/Salvelinus_alpinus/#09E563	
17	4.04	the RA area? Is the taxon adaptable in terms of climatic	No	7A-B5CA-11E8-A12E-005056AB59D3). Although there is some evidence for thermal adaptation to very	High
1/	4.04	and other environmental conditions, thus	110	low temperatures in cold rivers (mean annual temperature	'''''
1		enhancing its potential persistence if it has		<6.5°C), there is no corresponding adaptation to increasing	
1		invaded or could invade the RA area?		temperature, even in a hot geothermal river. When water	
1				temperatures exceed 22–28°C for S. salar, 22–25°C for S. trutta	
1				and 22–23°C for S. alpinus, the fishes will soon die unless they can move to cooler water. Deep pools with cooler water near the	
1				bottom serve as refugia in streams and rivers and should be	
				maintained or even created when scarce (Elliot et al., 2010)	
18	4.05	Is the taxon likely to disrupt food-web	Yes	In 10 Norwegian charr lakes, Langeland (1978) found that charr	Very high
		structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA		selected cladocerans above copepods and that increasing predation had negative effects on large cladocerans and also	
		area?		affected the size of two important prey species.	
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	No information found.	Low
20	4.07	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and	No	No information found.	Low
		infectious agents that are endemic in the RA			
21	4.08	Is it likely that the taxon will host, and/or	No	No information found.	Low
		act as a vector for, recognised pests and infectious agents that are absent from (novel			
	4.00	to) the RA area?	No	No information found	Low
22	4.09	Is it likely that the taxon will achieve a body size that will make it more likely to be	No	No information found.	Low
		released from captivity?			

23					
	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g.	Yes	The study of Grnbaum et al. (2008) showed that the use of a higher water velocity immediately after hatching is associated	Very high
		versatile in habitat use)?		with a significant increase in growth.	
24	4.11	Is it likely that the taxon's mode of existence	Yes	In a 6-year experimental study in one lake, Langeland (1982)	Very high
		(e.g. excretion of by-products) or behaviours		found that predation from charr changed the zooplankton	
		(e.g. feeding) will reduce habitat quality for		community from large- to smallsized species. The predation also	
		native taxa?		affected body size and the production of resting eggs in	
25	4.12	To the target likely to project in a sight-	No	cladocerans negatively (Klementsen et al., 2003).	1
25	4.12	Is the taxon likely to maintain a viable	INO	No information found.	Low
		population even when present in low densities (or persisting in adverse conditions			
		by way of a dormant form)?			
5. I	Resourd	ce exploitation			
	5.01	Is the taxon likely to consume threatened or	No	No information found.	Low
		protected native taxa in the RA area?			
27	5.02	Is the taxon likely to sequester food	Yes	In addition to the diet, there is a possibility that the taxon will use	Medium
		resources (including nutrients) to the		the available resources to the detriment of native species	
5 1	Reprodu	detriment of native taxa in the RA area?		(Klementsen et al., 2003)	
		Is the taxon likely to exhibit parental care	No	No parental involvement	Medium
		and/or to reduce age-at-maturity in response		(https://animaldiversity.org/accounts/Salvelinus_alpinus/).	
		to environmental conditions?			
29	6.02	Is the taxon likely to produce viable gametes	Yes	The literature points out that the taxon is adapted to the	Low
		or propagules (in the RA area)?		conditions in RA (Vukovič&Kosorić)	
30	6.03	Is the taxon likely to hybridise naturally with	Yes	Salvelinus aplinus x Salmo trutta (Chevassus, 1979).	Medium
21	6.04	native taxa? Is the taxon likely to be hermaphroditic or to	No	No information found.	Medium
τı	0.04	display asexual reproduction?	140		meululli
32	6.05	Is the taxon dependent on the presence of	No	No information found.	Low
		another taxon (or specific habitat features)			
		to complete its life cycle?			
33	6.06	Is the taxon known (or likely) to produce a	Yes	Range number of offspring: 2,500 to 8,500	High
	1	large number of propagules or offspring		(https://animaldiversity.org/accounts/Salvelinus_alpinus/)	
21	6.07	within a short time span (e.g. < 1 year)?	4	Sexual maturity in arctic char ranges from 4 years to 10 years -14	Very high
54	6.07	How many time units (days, months, years) does the taxon require to reach the age-at-	4	Sexual maturity in arctic char ranges from 4 years to 10 years old, usually when they reach around 500-600 mm in length	very nign
		first-reproduction?		(https://animaldiversity.org/accounts/Salvelinus_alpinus/#4D908F	
				B0-CA64-11E8-AE5C-005056AB59D3)	
7. I	Dispers	al mechanisms			
5	7.01	How many potential internal	>1	Aquaculture, sport fishing (Piria et al., 2017)	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	One of the first places where the taxon was introduced in Serbia is	High
		taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)?		Kokin Brod, which belongs to the Uvac Special Nature Reserve (Piria et al., 2017)	
37	7.03	Does the taxon have a means of actively	No	No information found.	Medium
	/	attaching itself to hard substrata (e.g. ship			. iculari
		hulls, pilings, buoys) such that it enhances			
		the likelihood of dispersal?			
38	7.04	Is natural dispersal of the taxon likely to	No	No information found.	Low
		occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?			
29	7.05	Is natural dispersal of the taxon likely to	Yes	The dispersal could occur in the juvenile stages (Janjua et al.,	Medium
,,,	1.05	occur as larvae/juveniles (for animals) or as	103	2010).	neulum
		fragments/seedlings (for plants) in the RA		2010).	
		area?			
40	7.06	Are older life stages of the taxon likely to	Yes	Anadromus and semi-anadromus, fluviatile-lacustrine and dwarf	High
1 1	7 07	migrate in the RA area for reproduction?	No	stocks are known (Kottelat&Freyhof, 2007)	Low
ŧ٦	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No	No information found.	Low
12	7.08	Is dispersed in the RA area by other animals?	Yes	Literary references indicate the release of the taxon into the water	Very high
. 2	,.00	vectors/pathways mentioned in the previous	103	by anglers or his escape from the farm (Piria et al., 2017 - D.Jelić,	very mgn
	1	seven questions (35–41; i.e. both		personal communication)	
		unintentional or intentional) likely to be			
3	7.09	Is dispersal of the taxon density dependent?	No	Characteristics that make these species suitable for commercial	Very high
3	7.09		No	farming in cold-water recirculating aquaculture systems include	Very high
		Is dispersal of the taxon density dependent?	No	•	Very high
3.	Toleran	Is dispersal of the taxon density dependent? ce attributes		farming in cold-water recirculating aquaculture systems include tolerance of S. alpinus to high density culture (Prokešova et al.,	
3.	Toleran	Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of	No	farming in cold-water recirculating aquaculture systems include	Very high Medium
3.	Toleran	Is dispersal of the taxon density dependent? ce attributes		farming in cold-water recirculating aquaculture systems include tolerance of S. alpinus to high density culture (Prokešova et al.,	
3 <u>.</u> 14	Toleran 8.01	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?		farming in cold-water recirculating aquaculture systems include tolerance of S. alpinus to high density culture (Prokešova et al.,	
4	Toleran	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		farming in cold-water recirculating aquaculture systems include tolerance of S. alpinus to high density culture (Prokešova et al., No information found. Dong et al. (2011) reviewed that hyperoxia may enhance food	
3 <u>.</u> 4	Toleran 8.01	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	farming in cold-water recirculating aquaculture systems include tolerance of S. alpinus to high density culture (Prokešova et al., No information found. Dong et al. (2011) reviewed that hyperoxia may enhance food intake, feed conversion efficiency, growth performance, survival,	Medium
4	Toleran 8.01	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 <u>cycle</u> ? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the	No	farming in cold-water recirculating aquaculture systems include tolerance of S. alpinus to high density culture (Prokešova et al., No information found. Dong et al. (2011) reviewed that hyperoxia may enhance food	Medium
4	Toleran 8.01 8.02	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	No Yes	farming in cold-water recirculating aquaculture systems include tolerance of S. alpinus to high density culture (Prokešova et al., No information found. Dong et al. (2011) reviewed that hyperoxia may enhance food intake, feed conversion efficiency, growth performance, survival, and tolerance to ammonia.	Medium
4	Toleran 8.01	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	No	farming in cold-water recirculating aquaculture systems include tolerance of S. alpinus to high density culture (Prokešova et al., No information found. Dong et al. (2011) reviewed that hyperoxia may enhance food intake, feed conversion efficiency, growth performance, survival,	Medium
3 <u>.</u> 4	Toleran 8.01 8.02	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	No Yes	farming in cold-water recirculating aquaculture systems include tolerance of S. alpinus to high density culture (Prokešova et al., No information found. Dong et al. (2011) reviewed that hyperoxia may enhance food intake, feed conversion efficiency, growth performance, survival, and tolerance to ammonia.	Medium
5	Toleran 8.01 8.02	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	No Yes	farming in cold-water recirculating aquaculture systems include tolerance of S. alpinus to high density culture (Prokešova et al., No information found. Dong et al. (2011) reviewed that hyperoxia may enhance food intake, feed conversion efficiency, growth performance, survival, and tolerance to ammonia.	Medium
5	8.01 8.02 8.03 8.04	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 <u>cycle</u> ? 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?	No Yes No	farming in cold-water recirculating aquaculture systems include tolerance of S. alpinus to high density culture (Prokešova et al., No information found. Dong et al. (2011) reviewed that hyperoxia may enhance food intake, feed conversion efficiency, growth performance, survival, and tolerance to ammonia. No information found. No information found.	Medium Medium Low
- - - - - - 7	8.01 8.02 8.03	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? Is the taxon able to tolerate salinity levels	No Yes No	farming in cold-water recirculating aquaculture systems include tolerance of S. alpinus to high density culture (Prokešova et al., No information found. Dong et al. (2011) reviewed that hyperoxia may enhance food intake, feed conversion efficiency, growth performance, survival, and tolerance to ammonia. No information found. No information found. The taxon includes anadromus and semi-anadromus species	Medium Medium Low
- - - - - - 7	8.01 8.02 8.03 8.04	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? Is the taxon able to tolerate salinity levels that are higher or lower than those found in	No Yes No	farming in cold-water recirculating aquaculture systems include tolerance of S. alpinus to high density culture (Prokešova et al., No information found. Dong et al. (2011) reviewed that hyperoxia may enhance food intake, feed conversion efficiency, growth performance, survival, and tolerance to ammonia. No information found. No information found.	Medium Medium Low
4 5 6 7 8	Toleran 8.01 8.02 8.03 8.04 8.05	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? Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	No Yes No Yes	farming in cold-water recirculating aquaculture systems include tolerance of S. alpinus to high density culture (Prokešova et al., No information found. Dong et al. (2011) reviewed that hyperoxia may enhance food intake, feed conversion efficiency, growth performance, survival, and tolerance to ammonia. No information found. No information found. The taxon includes anadromus and semi-anadromus species (Kottelat&Freyhof, 2007)	Medium Medium Low Medium
4 5 6 7 8	8.01 8.02 8.03 8.04	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? 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 Yes No	farming in cold-water recirculating aquaculture systems include tolerance of S. alpinus to high density culture (Prokešova et al., No information found. Dong et al. (2011) reviewed that hyperoxia may enhance food intake, feed conversion efficiency, growth performance, survival, and tolerance to ammonia. No information found. No information found. The taxon includes anadromus and semi-anadromus species (Kottelat&Freyhof, 2007) Humans	Medium Medium Low
-5 -6 -7 -8	Toleran 8.01 8.02 8.03 8.04 8.05	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 its usual environment? Are there effective natural enemies (predators) of the taxon present in the RA	No Yes No Yes	farming in cold-water recirculating aquaculture systems include tolerance of S. alpinus to high density culture (Prokešova et al., No information found. Dong et al. (2011) reviewed that hyperoxia may enhance food intake, feed conversion efficiency, growth performance, survival, and tolerance to ammonia. No information found. No information found. The taxon includes anadromus and semi-anadromus species (Kottelat&Freyhof, 2007) Humans (https://animaldiversity.org/accounts/Salvelinus_alpinus/#4D908F	Medium Medium Low Medium
	Toleran 8.01 8.02 8.03 8.04 8.05 8.06	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? 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 Yes No Yes	farming in cold-water recirculating aquaculture systems include tolerance of S. alpinus to high density culture (Prokešova et al., No information found. Dong et al. (2011) reviewed that hyperoxia may enhance food intake, feed conversion efficiency, growth performance, survival, and tolerance to ammonia. No information found. No information found. The taxon includes anadromus and semi-anadromus species (Kottelat&Freyhof, 2007) Humans	Medium Medium Low Medium

	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	There are no significant differences Elliot et al., 2010).	Medium
	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	There are no significant differences Elliot et al., 2010).	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	There are no significant differences Elliot et al., 2010).	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	There are no significant differences Elliot et al., 2010).	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	There are no significant differences Elliot et al., 2010).	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	There are no significant differences (Elliot et al., 2010).	Medium

Statistics

Scores	
BRA	13.5
BRA Outcome	-
BRA+CCA	11.5
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	4.5
1. Domestication/Cultivation	2.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	1.5
B. Biology/Ecology	9.0
4. Undesirable (or persistence) traits	2.0
5. Resource exploitation	2.0
6. Reproduction	2.0
7. Dispersal mechanisms	2.0
8. Tolerance attributes	1.0
C. Climate change	-2.0
9. Climate change	-2.0
Answered Questions	
Total	55 13
A. Biogeography/Historical 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	
6. Reproduction	2
7. Dispersal mechanisms	9
8. Tolerance attributes	6
C. Climate change	6
9. Climate change	6
Sectors affected	<u> </u>
Commercial	5
Environmental	3
Species or population nuisance traits	8
	-
Thresholds	
BRA	-
BRA+CCA	_
Confidence	
BRA+CCA	0.56
BRA	0.57
CCA	0.50

Date and Time 28/05/2021 09:06:26

Taxon and Assessor details	
Category	Fishes and Lampreys (freshwater)
Taxon name	Salvelinus alpinus
Common name	Arctic charr
Assessor	Tena Radocaj
Risk screening context	
Reason and socio-economic benefits	
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS
Taxonomy	
Native range	
Introduced range	
URL	

			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	Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater fishes. Publications Kottelat, Cornol, Switzerland. This species introduced only in Croatia; Knin fish farm	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	S.alpinus used for human consumption. (Kapetanović, D., Vardić, I., Valić, D., & Teskeredz [×] ić, E. (2010). Furunculosis in cultured Arctic charr (Salvelinus alpinus) in Croatia. Aquaculture research, 41(10), e719-e721.)	Low
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	No	Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater fishes. Publications Kottelat, Cornol, Switzerland.	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	Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater fishes. Publications Kottelat, Cornol, Switzerland. I use climatch. The similarity between climatic conditions RA area and native	High
5	2.02	What is the quality of the climate matching data?	High	Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater fishes. Publications Kottelat, Cornol, Switzerland. The quality of the climate matching data is high.	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	In Croatia, arctic charr Salvelinus alpinus (Linnaeus, 1758) was introduced from Bohinj Lake to Kozjak Lake (one of the Plitvice Lakes) in 1963 (Pažur 1970). Later, anglers released arctic charr in several inland waters, including the Ruda River in the 1980s (Josip Budinski, pers. comm.), or specimens escaped from farms, though the distribution of this species has not yet been revised (D. Jelić, pers. comm.). 8Pofuk, M., Zanella, D., & Piria, M. (2017). An overview of the translocated native and non-native fish species in Croatia: pathways, impacts and management. Management of biological invasions, 8(3), 425.)	High
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	None	This species is present in Croatia	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)?	Not applicable	This species is present in Croatia	Very high
3. 1	Invasive	e elsewhere			
9	3.01	Has the taxon become naturalised (established viable populations) outside its	Yes	Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater fishes. Publications Kottelat, Cornol, Switzerland.	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater fishes. Publications Kottelat, Cornol, Switzerland.	High
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	Yes	Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater fishes. Publications Kottelat, Cornol, Switzerland.	Medium
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	Yes	Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater fishes. Publications Kottelat, Cornol, Switzerland.	Low
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	no data	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	Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater fishes. Publications Kottelat, Cornol, Switzerland.	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	Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater fishes. Publications Kottelat, Cornol, Switzerland.	Medium
		Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater fishes. Publications Kottelat, Cornol, Switzerland.	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 adaptable in terms of climatic and other environmental conditions.	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 data	Low
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	no data	Low
20	4.07	act as a vector for, recognised pests and infectious agents that are endemic in the RA	Yes	Yes, the taxon may be a host or vector of known pests and infectious agents endemic to RA area. Because in every area exist infectious agents and pests.	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 Yes	Furunculosis, caused by Aeromonas salmonicida, is probably themost abundant disease in European aquaculture. Crane and Hyatt (2011) report that Salvelinus alpinus can be infected with infectious salmon anemia virus. According to Froese and Pauly (2018b), Salvelinus alpinus is a host for Abothrium crissum, Caligus elongatus, Diphyllobothrium dendriticum, D. ditremum, D. salvelini. 8Froese, R., and D. Pauly, editors. 2018a. Salvelinus alpinus (Linnaeus, 1758). FishBase. Available: https://www.fishbase.de/summarv/Salvelinus-alpinus.html. Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater fishes. Publications Kottelat, Cornol, Switzerland.	Medium Very high
23	4.10	released from captivity? Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g.	Yes	Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater fishes. Publications Kottelat, Cornol, Switzerland.	Very high
24	4.11	(e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for	No	Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater fishes. Publications Kottelat, Cornol, Switzerland.	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	Yes	Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater fishes. Publications Kottelat, Cornol, Switzerland.	Medium
		by way of a dormant form)?			
		te exploitation Is the taxon likely to consume threatened or protected native taxa in the RA area?	Yes	It is possible that it consume endangered and protected native taxa in the RA area. If there are protected taxa in the RA area will	Low
				consume them, whether or not the taxon is endangered.	
27	5.02	Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?	Not applicable	not applicable	Very high
	Reprodu	uction			
28	6.01	Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?	No	Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater fishes. Publications Kottelat, Cornol, Switzerland.	High
29	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater fishes. Publications Kottelat, Cornol, Switzerland.	Low
	6.03 6.04	Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to	No	Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater fishes. Publications Kottelat, Cornol, Switzerland.	Low Very high
	6.05	display asexual reproduction? Is the taxon dependent on the presence of	No	Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater fishes. Publications Kottelat, Cornol, Switzerland. Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater	Very high
		another taxon (or specific habitat features) to complete its life cycle?		fishes. Publications Kottelat, Cornol, Switzerland.	, ,
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	Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater fishes. Publications Kottelat, Cornol, Switzerland.	High
34	6.07	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	2	Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater fishes. Publications Kottelat, Cornol, Switzerland.	High
	1	al mechanisms			
35	7.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable	>1	1. human impact 2. flooding 3. natural spread via natural and manmade watercourses	Medium
36	7.02	Will any of these vectors/pathways bring the taxon in close proximity to one or more	No	No any of this vectors/pathways bring the taxon in close proximity in the protected areas.	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 the likelihood of dispersal?	No	no	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?	No	Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater fishes. Publications Kottelat, Cornol, Switzerland.	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	Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater fishes. Publications Kottelat, Cornol, Switzerland.	High
	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	Yes	Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater fishes. Publications Kottelat, Cornol, Switzerland.	Very high
41	7.07	Are propagules or eggs of the taxon likely to	No	Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater	Very high
	1	be dispersed in the RA area by other animals?	Voc	fishes. Publications Kottelat, Cornol, Switzerland. There is a possibility of a high rate of spread of taxa. Eg. if a	
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	fertilized individual enters a new area by any means of expansion.	Low
	7.08	vectors/pathways mentioned in the previous	No	fertilized individual enters a new area by any means of expansion. Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater	High
43	7.09	vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be		fertilized individual enters a new area by any means of expansion.	
43 8. 7	7.09 Foleran	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		fertilized individual enters a new area by any means of expansion. Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater	
43 <u>8. 7</u> 44	7.09 Foleran	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	fertilized individual enters a new area by any means of expansion. Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater fishes. Publications Kottelat, Cornol, Switzerland. Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater	High
43 <u>8. 7</u> 44 45	7.09 <i>Foleran</i> 8.01	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	fertilized individual enters a new area by any means of expansion. Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater fishes. Publications Kottelat, Cornol, Switzerland. Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater fishes. Publications Kottelat, Cornol, Switzerland. Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater	High Very high

48		Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	Yes	Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater fishes. Publications Kottelat, Cornol, Switzerland.	Very high
49	8.06	Are there effective natural enemies (predators) of the taxon present in the RA area?	No	Brown trout and Pikeperch (Vilhunen, S., & Hirvonen, H. (2003). Innate antipredator responses of Arctic charr (Salvelinus alpinus) depend on predator species and their diet. Behavioral Ecology and Sociobiology, 55(1), 1-10.)	Medium
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?	Not applicable	not applicable	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?	Decrease	The risks of establishment S.alpinus is decreased. Reason for that is increased temperatures because its catch has dramatically declined in several parts of Europe. (Elliott, J., & Elliott, J. A. (2010). Temperature requirements of Atlantic salmon Salmo salar, brown trout Salmo trutta and Arctic charr Salvelinus alpinus: predicting the effects of climate change. Journal of fish biology.	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?	Decrease	The risk of spread in the RA area is reduced. Temperatures are a major problem therefore. (Elliott, J., & Elliott, J. A. (2010). Temperature requirements of Atlantic salmon Salmo salar, brown trout Salmo trutta and Arctic charr Salvelinus alpinus: predicting the effects of climate change. Journal of fish biology, 77(8), 1793-	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	Decrease (Elliott, J., & Elliott, J. A. (2010). Temperature requirements of Atlantic salmon Salmo salar, brown trout Salmo trutta and Arctic charr Salvelinus alpinus: predicting the effects of climate change. Journal of fish biology, 77(8), 1793-1817.)	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	It is likely to no have impact on the ecosystem and system functioning. (Elliott, J., & Elliott, J. A. (2010). Temperature requirements of Atlantic salmon salar, brown trout Salmo trutta and Arctic charr Salvelinus alpinus: predicting the effects of climate change. Journal of fish biology, 77(8), 1793-1817.)	Low
55		Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	No change	Elliott, J., & Elliott, J. A. (2010). Temperature requirements of Atlantic salmon Salmo salar, brown trout Salmo trutta and Arctic charr Salvelinus alpinus: predicting the effects of climate change. Journal of fish biology, 77(8), 1793-1817.	Low

28.0
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	BRA+CCA	0.65
	BRA	0.69
	CCA	0.38
Date and Time		
	02/06/20	020 09:09:48

Taxon and Assessor details		
Category	Fishes and Lampreys (freshwater)	
Taxon name	Salvelinus fontinalis	
Common name	brook trout	
Assessor	Ana Marić	
Risk screening context		
Reason and socio-economic benefits		
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS	
Taxonomy		
Native range		
Introduced range		
URL		

			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	World Distribution of Brook Trout, Salaelinus fontinalis Hucu R. MecCnIMMoN and J. Scorr Campbell 1969	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	https://www.cabi.org/isc/datasheet/65325#tosummaryOfInvasiven ess	Very high
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	https://www.cabi.org/isc/datasheet/65325#tosummaryOfInvasiven ess	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	Proffesional estimation	High
5	2.02	What is the quality of the climate matching data?	Medium	https://www.cabi.org/isc/datasheet/65325#tosummaryOfInvasiven ess	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	FRESHWATER ALIEN FISH SPECIES INTRODUCED INTO CROATIA FOR AQUACULTURE AND CONSEQUENCES OF THEIR ESCAPES AND RELEASES IN INLAND WATERS Marina Piria1*, Divna Lukić1, Tatjana Boroša-Pecigoš2. 2016	High
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	Stocking	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	FRESHWATER ALIEN FISH SPECIES INTRODUCED INTO CROATIA FOR AQUACULTURE AND CONSEQUENCES OF THEIR ESCAPES AND RELEASES IN INLAND WATERS Marina Piria1*, Divna Lukić1, Tatjana Boroša-Pecigoš. 2016 https://www.cabi.org/isc/datasheet/65325#todistributionDatabase Table	Very high
	7	e elsewhere	1		
9		Has the taxon become naturalised (established viable populations) outside its	Yes	https://www.cabi.org/isc/datasheet/65325#todistributionDatabase Table	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	https://www.cabi.org/isc/datasheet/65325#toriskAndImpactFactor s	High
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	https://www.cabi.org/isc/datasheet/65325#toriskAndImpactFactor s	High
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	Yes	https://www.cabi.org/isc/datasheet/65325#toriskAndImpactFactor s	High
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	https://www.cabi.org/isc/datasheet/65325#toriskAndImpactFactor s	High
		//Ecology			
		able (or persistence) traits	1		
		Is it likely that the taxon will be poisonous or pose other risks to human health?		https://www.fishbase.se/summary/Salvelinus-fontinalis.html	High
15	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	https://www.cabi.org/isc/datasheet/65325#toriskAndImpactFactor s	High
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	https://www.fishbase.se/summary/Salvelinus-fontinalis.html	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	https://www.cabi.org/isc/datasheet/65325#toriskAndImpactFactor s	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	https://www.cabi.org/isc/datasheet/65325#toriskAndImpactFactor s	High
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes	Fechney LR, 1988. The summer diet of brook trout (Salvelinus fontinalis) in a South Island high-country stream. New Zealand Journal of Marine and Freshwater Research, 22(2):163-168	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	https://www.cabi.org/isc/datasheet/65325#tosummaryOfInvasiven ess	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	https://www.cabi.org/isc/datasheet/65325#tosummaryOfInvasiven ess	High
	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	https://www.fishbase.se/summary/Salvelinus-fontinalis.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)?	Yes	The Behavior of Juvenile Atlantic Salmon (Salmo salar) and Brook Trout (Salvelinus fontinalis) with Regard to Temperature and to Water Velocity R. John Gibson . 2011	Medium

4	4.11	Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours	Yes	https://www.cabi.org/isc/datasheet/65325#touses	High
-		(e.g. feeding) will reduce habitat quality for native taxa?			
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	Hierarchical analysis of relationships between brook trout (Salvelinus fontinalis) density and stream habitat features. Rodriguez. 2007	Medium
		e exploitation			1
6	5.01	Is the taxon likely to consume threatened or	Yes	https://www.cabi.org/isc/datasheet/65325#tobiologyAndEcology	High
7	5.02	protected native taxa in the RA area? Is the taxon likely to sequester food	Yes	https://www.cabi.org/isc/datasheet/65325#toriskAndImpactFactor	High
<i>,</i>	5.02	resources (including nutrients) to the detriment of native taxa in the RA area?	Tes	s	i ligii
	leprodu				
8	6.01	Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?	Yes	Kottelat. 2007	Very high
	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	FRESHWATER ALIEN FISH SPECIES INTRODUCED INTO CROATIA FOR AQUACULTURE AND CONSEQUENCES OF THEIR ESCAPES AND RELEASES IN INLAND WATERS Marina Piria1*, Divna Lukić1, Tatjana Boroša-Pecigoš. 2016	Very high
0	6.03	Is the taxon likely to hybridise naturally with native taxa?	Yes	Cucherousset, Julien and Aymes, J. C. and Poulet, Nicolas and Santoul, Frédéric and Céréghino, Régis. Do native brown trout and non-native brook trout interact reproductively? (2008)	Medium
1	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	No	Naturwissenschaften, vol. 95 (n° 7). pp. 647-654. ISSN 1432-1904 Cucherousset, Julien and Aymes, J. C. and Poulet, Nicolas and Santoul, Frédéric and Céréghino, Régis. Do native brown trout and non-native brook trout interact reproductively? (2008) Naturwissenschaften, vol. 95 (n° 7). pp. 647-654. ISSN 1432-1904	High
2	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	No	https://www.cabi.org/isc/datasheet/65325#tobiologyAndEcology	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	https://www.cabi.org/isc/datasheet/65325#tobiologyAndEcology	Very high
4	6.07	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	1	Kottelat. 2007	High
. D	ispersa	al mechanisms			
5	7.01	How many potential internal vectors/pathways could the taxon use to	>1	https://www.cabi.org/isc/datasheet/65325#toriskAndImpactFactor s	Medium
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 protected areas (e.g. MCZ, MPA, SSSI)?	Yes	FRESHWATER ALIEN FISH SPECIES INTRODUCED INTO CROATIA FOR AQUACULTURE AND CONSEQUENCES OF THEIR ESCAPES AND RELEASES IN INLAND WATERS Marina Piria1*, Divna Lukić1,	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	Tatjana Boroša-Pecigoš2. 2016 Kottelat. 2007	Very high
8	7.04	the likelihood of dispersal? Is natural dispersal of the taxon likely to	No	Kottelat. 2007	High
٩	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	Yes	Kottelat. 2007	High
5	7.05	occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?	165	Kolleidi. 2007	i iigii
	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	Yes	Kottelat. 2007	High
	7.07	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 Yes	Kottelat. 2007 https://www.cabi.org/isc/datasheet/65325#toriskAndImpactFactor	High High
		vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be		s	
	7.09	Is dispersal of the taxon density dependent?	Yes	Density-dependent individual growth and size dynamics of central Appalachian brook trout (Salvelinus fontinalis) RM Utz, KJ Hartman. 2009	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	No	Kottelat. 2007	Very 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	No	https://www.cabi.org/isc/datasheet/65325#towaterTolerances oxygen	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 events (manage)	No	https://www.cabi.org/isc/datasheet/65325#topreventionAndContro I	High
- 1	8.04	agents/means? Is the taxon likely to tolerate or benefit from	No	https://www.cabi.org/isc/datasheet/65325#topreventionAndContro	High
7	0.04				Very high
	8.05	environmental/human disturbance? Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	Yes	https://www.cabi.org/isc/datasheet/65325#towaterTolerances	very nigh
3		Is the taxon able to tolerate salinity levels	Yes	https://www.cabi.org/isc/datasheet/65325#towateriolerances	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?	No change	https://www.cabi.org/isc/datasheet/65325#tonaturalEnemies	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	https://www.cabi.org/isc/datasheet/65325#toclimate	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	https://www.cabi.org/isc/datasheet/65325#toclimate	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	https://www.cabi.org/isc/datasheet/65325#toclimate	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	https://www.cabi.org/isc/datasheet/65325#toclimate	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	https://www.cabi.org/isc/datasheet/65325#toclimate	High

Statistics

Scores	
BRA	35.5
BRA Outcome	-
BRA+CCA	35.5
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	23.0
4. Undesirable (or persistence) traits	9.0
5. Resource exploitation	7.0
6. Reproduction	5.0
7. Dispersal mechanisms	3.0
8. Tolerance attributes	-1.0
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	2 7 9
7. Dispersal mechanisms	
8. Tolerance attributes	6
C. Climate change	6
9. Climate change	6
Sectors affected	
Commercial	9
Environmental	12
Species or population nuisance traits	19
Thresholds	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.79
BRA	0.80
CCA	0.67

Date and Time 26/05/2021 16:08:00

AS-ISK v2	
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Taxon and Assessor details		
Category	Fishes and Lampreys (freshwater)	
Taxon name	Salvelinus fontinalis	
Common name	brook trout	
Assessor	Ivan Špelić	
Risk screening context		
Reason and socio-economic benefits		
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS	
Taxonomy		
Native range		
Introduced range		
URL		

			Response	Justification (references and/or other information)	Confidence
A. I	Biogeo	graphy/Historical			
		ication/Cultivation	ř.		1
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	Froese & Pauly 2020	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	No	Restocking of open waters with farmed fish (Povž et al. 2015)	High
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	No	Kottelat, M. & Freyhof, J. 2007. Handbook of European Freshwater Fishes. Kottelat, Cornol and Freyhof, Berlin, xiv + 646 pp.	Very high
2. (Climate	, distribution and introduction risk			
	2.01		High	Climatch 2020	Medium
5	2.02	What is the quality of the climate matching data?	Medium	Climatch 2020	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	Lenhardt, M., Markovic, G., Hegedis, A., Maletin, S., Cirkovic, M., Markovic, Z., 2011. Non-native and translocated fish species in Serbia and their impact on the native ichthyofauna. Reviews in Fish Biology and Fisheries 21, 407–421 doi:10.1007/s11160-010-	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	Not applicable	Already present (Lenhardt, M., Markovic, G., Hegedis, A., Maletin, S., Cirkovic, M., Markovic, Z., 2011. Non-native and translocated fish species in Serbia and their impact on the native ichthyofauna. Reviews in Fish Biology and Fisheries 21, 407–421 doi:10.1007/s11160-010-9180-8).	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)?	Not applicable	Already present (Lenhardt, M., Markovic, G., Hegedis, A., Maletin, S., Cirkovic, M., Markovic, Z., 2011. Non-native and translocated fish species in Serbia and their impact on the native ichthyofauna. Reviews in Fish Biology and Fisheries 21, 407–421 doi:10.1007/s11160-010-9180-8).	Very high
3. I	nvasiv	e elsewhere			
9	3.01	Has the taxon become naturalised (established viable populations) outside its	Yes	Kottelat, M. & Freyhof, J. 2007. Handbook of European Freshwater Fishes. Kottelat, Cornol and Freyhof, Berlin, xiv + 646 pp	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	Global Invasive Species Database (2020) Species profile: Salvelinus fontinalis. Downloaded from http://www.iucngisd.org/gisd/species.php?sc=1226 on 04-03-	Very high
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	Global Invasive Species Database (2020) Species profile: Salvelinus fontinalis. Downloaded from http://www.iucngisd.org/gisd/species.php?sc=1226 on 04-03-	High
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem services?	Yes	S. fontinalis is said to modify nutrient cycling in lakes through its grazing of zooplankton, which in cases of drinking-water reservoirs could have adverse implications for environmental	High
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	Brook trout are extremely popular in aquaculture and angling. Most of their introductions have been because of this. They are an important food source and socio-economic resource. Also, they are commonly used as experimentation test individuals (Global Invasive Species Database (2020) Species profile: Salvelinus fontinalis. Downloaded from http://www.iucngisd.org/gisd/species.php?sc=1226 on 04-03-	High
		y/Ecology			
	7	able (or persistence) traits	1		
		Is it likely that the taxon will be poisonous or pose other risks to human health?		Kottelat, M. & Freyhof, J. 2007. Handbook of European Freshwater Fishes. Kottelat, Cornol and Freyhof, Berlin, xiv + 646 pp	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	Brook trout have been found to compete with, displace, or replace many fish species throughout the world (Global Invasive Species Database (2020) Species profile: Salvelinus fontinalis. Downloaded from http://www.iucngisd.org/gisd/species.php?sc=1226 on 04-03-	High
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater fishes. Publications Kottelat, Cornol, Switzerland.	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	Occurs in clear, cool, well-oxygenated creeks, small to medium rivers, and lakes (Froese & Pauly 2020).	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 area?	Yes	Impacts include top down cascading trophic interactions resulting in modifications of benthic zooplankton, macroinvertebrates, and algal communities. Global Invasive Species Database (2020) Species profile: Salvelinus fontinalis. Downloaded from http://www.iucnqisd.org/gisd/species.php?sc=1226 on 04-03-	High

			1		
		Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes	Impacts include predation and population reduction of amphibians to the point of endangerment; and top down cascading trophic interactions resulting in modifications of benthic zooplankton, macroinvertebrates, and algal communities. Global Invasive Species Database (2020) Species profile: Salvelinus fontinalis. Downloaded from http://www.iucngisd.org/gisd/species.php?sc=1226 on 04-03-	High
0	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	CABI 2010	High
1	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	CABI 2010	High
2	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. and J. Freyhof 2007 Handbook of European freshwater fishes. Publications Kottelat, Cornol, Switzerland.	Very high
3	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)?	Yes	Inhabits streams and lakes. Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater fishes. Publications Kottelat, Cornol, Switzerland.	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 native taxa?	No		High
5	4.12	Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions	No	No information	Low
R	esourc	by way of a dormant form)?			
		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	Yes Not applicable	Predates on amphibians an fish. Global Invasive Species Database (2020) Species profile: Salvelinus fontinalis. Downloaded from http://www.iucngisd.org/gisd/species.php?sc=1226 on 04-03- No sufficient data for calculations.	High Very high
		detriment of native taxa in the RA area?			
	eprodu		N-) (am. 1 : 1
3	6.01	Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?	No	Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater fishes. Publications Kottelat, Cornol, Switzerland.	Very high
Ð	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	Lenhardt, M., Markovic, G., Hegedis, A., Maletin, S., Cirkovic, M., Markovic, Z., 2011. Non-native and translocated fish species in Serbia and their impact on the native ichthyofauna. Reviews in Fish Biology and Fisheries 21, 407-421. doi:10.1007/s11160-010-	Very high
		Is the taxon likely to hybridise naturally with native taxa?	Yes	Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater fishes. Publications Kottelat, Cornol, Switzerland. (with S. trutta)	Very high
1	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	No	Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater fishes. Publications Kottelat, Cornol, Switzerland.	Very high
2	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features)	No	Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater fishes. Publications Kottelat, Cornol, Switzerland.	Very high
3	6.06	to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring	Yes	Up to 5000 eggs per female (Froese & Pauly 2020).	Very 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?	2	Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater fishes. Publications Kottelat, Cornol, Switzerland.	Very high
_		al mechanisms How many potential internal	>1	Restocking, escape from aquaculture (CABI 2010)	Medium
		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 protected areas (e.g. MCZ, MPA, SSSI)?	Yes	Personal opinion	Low
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 adaptations	Very high
8	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	Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater fishes. Publications Kottelat, Cornol, Switzerland.	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	Drift (personal opinion)	Low
0	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	Yes	Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater fishes. Publications Kottelat, Cornol, Switzerland.	High
1	7.07	Are propagules or eggs of the taxon likely to	No	Personal opinion	Low
2	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 coven guestions (25, 41), i.e. both	Yes	Restocking, escape from aquaculture	High
		seven questions (35–41; i.e. both unintentional or intentional) likely to be			
2			No	Personal opinion	Low
_		co attributoc			

			1		
45	8.02	Is the taxon tolerant of a wide range of	No	Occurs in clear, cool, well-oxygenated habitats (Froese & Pauly	Very high
		water quality conditions relevant to that		2020).	
		taxon? [In the Justification field, indicate the			
		relevant water quality variable(s) being			
16	8.03	Can the taxon be controlled or eradicated in	No	Not allowed.	Very high
		the wild with chemical, biological, or other			
		agents/means?			
17	8.04	Is the taxon likely to tolerate or benefit from	No	Occurs in clear, cool, well-oxygenated habitats	High
		environmental/human disturbance?			
18	8.05	Is the taxon able to tolerate salinity levels	Yes	Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater	High
		that are higher or lower than those found in		fishes. Publications Kottelat, Cornol, Switzerland.	
		its usual environment?			
49	8.06	Are there effective natural enemies	Yes	Natural enemies of S. fontinalis include larger fish, piscivorous	Very high
		(predators) of the taxon present in the RA		birds (including mergansers and kingfishers), and mammals such	
		area?		as otters and bears. CABI 2010.	
		e change			
		change			
50	9.01	Under the predicted future climatic	Not applicable	Already present (Lenhardt, M., Markovic, G., Hegedis, A., Maletin,	Very high
		conditions, are the risks of entry into the RA		S., Cirkovic, M., Markovic, Z., 2011. Non-native and translocated	
		area posed by the taxon likely to increase,		fish species in Serbia and their impact on the native ichthyofauna.	
		decrease or not change?		Reviews in Fish Biology and Fisheries 21, 407–421	
	0.00		L	doi:10.1007/s11160-010-9180-8).	
51	9.02	Under the predicted future climatic	Decrease	The subject of thermal tolerance among coldwater fishes has been	High
		conditions, are the risks of establishment		widely documented and is often cited as the single most important	
		posed by the taxon likely to increase,		abiotic factor limiting the distribution, growth and survival of	
		decrease or not change?		species like brook trout (Argent et al. 2013). Cold-water habitats	
				and associated obligate species are particularly vulnerable to	
				potential impacts of climate change (Merriam et al. 2017).	
				Authors agree that climate change will not affect native	
			-	populations as negative as thought before.	
52	9.03	Under the predicted future climatic	Decrease	The subject of thermal tolerance among coldwater fishes has been	High
		conditions, are the risks of dispersal within		widely documentedand is often cited as the single most important	
		the RA area posed by the taxon likely to		abiotic factor limiting the distribution, growth and survival of	
		increase, decrease or not change?		species like brook trout (Argent et al. 2013). Cold-water habitats	
				and associated obligate species are particularly vulnerable to	
				potential impacts of climate change (Merriam et al. 2017).	
				Authors agree that climate change will not affect native	
				populations as negative as thought before.	
53	9.04	Under the predicted future climatic	No change	All populations of cold water species will probably decline (Lower	Low
		conditions, what is the likely magnitude of		impact i unfavourable conditions for cold-water species (COMTE,	
		future potential impacts on biodiversity		L., BUISSON, L., DAUFRESNE, M. and GRENOUILLET, G. (2013),	
		and/or ecological integrity/status?		Climate-induced changes in the distribution of freshwater fish:	
				observed and predicted trends. Freshwater Biology, 58: 625-639.	
				https://doi.org/10.1111/fwb.12081).) so relative impact would	
	0.05			presumably be the same on those species.	
54	9.05	Under the predicted future climatic	Lower	Less impact on zooplankton communities under predicted less	Low
		conditions, what is the likely magnitude of		favourable conditions for coldwater species (Lower impact i	
		future potential impacts on ecosystem		unfavourable conditions for cold-water species (COMTE, L.,	
		structure and/or function?		BUISSON, L., DAUFRESNE, M. and GRENOUILLET, G. (2013),	
				Climate-induced changes in the distribution of freshwater fish:	
				observed and predicted trends. Freshwater Biology, 58: 625-639.	
				https://doi.org/10.1111/fwb.12081).)	
55	9.06	Under the predicted future climatic	Lower	Less impact on zooplankton communities under predicted less	Low
		conditions, what is the likely magnitude of		favourable conditions for coldwater species (Lower impact i	
		future potential impacts on ecosystem		unfavourable conditions for cold-water species (COMTE, L.,	
		services/socio-economic factors?		BUISSON, L., DAUFRESNE, M. and GRENOUILLET, G. (2013),	
	1			Climate-induced changes in the distribution of freshwater fish:	
				observed and predicted trends. Freshwater Biology, 58: 625-639.	

Statistics	
Scores	
BRA	26.0
BRA Outcome	-
BRA+CCA	18.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	11.0
1. Domestication/Cultivation	0.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	10.0
B. Biology/Ecology	15.0
4. Undesirable (or persistence) traits	6.0
5. Resource exploitation	5.0
6. Reproduction	3.0
7. Dispersal mechanisms	2.0
8. Tolerance attributes	-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
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	6				
Environmental	10				
Species or population nuisance traits	6				
Thresholds					
BRA	-				
BRA+CCA	-				
Confidence					
BRA+CCA	0.79				
BRA	0.82				
CCA	0.54				
Date and Time					
19/05/2021 11:37:31					

Taxon and Assessor details	xon and Assessor details					
Category	Fishes and Lampreys (freshwater)					
Taxon name	Salvelinus fontinalis					
Common name	brook trout					
Assessor	Tamara Kanjuh					
Risk screening context	Risk screening context					
Reason and socio-economic benefits						
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS					
Taxonomy						
Native range						
Introduced range						
URL						

			Response	Justification (references and/or other information)	Confidence			
	A. Biogeography/Historical							
		ication/Cultivation			N/ 1111			
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	Culture and transport of brook trout began in the 1850s and was initially done to enhance populations in its native range (Karas, 1997).	Very high			
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	Brook trout are also raised commercially and sold to angling organisations or groups to stock their own lakes or ponds. There are businesses that hold a "U-fish license", where the public can come fish at their lake or pond and buy the fish that they catch (https://en.wikipedia.org/wiki/Brook trout#cite note-34)	High			
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	Salvelinus fontinalis is an invasive species that threatens native amphibians and fish, as well as the ecology of lakes and streams (Dunham et al., 2002)	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	Dfa, Dfb (Köppen-Geiger climate classification system)	Medium			
5	2.02	What is the quality of the climate matching data?	High	Köppen-Geiger climate classification system	High			
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	Brook trout regulary escape from fish farm into streams (Simonović et al., 2015).	Very high			
/	2.04	How many potential vectors could the taxon use to enter in the RA area?	>1	Aquaculture (Piria et al., 2017), sport fishing (Lenhardt et al., 2011) The tween is suscentially repred in the Vide fishered Curduling	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	The taxson is successfully reared in the Vrla fishpond - Surdulica (Simonovic2001).	Very high			
3. 1		e elsewhere						
9		Has the taxon become naturalised (established viable populations) outside its	No	Alien salmonids do not reproduce naturally in most of the Balkan waters (Piria et al., 2017)	Low			
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	Brook trout exert similar competitive pressures that result in reductions and displacements of fishes around the globe, such as; golden trout (Oncorhynchus aguabonita), brown trout (Salmo trutta), and dolly vardon (Salvelinus malma), the last two have also been known to hybridize (ISSG). Brook trout have also been theorized to have prevented the establishment of populations of stocked grayling (Thymallus thymallus) due to their aggressive nature (Fuller and Neilson, 2014).	Very high			
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	No information found.	Low			
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	No	No information found.	Low			
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	Yes	Negative economic effects may be incurred through the brook trout's detrimental effects on native fish populations. If the non- native brook trout is causing a decline in a more valuable native species the economic benefits they bring may be offset by the economic losses suffered from the loss of the more valuable	Very high			
		y/Ecology						
		able (or persistence) traits Is it likely that the taxon will be poisonous or	No	No information found.	Low			
		pose other risks to human health? Is it likely that the taxon will smother one or	Yes	Introductions may lead to replacement of native salmonids (e.g.	High			
		more native taxa (that are not threatened or protected)?		brown trout, Salmo trutta) (cabi.org)				
		Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	No information found.	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	Compared to other members of the salmonidae family brook trout are the least specialized in their habitat demands and as such can tolerate a wide variety of environmental conditions. Brook trout are equally at home in small streams, larger rivers, beaver ponds, large lakes, estuaries, and coastal marine environments (Karas,	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	Recent evidence from France provides information on both dietary overlap (Cucherousset et al., 2007) and reproductive interference (Cucherousset et al., 2008) of introduced S. fontinalis with native Salmo trutta. This indicates that the diet of the two species overlaps to an extent greater than expected, based on stable isotope signatures (Cucherousset et al., 2007).	High			
	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	No information found.	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 information found.	Low			

21					
21	4.08	Is it likely that the taxon will host, and/or	No	No information found.	Low
		act as a vector for, recognised pests and			
		infectious agents that are absent from (novel			
	1.00	to) the RA area?			
22	4.09	Is it likely that the taxon will achieve a body	No	No information found.	Low
		size that will make it more likely to be			
	4.12	released from captivity?			Mardi
23	4.10	Is the taxon capable of sustaining itself in a	Yes	When living in rivers and streams, brook trout like to stay in areas	Medium
		range of water velocity conditions (e.g.		of moderate flow, such as just above or below a set of rapids	
		versatile in habitat use)?		(Karas, 1997).	
4	4.11		No	No information found.	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	No information found.	Low
		population even when present in low			
		densities (or persisting in adverse conditions			
		by way of a dormant form)?			
		ce exploitation	1		1
6	5.01		No	No information found.	Low
		protected native taxa in the RA area?			
7	5.02	Is the taxon likely to sequester food	No	No information found.	Low
		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	No	No information found.	Low
		and/or to reduce age-at-maturity in response			
		to environmental conditions?			
9	6.02	Is the taxon likely to produce viable gametes	Yes	The alien salmonids do not reproduce naturally in most of the	High
		or propagules (in the RA area)?		Balkan waters (Piria et al., 2017).	-
80	6.03	Is the taxon likely to hybridise naturally with	Yes	Introduced S. fontinalis may be having detrimental effects on	Very high
		native taxa?		native Salmo trutta reproductionthrough subtle hybridization	
				behaviour, which was manifested by consistent spatial and	
				temporal overlap in redd sites and spawning periods, mixed-	
				species spawning groups, inter-specific subordinate males, and	
				the occurrence of natural (tiger trout) hybrids (Cucherousset et	
1	6.04	Is the taxon likely to be hermaphroditic or to	No	No information found.	Low
-	1	display asexual reproduction?	-		-
2	6.05	Is the taxon dependent on the presence of	Yes	Primarily, brook trout require cool, clear, and clean waters to	High
-		another taxon (or specific habitat features)		survive (Karas, 1997).	
		to complete its life cycle?			
33	6.06	Is the taxon known (or likely) to produce a	Yes	The eggs are large, 3.5–5.0 mm in diameter, with the number	High
		canon more intery to produce a			
		large number of propagules or offenring			ingn
		large number of propagules or offspring within a short time span (e.g. < 1 year)?		deposited depending on the size of the female, varying from 100	i iigii
		within a short time span (e.g. < 1 year)?		deposited depending on the size of the female, varying from 100 for a 144 mm TL female to 5000 eggs for a 565 mm TL female	-
	6.07	within a short time span (e.g. < 1 year)? How many time units (days, months, years)	2	deposited depending on the size of the female, varying from 100 for a 144 mm TL female to 5000 eggs for a 565 mm TL female S. fontinalis reach sexual maturity after two to four years	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-		deposited depending on the size of the female, varying from 100 for a 144 mm TL female to 5000 eggs for a 565 mm TL female	-
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?		deposited depending on the size of the female, varying from 100 for a 144 mm TL female to 5000 eggs for a 565 mm TL female S. fontinalis reach sexual maturity after two to four years	-
34 7.	6.07 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	2	deposited depending on the size of the female, varying from 100 for a 144 mm TL female to 5000 eggs for a 565 mm TL female S. fontinalis reach sexual maturity after two to four years (cabi.org).	High
34 7.	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? <i>al mechanisms</i> How many potential internal		deposited depending on the size of the female, varying from 100 for a 144 mm TL female to 5000 eggs for a 565 mm TL female S. fontinalis reach sexual maturity after two to four years (cabi.org). The primary pathway of introduction for the brook trout is	-
34 7.	6.07 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	2	deposited depending on the size of the female, varying from 100 for a 144 mm TL female to 5000 eggs for a 565 mm TL female S. fontinalis reach sexual maturity after two to four years (cabi.org). The primary pathway of introduction for the brook trout is intentional stocking for the enhancement of sport fishing	High
34 7	6.07 <i>Dispers</i> 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	2	deposited depending on the size of the female, varying from 100 for a 144 mm TL female to 5000 eggs for a 565 mm TL female S. fontinalis reach sexual maturity after two to four years (cabi.org). The primary pathway of introduction for the brook trout is intentional stocking for the enhancement of sport fishing opportunities, than escapes from hatcheries (Jansson, 2013;	High
34 7	6.07 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	2	deposited depending on the size of the female, varying from 100 for a 144 mm TL female to 5000 eggs for a 565 mm TL female S. fontinalis reach sexual maturity after two to four years (cabi.org). The primary pathway of introduction for the brook trout is intentional stocking for the enhancement of sport fishing opportunities, than escapes from hatcheries (Jansson, 2013; As Salvelinus fontinalis was introduced into the river Vlasina, it is	High
34 7	6.07 <i>Dispers</i> 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	2	deposited depending on the size of the female, varying from 100 for a 144 mm TL female to 5000 eqgs for a 565 mm TL female S. fontinalis reach sexual maturity after two to four years (cabi.org). The primary pathway of introduction for the brook trout is intentional stocking for the enhancement of sport fishing opportunities, than escapes from hatcheries (Jansson, 2013; As Salvelinus fontinalis was introduced into the river Vlasina, it is very close to spreading in the Landscape Of Outstanding Features	High
34 7. 35 36	6.07 Dispers 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)?	2 >1 No	deposited depending on the size of the female, varying from 100 for a 144 mm TL female to 5000 eggs for a 565 mm TL female S. fontinalis reach sexual maturity after two to four years (cabi.org). The primary pathway of introduction for the brook trout is intentional stocking for the enhancement of sport fishing opportunities, than escapes from hatcheries (Jansson, 2013; As Salvelinus fontinalis was introduced into the river Vlasina, it is very close to spreading in the Landscape Of Outstanding Features "Vlasina".	High High Low
34 7. 35 36	6.07 <i>Dispers</i> 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	2	deposited depending on the size of the female, varying from 100 for a 144 mm TL female to 5000 eqgs for a 565 mm TL female S. fontinalis reach sexual maturity after two to four years (cabi.org). The primary pathway of introduction for the brook trout is intentional stocking for the enhancement of sport fishing opportunities, than escapes from hatcheries (Jansson, 2013; As Salvelinus fontinalis was introduced into the river Vlasina, it is very close to spreading in the Landscape Of Outstanding Features	High
34 7. 35 36	6.07 Dispers 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	2 >1 No	deposited depending on the size of the female, varying from 100 for a 144 mm TL female to 5000 eggs for a 565 mm TL female S. fontinalis reach sexual maturity after two to four years (cabi.org). The primary pathway of introduction for the brook trout is intentional stocking for the enhancement of sport fishing opportunities, than escapes from hatcheries (Jansson, 2013; As Salvelinus fontinalis was introduced into the river Vlasina, it is very close to spreading in the Landscape Of Outstanding Features "Vlasina".	High High Low
4 5	6.07 Dispers 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	2 >1 No	deposited depending on the size of the female, varying from 100 for a 144 mm TL female to 5000 eggs for a 565 mm TL female S. fontinalis reach sexual maturity after two to four years (cabi.org). The primary pathway of introduction for the brook trout is intentional stocking for the enhancement of sport fishing opportunities, than escapes from hatcheries (Jansson, 2013; As Salvelinus fontinalis was introduced into the river Vlasina, it is very close to spreading in the Landscape Of Outstanding Features "Vlasina".	High
4 5 6 7	6.07 <i>Dispers</i> 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?	2 >1 No No	deposited depending on the size of the female, varying from 100 for a 144 mm TL female to 5000 eqgs for a 565 mm TL female S. fontinalis reach sexual maturity after two to four years (cabi.org). The primary pathway of introduction for the brook trout is intentional stocking for the enhancement of sport fishing opportunities, than escapes from hatcheries (Jansson, 2013; As Salvelinus fontinalis was introduced into the river Vlasina, it is very close to spreading in the Landscape Of Outstanding Features "Vlasina". No information found.	High Low Low
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34 35 36 37	6.07 <i>Dispers</i> 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?	2 >1 No No	deposited depending on the size of the female, varying from 100 for a 144 mm TL female to 5000 eggs for a 565 mm TL female S. fontinalis reach sexual maturity after two to four years (cabi.org). The primary pathway of introduction for the brook trout is intentional stocking for the enhancement of sport fishing opportunities, than escapes from hatcheries (Jansson, 2013; As Salvelinus fontinalis was introduced into the river Vlasina, it is very close to spreading in the Landscape Of Outstanding Features "Vlasina". No information found.	High Low Low
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4 5 6 7 8	6.07 <i>Dispers</i> 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?	2 >1 No No	deposited depending on the size of the female, varying from 100 for a 144 mm TL female to 5000 eggs for a 565 mm TL female S. fontinalis reach sexual maturity after two to four years (cabi.org). The primary pathway of introduction for the brook trout is intentional stocking for the enhancement of sport fishing opportunities, than escapes from hatcheries (Jansson, 2013; As Salvelinus fontinalis was introduced into the river Vlasina, it is very close to spreading in the Landscape Of Outstanding Features "Vlasina". No information found.	High Low Low
34 35 36 37	6.07 <i>Dispers</i> 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	2 >1 No No	deposited depending on the size of the female, varying from 100 for a 144 mm TL female to 5000 eggs for a 565 mm TL female S. fontinalis reach sexual maturity after two to four years (cabi.org). The primary pathway of introduction for the brook trout is intentional stocking for the enhancement of sport fishing opportunities, than escapes from hatcheries (Jansson, 2013; As Salvelinus fontinalis was introduced into the river Vlasina, it is very close to spreading in the Landscape Of Outstanding Features "Vlasina". No information found. No information found.	High Low Low
34 35 36 37 38	6.07 <i>Dispers</i> 7.01 7.02 7.03 7.04 7.05	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?	2 >1 No No Yes	deposited depending on the size of the female, varying from 100 for a 144 mm TL female to 5000 eggs for a 565 mm TL female S. fontinalis reach sexual maturity after two to four years (cabi.org). The primary pathway of introduction for the brook trout is intentional stocking for the enhancement of sport fishing opportunities, than escapes from hatcheries (Jansson, 2013; As Salvelinus fontinalis was introduced into the river Vlasina, it is very close to spreading in the Landscape Of Outstanding Features "Vlasina". No information found. No information found.	High Low Low Low
34 35 36 37 38	6.07 <i>Dispers</i> 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 area? Are older life stages of the taxon likely to	2 >1 No No	deposited depending on the size of the female, varying from 100 for a 144 mm TL female to 5000 eggs for a 565 mm TL female S. fontinalis reach sexual maturity after two to four years (cabi.org). The primary pathway of introduction for the brook trout is intentional stocking for the enhancement of sport fishing opportunities, than escapes from hatcheries (Jansson, 2013; As Salvelinus fontinalis was introduced into the river Vlasina, it is very close to spreading in the Landscape Of Outstanding Features "Vlasina". No information found. No information found. Young of the year washed downstream by water, adults naturally dispersed through migration (cabi.org) Some populations of brook trout also display a life history similar	High Low Low
34 35 36 37 38	6.07 <i>Dispers</i> 7.01 7.02 7.03 7.04 7.05	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?	2 >1 No No Yes	deposited depending on the size of the female, varying from 100 for a 144 mm TL female to 5000 eqgs for a 565 mm TL female S. fontinalis reach sexual maturity after two to four years (cabi.org). The primary pathway of introduction for the brook trout is intentional stocking for the enhancement of sport fishing opportunities, than escapes from hatcheries (Jansson, 2013; As Salvelinus fontinalis was introduced into the river Vlasina, it is very close to spreading in the Landscape Of Outstanding Features "Vlasina". No information found. No information found. Young of the year washed downstream by water, adults naturally dispersed through migration (cabi.org) Some populations of brook trout also display a life history similar to that of anadromy, but instead of migrating out to sea they	High Low Low Low
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34 7. 35 36 37 38 38 39 40	6.07 <i>Dispers</i> 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?	2 >1 No No Yes Yes	deposited depending on the size of the female, varying from 100 for a 144 mm TL female to 5000 eqgs for a 565 mm TL female S. fontinalis reach sexual maturity after two to four years (cabi.org). The primary pathway of introduction for the brook trout is intentional stocking for the enhancement of sport fishing opportunities, than escapes from hatcheries (Jansson, 2013; As Salvelinus fontinalis was introduced into the river Vlasina, it is very close to spreading in the Landscape Of Outstanding Features "Vlasina". No information found. No information found. Young of the year washed downstream by water, adults naturally dispersed through migration (cabi.org) Some populations of brook trout also display a life history similar to that of anadromy, but instead of migrating out to sea they migrate from their natal streams to large bodies of freshwater such as the Great Lakes (Karas, 1997).	High Low Low Low Medium
34 7. 35 36 37 38 38 39 40	6.07 <i>Dispers</i> 7.01 7.02 7.03 7.04 7.05	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	2 >1 No No Yes	deposited depending on the size of the female, varying from 100 for a 144 mm TL female to 5000 eqgs for a 565 mm TL female S. fontinalis reach sexual maturity after two to four years (cabi.org). The primary pathway of introduction for the brook trout is intentional stocking for the enhancement of sport fishing opportunities, than escapes from hatcheries (Jansson, 2013; As Salvelinus fontinalis was introduced into the river Vlasina, it is very close to spreading in the Landscape Of Outstanding Features "Vlasina". No information found. No information found. Young of the year washed downstream by water, adults naturally dispersed through migration (cabi.org) Some populations of brook trout also display a life history similar to that of anadromy, but instead of migrating out to sea they migrate from their natal streams to large bodies of freshwater	High Low Low Low
7. 355 366 377 388 388 399 400	6.07 <i>Dispers</i> 7.01 7.02 7.03 7.04 7.05 7.06 7.07	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? 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?	2 >1 No No Yes Yes	deposited depending on the size of the female, varying from 100 for a 144 mm TL female to 5000 eggs for a 565 mm TL female S. fontinalis reach sexual maturity after two to four years (cabi.org). The primary pathway of introduction for the brook trout is intentional stocking for the enhancement of sport fishing opportunities, than escapes from hatcheries (Jansson, 2013; As Salvelinus fontinalis was introduced into the river Vlasina, it is very close to spreading in the Landscape Of Outstanding Features "Vlasina". No information found. No information found. Young of the year washed downstream by water, adults naturally dispersed through migration (cabi.org) Some populations of brook trout also display a life history similar to that of anadromy, but instead of migrating out to sea they migrate from their natal streams to large bodies of freshwater such as the Great Lakes (Karas, 1997). No information found.	High Low Low Low Medium
· · 0	6.07 <i>Dispers</i> 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	2 >1 No No Yes Yes	deposited depending on the size of the female, varying from 100 for a 144 mm TL female to 5000 eqgs for a 565 mm TL female S. fontinalis reach sexual maturity after two to four years (cabi.org). The primary pathway of introduction for the brook trout is intentional stocking for the enhancement of sport fishing opportunities, than escapes from hatcheries (Jansson, 2013; As Salvelinus fontinalis was introduced into the river Vlasina, it is very close to spreading in the Landscape Of Outstanding Features "Vlasina". No information found. No information found. Young of the year washed downstream by water, adults naturally dispersed through migration (cabi.org) Some populations of brook trout also display a life history similar to that of anadromy, but instead of migrating out to sea they migrate from their natal streams to large bodies of freshwater such as the Great Lakes (Karas, 1997).	High Low Low Low Medium
· · 0	6.07 <i>Dispers</i> 7.01 7.02 7.03 7.04 7.05 7.06 7.07	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? 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? 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 and likely to here propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon and pany of the vectors/pathways mentioned in the previous	2 >1 No No Yes Yes	deposited depending on the size of the female, varying from 100 for a 144 mm TL female to 5000 eggs for a 565 mm TL female S. fontinalis reach sexual maturity after two to four years (cabi.org). The primary pathway of introduction for the brook trout is intentional stocking for the enhancement of sport fishing opportunities, than escapes from hatcheries (Jansson, 2013; As Salvelinus fontinalis was introduced into the river Vlasina, it is very close to spreading in the Landscape Of Outstanding Features "Vlasina". No information found. No information found. Young of the year washed downstream by water, adults naturally dispersed through migration (cabi.org) Some populations of brook trout also display a life history similar to that of anadromy, but instead of migrating out to sea they migrate from their natal streams to large bodies of freshwater such as the Great Lakes (Karas, 1997). No information found.	High Low Low Low Medium
7. 355 366 377 388 388 399 400	6.07 <i>Dispers</i> 7.01 7.02 7.03 7.04 7.05 7.06 7.07	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? 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	2 >1 No No Yes Yes	deposited depending on the size of the female, varying from 100 for a 144 mm TL female to 5000 eggs for a 565 mm TL female S. fontinalis reach sexual maturity after two to four years (cabi.org). The primary pathway of introduction for the brook trout is intentional stocking for the enhancement of sport fishing opportunities, than escapes from hatcheries (Jansson, 2013; As Salvelinus fontinalis was introduced into the river Vlasina, it is very close to spreading in the Landscape Of Outstanding Features "Vlasina". No information found. No information found. Young of the year washed downstream by water, adults naturally dispersed through migration (cabi.org) Some populations of brook trout also display a life history similar to that of anadromy, but instead of migrating out to sea they migrate from their natal streams to large bodies of freshwater such as the Great Lakes (Karas, 1997). No information found.	High Low Low Low Medium
34 7. 35 36 37 38 39 40 41 42	6.07 <i>Dispers</i> 7.01 7.02 7.03 7.04 7.04 7.05 7.06 7.07 7.08	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	2 >1 No No Yes Yes No Yes	deposited depending on the size of the female, varying from 100 for a 144 mm TL female to 5000 eggs for a 565 mm TL female S. fontinalis reach sexual maturity after two to four years (cabi.org). The primary pathway of introduction for the brook trout is intentional stocking for the enhancement of sport fishing opportunities, than escapes from hatcheries (Jansson, 2013; As Salvelinus fontinalis was introduced into the river Vlasina, it is very close to spreading in the Landscape Of Outstanding Features "Vlasina". No information found. No information found. Young of the year washed downstream by water, adults naturally dispersed through migration (cabi.org) Some populations of brook trout also display a life history similar to that of anadromy, but instead of migrating out to sea they migrate from their natal streams to large bodies of freshwater such as the Great Lakes (Karas, 1997). No information found.	High Low Low Low Medium
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	8.03	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	This is typically done by physical means such as, trapping, netting, and electrofishing and most likely has to be performed at regular intervals to keep abundances down (Britton et al., 2011). There has also been recent attempts at controlling populations using "daughterless technology" which involves the release of genetically engineered fish that produce a biased sex ratio towards males when they mate (Britton et al., 2011; Idaho F&G). This will hopefully reduce the population's ability to reproduce and result in negative nonulation growth rates (Britton et al., 2011: No information found.	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 found.	Low
	8.06 Climate	Are there effective natural enemies (predators) of the taxon present in the RA area? a change	Yes	Natural enemies of S. fontinalis include larger fish, piscivorous birds (including mergansers and kingfishers), and mammals such as otters and bears (cabi.org).	Medium
9. (Climate	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	Studies have shown that an increase in temperature leads to an increase in S.fontinalis mortality of all age stages. In contrast, extreme low summer flows reduced survival of large fish, but only in small tributaries, and had no significant effects on fish in smaller size classes in any location (CL Xu et al., 2010).	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	Studies have shown that an increase in temperature leads to an increase in S.fontinalis mortality of all age stages. In contrast, extreme low summer flows reduced survival of large fish, but only in small tributaries, and had no significant effects on fish in smaller size classes in any location (CL Xu et al., 2010).	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?	Decrease	Studies have shown that an increase in temperature leads to an increase in S.fontinalis mortality of all age stages. In contrast, extreme low summer flows reduced survival of large fish, but only in small tributaries, and had no significant effects on fish in smaller size classes in any location (CL Xu et al., 2010).	Medium
	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	Studies have shown that an increase in temperature leads to an increase in S.fontinalis mortality of all age stages. In contrast, extreme low summer flows reduced survival of large fish, but only in small tributaries, and had no significant effects on fish in smaller size classes in any location (CL Xu et al., 2010).	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	Studies have shown that an increase in temperature leads to an increase in S.fontinalis mortality of all age stages. In contrast, extreme low summer flows reduced survival of large fish, but only in small tributaries, and had no significant effects on fish in smaller size classes in any location (CL Xu et al., 2010).	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	Studies have shown that an increase in temperature leads to an increase in S.fontinalis mortality of all age stages. In contrast, extreme low summer flows reduced survival of large fish, but only in small tributaries, and had no significant effects on fish in smaller size classes in any location (CL Xu et al., 2010).	Medium

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

Confidence	
BRA+CCA	0.52
BRA	0.53
CCA	0.50
Date and Time	
28/05/2021	09:08:57

axon and Assessor details						
Category	Fishes and Lampreys (freshwater)					
Taxon name	Salvelinus fontinalis					
Common name	brook trout					
Assessor	Tena Radocaj					
Risk screening context						
Reason and socio-economic benefits						
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS					
Taxonomy						
Native range						
Introduced range						
URL						

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
		ication/Cultivation	1.4		
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. Kottelat, Cornol and Freyhof, Berlin, xiv + 646 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	In aquaculture, but not in Croatia	Low
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	No	Kottelat, M. & Freyhof, J. 2007. Handbook of European Freshwater Fishes. Kottelat, Cornol and Freyhof, Berlin, xiv + 646 pp.	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	Kottelat, M. & Freyhof, J. 2007. Handbook of European Freshwater Fishes. Kottelat, Cornol and Freyhof, Berlin, xiv + 646 pp. The similarity between climatic conditions RA area and native range is high. I use climatch	Very high
5	2.02	What is the quality of the climate matching data?	High	Kottelat, M. & Freyhof, J. 2007. Handbook of European Freshwater Fishes. Kottelat, Cornol and Freyhof, Berlin, xiv + 646 pp. The quality of the climate matching data is high.	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	S. fontinalis is present outside of captivity in the RA area	High
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	None	S. fontinalis is present in 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)?	Not applicable	S. fontinalis is present in the RA area	High
3. i	Invasive	e elsewhere			
9		Has the taxon become naturalised (established viable populations) outside its	Yes	Kottelat, M. & Freyhof, J. 2007. Handbook of European Freshwater Fishes. Kottelat, Cornol and Freyhof, Berlin, xiv + 646 pp	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	Kottelat, M. & Freyhof, J. 2007. Handbook of European Freshwater Fishes. Kottelat, Cornol and Freyhof, Berlin, xiv + 646 pp	Very high
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	Yes	Kottelat, M. & Freyhof, J. 2007. Handbook of European Freshwater Fishes. Kottelat, Cornol and Freyhof, Berlin, xiv + 646 pp	High
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	Yes	Kottelat, M. & Freyhof, J. 2007. Handbook of European Freshwater Fishes. Kottelat, Cornol and Freyhof, Berlin, xiv + 646 pp	Medium
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	S. fontinalis is mainly used for sports fisheries, so there is an economic benefit for individual fishermen as well as the creation of jobs in the aquaculture industry. In addition to the value of S. fontinalis for individual fishermen, recreational fishing and tourism may create a demand not only for food, accommodation and transportation, but also for related recreational activities such as camping, boating, canceing, etc. (CABI)	Low
B .	Biology	y/Ecology		tumbina, boutina, cunocina, ctc. (c/br)	
4. l		able (or persistence) traits			
14	4.01	Is it likely that the taxon will be poisonous or pose other risks to human health?	No	Kottelat, M. & Freyhof, J. 2007. Handbook of European Freshwater Fishes. Kottelat, Cornol and Freyhof, Berlin, xiv + 646 pp	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	Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater fishes. Publications Kottelat, Cornol, Switzerland.	High
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater fishes. Publications Kottelat, Cornol, Switzerland.	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 adaptable in terms of climatic and other environmental conditions.	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	Maybe, they can influence on food-web structure/function in aquatic ecosystem.	Low
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	no data for Croatia	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	Yes, the taxon may be a host or vector of known pests and infectious agents endemic to RA area. Because in every area exist infectious agents and pests.	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	Pathogenic bacterium Renibacterium salmoninarum causes kidney disease with high mortality rate and considerable economic losses in salmonid farming. Infections caused by Flavobacterium columnare are much-feared bacterioses, which have economically significant mortality. (Vardić, I., Kapetanović, D., Vailć, D., Kurtović, B., Teskeredžić, Z., & Teskeredžić, E. (2007). DETECTION OF RENIBACTERIUM SALMONINARUM IN TISSUE OF BROOK TROUT (SALVELINUS FONTINALIS) BY NESTED RT-PCR. Croatian Journal of Fisheries. 65(1). 15-24.)	Low

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22	4.09	Is it likely that the taxon will achieve a body size that will make it more likely to be	Yes	Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater fishes. Publications Kottelat, Cornol, Switzerland.	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	Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater fishes. Publications Kottelat, Cornol, Switzerland.	Very high
24	4.11	(e.g. excretion of by-products) or behaviours (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for	No	Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater fishes. Publications Kottelat, Cornol, Switzerland.	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	Yes	Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater fishes. Publications Kottelat, Cornol, Switzerland.	Very high
		by way of a dormant form)?			
		e exploitation Is the taxon likely to consume threatened or	Yes	It is possible that it consume endangered and protected native	Low
		protected native taxa in the RA area?	165	taxa in the RA area. If there are protected taxa in the RA area will consume them, whether or not the taxon is endangered.	LOW
7	5.02	Is the taxon likely to sequester food	Not applicable	not applicable	Very high
		resources (including nutrients) to the detriment of native taxa in the RA area?			
	Reprodu				
8	6.01	Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?	No	Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater fishes. Publications Kottelat, Cornol, Switzerland.	Very high
9	6.02	Is the taxon likely to produce viable gametes	Yes	Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater	Very high
0	6.03	or propagules (in the RA area)? Is the taxon likely to hybridise naturally with	Yes	fishes. Publications Kottelat, Cornol, Switzerland. Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater	Very high
		native taxa?		fishes. Publications Kottelat, Cornol, Switzerland. (with S. trutta)	, -
1	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	No	Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater fishes. Publications Kottelat, Cornol, Switzerland.	Very high
2	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features)	No	Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater fishes. Publications Kottelat, Cornol, Switzerland.	Very high
3	6.06	to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring	No	Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater fishes. Publications Kottelat, Cornol, Switzerland.	Very high
4	6.07	within a short time span (e.g. < 1 year)? How many time units (days, months, years)	2	Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater	Very high
-	0.07	does the taxon require to reach the age-at-	2	fishes. Publications Kottelat, Cornol, Switzerland.	very nigh
		first-reproduction?			
		al mechanisms How many potential internal	>1	1. Young of the year wash downstream by water, adults naturally	High
5	7.01	vectors/pathways could the taxon use to disperse within the RA area (with suitable	~1	disperse through migration. 2. Introduced for angling 3. flooding	light
6	7.02	Will any of these vectors/pathways bring the taxon in close proximity to one or more	No	No any of this vectors/pathways bring the taxon in close proximity in the protected areas.	Low
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	no	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	Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater fishes. Publications Kottelat, Cornol, Switzerland.	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	No	Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater fishes. Publications Kottelat, Cornol, Switzerland.	Medium
		fragments/seedlings (for plants) in the RA area?			
0	7.06	Are older life stages of the taxon likely to	Yes	Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater	High
1	7 07	migrate in the RA area for reproduction?	No	fishes. Publications Kottelat, Cornol, Switzerland.	Vonder
T	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No	Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater fishes. Publications Kottelat, Cornol, Switzerland.	Very high
2	7.08	Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous	Yes	There is a possibility of a high rate of spread of taxa. Eg. if a fertilized individual enters a new area by any means of expansion.	Low
		seven questions (35–41; i.e. both			
3	7.09	unintentional or intentional) likely to be Is dispersal of the taxon density dependent?	No	Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater	Very high
				fishes. Publications Kottelat, Cornol, Switzerland.	
		<i>ce attributes</i> Is the taxon able to withstand being out of	No	Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater	Very high
	5.01	water for extended periods (e.g. minimum of one or more hours) at some stage of its life		fishes. Publications Kottelat, Cornol, Switzerland.	ser, nigh
5	8.02	cycle? Is the taxon tolerant of a wide range of	No	Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater	Very high
-		water quality conditions relevant to that taxon? [In the Justification field, indicate the	-	fishes. Publications Kottelat, Cornol, Switzerland.	,g
6	8.03	relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other	Not applicable	Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater fishes. Publications Kottelat, Cornol, Switzerland.	Very high
	1	agents/means? Is the taxon likely to tolerate or benefit from	No	Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater fishes. Publications Kottelat, Cornol, Switzerland.	High
7	8.04			and a second sec	1
		environmental/human disturbance? Is the taxon able to tolerate salinity levels that are higher or lower than those found in	Yes	Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater fishes. Publications Kottelat, Cornol, Switzerland.	Low
8	8.05	environmental/human disturbance? Is the taxon able to tolerate salinity levels	Yes		Low Medium

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?	Not applicable	not applicable	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	The risks of establishment S.trutta is decreased. Reason for that is increased temperatures because its catch has dramatically declined in several parts of Europe. (Trumbo, B., Hudy, M., Smith, E. P., Kim, D. Y., Wiggins, B. A., Nislow, K. H., & Dolloff, C. A. (2010, September). Sensitivity and vulnerability of brook trout populations to climate change. In Wild trout X: conserving wild trout. Wild Trout Symposium. West Yellowstone. Montana (pp. 62-	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?	Decrease	Effects of climate change could be particularly profound for wild trout and aquatic ecosystems. The biology of salmonids is largely dependent on temperature and flow.The risk of spread in the RA area is reduced. Temperatures are a major problem therefore. (Trumbo, B., Hudy, M., Smith, E. P., Kim, D. Y., Wiggins, B. A., Nislow, K. H., & Dolloff, C. A. (2010, September). Sensitivity and vulnerability of brook trout populations to climate change. In Wild trout X: conserving wild trout. Wild Trout Symposium, West Yellowstone. Montana (pp. 62-68)	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		Low
	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Lower	It is likely to no have impact on the ecosystem and system functioning. 8Trumbo, B., Hudy, M., Smith, E. P., Kim, D. Y., Wiggins, B. A., Nislow, K. H., & Dolloff, C. A. (2010, September). Sensitivity and vulnerability of brook trout populations to climate change. In Wild trout X: conserving wild trout. Wild Trout Symposium, West Yellowstone, Montana (pp. 62-68)	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	Trumbo, B., Hudy, M., Smith, E. P., Kim, D. Y., Wiggins, B. A., Nislow, K. H., & Dolloff, C. A. (2010, September). Sensitivity and vulnerability of brook trout populations to climate change. In Wild trout X: conserving wild trout. Wild Trout Symposium, West Yellowstone, Montana (pp. 62-68)	Low

Statistics	
Scores	
BRA	28.0
BRA Outcome	-
BRA+CCA	20.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	16.0
1. Domestication/Cultivation	2.0
2. Climate, distribution and introduction risk	0.0
3. Invasive elsewhere	14.0
B. Biology/Ecology	12.0
4. Undesirable (or persistence) traits	7.0
5. Resource exploitation	5.0
6. Reproduction	2.0
7. Dispersal mechanisms	-1.0
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	
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 6
9. Climate change	6
Sectors affected	10
Commercial	13
Environmental	5
Species or population nuisance traits	4
Thursday	
Thresholds	
	-
BRA BRA+CCA	

-	BRA+CCA	
		Confidence
0.71	BRA+CCA	
0.75	BRA	
0.38	CCA	
		Date and Time
020 09:06:41	02/06/20	

Taxon and Assessor details		
Category	Fishes and Lampreys (freshwater)	
Taxon name	Salvelinus namaycush	
Common name	lake charr	
Assessor	Ana Marić	
Risk screening context		
Reason and socio-economic benefits		
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS	
Taxonomy		
Native range		
Introduced range		
URL		

			Response	Justification (references and/or other information)	Confidence
Α. Ι	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	RESULTS OF LAKE TROUT STOCKINGS IN FINLAND 1957-81 A. Mutenia.1984	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	RESULTS OF LAKE TROUT STOCKINGS IN FINLAND 1957-81 A. Mutenia.1984	Very high
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	S. fontinalis	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	Cf tolerate	High
5	2.02	What is the quality of the climate matching data?	Medium	No comment	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	No	Horzont species	Very high
7	2.04	How many potential vectors could the taxon	One	Stocking.	Very high
0	2.05	use to enter in the RA area?	NI-	https://www.cabi.org/isc/datasheet/65327#tosummaryOfInvasiven	
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	https://www.cabi.org/isc/datasheet/65327#tointroductions	Very high
3. 1		e elsewhere			
9		Has the taxon become naturalised (established viable populations) outside its	Yes	https://www.cabi.org/isc/datasheet/65327#tointroductions	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	https://www.cabi.org/isc/datasheet/65327#toriskAndImpactFactor s	Very high
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	Yes	https://www.cabi.org/isc/datasheet/65327#toriskAndImpactFactor s	High
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	Yes	https://www.cabi.org/isc/datasheet/65327#toriskAndImpactFactor s	High
	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	https://www.cabi.org/isc/datasheet/65327#toriskAndImpactFactor s	Very high
		y/Ecology			
		able (or persistence) traits			N
		Is it likely that the taxon will be poisonous or pose other risks to human health?		Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof,	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	https://www.cabi.org/isc/datasheet/65327#toriskAndImpactFactor s	High
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin. 646 pp	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	https://www.cabi.org/isc/datasheet/65327#toclimate	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	https://www.cabi.org/isc/datasheet/65327#toriskAndImpactFactor s	High
		Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes	https://www.cabi.org/isc/datasheet/65327#tointroductions	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	https://www.cabi.org/isc/datasheet/65327#toimpactSocial	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	https://www.cabi.org/isc/datasheet/65327#toimpactSocial	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	https://www.cabi.org/isc/datasheet/65327#todescription	Very high
	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)?	Yes	Importance of rearing-unit design and stocking density to the behavior, growth and metabolism of lake trout (Salvelinus namaycush) Author links open overlay panelRobert MRossaBarnaby JWatten. 1998	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?	No	https://www.cabi.org/isc/datasheet/65327#towaterTolerances	Medium

25	4.12	Is the taxon likely to maintain a viable	No	https://www.cabi.org/isc/datasheet/65327#todistributionDatabase	Medium
		population even when present in low		Table	. iouiuiii
		densities (or persisting in adverse conditions			
1	Resourc	by way of a dormant form)? ce exploitation			
		Is the taxon likely to consume threatened or	Yes	https://www.cabi.org/isc/datasheet/65327#todistributionDatabase	High
		protected native taxa in the RA area?		Table	
'	5.02	Is the taxon likely to sequester food	Yes	https://www.cabi.org/isc/datasheet/65327#todistributionDatabase Table	High
		resources (including nutrients) to the detriment of native taxa in the RA area?		Table	
ł	Reprod				
3	6.01	Is the taxon likely to exhibit parental care	Yes	Life history differences parallel environmental differences among	High
		and/or to reduce age-at-maturity in response		North American lake trout (Salvelinus namaycush) populations	
a	6.02	to environmental conditions? Is the taxon likely to produce viable gametes	Yes	Jenni L. McDermid, Brian J. Shuter, and Nigel P. Lester. 2009 https://www.cabi.org/isc/datasheet/65325#tohistoryOfIntroduction	Medium
	0.02	or propagules (in the RA area)?	103	AndSpread S. fontinais is	neulum
0	6.03	Is the taxon likely to hybridise naturally with	th Yes Survival, growth and sexual maturation of the tiger trout hybri		High
		native taxa?		(Salmo trutta 9 × Salvelinus fontinalis °) Author links open	
1	6.04	Is the taxon likely to be hermaphroditic or to	overlay panelJean MarieBlanc1BernardChevassus2 1986. to be hermaphroditic or to No https://www.cabi.org/isc/datasheet/65327#todistributionDa		Very high
-	0.04	display asexual reproduction?	No	Table	very night
2	6.05	Is the taxon dependent on the presence of	No	https://www.fishbase.se/summary/Salvelinus-namaycush.html	Very high
		another taxon (or specific habitat features)			
2	6.06	to complete its life cycle? Is the taxon known (or likely) to produce a	Yes	Kottelat, M. and J. Freyhof, 2007. Handbook of European	Very high
5	0.00	large number of propagules or offspring	Tes	freshwater fishes. Publications Kottelat, Cornol and Freyhof,	very nigh
		within a short time span (e.g. < 1 year)?		Berlin. 646 pp	
4	6.07	How many time units (days, months, years)	6	Kottelat, M. and J. Freyhof, 2007. Handbook of European	Very high
		does the taxon require to reach the age-at-		freshwater fishes. Publications Kottelat, Cornol and Freyhof,	
. /	Disners	first-reproduction?	I	Berlin. 646 pp	l
	7.01	How many potential internal	One	https://www.cabi.org/isc/datasheet/65327#toriskOfIntroduction	High
		vectors/pathways could the taxon use to		stocking	
6	7.02	disperse within the RA area (with suitable	Vec	Depende en steelving astivities	Vonchist
o	7.02	Will any of these vectors/pathways bring the taxon in close proximity to one or more	Yes	Depends on stocking activities	Very high
		protected areas (e.g. MCZ, MPA, SSSI)?			
7	7.03	Does the taxon have a means of actively	No	Kottelat, M. and J. Freyhof, 2007. Handbook of European	Very high
		attaching itself to hard substrata (e.g. ship		freshwater fishes. Publications Kottelat, Cornol and Freyhof,	
		hulls, pilings, buoys) such that it enhances		Berlin. 646 pp	
8	7.04	the likelihood of dispersal? Is natural dispersal of the taxon likely to	No	Kottelat, M. and J. Freyhof, 2007. Handbook of European	Very high
		occur as eggs (for animals) or as propagules		freshwater fishes. Publications Kottelat, Cornol and Freyhof,	· · · / · · · g.
		(for plants: seeds, spores) in the RA area?		Berlin. 646 pp	-
9	7.05	Is natural dispersal of the taxon likely to	Yes	Kottelat, M. and J. Freyhof, 2007. Handbook of European	Medium
		occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA		freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin. 646 pp	
		area?			
0	7.06	Are older life stages of the taxon likely to	Yes	Kottelat, M. and J. Freyhof, 2007. Handbook of European	High
_	7.07	migrate in the RA area for reproduction?		freshwater fishes. Publications Kottelat, Cornol and Freyhof,	
1	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No	https://www.cabi.org/isc/datasheet/65327#toriskOfIntroduction	Very high
2	7.08	Is dispersal of the taxon along any of the	No	https://www.cabi.org/isc/datasheet/65325#tohistoryOfIntroduction	Very high
		vectors/pathways mentioned in the previous		AndSpread S. fontinalis wasnt rapid, depends on stocking	, 3
		seven questions (35-41; i.e. both			
2	7.09	unintentional or intentional) likely to be Is dispersal of the taxon density dependent?	No	Effectiveness of lake trout (Salvelinus namaycush) suppression in	Very high
5	7.09	is dispersal of the taxon density dependent:	NO	Lake Pend Oreille, Idaho: 2006–2016 Andrew M. Dux, Michael J.	very nigh
				Hansen, Matthew P. Corsi, Nicholas C. Wahl, James P. Fredericks,	
	<u> </u>			Charles E. Corsi, Daniel J. Schill & Ned J. Horner. 2019	
		Is the taxon able to withstand being out of	No	Importance of rearing-unit design and stocking density to the	Very high
+	0.01	water for extended periods (e.g. minimum of	110	behavior, growth and metabolism of lake trout (Salvelinus	very night
		one or more hours) at some stage of its life		namaycush) Author links open overlay panelRobert	
_		cvcle?		MRossaBarnaby JWatten. 1998	
5	8.02	Is the taxon tolerant of a wide range of	No	Acute and chronic toxicity of nitrate to early life stages of lake	Very high
		water quality conditions relevant to that taxon? [In the Justification field, indicate the		trout (Salvelinus namaycush) and lake whitefish (Coregonus clupeaformis) Michael D. McGurk, François Landry, Armando Tang,	
		relevant water quality variable(s) being		Chris C. Hanks Nitrate	
6	8.03	Can the taxon be controlled or eradicated in	No	https://www.cabi.org/isc/datasheet/65327#topreventionAndContro	Very high
		the wild with chemical, biological, or other			
7	8.04	agents/means? Is the taxon likely to tolerate or benefit from	No	https://www.cabi.org/isc/datasheet/65327#toriskAndImpactFactor	Very high
	0.04	environmental/human disturbance?		S	, mgn
8	8.05	Is the taxon able to tolerate salinity levels	Yes	Variation in salinity tolerance, gill Na+/K+-ATPase, Na+/K+/2Cl-	High
		that are higher or lower than those found in		cotransporter and mitochondria-rich cell distribution in three	
		its usual environment?		salmonids Salvelinus namaycush, Salvelinus fontinalis and Salmo salar Junya Hiroi* and Stephen D. McCormick. 2007	
	8.06	Are there effective natural enemies	Yes	https://www.cabi.org/isc/datasheet/65327#tonaturalEnemies	High
9	0.00	(predators) of the taxon present in the RA			
. (Climat	e change			Very bich
. (Climat Climate	e change	No change	https://www.cabi.org/icc/datachaot/6E227#tavial/AndIman-tEtavi	Very high
. (Climat	change Under the predicted future climatic	No change	https://www.cabi.org/isc/datasheet/65327#toriskAndImpactFactor	, 3
<u>.</u> (Climat Climate	e change	No change	https://www.cabi.org/isc/datasheet/65327#toriskAndImpactFactor s	, 5
<u>. (</u> 0	Climate Climate 9.01	 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? 		s	
<u>).</u> 0	Climat Climate	 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 Decrease	s Non-native fishes and climate change: predicting species	Very high
<u>). (</u> 0	Climate Climate 9.01	 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? 		s	

52	9.03	Under the predicted future climatic	Decrease	Non-native fishes and climate change: predicting species	High
		conditions, are the risks of dispersal within		responses to warming temperatures in a temperate region J. R.	
		the RA area posed by the taxon likely to		BRITTON*, J. CUCHEROUSSET*, G. D. DAVIES*, †, M. J.	
		increase, decrease or not change?		GODARD‡ AND G. H. COPP* 2010	
53	9.04	Under the predicted future climatic	No change	Non-native fishes and climate change: predicting species	Medium
		conditions, what is the likely magnitude of		responses to warming temperatures in a temperate region J. R.	
		future potential impacts on biodiversity		BRITTON*, J. CUCHEROUSSET*, G. D. DAVIES*, †, M. J.	
		and/or ecological integrity/status?		GODARD‡ AND G. H. COPP* 2010	
54	9.05	Under the predicted future climatic	Lower	Non-native fishes and climate change: predicting species	High
		conditions, what is the likely magnitude of		responses to warming temperatures in a temperate region J. R.	
		future potential impacts on ecosystem		BRITTON*, J. CUCHEROUSSET*, G. D. DAVIES*, †, M. J.	
		structure and/or function?		GODARD‡ AND G. H. COPP* 2010	
55	9.06	Under the predicted future climatic	No change	Non-native fishes and climate change: predicting species	High
		conditions, what is the likely magnitude of		responses to warming temperatures in a temperate region J. R.	
		future potential impacts on ecosystem		BRITTON*, J. CUCHEROUSSET*, G. D. DAVIES*, †, M. J.	
		services/socio-economic factors?		GODARD‡ AND G. H. COPP* 2010	

Statistics	
Scores	
BRA	30.5
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	16.0
4. Undesirable (or persistence) traits	7.0
5. Resource exploitation	7.0
6. Reproduction	3.0
7. Dispersal mechanisms	0.0
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	3 5 5
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	5
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	36 12
<i>4. Undesirable (or persistence) traits</i> <i>5. Resource exploitation</i>	36 12 2
4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction	36 12 2 7
4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms	36 12 2 7 9
4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes	36 12 2 7 9 6
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
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
4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected	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	6 9
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	6 9
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	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 Commercial Environmental	6 9

Thresholds	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.85
BRA	0.86
CCA	0.79
Date and Time	
24/05/2	021 11:11:40

Taxon and Assessor details			
Category	Fishes and Lampreys (freshwater)		
Taxon name	Salvelinus namaycush		
Common name	lake charr		
Assessor	Ivan Špelić		
Risk screening context	Risk screening context		
Reason and socio-economic benefits			
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS		
Taxonomy			
Native range			
Introduced range			
URL			

			Response	Justification (references and/or other information)	Confidence
A. I	Biogeo	graphy/Historical			
		ication/Cultivation	1		
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	Ackefors, H. (1982). Aquaculture: A New Industry in Sweden. Ambio, 11(6), 362-365. Retrieved April 22, 2020, from www.jstor.org/stable/4312841	High
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	Morissette, O., Sirois, P., Lester, N. P., Wilson, C. C., & Bernatchez, L. (2018). Supplementation stocking of Lake Trout (Salvelinus namaycush) in small boreal lakes: Ecotypes influence on growth and condition. PLoS ONE, 13, e0200599	High
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	Salvelinus fontinalis	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	Climatch 2020	Medium
5	2.02	What is the quality of the climate matching data?	Medium	Climatch 2020	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	No	Povž et al. 2018	High
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	Introduction for angling (CABI 2019).	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	Austria, Italy (Froese & Pauly 2020).	Medium
3.1	nvasive	e elsewhere			
9	3.01	Has the taxon become naturalised (established viable populations) outside its	Yes	CABI 2019, Froese & Pauly 2020	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	Global Invasive Species Database (2020) Species profile: Salvelinus namaycush. Downloaded from http://www.iucngisd.org/gisd/species.php?sc=1363 on 22-04-	High
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	Rarely used in aquaculture (Fisheries and Aquaculture Department. Introduced Species Fact Sheets. In: FAO Fisheries and Aquaculture Department [online]. Rome. Updated 17 March 2017. [Cited 22 April 2020]), no documented impacts.	Medium
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem services?	Yes	Pam Fuller, and Matt Neilson, 2020, Salvelinus namaycush (Walbaum in Artedi, 1792): U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, FL, https://nas.er.usgs.gov/queries/FactSheet.aspx?SpeciesID=942, Revision Date: 11/12/2019, Peer Review Date: 2/2/2016, Access Date: 4/22/2020	High
	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	Yes	Pam Fuller, and Matt Neilson, 2020, Salvelinus namaycush (Walbaum in Artedi, 1792): U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, FL, https://nas.er.usgs.gov/queries/FactSheet.aspx?SpeciesID=942, Revision Date: 11/12/2019, Peer Review Date: 2/2/2016, Access Date: 4/22/2020	Medium
		//Ecology			
		able (or persistence) traits			
		Is it likely that the taxon will be poisonous or pose other risks to human health?		Harmless (Froese & Pauly 2020).	Very high
	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	Pam Fuller, and Matt Neilson, 2020, Salvelinus namaycush (Walbaum in Artedi, 1792): U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, FL, https://nas.er.usgs.gov/queries/FactSheet.aspx?SpeciesID=942, Revision Date: 11/12/2019, Peer Review Date: 2/2/2016, Access Date: 4/22/2020	High
	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	No parasitic behaviour.	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	Lake trout are a cold-water species requiring relatively high concentrations of dissolved oxygen for survival. Lake trout are the only major native sport fish adapted to the deep, cold water of oligotrophic (low-nutrient) lakes. At the southern range of the species, lake trout require deep water refugia, where preferred temperature ranges and oxygen levels exist (Lenart, S. 2001. "Salvelinus namaycush" (On-line), Animal Diversity Web. Accessed April 22, 2020 at https://animaldiversity.org/accounts/Salvelinus namaycush/).	Very high

18	4.05	Is the taxon likely to disrupt food-web	No	Only established in few lakes in Europe (some Alpine and	Medium	
		structure/function in aquatic ecosystems if it		Scandinavian lakes); adverse impact of this type only documented		
		has invaded or is likely to invade the RA		in North America, not in Europe. Crossman, E. J. (1995).		
		area?		Introduction of the Lake Trout (Salvelinus namaycush) in Areas		
				Outside its Native Distribution: A Review. Journal of Great Lakes		
				Research, 21, 17–29. doi:10.1016/s0380-1330(95)71081-4.		
				Eloranta, A. P., Nieminen, P., & Kahilainen, K. K. (2014). Trophic		
				interactions between introduced lake trout (Salvelinus		
				namaycush) and native Arctic charr (S. alpinus) in a large		
				Fennoscandian subarctic lake. Ecology of Freshwater Fish. 24(2).		
9	4.06	Is the taxon likely to exert adverse impacts	No	Only established in few lakes in Europe (some Alpine and	Medium	
-		on ecosystem services in the RA area?		Scandinavian lakes); adverse impact of this type only documented		
		on ecosystem services in the NA area.		in North America, not in Europe. Crossman, E. J. (1995).		
				Introduction of the Lake Trout (Salvelinus namaycush) in Areas		
				Outside its Native Distribution: A Review. Journal of Great Lakes		
				Research, 21, 17–29. doi:10.1016/s0380-1330(95)71081-4.		
				Eloranta, A. P., Nieminen, P., & Kahilainen, K. K. (2014). Trophic		
				interactions between introduced lake trout (Salvelinus		
				namaycush) and native Arctic charr (S. alpinus) in a large		
0	4.07		¥	Fennoscandian subarctic lake. Ecology of Freshwater Fish. 24(2).	LU - b	
20	4.07	Is it likely that the taxon will host, and/or	Yes	Froese & Pauly 2020	High	
		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	Froese & Pauly 2020	High	
		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	150 cm, 32 kg (Froese & Pauly 2020).	Very high	
	1	size that will make it more likely to be				
		released from captivity?				
23	4.10	Is the taxon capable of sustaining itself in a	Yes	Occurs in shallow and deep waters of northern lakes and streams	High	
	1	range of water velocity conditions (e.g.		(Froese & Pauly 2020).		
	1	versatile in habitat use)?				
24	4.11		No	Not documented in literature.	High	
		(e.g. excretion of by-products) or behaviours			5	
		(e.g. feeding) will reduce habitat quality for				
		native taxa?				
25	4.12	Is the taxon likely to maintain a viable	No	Not documented.	Medium	
		population even when present in low				
		densities (or persisting in adverse conditions				
		by way of a dormant form)?				
_						
5. 1	Resourd	ce exploitation				
		<i>e exploitation</i> Is the taxon likely to consume threatened or	Yes	Feeds on plankton, insects and fishes (Kottelat & Freyhof 2008).	Very high	
	Resourd 5.01	Is the taxon likely to consume threatened or	Yes	Feeds on plankton, insects and fishes (Kottelat & Freyhof 2008).	Very high	
26	5.01	Is the taxon likely to consume threatened or protected native taxa in the RA area?				
26		Is the taxon likely to consume threatened or		Feeds on plankton, insects and fishes (Kottelat & Freyhof 2008). No data for calculation.	Very high Very high	
26	5.01	Is the taxon likely to consume threatened or protected native taxa in the RA area? Is the taxon likely to sequester food				
26 27	5.01	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?				
26	5.01 5.02	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?		No data for calculation. Research has indicated that environmental factors, such as lake		
26	5.01 5.02 Reprod	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? action	Not applicable	No data for calculation.	Very high	
26	5.01 5.02 Reprod	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>iction</i> Is the taxon likely to exhibit parental care	Not applicable	No data for calculation. Research has indicated that environmental factors, such as lake	Very high	
26 27 5. 1	5.01 5.02 Reprod	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	Not applicable	No data for calculation. Research has indicated that environmental factors, such as lake size and dissolved solid concentrations, may play a role in the age	Very high	
26 27 5. 1	5.01 5.02 Reprod	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	Not applicable	No data for calculation. Research has indicated that environmental factors, such as lake size and dissolved solid concentrations, may play a role in the age of first maturity and overall repoductive success of the lake trout	Very high	
26 27 5. 1	5.01 5.02 Reprod	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	Not applicable	No data for calculation. Research has indicated that environmental factors, such as lake size and dissolved solid concentrations, may play a role in the age of first maturity and overall repoductive success of the lake trout (Lenart, S. 2001. "Salvelinus namaycush" (On-line), Animal	Very high	
26 27 5. 1 28	5.01 5.02 Reprod	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	Not applicable Yes	No data for calculation. Research has indicated that environmental factors, such as lake size and dissolved solid concentrations, may play a role in the age of first maturity and overall repoductive success of the lake trout (Lenart, S. 2001. "Salvelinus namaycush" (On-line), Animal Diversity Web. Accessed April 22, 2020 at	Very high	
26 27 5. 1 28	5.01 5.02 Reprod	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>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	Not applicable Yes	No data for calculation. Research has indicated that environmental factors, such as lake size and dissolved solid concentrations, may play a role in the age of first maturity and overall repoductive success of the lake trout (Lenart, S. 2001. "Salvelinus namaycush" (On-line), Animal Diversity Web. Accessed April 22, 2020 at https://animaldiversity.org/accounts/Salvelinus namaycush/). Established in some high altitude lakes in Pyrenees, north Italy	Very high High	
26 27 5. 1 28	5.01 5.02 Reprod	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>action</i> Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?	Not applicable Yes	No data for calculation. Research has indicated that environmental factors, such as lake size and dissolved solid concentrations, may play a role in the age of first maturity and overall repoductive success of the lake trout (Lenart, S. 2001. "Salvelinus namaycush" (On-line), Animal Diversity Web. Accessed April 22, 2020 at https://animaldiversity.org/accounts/Salvelinus namaycush/). Established in some high altitude lakes in Pyrenees, north Italy and Scandinavia. In lakes of Alps (France, Switzerland) apparently	Very high High	
26 27 5. 1 28	5.01 5.02 6.01 6.01	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? Justion 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)?	Not applicable Yes No	No data for calculation. Research has indicated that environmental factors, such as lake size and dissolved solid concentrations, may play a role in the age of first maturity and overall repoductive success of the lake trout (Lenart, S. 2001. "Salvelinus namaycush" (On-line), Animal Diversity Web. Accessed April 22, 2020 at https://animaldiversity.org/accounts/Salvelinus_namaycush/). Established in some high altitude lakes in Pyrenees, north Italy and Scandinavia. In lakes of Alps (France, Switzerland) apparently survives only by stocking (Kottelat & Freyhof 2008).	Very high High Medium	
26 27 5. 1 28	5.01 5.02 Reprod	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>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	Not applicable Yes	No data for calculation. Research has indicated that environmental factors, such as lake size and dissolved solid concentrations, may play a role in the age of first maturity and overall repoductive success of the lake trout (Lenart, S. 2001. "Salvelinus namaycush" (On-line), Animal Diversity Web. Accessed April 22, 2020 at https://animaldiversity.org/accounts/Salvelinus namaycush/). Established in some high altitude lakes in Pyrenees, north Italy and Scandinavia. In lakes of Alps (France, Switzerland) apparently	Very high High	
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227 277 28 28 29 29 29 31 31 31 33 33 33 33	5.01 5.02 6.01 6.03 6.04 6.05 6.06 6.06	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>action</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 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?	Not applicable Yes No No No Yes Yes	No data for calculation. Research has indicated that environmental factors, such as lake size and dissolved solid concentrations, may play a role in the age of first maturity and overall repoductive success of the lake trout (Lenart, S. 2001. "Salvelinus namaycush" (On-line), Animal Diversity Web. Accessed April 22, 2020 at https://animaldiversity.org/accounts/Salvelinus namaycush/). Established in some high altitude lakes in Pyrenees, north Italy and Scandinavia. In lakes of Alps (France, Switzerland) apparently survives only by stocking (Kottelat & Freyhof 2008). No related species in RA area (Kottelat & Freyhof 2008). Froese & Pauly 2020 David T. Callaghan, Paul J. Blanchfield, Peter A. Cott (2016): Lake trout (Salvelinus namaycush) spawning habitat in a northern lake: The role of wind and physical characteristics on habitat quality. Journal of Great Lakes Research, Volume 42, Issue 2, 2016, Pages 18000 eggs per female (Froese & Pauly 2020). Sometimes they don't spawn every year to conserve energy (David T. Callaghan, Paul J. Blanchfield, Peter A. Cott, Lake trout (Salvelinus namaycush) spawning habitat in a northern lake: The role of wind and physical characteristics on habitat quality. Journal of Great Lakes Research, Volume 42, Issue 2, 2016, Pages 299-307). 3 years is minimum, mostly between 5 and 7 (Froese & Pauly	Very high High Medium Very high Very high High Medium	
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27 27 5. 1 80 31 32 33 33 33	5.01 5.02 6.01 6.03 6.04 6.05 6.06 6.06	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? Jotion 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? How many potential internal	Not applicable Yes No No No Yes Yes	No data for calculation. Research has indicated that environmental factors, such as lake size and dissolved solid concentrations, may play a role in the age of first maturity and overall repoductive success of the lake trout (Lenart, S. 2001. "Salvelinus namaycush" (On-line), Animal Diversity Web. Accessed April 22, 2020 at https://animaldiversity.org/accounts/Salvelinus namaycush/). Established in some high altitude lakes in Pyrenees, north Italy and Scandinavia. In lakes of Alps (France, Switzerland) apparently survives only by stocking (Kottelat & Freyhof 2008). No related species in RA area (Kottelat & Freyhof 2008). Froese & Pauly 2020 David T. Callaghan, Paul J. Blanchfield, Peter A. Cott (2016): Lake trout (Salvelinus namaycush) spawning habitat in a northern lake: The role of wind and physical characteristics on habitat quality. Journal of Great Lakes Research, Volume 42, Issue 2, 2016, Pages 18000 eggs per female (Froese & Pauly 2020). Sometimes they don't spawn every year to conserve energy (David T. Callaghan, Paul J. Blanchfield, Peter A. Cott, (Salvelinus namaycush) spawning habitat in a northern lake: The role of wind and physical characteristics on habitat ually. Journal of Great Lakes Research, Volume 42, Issue 2, 2016, Pages 18000 eggs per female (Froese & Pauly 2020). Sometimes they don't spawn every year to conserve energy (David T. Callaghan, Paul J. Blanchfield, Peter A. Cott, Lake trout (Salvelinus namaycush) spawning habitat in a northern lake: The role of wind and physical characteristics on habitat quality. Journal of Great Lakes Research, Volume 42, Issue 2, 2016, Pages 299-307). 3 years is minimum, mostly between 5 and 7 (Froese & Pauly 2020). Introductions for angling, no spawning in wild is expected	Very high High Medium Very high Very high High Medium	
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227 277 227 228 229 229 229 229 229 229 229 229 331 332 333 333 333 334 7.	5.01 5.02 6.01 6.03 6.04 6.05 6.06 6.06 6.06 7.01 7.02	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>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? <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)?	Not applicable Yes No No No No Yes Yes 3 One No	No data for calculation. Research has indicated that environmental factors, such as lake size and dissolved solid concentrations, may play a role in the age of first maturity and overall repoductive success of the lake trout (Lenart, S. 2001. "Salvelinus namaycush" (On-line), Animal Diversity Web. Accessed April 22, 2020 at https://animaldiversity.org/accounts/Salvelinus namaycush/). Established in some high altitude lakes in Pyrenees, north Italy and Scandinavia. In lakes of Alps (France, Switzerland) apparently survives only by stocking (Kottelat & Freyhof 2008). No related species in RA area (Kottelat & Freyhof 2008). Froese & Pauly 2020 David T. Callaghan, Paul J. Blanchfield, Peter A. Cott (2016): Lake trout (Salvelinus namaycush) spawning habitat in a northern lake: The role of wind and physical characteristics on habitat quality. Journal of Great Lakes Research, Volume 42, Issue 2, 2016, Pages 18000 eggs per female (Froese & Pauly 2020). Sometimes they don't spawn every year to conserve energy (David T. Callaghan, Paul J. Blanchfield, Peter A. Cott, Lake trout (Salvelinus namaycush) spawning habitat in a northern lake: The role of wind and physical characteristics on habitat quality. Journal of Great Lakes Research, Volume 42, Issue 2, 2016, Pages 299-307). 3 years is minimum, mostly between 5 and 7 (Froese & Pauly 2020). Introductions for angling, no spawning in wild is expected (personal opinion). Personal opinion.	Very high High Medium Very high Very high High High Low	
227 277 227 228 229 229 229 229 229 229 229 229 331 332 333 333 333 334 7.	5.01 5.02 6.01 6.03 6.04 6.05 6.06 6.06 6.06	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>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 likely to be hermaphroditic or to display asexual reproduction? Is the taxon likely to be hermaphroditic or to display asexual reproduction? 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 potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively	Not applicable Yes No No No Yes Yes 3 One	No data for calculation. Research has indicated that environmental factors, such as lake size and dissolved solid concentrations, may play a role in the age of first maturity and overall repoductive success of the lake trout (Lenart, S. 2001. "Salvelinus namaycush" (On-line), Animal Diversity Web. Accessed April 22, 2020 at https://animaldiversity.org/accounts/Salvelinus namaycush/). Established in some high altitude lakes in Pyrenees, north Italy and Scandinavia. In lakes of Alps (France, Switzerland) apparently survives only by stocking (Kottelat & Freyhof 2008). No related species in RA area (Kottelat & Freyhof 2008). Froese & Pauly 2020 David T. Callaghan, Paul J. Blanchfield, Peter A. Cott (2016): Lake trout (Salvelinus namaycush) spawning habitat in a northern lake: The role of wind and physical characteristics on habitat quality. Journal of Great Lakes Research, Volume 42, Issue 2, 2016, Pages 18000 eggs per female (Froese & Pauly 2020). Sometimes they don't spawn every year to conserve energy (David T. Callaghan, Paul J. Blanchfield, Peter A. Cott, Lake trout (Salvelinus namaycush) spawning habitat in a northern lake: The role of wind and physical characteristics on habitat quality. Journal of Great Lakes Research, Volume 42, Issue 2, 2016, Pages 299-307). 3 years is minimum, mostly between 5 and 7 (Froese & Pauly 2020). Introductions for angling, no spawning in wild is expected (personal opinion).	Very high High Medium Very high Very high High Medium Low	
27 27 5. 12 12 13 14 15 16 17 18	5.01 5.02 6.01 6.03 6.04 6.05 6.06 6.06 6.06 7.01 7.02	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>action</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 likely to be hermaphroditic or to display asexual reproduction? Is the taxon likely to be hermaphroditic or to display asexual reproduction? 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	Not applicable Yes No No No No Yes Yes 3 One No	No data for calculation. Research has indicated that environmental factors, such as lake size and dissolved solid concentrations, may play a role in the age of first maturity and overall repoductive success of the lake trout (Lenart, S. 2001. "Salvelinus namaycush" (On-line), Animal Diversity Web. Accessed April 22, 2020 at https://animaldiversity.org/accounts/Salvelinus namaycush/). Established in some high altitude lakes in Pyrenees, north Italy and Scandinavia. In lakes of Alps (France, Switzerland) apparently survives only by stocking (Kottelat & Freyhof 2008). No related species in RA area (Kottelat & Freyhof 2008). Froese & Pauly 2020 David T. Callaghan, Paul J. Blanchfield, Peter A. Cott (2016): Lake trout (Salvelinus namaycush) spawning habitat in a northern lake: The role of wind and physical characteristics on habitat quality. Journal of Great Lakes Research, Volume 42, Issue 2, 2016, Pages 18000 eggs per female (Froese & Pauly 2020). Sometimes they don't spawn every year to conserve energy (David T. Callaghan, Paul J. Blanchfield, Peter A. Cott, Lake trout (Salvelinus namaycush) spawning habitat in a northern lake: The role of wind and physical characteristics on habitat quality. Journal of Great Lakes Research, Volume 42, Issue 2, 2016, Pages 299-307). 3 years is minimum, mostly between 5 and 7 (Froese & Pauly 2020). Introductions for angling, no spawning in wild is expected (personal opinion). Personal opinion.	Very high High Medium Very high Very high High High Low	
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226 227 5. 228 229 300 311 322 333 334 335 336 337	5.01 5.02 6.01 6.03 6.04 6.05 6.06 6.06 6.06 7.01 7.02 7.03	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>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 potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or 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?	Not applicable Yes No No No No Yes Yes 3 One No	No data for calculation. Research has indicated that environmental factors, such as lake size and dissolved solid concentrations, may play a role in the age of first maturity and overall repoductive success of the lake trout (Lenart, S. 2001. "Salvelinus namaycush" (On-line), Animal Diversity Web. Accessed April 22, 2020 at https://animaldiversity.org/accounts/Salvelinus namaycush). Established in some high altitude lakes in Pyrenees, north Italy and Scandinavia. In lakes of Alps (France, Switzerland) apparently survives only by stocking (Kottelat & Freyhof 2008). No related species in RA area (Kottelat & Freyhof 2008). No related species in RA area (Kottelat & Freyhof 2008). Froese & Pauly 2020 David T. Callaghan, Paul J. Blanchfield, Peter A. Cott (2016): Lake trout (Salvelinus namaycush) spawning habitat in a northern lake: The role of wind and physical characteristics on habitat quality. Journal of Great Lakes Research, Volume 42, Issue 2, 2016, Pages 18000 eggs per female (Froese & Pauly 2020). Sometimes they don't spawn every year to conserve energy (David T. Callaghan, Paul J. Blanchfield, Peter A. Cott, Lake trout (Salvelinus namaycush) spawning habitat in a northern lake: The role of wind and physical characteristics on habitat quality. Journal of Great Lakes Research, Volume 42, Issue 2, 2016, Pages 18000 eggs per female (Froese & Pauly 2020). Sometimes they don't spawn every year to conserve energy (David T. Callaghan, Paul J. Blanchfield, Peter A. Cott, Lake trout (Salvelinus namaycush) spawning habitat in a northern lake: The role of wind and physical characteristics on habitat quality. Journal of Great Lakes Research, Volume 42, Issue 2, 2016, Pages 209-307). 3 years is minimum, mostly between 5 and 7 (Froese & Pauly 2020). Introductions for angling, no spawning in wild is expected (personal opinion). Personal opinion. No adaptations.	Very high High Medium Very high Very high High High Low Low	
226 227 5. 28 29 300 311 322 333 334 344 7. 355 366 337	5.01 5.02 6.01 6.03 6.04 6.05 6.06 6.06 6.06 7.01 7.02	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>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 likely to be hermaphroditic or to display asexual reproduction? Is the taxon likely to be hermaphroditic or to display asexual reproduction? 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 potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or 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	Not applicable Yes No No No No Yes Yes 3 One No	No data for calculation. Research has indicated that environmental factors, such as lake size and dissolved solid concentrations, may play a role in the age of first maturity and overall repoductive success of the lake trout (Lenart, S. 2001. "Salvelinus namaycush" (On-line), Animal Diversity Web. Accessed April 22, 2020 at https://animaldiversity.org/accounts/Salvelinus_namaycush/). Established in some high altitude lakes in Pyrenees, north Italy and Scandinavia. In lakes of Alps (France, Switzerland) apparently survives only by stocking (Kottelat & Freyhof 2008). No related species in RA area (Kottelat & Freyhof 2008). Froese & Pauly 2020 David T. Callaghan, Paul J. Blanchfield, Peter A. Cott (2016): Lake trout (Salvelinus namaycush) spawning habitat in a northern lake: The role of wind and physical characteristics on habitat quality. Journal of Great Lakes Research, Volume 42, Issue 2, 2016, Pages 18000 eggs per female (Froese & Pauly 2020). Sometimes they don't spawn every year to conserve energy (David T. Callaghan, Paul J. Blanchfield, Peter A. Cott, Callaghan, Paul J. Blanchfield, Peter A. Cott, Callaghan, Paul J. Blanchfield, Peter A. Cott, Lake trout (Salvelinus namaycush) spawning habitat in a northern lake: The role of wind and physical characteristics on habitat quality. Journal of Great Lakes Research, Volume 42, Issue 2, 2016, Pages 18000 eggs per female (Froese & Pauly 2020). Sometimes they don't spawn every year to conserve energy (David T. Callaghan, Paul J. Blanchfield, Peter A. Cott, Lake trout (Salvelinus namaycush) spawning habitat in a northern lake: The role of wind and physical characteristics on habitat quality. Journal of Great Lakes Research, Volume 42, Issue 2, 2016, Pages 299-307). 3 years is minimum, mostly between 5 and 7 (Froese & Pauly 2020). Introductions for angling, no spawning in wild is expected (personal opinion). Personal opinion. No adaptations.	Very high High Medium Very high Very high High High Low	
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39			1		
	7.05	Is natural dispersal of the taxon likely to	No	Probably no possible reproduction in RA area, even if introduced to	Medium
		occur as larvae/juveniles (for animals) or as		adequate habitats similar to Alpine lakes in Switzerland and	
		fragments/seedlings (for plants) in the RA		France (Kottelat & Freyhof 2008).	
10	7.06	area? Are older life stages of the taxon likely to	No	Probably no possible reproduction in PA area, over if introduced to	Medium
ŧU	1.00	migrate in the RA area for reproduction?	NU	Probably no possible reproduction in RA area, even if introduced to adequate habitats similar to Alpine lakes in Switzerland and	meulum
		inigrate in the RA area for reproduction?			
11	7.07	Are propagules or eggs of the taxon likely to	No	France (Kottelat & Freyhof 2008).	High
+1	7.07	1 1 5 55 ,	NO		підп
		be dispersed in the RA area by other animals?		adequate habitats similar to Alpine lakes in Switzerland and France (Kottelat & Freyhof 2008).	
12	7.08	Is dispersal of the taxon along any of the	Yes		Very high
+Z	7.08		Tes	Introduction for angling.	very nigh
		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?	No	Not documented in literature.	Medium
-		ce attributes	INO		Medium
		Is the taxon able to withstand being out of	No	Sensitive species, not tolerant to low oxygen levels (Lenart, S.	Very high
•••	0.01	water for extended periods (e.g. minimum of		2001. "Salvelinus namaycush" (On-line), Animal Diversity Web.	very mgn
		one or more hours) at some stage of its life		Accessed April 22, 2020 at	
		cycle?		https://animaldiversity.org/accounts/Salvelinus_namaycush/).	
15	8.02	Is the taxon tolerant of a wide range of	No	Needs cold water (below 13 deg Celsius) and high concentration of	Very high
	0.02	water quality conditions relevant to that		dissloved oxygen (Global Invasive Species Database (2020)	very mgn
		taxon? [In the Justification field, indicate the		Species profile: Salvelinus namaycush. Downloaded from	
		relevant water quality variable(s) being		http://www.iucngisd.org/gisd/species.php?sc=1363 on 22-04-	
		considered.]		2020.; Lenart, S. 2001. "Salvelinus namaycush" (On-line), Animal	
		considered.]		Diversity Web. Accessed April 22, 2020 at	
				https://animaldiversity.org/accounts/Salvelinus_namaycush/).	
16	8.03	Can the taxon be controlled or eradicated in	Not applicable	Not allowed in Slovenia.	Very high
5		the wild with chemical, biological, or other			.,
		agents/means?			
17	8.04	Is the taxon likely to tolerate or benefit from	Yes	Can survive in reservoirs if conditions are met (Pam Fuller, and	High
		environmental/human disturbance?		Matt Neilson, 2020, Salvelinus namaycush (Walbaum in Artedi,	5
		· · · · , · · · · · · · · ·		1792): U.S. Geological Survey, Nonindigenous Aquatic Species	
				Database, Gainesville, FL,	
				https://nas.er.usgs.gov/queries/FactSheet.aspx?SpeciesID=942,	
				Revision Date: 11/12/2019, Peer Review Date: 2/2/2016, Access	
				Date: 4/22/2020).	
18	8.05	Is the taxon able to tolerate salinity levels	No	Muir, A.M., Hansen, M.J., Bronte, C.R. and Krueger, C.C. (2016),	High
		that are higher or lower than those found in		If Arctic charr Salvelinus alpinus is 'the most diverse vertebrate',	
		its usual environment?		what is the lake charr Salvelinus namaycush?. Fish Fish, 17: 1194-	
				1207. doi:10.1111/faf.12114	
49	8.06	Are there effective natural enemies	Yes	Otters, piscivorous birds, maybe piscivorous fish if present in the	Medium
49	8.06	Are there effective natural enemies (predators) of the taxon present in the RA	Yes	Otters, piscivorous birds, maybe piscivorous fish if present in the habitat (personal opinion).	Medium
		Are there effective natural enemies (predators) of the taxon present in the RA e change	Yes	Otters, piscivorous birds, maybe piscivorous fish if present in the habitat (personal opinion).	Medium
c. c	Climate	(predators) of the taxon present in the RA	Yes		Medium
<mark>с. с</mark> Э. с	Climate	(predators) of the taxon present in the RA e change	Yes No change		Medium High
с. с 9. с	Climate	(predators) of the taxon present in the RA e change change		habitat (personal opinion).	
с . с Э. с	Climate	(predators) of the taxon present in the RA e change change Under the predicted future climatic		habitat (personal opinion).	
c. c 9. c 50	<u>Climate</u> 9.01	(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		habitat (personal opinion).	
c. c 9. c 50	Climate	(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,		habitat (personal opinion).	
c. c 9. c 50	<u>Climate</u> 9.01	(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?	No change	habitat (personal opinion). Only path is introduction my man so no change expected.	High
c. c 9. c 50	<u>Climate</u> 9.01	(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	No change	habitat (personal opinion). Only path is introduction my man so no change expected. Needs temperatures under 13 degrees Celsius and high oxygen	High
c. c 9. c 50	<u>Climate</u> 9.01	(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	No change	habitat (personal opinion). Only path is introduction my man so no change expected. Needs temperatures under 13 degrees Celsius and high oxygen levels, those habitats will decrease (COMTE, L., BUISSON, L.,	High
c. c 9. c 50	<u>Climate</u> 9.01	(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,	No change	habitat (personal opinion). Only path is introduction my man so no change expected. Needs temperatures under 13 degrees Celsius and high oxygen levels, those habitats will decrease (COMTE, L., BUISSON, L., DAUFRESNE, M. and GRENOUILLET, G. (2013), Climate-induced	High
<u>c. (</u> 50	<u>Climate</u> 9.01 9.02	(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,	No change	habitat (personal opinion). Only path is introduction my man so no change expected. Needs temperatures under 13 degrees Celsius and high oxygen levels, those habitats will decrease (COMTE, L., BUISSON, L., DAUFRESNE, M. and GRENOUILLET, G. (2013), Climate-induced changes in the distribution of freshwater fish: observed and predicted trends. Freshwater Biology, 58: 625-639. Needs temperatures under 13 degrees Celsius and high oxygen	High
<u>51</u>	<u>Climate</u> 9.01 9.02	(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?	No change Decrease	habitat (personal opinion). Only path is introduction my man so no change expected. Needs temperatures under 13 degrees Celsius and high oxygen levels, those habitats will decrease (COMTE, L., BUISSON, L., DAUFRESNE, M. and GRENOUILLET, G. (2013), Climate-induced changes in the distribution of freshwater fish: observed and predicted trends. Freshwater Biology, 58: 625-639.	High Medium
<u>c. (</u> 50	<u>Climate</u> 9.01 9.02	(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	No change Decrease	habitat (personal opinion). Only path is introduction my man so no change expected. Needs temperatures under 13 degrees Celsius and high oxygen levels, those habitats will decrease (COMTE, L., BUISSON, L., DAUFRESNE, M. and GRENOUILLET, G. (2013), Climate-induced changes in the distribution of freshwater fish: observed and predicted trends. Freshwater Biology, 58: 625-639. Needs temperatures under 13 degrees Celsius and high oxygen	High Medium
<u>c. c</u> 9. <u>c</u> 50	<u>Climate</u> 9.01 9.02	(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	No change Decrease	habitat (personal opinion). Only path is introduction my man so no change expected. Needs temperatures under 13 degrees Celsius and high oxygen levels, those habitats will decrease (COMTE, L., BUISSON, L., DAUFRESNE, M. and GRENOUILLET, G. (2013), Climate-induced changes in the distribution of freshwater fish: observed and predicted trends. Freshwater Biology, 58: 625-639. Needs temperatures under 13 degrees Celsius and high oxygen levels, those habitats will decrease (COMTE, L., BUISSON, L.,	High Medium
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Statistics	
Scores	
BRA	22.0
BRA Outcome	-
BRA+CCA	12.0
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	4.0
4. Undesirable (or persistence) traits	4.0
5. Resource exploitation	5.0
6. Reproduction	-1.0
7. Dispersal mechanisms	-4.0

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	2
6. Reproduction	7
7. Dispersal mechanisms	9
8. Tolerance attributes	6
C. Climate change	6
9. Climate change	6
Sectors affected	
Commercial	10
Environmental	5
Species or population nuisance traits	-2
Thresholds	
BRA	-

	BRA	-
	BRA+CCA	-
Confidence		
	BRA+CCA	0.69
	BRA	0.72
	CCA	0.42
Date and Time		
	19/05/20	021 11:38:25

axon and Assessor details		
Category	Fishes and Lampreys (freshwater)	
Taxon name	Salvelinus namaycush	
Common name	lake charr	
Assessor	Tamara Kanjuh	
Risk screening context		
Reason and socio-economic benefits		
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS	
Taxonomy		
Native range		
Introduced range		
URL		

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
		ication/Cultivation	1		
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	Success of the stocked fish has varied depending on the area (https://animaldiversity.org/accounts/Salvelinus_namaycush/).	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	Often caught by fishers (Billard, 1997).	High
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	No	Did not find information about invasive ones.	Low
2 (limate	, distribution and introduction risk			
2. C 4	2.01	How similar are the climatic conditions of the	Medium	Dfa, Dfb (Köppen-Geiger climate classification system)	High
	2.01	Risk Assessment (RA) area and the taxon's native range?			
5	2.02	What is the quality of the climate matching data?	High	Köppen-Geiger climate classification system	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	Radočaj et al. (2021)	Medium
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	Stocking: Salvelinus namaycush is primarily bred and stocked for recreational fisheries worldwide (Fuller, 2007).	Very high
8	2.05	Is the taxon currently found in close	Yes	Radočaj et al. (2021)	High
		proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional			
		and intentional introductions)?			
3. I.		e elsewhere			Madium
У	3.01	Has the taxon become naturalised (established viable populations) outside its	No	No information found.	Medium
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	Radočaj et al. (2021)	High
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	Yes	Radočaj et al. (2021)	Medium
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	Yes	Radočaj et al. (2021)	Medium
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	Yes	Radočaj et al. (2021)	Medium
B. F	Biology	//Ecology			
		able (or persistence) traits			
		Is it likely that the taxon will be poisonous or	No	Harmless (FishBase)	High
15	4.02	pose other risks to human health? Is it likely that the taxon will smother one or	Yes	It can happen due to food competition, space occupation,	Medium
		more native taxa (that are not threatened or protected)?		hybridization.	
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	The taxon is not a parasite.	High
17	4.04	Is the taxon adaptable in terms of climatic	No	Sensitive to environmental conditions.	Medium
		and other environmental conditions, thus enhancing its potential persistence if it has			
	4.05	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 has invaded or is likely to invade the RA	Yes	Radočaj et al. (2021)	Medium
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	No information found.	Low
20	4.07	Is it likely that the taxon will host, and/or	No	No information found.	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 information found.	Low
		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	Not in captivity.	Medium
		size that will make it more likely to be			
22	4.10	released from captivity? Is the taxon capable of sustaining itself in a	Yes	Radočaj et al. (2021)	High
23	4.10	range of water velocity conditions (e.g. versatile in habitat use)?	1.65		nign
24	4.11	Is it likely that the taxon's mode of existence	Yes	Radočaj et al. (2021)	High
		(e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for			
25	4.12	native taxa? Is the taxon likely to maintain a viable	No	No information found.	Low
		population even when present in low densities (or persisting in adverse conditions			
		by way of a dormant form)?			

5 D	Acouro	ce exploitation			
	5.01	Is the taxon likely to consume threatened or	Yes	Radočaj et al. (2021)	High
		protected native taxa in the RA area?			-
27	5.02	Is the taxon likely to sequester food	No	No information found.	Low
		resources (including nutrients) to the detriment of native taxa in the RA area?			
6. R	leprodu				
	6.01	Is the taxon likely to exhibit parental care	No	No information found.	Medium
		and/or to reduce age-at-maturity in response			
20	6.02	to environmental conditions?			11: - la
29	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	Radočaj et al. (2021)	High
30	6.03	Is the taxon likely to hybridise naturally with	No	Not native, but yes with Salvelinus fontinalis (Nova Scotia	High
		native taxa?		Fisheries and Aquaculture, Inland Fisheries Division, 2007).	
31	6.04	Is the taxon likely to be hermaphroditic or to	No	Kottelat&Freyhof (2007)	High
22	6.05	display asexual reproduction? Is the taxon dependent on the presence of	No	Kottelat&Freyhof (2007)	High
32	6.05	another taxon (or specific habitat features)	NO	Kottelat&Freyhor (2007)	High
		to complete its life cycle?			
33	6.06	Is the taxon known (or likely) to produce a	Yes	Kottelat&Freyhof (2007)	High
		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)	5	Age at maturity varies widely from around 5 years in southern	Very high
54	0.07	does the taxon require to reach the age-at-	5	areas of its native range to more than 20 years in northern areas	very nigh
		first-reproduction?		(cabi.org).	
	_	al mechanisms			
35	7.01	How many potential internal	One	Intentional stockong.	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	Intentional stocking.	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	Kottelat&Feryhof (2007)	High
		attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances			
		the likelihood of dispersal?			
38	7.04	Is natural dispersal of the taxon likely to	No	The dispersal of Salvelinus namaycush downstream and into new	High
		occur as eggs (for animals) or as propagules		tributaries through regular stocking upstream is bound to occur	
20	7.05	(for plants: seeds, spores) in the RA area?		(Hesthagen&Sandlund, 2007).	11: - la
39	7.05	Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as	Yes	The dispersal of Salvelinus namaycush downstream and into new tributaries through regular stocking upstream is bound to occur	High
		fragments/seedlings (for plants) in the RA		(Hesthagen&Sandlund, 2007).	
		area?		, <u>J , ,</u>	
40	7.06	Are older life stages of the taxon likely to	Yes	In large water bodies such as the Great Lakes, S. namaycush may	Medium
41	7.07	migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to	No	migrate up to 300 km (186 mi) to their spawning grounds. Kottelat&Freyhof, 2007	Medium
41	1.07	be dispersed in the RA area by other animals?	NO		medium
42	7.08	Is dispersal of the taxon along any of the	Yes	Intentional stocking.	High
		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	No information found.	Medium
		ce attributes	1.40		
_	8.01	Is the taxon able to withstand being out of	No	Can not survive out of water.	High
		water for extended periods (e.g. minimum of			
		one or more hours) at some stage of its life			
45	8.02	cycle? Is the taxon tolerant of a wide range of	No	Sensitive to environmental conditions.	Medium
		water quality conditions relevant to that	-		
		taxon? [In the Justification field, indicate the			
10	0.02	relevant water quality variable(s) being			LU - b
46	8.03	Can the taxon be controlled or eradicated in the wild with chemical, biological, or other	Yes	Preventative measures: Hewitt et al. (2006); Copp et al. (2005) and physical measures: Kaeding et al. (1996)	High
		agents/means?		and physical measures. Addung et al. (1990)	
47	8.04	Is the taxon likely to tolerate or benefit from	No	Salvelinus namaycush are particularly susceptible to pollution,	High
		environmental/human disturbance?		including but not limited to insecticides (FishBase, 2008).	
48	8.05	Is the taxon able to tolerate salinity levels	No	Sensitive to environmental conditions.	Medium
		that are higher or lower than those found in its usual environment?			
49	8.06	Are there effective natural enemies	Yes	Like other salmonids.	Medium
-		(predators) of the taxon present in the RA			
	Climate	e change			
9. C					
50		change	Decrease	Sensitive to environmental conditions	Medium
50		change Under the predicted future climatic	Decrease	Sensitive to environmental conditions.	Medium
50		change	Decrease	Sensitive to environmental conditions.	Medium
	9.01	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?			
		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	Decrease Decrease	Sensitive to environmental conditions. Sensitive to environmental conditions.	Medium Medium
	9.01	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			
	9.01	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,			
51	9.01	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			
51	9.01	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	Decrease	Sensitive to environmental conditions.	Medium
51	9.01	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	Decrease	Sensitive to environmental conditions.	Medium
51	9.01 9.02 9.03	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?	Decrease	Sensitive to environmental conditions. Sensitive to environmental conditions.	Medium Medium
51	9.01	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	Decrease	Sensitive to environmental conditions.	Medium
51	9.01 9.02 9.03	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?	Decrease	Sensitive to environmental conditions. Sensitive to environmental conditions.	Medium Medium

54	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Lower	Sensitive to environmental conditions.	Medium
55	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	Lower	Sensitive to environmental conditions.	Medium

Statistics	
Scores	
BRA	12.0
BRA Outcome	-
BRA+CCA	0.0
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	3.0
4. Undesirable (or persistence) traits	3.0
5. Resource exploitation	5.0
6. Reproduction	0.0
7. Dispersal mechanisms	1.0
8. Tolerance attributes	-6.0
C. Climate change	-12.0
9. Climate change	-12.0
Answered Questions	12.0
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	9
Environmental	6
Species or population nuisance traits	-12
Thresholds	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.61
BRA	0.63
CCA	0.50
Date and Time	
	021 21:42:47
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axon and Assessor details						
Category	Fishes and Lampreys (freshwater)					
Taxon name	Salvelinus namaycush					
Common name	lake charr					
Assessor	Tena Radocaj					
Risk screening context						
Reason and socio-economic benefits						
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS					
Taxonomy						
Native range						
Introduced range						
URL						

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
1. L		ication/Cultivation	N		List
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	Ackefors, H. (1982). Aquaculture: A New Industry in Sweden. Ambio, 11(6), 362-365.	High
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	Morissette, O., Sirois, P., Lester, N. P., Wilson, C. C., & Bernatchez, L. (2018). Supplementation stocking of Lake Trout (Salvelinus namaycush) in small boreal lakes: Ecotypes influence on growth and condition. PLoS ONE, 13, e0200599	High
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	Salvelinus fontinalis	Medium
2. (Climate,	, distribution and introduction risk			
4	2.01	How similar are the climatic conditions of the	High	The similarity between climatic conditions RA area and native	Medium
		Risk Assessment (RA) area and the taxon's native range?		range is high. I use climatch.	
5 6	2.02	What is the quality of the climate matching data? Is the taxon already present outside of	Medium No	The quality of the climate matching data is medium. Lake trout is not present outside of captivity in the RA area.	Medium High
7	2.03	captivity in the RA area? How many potential vectors could the taxon	One	One potential vectors: recreational fisheries. (CABI, 2019)	Medium
ŕ	2.04	use to enter in the RA area?	One	One potential vectors. recreational fishenes. (CABI, 2019)	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	Lake trout established populations on the Northern Italy (several localities). (Bianco, P. G., & Ketmaier, V. (2001). Anthropogenic changes in the freshwater fish fauna of Italy, with reference to the central region and Barbus graellsii, a newly established alien species of Iberian origin. Journal of Fish Biology, 59, 190-208.)	Medium
<i>3.1</i> 9	3.01	e elsewhere Has the taxon become naturalised	Yes	Lake trout have self-sustaining populations in Norwegian	Medium
9	5.01	(established viable populations) outside its native range?	Tes	freshwaters and Northern Italy. Lake trout were released in 1971 into two small lakes. (Hesthagen, T., & Sandlund, O. T. (2007). Non-native freshwater fishes in Norway: history, consequences and perspectives. Journal of Fish Biology, 71, 173-183.) (Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater fishes. Publications Kottelat. Cornol. Switzerland.)	Medium
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	Lake Trout stocking is associated with declines of toads in the Alps and of salamanders Euproctis sp. in the Pyrenees. (Lobón-Cerviá, J., Esteve, M., Berrebi, P., Duchi, A., Lorenzoni, M., & Young, K. A. (2019). Trout and char of central and Southern Europe and Northern Africa. Trout and char of the world. Bethesda, Maryland: American Fisheries Society.)	Medium
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	Rarely used in aquaculture (Fisheries and Aquaculture Department. Introduced Species Fact Sheets. In: FAO Fisheries and Aquaculture Department [online]. Rome. Updated 17 March 2017. [Cited 22 April 2020]), no documented impacts.	Low
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem services?	Yes	The introduction of the invasive trout species Salvelinus namaycush has had detrimental effects on native biodiversity worldwide. Many various species of fish are affected not only by competition but by predation as well (Fuller, 2007). (GISD, 2009)	Medium
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	Yes	Pam Fuller, and Matt Neilson, 2020, Salvelinus namaycush (Walbaum in Artedi, 1792): U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, FL, https://nas.er.usgs.gov/queries/FactSheet.aspx?SpeciesID=942, Revision Date: 11/12/2019, Peer Review Date	Low
		//Ecology			
		able (or persistence) traits Is it likely that the taxon will be poisonous or	No	Lake trout is harmless for human health (Fishbase)	Low
		pose other risks to human health?			
	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	Pam Fuller, and Matt Neilson, 2020, Salvelinus namaycush (Walbaum in Artedi, 1792): U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, FL, https://nas.er.usgs.gov/queries/FactSheet.aspx?SpeciesID=942, Revision Date: 11/12/2019, Peer Review Date	Medium
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	No	Medium
	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	Lake trout use habitat: temperate; 4°C - 13°C, it is not enough to survive in Croatia. (Fishbase- Michigan Department of Natural Resources, 2019. Lake trout. https://www.michigan.gov/dnr/0,8817,7-350-	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	No	Because, it not survive in RA area	Low
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	The taxon will not have an adverse impact on ecosystem services in the RA area.	Low

20	4.07	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and	Yes	Yes, the taxon may be a host or vector of known pests and infectious agents endemic to RA area. Because in every area exist	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?	Yes	infectious agents and pests. Salmonid Herpesvirus-3, commonly known as the Epizootic Epitheliotropic Disease virus (EEDV), causes a disease of lake trout (Salvelinus namaycush) that has killed millions of fish over the past several decades. (Faisal, M., Purbayu, M., Shavalier, M.	Medium
22	4.09	Is it likely that the taxon will achieve a body size that will make it more likely to be	Yes	A., Marsh, T. L., & Loch, T. P. (2019). Shedding of the Salmonid Herpesvirus-3 by Infected Lake Trout (Salvelinus namaycush). Size up 10 about 1000 mm SL. usually 350-450 mm SL. (Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater fishes.	Medium
23	4.10	released from captivity? Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g.	No	Publications Kottelat, Cornol, Switzerland.) Occurs in shallow and deep waters of northern lakes and streams (Froese & Pauly 2020).	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	no data available	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)?	No	no data available	Medium
5. R	esourc	e exploitation			
26	5.01	Is the taxon likely to consume threatened or protected native taxa in the RA area?	Yes	It is possible that it consume endangered and protected native taxa in the RA area. If there are protected taxa in the RA area will consume them, whether or not the taxon is endangered.	Low
27	5.02	Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?	Not applicable	not applicable	Very high
<u>6.</u> R	eprodu			I	·
28	6.01	Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?	Yes	Lenart, S. 2001. "Salvelinus namaycush" (On-line), Animal Diversity Web. Accessed May 15, 2020 at https://animaldiversity.org/accounts/Salvelinus_namaycush/	Medium
29	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	No	Established in some high altitude lakes in Pyrenees, north Italy and Scandinavia. In lakes of Alps (France, Switzerland) apparently survives only by stocking (Kottelat & Freyhof 2008).	Low
30	6.03	Is the taxon likely to hybridise naturally with native taxa?	No	No	Low
31	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	No	No	Low
32	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	Yes	David T. Callaghan, Paul J. Blanchfield, Peter A. Cott (2016): Lake trout (Salvelinus namaycush) spawning habitat in a northern lake: The role of wind and physical characteristics on habitat quality. Journal of Great Lakes Research, Volume 42, Issue 2, 2016, Pages	Low
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	David T. Callaghan, Paul J. Blanchfield, Peter A. Cott, Lake trout (Salvelinus namaycush) spawning habitat in a northern lake: The role of wind and physical characteristics on habitat quality. Journal	Medium
34	6.07	How many time units (days, months, years) does the taxon require to reach the age-at-	6	of Great Lakes Research, Volume 42, Issue 2, 2016, Pages 299- Spawns for the first time at 6-7 years. (Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater fishes. Publications	Very high
7. D	ispersa	first-reproduction? al mechanisms		Kottelat, Cornol, Switzerland.)	
		How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable	>1	Two potential vectors: natural dispersal and recreational fisheries.	Medium
36	7.02	Will any of these vectors/pathways bring the taxon in close proximity to one or more	No	That vector/pathway can't bring taxon in protected area.	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 adaptations.	Low
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	Probably no possible reproduction in RA area, even if introduced to adequate habitats similar to Alpine lakes in Switzerland and France (Kottelat & Freyhof 2008).	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?	No	Probably no possible reproduction in RA area, even if introduced to adequate habitats similar to Alpine lakes in Switzerland and France (Kottelat & Freyhof 2008).	Low
40	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	No	Probably no possible reproduction in RA area, even if introduced to adequate habitats similar to Alpine lakes in Switzerland and France (Kottelat & Freyhof 2008).	Low
41	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No	Probably no possible reproduction in RA area, even if introduced to adequate habitats similar to Alpine lakes in Switzerland and France (Kottelat & Freyhof 2008).	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 a high rate of spread of taxa. Eg. if a fertilized individual enters a new area by any means of expansion.	Low
43	7.09	unintentional or intentional) likely to be Is dispersal of the taxon density dependent?	No	no data available	Low
	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	No	Sensitive species, not tolerant to low oxygen levels	Low
		cycle? Is the taxon tolerant of a wide range of	No	S. namaycush prefers temperatures below 13°C and is rarely	Low

46	8.03	Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	Not applicable	It is not regulated in Croatia	Very high
47	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	Yes	Pam Fuller, and Matt Neilson, 2020, Salvelinus namaycush (Walbaum in Artedi, 1792): U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, FL, https://nas.er.usgs.gov/queries/FactSheet.aspx?SpeciesID=942, Revision Date: 11/12/2019, Peer Review Date: 2/2/2016, Access Date: 4/22/2020).	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	Muir, A.M., Hansen, M.J., Bronte, C.R. and Krueger, C.C. (2016), If Arctic charr Salvelinus alpinus is 'the most diverse vertebrate', what is the lake charr Salvelinus namaycush?. Fish Fish, 17: 1194- 1207. doi:10.1111/faf.12114	Medium
49	8.06	Are there effective natural enemies (predators) of the taxon present in the RA	Yes	Otters, piscivorous birds	Medium
С. (Climate	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	The risk of entering the RA area does not change. The risk may be increased due to recreational fishing (human impact), but not due to climate change.	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	Cold water species, tolerates water up to about 13 degrees Celsius (Fishbase)	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	Cold water species, tolerates water up to about 13 degrees Celsius (Fishbase)	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	Future potential impacts on biodiversity and ecological status will lower.	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 future potential impacts on ecosystem structure and function will lower.	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 future potential impacts on ecosystem services and socio- economic factors will lower.	Medium

Statistics	
Scores	
BRA	21.0
BRA Outcome	-
BRA+CCA	11.0
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	3.0
4. Undesirable (or persistence) traits	3.0
5. Resource exploitation	5.0
6. Reproduction	-2.0
7. Dispersal mechanisms	-3.0
8. Tolerance attributes	0.0
C. Climate change	-10.0
9. Climate change	-10.0
Answered Questions	
Total	55 13
A. Biogeography/Historical	_
1. Domestication/Cultivation	3
2. Climate, distribution and introduction risk 3. Invasive elsewhere	5
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	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	
Commercial	11
Environmental	5
Species or population nuisance traits	-3
Thresholds	
BRA	-
BRA+CCA	
Confidence	
Confidence	

BRA+CCA	0.44
BRA	0.43
CCA	0.50
Date and Time	
15/05/2	2020 14:02:35

axon and Assessor details						
Category	Fishes and Lampreys (freshwater)					
Taxon name	Salvelinus umbla					
Common name	Alpine charr					
Assessor	Ana Marić					
Risk screening context						
Reason and socio-economic benefits						
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS					
Taxonomy						
Native range						
Introduced range						
URL						

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
		ication/Cultivation	No	Differences in immune components of blood, calcon and basid	High
	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	No	Differences in immune components of blood, spleen and head kidney between diploid and auto- and allotriploid Salmonidae Author links open overlay panelFranzLahnsteiner. 2020	High
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	Trout and Char of Central and Southern Europe and Northern Africa Javier Lobón-Cerviá, Manu Esteve, Patrick Berrebi, Antonino Duchi, Massimo Lorenzoni, Kyle A. Young. 2018	Very high
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	Salvelinus fontinalis Identifying threats from introduced and translocated non-native freshwater fishes in neighbouring countries under current and future climatic conditions Tena	Very high
2 (limato	, distribution and introduction risk		Radočaj a, Ivan Špelić a, Lorenzo Vilizzi b, *, Meta Povž c, Marina	
2. (4	2.01	How similar are the climatic conditions of the	Medium	Only few high altitude lakes in target area	High
	2.01	Risk Assessment (RA) area and the taxon's native range?			- ingli
5	2.02	What is the quality of the climate matching data?	Medium	Climatch	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	No	Identifying threats from introduced and translocated non-native freshwater fishes in neighbouring countries under current and future climatic conditions Tena Radočaj a, Ivan Špelić a, Lorenzo Vilizzi b, *, Meta Povž c, Marina Piria. 2021	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	Stocking	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	Trout and Char of Central and Southern Europe and Northern Africa Javier Lobón-Cerviá, Manu Esteve, Patrick Berrebi, Antonino Duchi, Massimo Lorenzoni, Kyle A. Young. 2018 Is it likely to enter? Horizont species	High
	7	e elsewhere			b
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	Trout and Char of Central and Southern Europe and Northern Africa Javier Lobón-Cerviá, Manu Esteve, Patrick Berrebi, Antonino Duchi, Massimo Lorenzoni, Kyle A. Young. 2018	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	No	Trout and Char of Central and Southern Europe and Northern Africa Javier Lobón-Cerviá, Manu Esteve, Patrick Berrebi, Antonino Duchi, Massimo Lorenzoni, Kyle A. Young. 2018	Very high
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	Trout and Char of Central and Southern Europe and Northern Africa Javier Lobón-Cerviá, Manu Esteve, Patrick Berrebi, Antonino Duchi, Massimo Lorenzoni, Kyle A. Young. 2018	Very high
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem services?	No	Trout and Char of Central and Southern Europe and Northern Africa Javier Lobón-Cerviá, Manu Esteve, Patrick Berrebi, Antonino Duchi, Massimo Lorenzoni, Kyle A. Young. 2018	Very high
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	Trout and Char of Central and Southern Europe and Northern Africa Javier Lobón-Cerviá, Manu Esteve, Patrick Berrebi, Antonino Duchi, Massimo Lorenzoni, Kyle A. Young. 2018	High
B. I	Biology	y/Ecology		Duchi, Massino Lorenzoni, Kyle A. Toung. 2010	
		able (or persistence) traits			
14	4.01	Is it likely that the taxon will be poisonous or pose other risks to human health?	No	Trout and Char of Central and Southern Europe and Northern Africa Javier Lobón-Cerviá, Manu Esteve, Patrick Berrebi, Antonino Dubi	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	Duchi, Massimo Lorenzoni, Kyle A. Young. 2018 Trout and Char of Central and Southern Europe and Northern Africa Javier Lobón-Cerviá, Manu Esteve, Patrick Berrebi, Antonino Duchi, Massimo Lorenzoni, Kyle A. Young. 2018	High
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in	No	Trout and Char of Central and Southern Europe and Northern Africa Javier Lobón-Cerviá, Manu Esteve, Patrick Berrebi, Antonino	High
17	4.04	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?	No	Duchi, Massimo Lorenzoni, Kyle A. Young. 2018 Trout and Char of Central and Southern Europe and Northern Africa Javier Lobón-Cerviá, Manu Esteve, Patrick Berrebi, Antonino Duchi, Massimo Lorenzoni, Kyle A. Young. 2018	High
18	4.05	Invaded or could invade the KA 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	Trout and Char of Central and Southern Europe and Northern Africa Javier Lobón-Cerviá, Manu Esteve, Patrick Berrebi, Antonino Duchi, Massimo Lorenzoni, Kyle A. Young. 2018	High
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	Trout and Char of Central and Southern Europe and Northern Africa Javier Lobón-Cerviá, Manu Esteve, Patrick Berrebi, Antonino Duchi, Massimo Lorenzoni, Kyle A. Young. 2018	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	Trout and Char of Central and Southern Europe and Northern Africa Javier Lobón-Cerviá, Manu Esteve, Patrick Berrebi, Antonino Duchi, Massimo Lorenzoni, Kyle A. Young. 2018	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	Trout and Char of Central and Southern Europe and Northern Africa Javier Lobón-Cerviá, Manu Esteve, Patrick Berrebi, Antonino Duchi, Massimo Lorenzoni, Kyle A. Young. 2018	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	https://www.fishbase.se/summary/Salvelinus-umbla.html	High

	_	change			
	Climate	e change			
		(predators) of the taxon present in the RA area?		Africa Javier Lobón-Cerviá, Manu Esteve, Patrick Berrebi, Antonino Duchi, Massimo Lorenzoni, Kyle A. Young. 2018	
19	8.06	Are there effective natural enemies	Yes	Trout and Char of Central and Southern Europe and Northern	Very high
τU	5.05	that are higher or lower than those found in its usual environment?	165		
	8.05	environmental/human disturbance? Is the taxon able to tolerate salinity levels	Yes	Africa Javier Lobón-Cerviá, Manu Esteve, Patrick Berrebi, Antonino Duchi, Massimo Lorenzoni, Kyle A. Young. 2018 Salvelinus fontinalis is	Medium
17	8.04	the wild with chemical, biological, or other agents/means? Is the taxon likely to tolerate or benefit from	No	Africa Javier Lobón-Cerviá, Manu Esteve, Patrick Berrebi, Antonino Duchi, Massimo Lorenzoni, Kyle A. Young. 2018 Trout and Char of Central and Southern Europe and Northern	Very high
16	8.03	taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in	Not applicable	Duchi, Massimo Lorenzoni, Kyle A. Young. 2018 Trout and Char of Central and Southern Europe and Northern	High
45	8.02	cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that	No	Trout and Char of Central and Southern Europe and Northern Africa Javier Lobón-Cerviá, Manu Esteve, Patrick Berrebi, Antonino	Very 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	Trout and Char of Central and Southern Europe and Northern Africa Javier Lobón-Cerviá, Manu Esteve, Patrick Berrebi, Antonino Duchi, Massimo Lorenzoni, Kyle A. Young. 2018	Very high
		ce attributes		Duchi, Massimo Lorenzoni, Kyle A. Young. 2018	
3	7.09	unintentional or intentional) likely to be Is dispersal of the taxon density dependent?	No	Trout and Char of Central and Southern Europe and Northern Africa Javier Lobón-Cerviá, Manu Esteve, Patrick Berrebi, Antonino	Medium
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	No	Trout and Char of Central and Southern Europe and Northern Africa Javier Lobón-Cerviá, Manu Esteve, Patrick Berrebi, Antonino Duchi, Massimo Lorenzoni, Kyle A. Young. 2018	High
1	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No	https://www.fishbase.se/summary/Salvelinus-umbla.html	High
	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	Yes	https://www.fishbase.se/summary/Salvelinus-umbla.html yes by stocking	High
Э	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	https://www.fishbase.se/summary/Salvelinus-umbla.html by stocking yes	High
		occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?	-		, ,
8	7.04	attaching itself to 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	https://www.fishbase.se/summary/Salvelinus-umbla.html	Very high
7	7.03	protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively	No	https://www.fishbase.se/summary/Salvelinus-umbla.html	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	Stocking	Very high
5	7.01	How many potential internal vectors/pathways could the taxon use to	One	Stocking	Very high
. <i>C</i>	Dispersa	does the taxon require to reach the age-at- first-reproduction? al mechanisms			
4	6.07	within a short time span (e.g. < 1 year)? How many time units (days, months, years)	2	Kottelat. 2007	Very high
3	6.06	to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring	Yes	https://www.fishbase.se/summary/Salvelinus-umbla.html	High
2	6.05	display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features)	No	https://www.fishbase.se/summary/Salvelinus-umbla.html	Very high
1	6.04	native taxa? Is the taxon likely to be hermaphroditic or to	No	https://www.fishbase.se/summary/Salvelinus-umbla.html	Very high
		or propagules (in the RA area)? Is the taxon likely to hybridise naturally with	Yes	Salmo x Salvelinus	Medium
9	6.02	to environmental conditions? Is the taxon likely to produce viable gametes	Yes	Duchi, Massimo Lorenzoni, Kyle A. Young. 2018 Non-native Freshwater Fishes in Slovenia Meta Povž. 2017	Very high
		Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response	No	Trout and Char of Central and Southern Europe and Northern Africa Javier Lobón-Cerviá, Manu Esteve, Patrick Berrebi, Antonino	Medium
5	Reprodu	detriment of native taxa in the RA area?		Africa Javier Lobon-Cervia, Manu Esteve, Patrick Berrebi, Antonino Duchi, Massimo Lorenzoni, Kyle A. Young. 2018	
7	5.02	Is the taxon likely to sequester food resources (including nutrients) to the	Yes	Duchi, Massimo Lorenzoni, Kyle A. Young. 2018 fishbase Trout and Char of Central and Southern Europe and Northern Africa Javier Lobón-Cerviá, Manu Esteve, Patrick Berrebi, Antonino	High
		e exploitation Is the taxon likely to consume threatened or protected native taxa in the RA area?	Yes	Trout and Char of Central and Southern Europe and Northern Africa Javier Lobón-Cerviá, Manu Esteve, Patrick Berrebi, Antonino	Very high
		population even when present in low densities (or persisting in adverse conditions by way of a dormant form)?		Africa Javier Lobón-Cerviá, Manu Esteve, Patrick Berrebi, Antonino Duchi, Massimo Lorenzoni, Kyle A. Young. 2018	
5	4.12	native taxa? Is the taxon likely to maintain a viable	No	Trout and Char of Central and Southern Europe and Northern	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	Gracia, Anna Vila-Gispert & Emili García-Berthou 2020 Trout and Char of Central and Southern Europe and Northern Africa Javier Lobón-Cerviá, Manu Esteve, Patrick Berrebi, Antonino Duchi, Massimo Lorenzoni, Kyle A. Young. 2018	Very high
		Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)?	Yes	Key factors explaining critical swimming speed in freshwater fish: a review and statistical analysis for Iberian species Carlos Cano- Barbacil, Johannes Radinger, María Argudo, Francesc Rubio-	Medium

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	Trout and Char of Central and Southern Europe and Northern Africa Javier Lobón-Cerviá, Manu Esteve, Patrick Berrebi, Antonino Duchi, Massimo Lorenzoni, Kyle A. Young. 2018	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	Trout and Char of Central and Southern Europe and Northern Africa Javier Lobón-Cerviá, Manu Esteve, Patrick Berrebi, Antonino Duchi, Massimo Lorenzoni, Kyle A. Young. 2018	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?	No change	Trout and Char of Central and Southern Europe and Northern Africa Javier Lobón-Cerviá, Manu Esteve, Patrick Berrebi, Antonino Duchi, Massimo Lorenzoni, Kyle A. Young. 2018	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?	No change	Trout and Char of Central and Southern Europe and Northern Africa Javier Lobón-Cerviá, Manu Esteve, Patrick Berrebi, Antonino Duchi, Massimo Lorenzoni, Kyle A. Young. 2018	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?	Lower	Trout and Char of Central and Southern Europe and Northern Africa Javier Lobón-Cerviá, Manu Esteve, Patrick Berrebi, Antonino Duchi, Massimo Lorenzoni, Kyle A. Young. 2018	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	Trout and Char of Central and Southern Europe and Northern Africa Javier Lobón-Cerviá, Manu Esteve, Patrick Berrebi, Antonino Duchi, Massimo Lorenzoni, Kyle A. Young. 2018	High

Statistics

Scores	
BRA	14.5
BRA Outcome	-
BRA+CCA	8.5
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	3.5
1. Domestication/Cultivation	2.0
2. Climate, distribution and introduction risk	0.0
3. Invasive elsewhere	1.5
B. Biology/Ecology	11.0
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	-6.0
9. Climate change	-6.0
Answered Questions	
Total	55 13
A. Biogeography/Historical	3
1. Domestication/Cultivation	5
2. Climate, distribution and introduction risk 3. Invasive elsewhere	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	0
Commercial	-1
Environmental	4
Species or population nuisance traits	7
	-
Thresholds	
BRA	
BRA+CCA	-
Confidence	
BRA+CCA	0.85
BRA	0.84
CCA	0.92
CCA	0.92

Date and Time 24/05/2021 15:36:09

Taxon and Assessor details		
Category	Fishes and Lampreys (freshwater)	
Taxon name	Salvelinus umbla	
Common name	Alpine charr	
Assessor	Ivan Špelić	
Risk screening context		
Reason and socio-economic benefits		
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS	
Taxonomy		
Native range		
Introduced range		
URL		

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
		ication/Cultivation	1		
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	For stocking programs (Kottelat & Freyhof 2007).	Medium
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	Restocking of lakes (Kottelat & Freyhof 2007).	High
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	S. fontinalis (CABI 2019)	High
2. (Climate,	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?	Low	Climatch 2020	Medium
5	2.02	What is the quality of the climate matching data?	Medium	Climatch 2020	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	No	Lenhardt, M., Markovic, G., Hegedis, A., Maletin, S., Cirkovic, M., Markovic, Z., 2011. Non-native and translocated fish species in Serbia and their impact on the native ichthyofauna. Reviews in Fish Biology and Fisheries 21, 407–421 doi:10.1007/s11160-010-	High
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	Introduction for angling.	Low
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	Slovenia (Povž 2018).	High
		e elsewhere			
9	3.01	Has the taxon become naturalised (established viable populations) outside its	Yes	Povž et al. 2018	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	No	Usually introduced to lakes without any fish species (Schabetsberger, R., Luger, M.S., Drozdowski, G., Jagsch, A., 2009. Only the small survive: monitoring long-term changes in the zooplankton community of an Alpine lake after fish introduction. Biological Invasions doi:10.1007/s10530-008-9341-	Medium
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	Usually introduced to lakes without any fish species (Schabetsberger, R., Luger, M.S., Drozdowski, G., Jagsch, A., 2009. Only the small survive: monitoring long-term changes in the zooplankton community of an Alpine lake after fish introduction. Biological Invasions doi:10.1007/s10530-008-9341-	Medium
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem services?	No	Usually introduced to lakes without any fish species (Schabetsberger, R., Luger, M.S., Drozdowski, G., Jagsch, A., 2009. Only the small survive: monitoring long-term changes in the zooplankton community of an Alpine lake after fish introduction. Biological Invasions doi:10.1007/s10530-008-9341-	High
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	Usually introduced to lakes without any fish species (Schabetsberger, R., Luger, M.S., Drozdowski, G., Jagsch, A., 2009. Only the small survive: monitoring long-term changes in the zooplankton community of an Alpine lake after fish introduction. Biological Invasions doi:10.1007/s10530-008-9341-	High
В. В	Biology	//Ecology			
4. L	Indesira	able (or persistence) traits			
14	4.01	Is it likely that the taxon will be poisonous or pose other risks to human health?	No	Harmless (Froese & Pauly).	Very high
	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	Adverse impact on large zooplankton (Schabetsberger, R., Luger, M.S., Drozdowski, G., Jagsch, A., 2009. Only the small survive: monitoring long-term changes in the zooplankton community of an Alpine lake after fish introduction. Biological Invasions doi:10.1007/s10530-008-9341-z).	Medium
	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	No parasitic behaviour.	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	Limited to deep, cold lakes (Povž et al. 2015).	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	Depletes large zooplankton (Schabetsberger, R., Luger, M.S., Drozdowski, G., Jagsch, A., 2009. Only the small survive: monitoring long-term changes in the zooplankton community of an Alpine lake after fish introduction. Biological Invasions doi:10.1007/s10530-008-9341-z).	Medium
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	Usually introduced to lakes without other fish species to improve fishing (Aparicio, E., 2015. First record of a self-sustaining population of Alpine charr Salvelinus umbla (Linnaeus, 1758) (Actinopterygii, Salmonidae) in Spain. Graellsia.	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	Achleitner, D., Gassner, H., & Schabetsberger, R. (2009). "Global worming": first record of an epidemic ofTriaenophorus crassusin a population of Arctic charrSalvelinus umbla. Journal of Fish Biology, 74(4).001.001.001	High
21	4.08	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	74(4), 961–966. doi:10.1111/j.1095-8649.2008.02166.x Achleitner, D., Gassner, H., & Schabetsberger, R. (2009). "Global worming": first record of an epidemic ofTriaenophorus crassusin a population of Arctic charrSalvelinus umbla. Journal of Fish Biology,	High
2	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	74(4), 961–966. doi:10.1111/j.1095-8649.2008.02166.x Maximum length 110 cm (Povž et al. 2015).	Very high
3	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)?	No	This species rarely thrives in running waters (Aparicio, E., 2015. First record of a self-sustaining population of Alpine charr Salvelinus umbla (Linnaeus, 1758) (Actinopterygii, Salmonidae) in Spain. Graellsia doi:10.3989/araellsia.2015.v71.147).	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 native taxa?	No	Lives in oligotrophic lakes, no behaviour to reduce habitat quality (Freyhof, J. & Kottelat, M. 2008. Salvelinus umbla. The IUCN Red List of Threatened Species 2008: e.T135426A4127943. https://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T135426A412794 3.en. Downloaded on 07 May 2020.).	Very 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	Resilience low, minimum population doubling time 4.5 - 14 years (Froese & Pauly 2020). Usually maintained by stocking.	High
	1	ce exploitation			
6	5.01	Is the taxon likely to consume threatened or protected native taxa in the RA area?	Yes	Preys on crustaceans, insects and benthic fauna; a few individuals develop as large piscivores (Kottelat & Freyhof 2007).	Low
7	5.02	Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?	Not applicable	No data for calculation.	Very 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 to environmental conditions?	No	Kottelat & Freyhof 2007.	High
9	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	No	Needs deep lakes to spawn. Spawns on pebble to stone bottom on steep slopes, at depths of 30-120 m (Kottelat & Freyhof 2007). Reproduction in Alpine lakes.	Low
0	6.03	Is the taxon likely to hybridise naturally with native taxa?	No	No documented hybrids in the wild with native species of RA area	Medium
1	6.04	Is the taxon likely to be hermaphroditic or to	No	Kottelat & Freyhof 2007	High
2	6.05	display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features)	Yes	Needs deep lakes to spawn. Spawns on pebble to stone bottom on steep slopes, at depths of 30-120 m (Kottelat & Freyhof 2007).	Medium
3	6.06	to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring	Yes	Up to 7300 eggs per female (Povž et al. 2015).	High
4	6.07	within a short time span (e.g. < 1 year)? How many time units (days, months, years)	2	2-3 years (Kottelat & Freyhof 2007).	High
		does the taxon require to reach the age-at-			
. [Dispers	first-reproduction?			
		first-reproduction? al mechanisms How many potential internal	>1	Stocking for angling (Povž et al. 2018).	Medium
5	7.01	first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable			
5		first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to	>1 Yes	Stocking for angling (Povž et al. 2018). Personal opinion (some protected areas with lakes, e.g. Plitvice lakes).	Medium
5 6	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		Personal opinion (some protected areas with lakes, e.g. Plitvice	
5 6 7	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 the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules	Yes	Personal opinion (some protected areas with lakes, e.g. Plitvice lakes).	Low
5 6 7 8	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 occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA	Yes	Personal opinion (some protected areas with lakes, e.g. Plitvice lakes). No adaptations. Even if spawning, eggs are deposited in deep part of lakes	Low Very high
5 6 7 8 9	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/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to	Yes No No	Personal opinion (some protected areas with lakes, e.g. Plitvice lakes). No adaptations. Even if spawning, eggs are deposited in deep part of lakes (Kottelat & Freyhof 2007).	Low Very high High
5 6 7 8 9	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? 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	Personal opinion (some protected areas with lakes, e.g. Plitvice lakes). No adaptations. Even if spawning, eggs are deposited in deep part of lakes (Kottelat & Freyhof 2007). No spawning expected. No spawning expected. Even if spawning, eggs are deposited in deep part of lakes	Low Very high High Low
5 6 7 8 9 9	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	Personal opinion (some protected areas with lakes, e.g. Plitvice lakes). No adaptations. Even if spawning, eggs are deposited in deep part of lakes (Kottelat & Freyhof 2007). No spawning expected.	Low Very high High Low
5 6 7 8 9 0 1 2	7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08	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 of 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 Yes	Personal opinion (some protected areas with lakes, e.g. Plitvice lakes). No adaptations. Even if spawning, eggs are deposited in deep part of lakes (Kottelat & Freyhof 2007). No spawning expected. No spawning expected. Even if spawning, eggs are deposited in deep part of lakes (Kottelat & Freyhof 2007). Introductions, escapes.	Low Very high High Low High High
5 6 7 8 9 0 1 2 3	7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08	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 done and the set of the area?	Yes No No No No	Personal opinion (some protected areas with lakes, e.g. Plitvice lakes). No adaptations. Even if spawning, eggs are deposited in deep part of lakes (Kottelat & Freyhof 2007). No spawning expected. Even if spawning, eggs are deposited in deep part of lakes (Kottelat & Freyhof 2007).	Low Very high High Low Low
5 6 7 8 9 0 1 2 3 . 7	7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08	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	Yes No No No Yes	Personal opinion (some protected areas with lakes, e.g. Plitvice lakes). No adaptations. Even if spawning, eggs are deposited in deep part of lakes (Kottelat & Freyhof 2007). No spawning expected. No spawning expected. Even if spawning, eggs are deposited in deep part of lakes (Kottelat & Freyhof 2007). Introductions, escapes.	Low Very high High Low Low High
5 6 7 8 9 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	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 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 Yes No	Personal opinion (some protected areas with lakes, e.g. Plitvice lakes). No adaptations. Even if spawning, eggs are deposited in deep part of lakes (Kottelat & Freyhof 2007). No spawning expected. Even if spawning, eggs are deposited in deep part of lakes (Kottelat & Freyhof 2007). Introductions, escapes.	Low Very high High Low High High

47	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	No	Freyhof, J. & Kottelat, M. 2008. Salvelinus umbla. The IUCN Red List of Threatened Species 2008: e.T135426A4127943. https://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T135426A412794 3.en. Downloaded on 07 May 2020.	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	Only landlocked populations in lakes (Freyhof, J. & Kottelat, M. 2008. Salvelinus umbla. The IUCN Red List of Threatened Species 2008: e.T135426A4127943. https://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T135426A412794 3.en. Downloaded on 07 May 2020.).	Medium
49	8.06	Are there effective natural enemies (predators) of the taxon present in the RA	Yes	Probably otters and piscivorous birds (personal opinion).	Medium
		e change			
		change			1.
	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	Only pathway is human introduction, not influenced by climate.	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?	Decrease	Restricted to cold water habitats (Aparicio, E., 2015. First record of a self-sustaining population of Alpine charr Salvelinus umbla (Linnaeus, 1758) (Actinopterygii, Salmonidae) in Spain. Graellsia doi:10.3989/graellsia.2015.v71.147). Jonsson, T., Setzer, M., 2015. A freshwater predator hit twice by the effects of warming across trophic levels. Nature Communications doi:10.1038/ncomms6992. Suitable habitats will decrase (Less impact on zooplanktpn communities under predicted less favourable conditions for coldwater species (Lower impact i unfavourable conditions for cold-water species (COMTE, L., BUISSON, L., DAUFRESNE, M. and GRENOUILLET, G. (2013), Climate-induced changes in the distribution of freshwater fish: observed and predicted trends. Freshwater Biology, 58: 625-639. https://doi.org/10.1111/fwb.12081).))	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	Restricted to cold water habitats (Aparicio, E., 2015. First record of a self-sustaining population of Alpine charr Salvelinus umbla (Linnaeus, 1758) (Actinopterygii, Salmonidae) in Spain. Graellsia doi:10.3989/graellsia.2015.v71.147). Jonsson, T., Setzer, M., 2015. A freshwater predator hit twice by the effects of warming across trophic levels. Nature Communications doi:10.1038/ncomms6992. Suitable habitats will decrase (Less impact on zooplanktpn communities under predicted less favourable conditions for coldwater species (Lower impact i unfavourable conditions for cold-water species (COMTE, L., BUISSON, L., DAUFRESNE, M. and GRENOUILLET, G. (2013), Climate-induced changes in the distribution of freshwater fish: observed and predicted trends. Freshwater Biology, 58: 625-639.	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	https://doi.org/10.1111/fwb 120811.)) Restricted to cold water habitats (Aparicio, E., 2015. First record of a self-sustaining population of Alpine charr Salvelinus umbla (Linnaeus, 1758) (Actinopterygii, Salmonidae) in Spain. Graellsia doi:10.3989/graellsia.2015.v71.147). Jonsson, T., Setzer, M., 2015. A freshwater predator hit twice by the effects of warming across trophic levels. Nature Communications doi:10.1038/ncomms6992. Decreased possible impact on plankton	Low
	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Lower	Restricted to cold water habitats (Aparicio, E., 2015. First record of a self-sustaining population of Alpine charr Salvelinus umbla (Linnaeus, 1758) (Actinopterygii, Salmonidae) in Spain. Graellsia doi:10.3989/graellsia.2015.v71.147). Jonsson, T., Setzer, M., 2015. A freshwater predator hit twice by the effects of warming across trophic levels. Nature Communications doi:10.1038/ncomms6992. Decreased possible impact on plankton	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	So far no adverse impact, no change expected.	Medium

Statistics	
Scores	
BRA	6.0
BRA Outcome	-
BRA+CCA	-2.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	5.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	0.0
3. Invasive elsewhere	1.0
B. Biology/Ecology	1.0
4. Undesirable (or persistence) traits	4.0
5. Resource exploitation	5.0
6. Reproduction	-2.0
7. Dispersal mechanisms	-2.0
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	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	5
Environmental	3
Species or population nuisance traits	-7
Thresholds	
Thresholds	-
	-
BRA	-
BRA BRA+CCA	- - 0.65
BRA BRA+CCA Confidence	- - 0.65 0.67
BRA BRA+CCA Confidence BRA+CCA	
BRA BRA+CCA Confidence BRA+CCA BRA	0.67
BRA BRA+CCA Confidence BRA+CCA BRA	0.67

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Taxon and Assessor details						
Category	Fishes and Lampreys (freshwater)					
Taxon name	Salvelinus umbla					
Common name	Alpine charr					
Assessor	Tamara Kanjuh					
Risk screening context						
Reason and socio-economic benefits						
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS					
Taxonomy						
Native range						
Introduced range						
URL						

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
		ication/Cultivation			
1		Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	cabi.org	High
2		Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	cabi.org	High
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	No	No information found.	Low
2 (limate	distribution and introduction risk			
<u>2.</u> 4		How similar are the climatic conditions of the	Medium	Dfa, Dfb (Köppen-Geiger climate classification system)	High
		Risk Assessment (RA) area and the taxon's native range?			
5	2.02	What is the quality of the climate matching data?	High	Köppen-Geiger climate classification system	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	Radočaj et al. (2021)	High
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	Intentional stocking.	Medium
8		Is the taxon currently found in close proximity to, and likely to enter into, the RA	Yes	Radočaj et al. (2021)	High
		area in the near future (e.g. unintentional			
2 7	nuncius	and intentional introductions)?			
		e elsewhere Has the taxon become naturalised	Yes	Established populations (Simonović, 2001; Aparicio, 2015)	High
		(established viable populations) outside its			5
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	Established populations (Simonović, 2001)	High
11		In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	Not known.	Medium
12		In the taxon's introduced range, are there known adverse impacts to ecosystem	No	Not known.	Medium
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	Not known.	Medium
B. E	Biology	/Ecology			
4. L		able (or persistence) traits			
14	4.01	Is it likely that the taxon will be poisonous or pose other risks to human health?	No	Harmless (FishBase)	High
15		Is it likely that the taxon will smother one or more native taxa (that are not threatened or	Yes	Established populations (Simonović, 2001)	High
16		protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in	No	The taxon is not a parasite.	High
17	4.04	the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has	Yes	Established populations (Simonović, 2001)	Medium
		invaded or could invade the RA area?			
18		Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it	Yes	Established populations (Simonović, 2001)	High
19		has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts	No	No information found.	Medium
		on ecosystem services in the RA area?			
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	No	No information found.	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	No	No information found.	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?	No	No information found.	Medium
23		Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)?	Yes	Established populations (Simonović, 2001)	High
	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	Established populations (Simonović, 2001)	High
25		Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions	Yes	Established populations (Simonović, 2001)	High
	1	by way of a dormant form)?			

5 6	Pecourc	e exploitation			
	5.01	Is the taxon likely to consume threatened or	Yes	Established populations (Simonović, 2001)	High
		protected native taxa in the RA area?		······································	5
27	5.02	Is the taxon likely to sequester food	No	No information found.	Medium
		resources (including nutrients) to the detriment of native taxa in the RA area?			
6. F	Reprodu				
28	6.01	Is the taxon likely to exhibit parental care	No	Kottelat&Freyhof (2007)	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	Established populations (Simonović, 2001)	High
	0.02	or propagules (in the RA area)?			
30	6.03	Is the taxon likely to hybridise naturally with	No	Kottelat&Freyhof (2007)	High
21	6.04	native taxa? Is the taxon likely to be hermaphroditic or to	No	Kottelat&Freyhof (2007)	High
51	0.04	display asexual reproduction?	INU		riigii
32	6.05	Is the taxon dependent on the presence of	No	Kottelat&Freyhof (2007)	High
		another taxon (or specific habitat features)			
33	6.06	to complete its life cycle? Is the taxon known (or likely) to produce a	Yes	Kottelat&Freyhof (2007)	High
55	0.00	large number of propagules or offspring	105		ingii
		within a short time span (e.g. < 1 year)?			
34	6.07	How many time units (days, months, years) does the taxon require to reach the age-at-	5	Similar to other salmonids.	Medium
		first-reproduction?			
7. L	Dispersa	al mechanisms			
35	7.01	How many potential internal	One	Intentional stocking.	High
1		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	Intentional stocking.	High
1		taxon in close proximity to one or more			
37	7.03	protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively	No	Kottelat&Freyhof (2007)	High
57	1.05	attaching itself to hard substrata (e.g. ship	NU		ngn
1		hulls, pilings, buoys) such that it enhances			
20	7.04	the likelihood of dispersal?	No	Nat Impun	Hich
38	7.04	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules	No	Not known.	High
		(for plants: seeds, spores) in the RA area?			
39	7.05	Is natural dispersal of the taxon likely to	Yes	Could disperse as juveniles.	Medium
1		occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA			
		area?			
40	7.06	Are older life stages of the taxon likely to	No	Kottelat&Freyhof (2007)	High
41	7.07	migrate in the RA area for reproduction?	No	Kattalate Facular (2007)	Hich
41	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No	Kottelat&Feeyhof (2007)	High
42	7.08	Is dispersal of the taxon along any of the	Yes	Intentional stocking.	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?	No	No information found.	Medium
		ce attributes	1		
44	8.01	Is the taxon able to withstand being out of water for extended periods (e.g. minimum of	No	Kottelat&Freyhof (2007)	High
		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	No	The taxon is sensitive to enviromental conditions.	Medium
1		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 information found.	Medium
1		the wild with chemical, biological, or other agents/means?			
47	8.04	Is the taxon likely to tolerate or benefit from	No	The taxon is sensitive to enviromental conditions.	Medium
40	0.05	environmental/human disturbance?	No	The tayon is considius to an increase to a 200	Madium
48	8.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in	No	The taxon is sensitive to enviromental conditions.	Medium
1		its usual environment?			
49	8.06	Are there effective natural enemies	Yes	As other salmonids.	High
	limate	(predators) of the taxon present in the RA change			
		change			
		Under the predicted future climatic	Decrease	The taxon is sensitive to enviromental conditions.	Medium
1		conditions, are the risks of entry into the RA			
1		area posed by the taxon likely to increase, decrease or not change?			
51	9.02	Under the predicted future climatic	Decrease	The taxon is sensitive to enviromental conditions.	Medium
1		conditions, are the risks of establishment			
1		posed by the taxon likely to increase, decrease or not change?			
52	9.03	Under the predicted future climatic	Decrease	The taxon is sensitive to enviromental conditions.	Medium
		conditions, are the risks of dispersal within			
Í		the RA area posed by the taxon likely to			
50	9.04	increase, decrease or not change? Under the predicted future climatic	Lower	The taxon is sensitive to enviromental conditions.	Medium
• • •	J.U-T				. icaidin
53		conditions, what is the likely magnitude of			
22		conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?			

54	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Lower	The taxon is sensitive to enviromental conditions.	Medium
55	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	Lower	The taxon is sensitive to enviromental conditions.	Medium

Statistics	
Scores	
BRA	12.0
BRA Outcome	-
BRA+CCA	0.0
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	6.0
1. Domestication/Cultivation	2.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	3.0
B. Biology/Ecology	6.0
4. Undesirable (or persistence) traits	6.0
5. Resource exploitation	5.0
6. Reproduction	0.0
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	3 5 5 36
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
C. Climate change	6
9. Climate change	6
Sectors affected	
Commercial	5
Environmental	4
Species or population nuisance traits	-6
Thresholds	
BRA	-
BRA+CCA	-
Confidence	
BRA+CCA	0.64
BRA	0.65
CCA	0.50
Date and Time	
03/06/20	021 11:46:49

Faxon and Assessor details						
Category	Fishes and Lampreys (freshwater)					
Taxon name	Salvelinus umbla					
Common name	Alpine charr					
Assessor	Tena Radocaj					
Risk screening context						
Reason and socio-economic benefits						
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS					
Taxonomy						
Native range						
Introduced range						
URL						

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
		ication/Cultivation	N/	To Cutterning Alains Classics in the state of the state o	Madia
1		Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	In Switzerland, Alpine Char supports important recreational and commercial fisheries and char are economically and culturally important in mountainous areas of France. (Lobón-Cerviá, J., Esteve, M., Berrebi, P., Duchi, A., Lorenzoni, M., & Young, K. A. (2019). Trout and char of central and Southern Europe and Northern Africa. Trout and char of the world. Bethesda, Maryland:	Medium
		Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	In Switzerland, Alpine Char supports important recreational and commercial fisheries and it is a popular food in homes and restaurants. (Lobón-Cerviá, J., Esteve, M., Berrebi, P., Duchi, A., Lorenzoni, M., & Young, K. A. (2019). Trout and char of central and Southern Europe and Northern Africa. Trout and char of the world. Bethesda, Maryland: American Fisheries Society.)	High
3		Does the taxon have invasive races, varieties, sub-taxa or congeners?	No	No	Low
2. 0		distribution and introduction risk			
		Risk Assessment (RA) area and the taxon's native range?	High	The similarity between climatic conditions RA area and native range is high. I use climatch.	Medium
5		What is the quality of the climate matching data?	Medium	The quality of the climate matching data is medium.	Medium
6		Is the taxon already present outside of captivity in the RA area?	No	Salvelinus umbla is not present outside of captivity in the RA area.	Very high
7		How many potential vectors could the taxon use to enter in the RA area?	One	Sport fishing (Povž, M. (2017). Non-native freshwater fishes in Slovenia. Acta Zoologica Bulgarica, 9, 105-110.)	Medium
		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 established in Slovenia (Povž, M. (2017). Non-native freshwater fishes in Slovenia. Acta Zoologica Bulgarica, 9, 105-110.)	Medium
	-	elsewhere			1.
9		Has the taxon become naturalised (established viable populations) outside its native range?	Yes	Spain (Aparicio, E. (2015). First record of a self-sustaining population of Alpine charr Salvelinus umbla (Linnaeus. 1758)(Actinopterygii, Salmonidae) in Spain. Graellsia, 71(2),	Low
10		In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	Schabetsberger, R., Luger, M. S., Drozdowski, G., & Jagsch, A. (2009). Only the small survive: monitoring long-term changes in the zooplankton community of an Alpine lake after fish introduction. Biological Invasions, 11(6), 1335-1345.)	Low
11		In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	no data available	Low
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	No	no data available	Low
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	no data available	Low
B. E		//Ecology			
4. L	Indesira	able (or persistence) traits			
14		Is it likely that the taxon will be poisonous or pose other risks to human health?	No	Salvelinus umbla is harmless (Fishbase)	Medium
	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	Nine years after stocking of fertile charr, the two calanoids had virtually disappeared, and Daphnia rosea had notably declined in abundance. (Schabetsberger, R., Luger, M. S., Drozdowski, G., & Jagsch, A. (2009). Only the small survive: monitoring long-term changes in the zooplankton community of an Alpine lake after fish introduction. Biological Invasions, 11(6), 1335-1345.)	Low
		Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	No	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	Although is similarity climatic conditions natural range and RA area is high, this species won't survive in RA area because of high temperatures in RA area. S. umbla lives in high altitude lakes and deep lakes in glacial valleys.	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	No	S.umbla does not disrupt food-web structure or function in the aquatic ecosystem in the RA area.	Low
		Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	The taxon does not have an adverse impact on ecosystem services in the RA area.	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	Yes, the taxon may be a host or vector of known pests and infectious agents endemic to RA area. Because in every area exist infectious agents and pests.	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	Achleitner, D., Gassner, H., & Schabetsberger, R. (2009). 'Global worming': first record of an epidemic of Triaenophorus crassus in a population of Arctic charr Salvelinus umbla. Journal of Fish	Medium
		to) the RA area?		Biology, 74(4), 961-966.	

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: 75.0 cm SL (Fishbase)	Medium
23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)?	No	S.umbla inhabit of northern lakes (Freyhof, J. & Kottelat, M. 2008. Salvelinus umbla. The IUCN Red List of Threatened Species 2008: e.T135426A4127943)	Low
24	4.11		No	no data available	Low
25	4.12	Is the taxor likely to maintain a viable population even when present in low densities (or persisting in adverse conditions	No	no data available	Low
		by way of a dormant form)?			
		e exploitation	Vac	It is possible that it concume endangered and protected pative	Low
	5.01	Is the taxon likely to consume threatened or protected native taxa in the RA area?	Yes	It is possible that it consume endangered and protected native taxa in the RA area. If there are protected taxa in the RA area will consume them, whether or not the taxon is endangered. Preys on crustaceans, insects and benthic fauna; a few individuals develop as large piscivores (Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Frevhof, Berlin. 646 pp)	
27	5.02	Is the taxon likely to sequester food	Not applicable	Not applicable	Very high
		resources (including nutrients) to the detriment of native taxa in the RA area?]
6. F	Reprodu				
		Is the taxon likely to exhibit parental care	No	Personal opinion	Low
		and/or to reduce age-at-maturity in response to environmental conditions?			
	6.02	or propagules (in the RA area)?	No	The species is found in many Alpine and sub-Alpine lakes in France, Switzerland, Germany, Italy and Austria. (Freyhof, J. & Kottelat, M. 2008. Salvelinus umbla. The IUCN Red List of Threatened Species 2008: e.T135426A4127943)	Low
30	6.03	Is the taxon likely to hybridise naturally with	No	Kottelat, M. and J. Freyhof 2007 Handbook of European freshwater	Low
31	6.04	native taxa? Is the taxon likely to be hermaphroditic or to	No	fishes. Publications Kottelat, Cornol, Switzerland. No	Low
32	6.05	display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features)	No	Personal opinion	Low
33	6.06	to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring	Yes	Personal opinion	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-	2	Spawns for the first time at 2-3 years. (Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes.	High
7 0		first-reproduction?		Publications Kottelat, Cornol and Freyhof, Berlin. 646 pp.)	
		al mechanisms How many potential internal vectors/pathways could the taxon use to	>1	Release for sport fishing, self- reproduction (Povž, M. (2017). Non-native freshwater fishes in Slovenia. Acta Zoologica Bulgarica,	Medium
		disperse within the RA area (with suitable		9, 105-110.)	
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	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	No	No adaptations.	Medium
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	Freyhof, J. & Kottelat, M. 2008. Salvelinus umbla. The IUCN Red List of Threatened Species 2008: e.T135426A4127943	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	Freyhof, J. & Kottelat, M. 2008. Salvelinus umbla. The IUCN Red List of Threatened Species 2008: e.T135426A4127943)	Low
40	7.06	area? Are older life stages of the taxon likely to	No	Freyhof, J. & Kottelat, M. 2008. Salvelinus umbla. The IUCN Red List of Threatened Species 2008: e.T135426A4127943	Low
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	List of Threatened Species 2008: e.T135426A4127943 Freyhof, J. & Kottelat, M. 2008. Salvelinus umbla. The IUCN Red List of Threatened Species 2008: e.T135426A4127943)	Low
42	7.08	Is dispersed in the total of other diministry vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be	Yes	There is a possibility of a high rate of spread of taxa. Eg. if a fertilized individual enters a new area by any means of expansion.	Low
43	7.09	Is dispersal of the taxon density dependent?	No	Personal opinion	Low
	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	Personal opinion	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	No	Sensitive species (personal opinion)	Low
46	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?	Not applicable	It is not regulated in Croatia	Very high
47	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	No	(Freyhof, J. & Kottelat, M. 2008. Salvelinus umbla. The IUCN Red List of Threatened Species 2008: e.T135426A4127943)	Medium

48		Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	No	Freshwater fish (Zavod za ribištvo Slovenije. BiosWeb. [online], Ljubljana, Zavod za ribištvo Slovenije, 2014, [Posodobljeno 21.05.2020], [Citirano 21.05.2020], Salvelinus umbla, http://www.biosweb.org/index.php?task=taxonsheet&tid=2773, Dostopno na spletnem naslovu: <www.biosweb.org>, ISSN 2350- 4757)</www.biosweb.org>	Medium
49	8.06	Are there effective natural enemies	Yes	Otters, piscivorous birds	Medium
		(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?	No change	The risk of entering the RA area does not change. The risk may be increased due to recreational fishing (human impact), but not due to climate change.	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	Jonsson, T., & Setzer, M. (2015). A freshwater predator hit twice by the effects of warming across trophic levels. Nature Communications, 6(1), 1-9.	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	Jonsson, T., & Setzer, M. (2015). A freshwater predator hit twice by the effects of warming across trophic levels. Nature Communications, 6(1), 1-9.	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	Future potential impacts on biodiversity and ecological status will not 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	The future potential impacts on ecosystem structure and function will not 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	The future potential impacts on ecosystem services and socio- economic factors will not change.	Medium

Statistics	
Scores	
BRA	9.0
BRA Outcome	-
BRA+CCA	5.0
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	1.0
4. Undesirable (or persistence) traits	3.0
5. Resource exploitation	5.0
6. Reproduction	0.0
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	
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2
6. Reproduction	12 2 7 9
7. Dispersal mechanisms	
8. Tolerance attributes	6
C. Climate change	6
9. Climate change	6
Sectors affected	
Commercial	9
Commercial Environmental	9 5
Commercial	
Commercial Environmental	

Thresholds	
BR	A –
BRA+CC/	۰ -
Confidence	
BRA+CC/	A 0.40
BR	A 0.39
CC/	A 0.50
Date and Time	
21/05/	2020 09-56-08

Taxon and Assessor details						
Category	Fishes and Lampreys (freshwater)					
Taxon name	Thymallus thymallus					
Common name	grayling					
Assessor	Ana Marić					
Risk screening context						
Reason and socio-economic benefits						
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS					
Taxonomy						
Native range						
Introduced range						
URL						

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
1. L		ication/Cultivation	1		1
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	Distribution of Pseudomonas fluorescens and Aeromonas hydrophila Bacteria in a Recirculating Aquaculture System during Farming of European Grayling (Thymallus thymallus L.) Broodstock Iwona Goła's 1,*, Mariusz Szmyt, Jacek Potorski 1, Michał Łopata 3 Anna Gotkowska-Płachta 1 and Katarzyna Gli 'nska-Lewczuk 2019. Yes for brroodstock not easily Genetic caracterisation of European grayling populations (Thymallus thymallus): Implications for conservation and management.	High
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	Naredba o merama za očuvanje i zaštitu ribljeg fonda "Službeni glasnik RS", br. 104/2009 Na osnovu člana 21. stav 2. Zakona o zaštiti i održivom korišćenju ribljeg fonda	Very high
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	No	Genetic caracterisation of European grayling populations (Thymallus thymallus): Implications for conservation and management. Bernhard Gum. 2006.	High
2. (Climate	, distribution and introduction risk			
4		Risk Assessment (RA) area and the taxon's native range?	Medium	https://climatch.cp1.agriculture.gov.au/climatch.jsp	High
5	2.02	What is the quality of the climate matching data?	Medium	https://climatch.cp1.agriculture.gov.au/climatch.jsp	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	Genetic differentiation of European grayling (Thymallus thymallus) populations in Serbia, based on mitochondrial and nuclear DNA analyses Saša Marić1*, Andrej Razpet2, Vera Nikolić1, Predrag Simonović1 2011	High
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	Intentional, stocking	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	National Aquaculture Sector Overview Slovenia.2005. Food and Agriculture Organization of the United Nations for a world without hunger	High
3.1	nvasive	e elsewhere			
9		Has the taxon become naturalised (established viable populations) outside its native range?	Yes	Genetic caracterisation of European grayling populations (Thymallus thymallus): Implications for conservation and management. Bernhard Gum. 2006.	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	No	Genetic caracterisation of European grayling populations (Thymallus thymallus): Implications for conservation and management. Bernhard Gum. 2006.	High
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	Genetic caracterisation of European grayling populations (Thymallus thymallus): Implications for conservation and management. Bernhard Gum. 2006.	Very high
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem services?	No	Genetic caracterisation of European grayling populations (Thymallus thymallus): Implications for conservation and management. Bernhard Gum. 2006.	Very high
	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	Genetic caracterisation of European grayling populations (Thymallus thymallus): Implications for conservation and management. Bernhard Gum. 2006.	High
		y/Ecology			
		able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health?	No	Genetic caracterisation of European grayling populations (Thymallus thymallus): Implications for conservation and management. Bernhard Gum. 2006.	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	Genetic caracterisation of European grayling populations (Thymallus thymallus): Implications for conservation and management. Bernhard Gum. 2006.	High
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	Genetic caracterisation of European grayling populations (Thymallus thymallus): Implications for conservation and management. Bernhard Gum. 2006.	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	Genetic caracterisation of European grayling populations (Thymallus thymallus): Implications for conservation and management. Bernhard Gum. 2006.	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	No	Genetic caracterisation of European grayling populations (Thymallus thymallus): Implications for conservation and management. Bernhard Gum. 2006.	High
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	Genetic caracterisation of European grayling populations (Thymallus thymallus): Implications for conservation and management. Bernhard Gum. 2006.	High

		one or more hours) at some stage of its life		management. Bernhard Gum. 2006.	
4	8.01	Is the taxon able to withstand being out of water for extended periods (e.g. minimum of	No	Genetic caracterisation of European grayling populations (Thymallus thymallus): Implications for conservation and	Very high
		ce attributes	No	Constic caracterisation of European graviting negulations	Vory high
	7.09		Yes	REF	Medium
-		vectors/pathways mentioned in the previous seven questions (35–41; i.e. both	-	(Thymallus thymallus): Implications for conservation and management. Bernhard Gum. 2006.	
>	7.08	be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the	No	(Thymallus thymallus): Implications for conservation and management. Bernhard Gum. 2006. Genetic caracterisation of European grayling populations	High
L	7.07	Are propagules or eggs of the taxon likely to	No	management. Bernhard Gum. 2006. Genetic caracterisation of European grayling populations	Very high
)	7.06	area? Are older life stages of the taxon likely to migrate in the RA area for reproduction?	Yes	Genetic caracterisation of European grayling populations (Thymallus thymallus): Implications for conservation and	Very high
'	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	Genetic caracterisation of European grayling populations (Thymallus thymallus): Implications for conservation and management. Bernhard Gum. 2006.	High
		occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?		freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin. 646 pp.	
}	7.04	hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to	No	Berlin. 646 pp. Kottelat, M. and J. Freyhof, 2007. Handbook of European	High
,	7.03	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship	No	Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof,	Very high
0	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	Genetic differentiation of European grayling (Thymallus thymallus) populations in Serbia, based on mitochondrial and nuclear DNA analyses Saša Marić1*, Andrej Razpet2, Vera Nikolić1, Predrag Simonović1 2011	High
		vectors/pathways could the taxon use to disperse within the RA area (with suitable			
		al mechanisms How many potential internal	One	Stocking. Hatcheries escape?	Medium
		does the taxon require to reach the age-at- first-reproduction?		(Thymallus thymallus): Implications for conservation and management. Bernhard Gum. 2006.	
4	6.07	within a short time span (e.g. < 1 year)? How many time units (days, months, years)	3	management. Bernhard Gum. 2006. Genetic caracterisation of European grayling populations	Very high
3	6.06	to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring	Yes	management. Bernhard Gum. 2006. Genetic caracterisation of European grayling populations (Thymallus thymallus): Implications for conservation and	Very high
2	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features)	No	Genetic caracterisation of European grayling populations (Thymallus thymallus): Implications for conservation and	High
L	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	No	Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof,	Very high
)	6.03	Is the taxon likely to hybridise naturally with native taxa?	No	management. Bernhard Gum. 2006. Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof,	High
Ð	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	and management. Bernhard Gum. 2006. Genetic caracterisation of European grayling populations (Thymallus thymallus): Implications for conservation and	High
		and/or to reduce age-at-maturity in response to environmental conditions?		freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin. 646 pp. Genetic caracterisation of European grayling populations (Thymallus thymallus): Implications for conservation and management Bornbard Cum 2006	
3	6.01	Is the taxon likely to exhibit parental care	Yes	Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat. Cornol and Freyhof	High
	Reprodu			Berlin, 646 pp.	
7	5.02	Is the taxon likely to sequester food resources (including nutrients) to the	No	Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof,	High
	5.01	Is the taxon likely to consume threatened or protected native taxa in the RA area?	Yes	Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof,	High
_	1	by way of a dormant form)?			1
		population even when present in low densities (or persisting in adverse conditions		(Thymallus thymallus): Implications for conservation and management. Bernhard Gum. 2006.	-
5	4.12	(e.g. feeding) will reduce habitat quality for native taxa? Is the taxon likely to maintain a viable	No	Berlin. 646 pp. Genetic caracterisation of European grayling populations	High
4	4.11	Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours	No	Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof,	Very high
3	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)?	Yes	Genetic caracterisation of European grayling populations (Thymallus thymallus): Implications for conservation and management. Bernhard Gum. 2006.	Very high
		size that will make it more likely to be released from captivity?		(Thymallus thymallus): Implications for conservation and management. Bernhard Gum. 2006.	5
2	4.09	to) the RA area? Is it likely that the taxon will achieve a body	Yes	Broodstock Iwona Goła s 1,*, Mariusz Szmyt, Jacek Potorski 1, Michał Łopata 3 Anna Gotkowska-Płachta 1 and Katarzyna Gli Genetic caracterisation of European grayling populations	High
		act as a vector for, recognised pests and infectious agents that are absent from (novel		hydrophila Bacteria in a Recirculating Aquaculture System during Farming of European Grayling (Thymallus thymallus L.)	
1	4.08	Is it likely that the taxon will host, and/or	Yes	Szmvt . Jacek Potorski 1. Michał Łopata 3 Anna Gotkowska-Płachta Distribution of Pseudomonas fluorescens and Aeromonas	High
				fluorescens and Aeromonas hydrophila Bacteria in a Recirculating Aquaculture System during Farming of European Grayling (Thymallus thymallus L.) Broodstock Iwona Goła 's 1,*, Mariusz	
		area?		Olga L Rubio-Mejía1, Scott J Denholm5, Sigurd Hytterød1, James E Bron1 and Andrew P Shinn 2014 Distribution of Pseudomonas	
		infectious agents that are endemic in the RA		Paladini1*, Haakon Hansen2, Chris F Williams3, Nick GH Taylor4,	
		-			

45	8.02	Is the taxon tolerant of a wide range of	No	Genetic caracterisation of European grayling populations	Very high
	0.02	water quality conditions relevant to that		(Thymallus thymallus): Implications for conservation and	i ci y ingli
		taxon? [In the Justification field, indicate the		management. Bernhard Gum. 2006.	
		relevant water quality variable(s) being			
46	8.03	Can the taxon be controlled or eradicated in	Not applicable	Genetic caracterisation of European grayling populations	Very high
-		the wild with chemical, biological, or other		(Thymallus thymallus): Implications for conservation and	- / 5
		agents/means?		management. Bernhard Gum. 2006.	
47	8.04	Is the taxon likely to tolerate or benefit from	No	Genetic caracterisation of European grayling populations	High
		environmental/human disturbance?		(Thymallus thymallus): Implications for conservation and	5
		· · · · · · · · · · · · · · · · · · ·		management. Bernhard Gum. 2006.	
48	8.05	Is the taxon able to tolerate salinity levels	Yes	Genetic caracterisation of European grayling populations	High
		that are higher or lower than those found in		(Thymallus thymallus): Implications for conservation and	-
		its usual environment?		management. Bernhard Gum. 2006.	
49	8.06	Are there effective natural enemies	Yes	Kottelat, M. and J. Freyhof, 2007. Handbook of European	Very high
		(predators) of the taxon present in the RA		freshwater fishes. Publications Kottelat, Cornol and Freyhof,	
С. (Climat	e change			
9. (Climate	change			
50	9.01	Under the predicted future climatic	No change	Genetic caracterisation of European grayling populations	Very high
		conditions, are the risks of entry into the RA		(Thymallus thymallus): Implications for conservation and	
		area posed by the taxon likely to increase,		management. Bernhard Gum. 2006.	
		decrease or not change?			
51	9.02	Under the predicted future climatic	Decrease	Genetic caracterisation of European grayling populations	Medium
		conditions, are the risks of establishment		(Thymallus thymallus): Implications for conservation and	
		posed by the taxon likely to increase,		management. Bernhard Gum. 2006.	
		decrease or not change?			
52	9.03	Under the predicted future climatic	Decrease	Genetic caracterisation of European grayling populations	High
		conditions, are the risks of dispersal within		(Thymallus thymallus): Implications for conservation and	
		the RA area posed by the taxon likely to		management. Bernhard Gum. 2006.	
		increase, decrease or not change?			
53	9.04	Under the predicted future climatic	No change	Genetic caracterisation of European grayling populations	Medium
		conditions, what is the likely magnitude of		(Thymallus thymallus): Implications for conservation and	
		future potential impacts on biodiversity		management. Bernhard Gum. 2006.	
		and/or ecological integrity/status?			
54	9.05	Under the predicted future climatic	No change	Genetic caracterisation of European grayling populations	High
		conditions, what is the likely magnitude of		(Thymallus thymallus): Implications for conservation and	
		future potential impacts on ecosystem		management. Bernhard Gum. 2006.	
		structure and/or function?			
55	9.06	Under the predicted future climatic	No change	Genetic caracterisation of European grayling populations	High
		conditions, what is the likely magnitude of		(Thymallus thymallus): Implications for conservation and	
		future potential impacts on ecosystem		management. Bernhard Gum. 2006.	
		services/socio-economic factors?			

Statistics	
Scores	
BRA	12.5
BRA Outcome	-
BRA+CCA	8.5
BRA+CCA Outcome	-
Score partition	
A. Biogeography/Historical	4.5
1. Domestication/Cultivation	2.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	1.5
B. Biology/Ecology	8.0
4. Undesirable (or persistence) traits	3.0
5. Resource exploitation	5.0
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 13
A. Biogeography/Historical	
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	
6. Reproduction	2
7. Dispersal mechanisms	9
8. Tolerance attributes	6
C. Climate change	6
9. Climate change	6
Sectors affected	
Commercial	4
Environmental	6
Species or population nuisance traits	1
Thresholds	
BRA	-
BRA+CCA	-
Confidence	
BDA+CCA	0.92

BRA+CCA	0.82
BRA	0.83
CCA	0.71
Date and Time	
17/05/2	021 00:14:57

axon and Assessor details						
Category	Fishes and Lampreys (freshwater)					
Taxon name	Thymallus thymallus					
Common name	grayling					
Assessor	Ivan Špelić					
Risk screening context						
Reason and socio-economic benefits						
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS					
Taxonomy						
Native range	Native range					
Introduced range						
URL						

			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	Farming for restocking (FAO)	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	Farmed and sold live for restocking of open waters (FAO)	Very high
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	No	Personal opinion	Very high
2. (Climate.	, distribution and introduction risk			
4		How similar are the climatic conditions of the	Medium	Climatch 2020	Low
		Risk Assessment (RA) area and the taxon's native range?			
5	2.02	What is the quality of the climate matching data?	Low	Climatch 2020	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	Cetina with tributaries (personal observation).	Very high
7	2.04	How many potential vectors could the taxon	Not applicable	Already present	Very high
8	2.05	use to enter in the RA area? Is the taxon currently found in close	Not applicable	Already present	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 (established viable populations) outside its	Yes	easily reproduce in new areas (personal data)	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or	Yes	Hybridizing with native endemic subspecies (Horvath et al. 2014)	Very high
11	3.03	commercial taxa? In the taxon's introduced range, are there	No	in this areas there is no such activities	Very high
		known adverse impacts to aquaculture? In the taxon's introduced range, are there		Reducing population of endemic subspecies (Horvath et al 2014)	, -
		known adverse impacts to ecosystem	Yes		High
		In the taxon's introduced range, are there known adverse socio-economic impacts?	No	Similar angling suitability as native lineage.	Medium
		//Ecology			
		able (or persistence) traits	1		
14	4.01	Is it likely that the taxon will be poisonous or pose other risks to human health?	No	Harmless (Froese & Pauly 2019)	Very high
15	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or	Yes	Native lineage of grayling (Horvath et al 2014)	High
16	4.03	protected)? Are there any threatened or protected taxa	No	No examples	Very high
10	4.05	that the non-native taxon would parasitise in the RA area?	110		very high
17	4.04	Is the taxon adaptable in terms of climatic	No	Very sensitive to pollution (Froese & Pauly 2019), cool water	Very high
		and other environmental conditions, thus enhancing its potential persistence if it has		species and needs high oxygen levels.	
L		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	No such examples,	High
1		has invaded or is likely to invade the RA			
19		Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	Suitable for angling, no known adverse impacts.	Medium
20	4.07	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and	Yes	Susceptible to pathogens (Grayling (Thymallus thymallus) Ecological Risk Screening Summary, U.S. Fish & Wildlife Service,	Medium
		infectious agents that are endemic in the RA		February 2015. Revised, March 2017, April 2017. Web Version,	
21	4.08	Is it likely that the taxon will host, and/or	Yes	Could bring some pathogens when stocked from fish farms	Medium
		act as a vector for, recognised pests and infectious agents that are absent from (novel		(personal opinion), proved to be a vector of Gyrodactylus salaris parasite (Paladini et al. 2014).	
	4.00	to) the RA area?			N/ 1 · · ·
22	4.09	Is it likely that the taxon will achieve a body size that will make it more likely to be	Yes	Grows to 60 cm and 6,7 kg (Froese & Pauly 2019).	Very high
 		released from captivity?			
23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g.	Yes	Inhabits fast flowing rivers, in Scandinavia it occurs in clear lakes (Froese & Pauly 2019).	Very high
	4.44	versatile in habitat use)?	N-		LU-h
24	4.11	Is it likely that the taxon's mode of existence	No	No data available but sensitive to pollution and inhabits localities	High
		(e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for		with stone or hard sand bottom (Froese & Pauly 2019).	
25	4.12	native taxa? Is the taxon likely to maintain a viable	No	No data, forms schools, gregarious (Froese & Pauly 2019).	Very high
1		population even when present in low			1
1		densities (or persisting in adverse conditions by way of a dormant form)?			
Ĩ	1	ing way of a dofinant form)?	1	1	1

5 F	esourc	e exploitation			
		Is the taxon likely to consume threatened or protected native taxa in the RA area?	Yes	No records on possible or actual impacts of introductions (Ecological Risk Screening Summary. U.S. Fish & Wildlife Service, February 2015. Revised, March 2017, April 2017. Web Version, 6/25/2018).	Medium
27	5.02	Is the taxon likely to sequester food resources (including nutrients) to the	Not applicable	No data for calculation.	Very high
c 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	Males defending terrritories at spawning site but leave after spawning and do not guard the eggs (Ingram et al. 2000).	Very high
29	6.02	to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	Personal observation.	Very high
30	6.03		No	No native species to hybridise with (Kottelat & Freyhof 2007).	Very high
_	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	No	No such data	Very high
32	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features)	Yes	Breeds in shallow stretches, usually 20-40 cm deep, or riffles, with moderate current of about 0.5 m/s and clean gravel bottom	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	(Froese & Pauly 2019). Female grayling can lay between 421 – 36,000 eggs per breeding season (Peter Jørgen Tønnessen Haddeland, 2012 MSc thesis)	Very high
34	6.07	How many time units (days, months, years) does the taxon require to reach the age-at-	2	kottelat and Freyhof	Very high
7. Г) ispersa	first-reproduction? al mechanisms			·
		How many potential internal vectors/pathways could the taxon use to	>1	Stocking (Horvath et al. 2014), floods (personal opinion).	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	Krka National park	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 adaptations.	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	They dig redds and have sticky eggs (Everard & Knight 2013).	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	Dokk 2015	Very high
40	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	Yes	Ovidio et al. 2004	Very high
		Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No	No data	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	Stocking, drift	Very high
-			No	No data to support this	Very 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	Very sensitive species (personal data).	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	Sensitive to pollution (Froese & Pauly 2019).	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 agents/means?	No	Not allowed	Very high
47	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	No	Population reduction caused by anthropogenic damage to biotopes (Ovidio et al. 2004).	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	Unable to tolerate higher saline waters (Blair et al. 2016).	Very high
49	8.06	Are there effective natural enemies (predators) of the taxon present in the RA	Yes	Piscivorous birds, predatory fish (pike), otters.	High
		e change			
		<i>change</i> Under the predicted future climatic	Not annlicable	Already present.	Very high
		conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?			sery mgn
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	Significant reductions in suitable range for grayling under future climate predictions were demonstrated for UK (Huml et al. 2019). Similar can be expected for the RA area.	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	Significant reductions in suitable range for grayling under future climate predictions were demonstrated for UK (Huml et al. 2019). Similar can be expected for the RA area.	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	Impact already virtually non existant (after hybridization with native lineage) - personal opinion.	Medium

54	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	No change	No records on possible or actual impacts of introductions (Ecological Risk Screening Summary. U.S. Fish & Wildlife Service, February 2015. Revised, March 2017, April 2017. Web Version, 6/25/2018).	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 records on possible or actual impacts of introductions (Ecological Risk Screening Summary. U.S. Fish & Wildlife Service, February 2015. Revised, March 2017, April 2017. Web Version, 6/25/2018).	Medium

Statistics	
Scores	
BRA	19.0
BRA Outcome	-
BRA+CCA	15.0
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	6.0
4. Undesirable (or persistence) traits	4.0
5. Resource exploitation	5.0
6. Reproduction	-1.0
7. Dispersal mechanisms	2.0
8. Tolerance attributes	-4.0
C. Climate change	-4.0
9. Climate change	-4.0
Answered Questions	110
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	0
Commercial	10
Environmental	10
Species or population nuisance traits	-1
Species of population nuisance traits	-1
Thresholds	
BRA	-
BRA+CCA	-
Confidence	0.05
BRA+CCA	0.85
BRA	0.88
CCA	0.58
Date and Time	
25/05/20	021 23:50:10

Taxon and Assessor details	axon and Assessor details						
Category	Fishes and Lampreys (freshwater)						
Taxon name	Thymallus thymallus						
Common name	grayling						
Assessor	Tamara Kanjuh						
Risk screening context							
Reason and socio-economic benefits							
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS						
Taxonomy							
Native range							
Introduced range							
URL							

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical ication/Cultivation	_		_
1		Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	Thymallus thymallus is reared for re-stocking and for feeding purposes. It is a highly appreciated species for sports fishing in northern Europe, where several initiatives have been undertaken for conservation of endangered populations. Its breeding in aquaculture relies mostly on wild parents, and many aspects of its	High
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	rearing remain undisclosed Due to their agreeable taste and attractive form, the grayling species are valued as food and game fishes, and they are occasionally seen in public aquaria	High
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	No	In recent years, an increasing number of studies report severe declines in population sizes (Uiblein et al., 2005).	High
2. (Climate	, distribution and introduction risk		decimes in population sizes (oblem et al., 2003).	
4	2.01	How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range?	Medium	Dfa, Dfb (Köppen-Geiger climate classification system)	Medium
5	2.02	What is the quality of the climate matching data?	High	Köppen-Geiger climate classification system	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	European grayling was introduced to the Skadar Lake drainage area in the 1960s (Drecun, 1962; Knežević, 1981) and is present in the inland waters of Montenegro (Morača River) and may also be present in Skadar Lake (Talevski et al., 2009).	High
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	Sport fishing.	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	Yes	European grayling was introduced to the Skadar Lake drainage area in the 1960s (Drecun, 1962; Knežević, 1981) and is present in the inland waters of Montenegro (Morača River) and may also	High
3 1	nvasivi	and intentional introductions)?		be present in Skadar Lake (Talevski et al., 2009).	
9	3.01	Has the taxon become naturalised (established viable populations) outside its	No	No information found.	Low
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	No	No information found.	Low
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	No information found.	Low
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	No	No information found.	Low
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	No information found.	Low
		//Ecology			
		able (or persistence) traits Is it likely that the taxon will be poisonous or	No	Harmless to human (fishbase.se)	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	No	No information found.	Low
16	4.03	protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	No information found.	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?	No	Grayling make an ideal indicator species of habitat quality and climate change and, even in comparison with other salmonids, shows high sensitivity to high temperature (Ibbotson et al., 2001; Jonsson&Jonsson, 2009).	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 information found.	Low
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	No information found.	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 information found.	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?	No	No information found.	Low
	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	No information found.	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	In general, a moderate velocity is required at spawning sites, ranging from 20-90cm/s (Gonczi, 1989; Sempeski&Gaudin, 1995a).	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 information found.	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	It has been found that density dependent mortality occurred at the highest levels of parent stock (Clark, 1992) High stocking density has also been found to increase downstream dispersion from a site (Cowx, 1994).	High
5. R	esourc	e exploitation			
			No	No information found.	Low
		protected native taxa in the RA area?			
27	5.02	Is the taxon likely to sequester food	No	No information found.	Low
		resources (including nutrients) to the			
6 D	eprodu	detriment of native taxa in the RA area?			
		Is the taxon likely to exhibit parental care	No	Grayling belong to a group of lithophils which hide their brood	Medium
20	0.01	and/or to reduce age-at-maturity in response to environmental conditions?	NO	under gravel and do not guard the deposited eggs (Balon, 1975).	healam
29	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	No information found.	Medium
30	6.03	Is the taxon likely to hybridise naturally with native taxa?	Yes	Marić et al. (2012) point out that their results (STRUCTURE and DAS) support observation of wide spread introgression of grayling in the Soča River basin (Sušnik et al., 2004) and are also congruent with the results of wild male genotyping being annually performed in a frame of Adriatic grayling action plan (Jesenšek&Šumer, 2004), which have revealed only hybrid individuals with varying proportion of parental alleles (D.	High
31	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	No	No information found.	Low
32	6.05	Is the taxon dependent on the presence of	Yes	Very sensitive to water quality, requires clean cold water	High
52	5.55	another taxon (or specific habitat features) to complete its life cycle?		(Kottelat&Freyhof, 2007).	
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	Depending on the size of the female, she may lay between 1,500 and 30,000 eggs (animaldiversity.org)	Medium
34	6.07	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	3	Spawnes for the first time 2-3 years (Kottelat&Freyhof, 2007).	High
7. D	ispersa	Il mechanisms			
		How many potential internal	>1	Stocking, sport fishing, angling (Piria et al., 2017).	High
		vectors/pathways could the taxon use to			-
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	European grayling was introduced to the Skadar Lake drainage area in the 1960s (Drecun, 1962; Knežević, 1981) and is present	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	in the inland waters of Montenegro (Morača River) and may also be present in Skadar Lake (Talevski et al., 2009). No information found.	Low
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 information found.	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	Proportions of stocked grayling juveniles recaptured by electric fishing in the fast-flowing section of the experimental stream (the rapids) were 9.9%, 46.7% and 16.6% after the first, second and third stocking, respectively (Carlstein&Eriksson, 1995).	High
40	7.06	Are older life stages of the taxon likely to	Yes	Adults make short spawning migrations (Kottelat&Freyhof, 2007).	High
	7.07	migrate in the RA area for reproduction?			
41	7.07	Are propagules or eggs of the taxon likely to	No	No information found.	Low
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	No information found.	Low
43	7.09	unintentional or intentional) likely to be Is dispersal of the taxon density dependent?	Yes	It has been found that density dependent mortality occurred at the highest levels of parent stock (Clark, 1992) High stocking density has also been found to increase downstream dispersion from a site (Cowx, 1994).	High
		e 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 information found.	Low
45	8.02	cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that	Yes	They are in addition able to tolerate low oxygen tension of between 1.4 mg/L at 8°C to 1.8 mg/L at 20°C	Medium
46	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 chamical biological or ether.	No	(Feldmuth&Erilcsen, 1978). No information found.	Low
		the wild with chemical, biological, or other agents/means?			
47	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	No	During the second half of the 20th century, a decline in the number of its populations has been observed, primarily because of the construction of hydroenergetic objects, intensified fishing and inadequate protection (lankowić 2010)	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	inadequate protection (Janković, 2010). No information found.	Low
49	8.06	Are there effective natural enemies	No	No information found.	Low
	limet	(predators) of the taxon present in the RA			
C. C	umate	e change			

9. (9. Climate change				
50	9.01	Under the predicted future climatic	No change	European grayling, even in comparison with other salmonids,	Medium
		conditions, are the risks of entry into the RA		shows high sensitivity to high temperature (Ibbotson et al., 2001;	
		area posed by the taxon likely to increase,		Jonsson&Jonsson, 2009) and exhibits narrow water quality	
		decrease or not change?		requirements (Oberdorffet al., 2002; Uiblein et al., 2001).	
51	9.02	Under the predicted future climatic	No change	European grayling, even in comparison with other salmonids,	Medium
		conditions, are the risks of establishment		shows high sensitivity to high temperature (Ibbotson et al., 2001;	
		posed by the taxon likely to increase,		Jonsson&Jonsson, 2009) and exhibits narrow water quality	
		decrease or not change?		requirements (Oberdorffet al., 2002; Uiblein et al., 2001).	
52	9.03	Under the predicted future climatic	Increase	European grayling, even in comparison with other salmonids,	Medium
		conditions, are the risks of dispersal within		shows high sensitivity to high temperature (Ibbotson et al., 2001;	
		the RA area posed by the taxon likely to		Jonsson&Jonsson, 2009) and exhibits narrow water quality	
		increase, decrease or not change?		requirements (Oberdorffet al., 2002; Uiblein et al., 2001).	
53	9.04	Under the predicted future climatic	No change	European grayling, even in comparison with other salmonids,	Medium
		conditions, what is the likely magnitude of		shows high sensitivity to high temperature (Ibbotson et al., 2001;	
		future potential impacts on biodiversity		Jonsson&Jonsson, 2009) and exhibits narrow water quality	
		and/or ecological integrity/status?		requirements (Oberdorffet al., 2002; Uiblein et al., 2001).	
54	9.05	Under the predicted future climatic	No change	European grayling, even in comparison with other salmonids,	Medium
		conditions, what is the likely magnitude of		shows high sensitivity to high temperature (Ibbotson et al., 2001;	
		future potential impacts on ecosystem		Jonsson&Jonsson, 2009) and exhibits narrow water quality	
		structure and/or function?		requirements (Oberdorffet al., 2002; Uiblein et al., 2001).	
55	9.06	Under the predicted future climatic	Lower	European grayling, even in comparison with other salmonids,	Medium
		conditions, what is the likely magnitude of		shows high sensitivity to high temperature (Ibbotson et al., 2001;	
		future potential impacts on ecosystem		Jonsson&Jonsson, 2009) and exhibits narrow water quality	
		services/socio-economic factors?		requirements (Oberdorffet al., 2002; Uiblein et al., 2001).	

Statistics Scores	
BRA	5.0
BRA Outcome	5.0
BRA+CCA	5.0
BRA+CCA Outcome	5.0
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	1.0
5. Resource exploitation	0.0
6. Reproduction	1.0
7. Dispersal mechanisms	2.0
8. Tolerance attributes	0.0
C. Climate change	0.0
9. Climate change	0.0
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 7 9
6. Reproduction	/
7. Dispersal mechanisms	9
8. Tolerance attributes	
C. Climate change	6 6
9. Climate change Sectors affected	0
Commercial	3
Environmental	1
Species or population nuisance traits	4
	-
Thresholds	
BRA	-
BRA+CCA	_
Confidence	
BRA+CCA	0.47
BRA	0.47
	0.50

Date and Time

28/05/2021 09:07:18

Taxon and Assessor details		
Category	Fishes and Lampreys (freshwater)	
Taxon name	Thymallus thymallus	
Common name	grayling	
Assessor	Tena Radocaj	
Risk screening context		
Reason and socio-economic benefits		
Risk assessment area	Danube & Adriatic basins BA, HR, ME, RS	
Taxonomy		
Native range		
Introduced range		
URL		

			Response	Justification (references and/or other information)	Confidence
Α. Ι	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	In karstic rivers Cetina and Gacka	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 Thymallus t. is grown on for human consumption in Slovenia. (FAO)	High
3	1.03	Does the taxon have invasive races,	No	no	Very high
2 (varieties, sub-taxa or congeners?			
2. C	2.01	<i>h, distribution and introduction risk</i> How similar are the climatic conditions of the	High	The similarity between climatic conditions RA area and native	Very high
4	2.01	Risk Assessment (RA) area and the taxon's native range?	nign	range is high. I use climatch.	very nigh
5	2.02	What is the quality of the climate matching data?	High	The quality of the climate matching data is medium.	Very high
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	It is present outside of captivity in the RA area.	High
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	None	It is present in the RA area.	High
8	2.05	Is the taxon currently found in close	Not applicable	It is present in the RA area.	High
		proximity to, and likely to enter into, the RA			
		area in the near future (e.g. unintentional			
		and intentional introductions)?			
<u>з.</u> I 0		e elsewhere	Vec	Introduced over most of southern and control Einland, ortablished	Very high
У	3.01	Has the taxon become naturalised (established viable populations) outside its	Yes	Introduced over most of southern and central Finland, established viable populations. (IUCN)	very nign
10	3.02	In the taxon's introduced range, are there	No	no data available	Medium
10	5.02	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	in this areas there is no such activities	Very high
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	No	no data	Medium
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	no data	Low
B. I	Biology	y/Ecology			
		able (or persistence) traits			
4. L	Indesir		No	no	Very high
<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 more native taxa (that are not threatened or	No	no no data	Very high Medium
<u>4. (</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 that the non-native taxon would parasitise in			, -
<u>4. (</u> 14 15 16	<i>Indesir</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 and other environmental conditions, thus	No	no data	Medium
<u>4. (</u> 14 15 16	<u>Indesir</u> 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	No	no data no The taxon is adaptable of climatic and other environmental	Medium Very high
<u>4. (</u> 14 15 16 17	<u>Indesir</u> 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 invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it	No	no data no The taxon is adaptable of climatic and other environmental	Medium Very high
<u>4. (</u> 14 15 16 17 18	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 Is the taxon likely to exert adverse impacts	No No Yes	no data no The taxon is adaptable of climatic and other environmental conditions. The taxon not disrupt food-web structure/function in aquatic	Medium Very high Medium
<u>4. (</u> 14 15 16 17 18 19	4.01 4.02 4.03 4.04 4.05 4.06	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	No No Yes No	no data no The taxon is adaptable of climatic and other environmental conditions. The taxon not disrupt food-web structure/function in aquatic ecosystem in the RA area. Personal opinion- no data The taxon no impacts on ecosystem services in the RA area. Yes, the taxon may be a host or vector of known pests and infectious agents endemic to RA area. Because in every area exist	Medium Very high Medium Low
<u>4. (</u> 14 15 16 17 17 18 19 20	<u>Indesir</u> 4.01 4.02 4.03 4.04 4.05 4.06 4.07	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	No No Yes No Yes	no data no The taxon is adaptable of climatic and other environmental conditions. The taxon not disrupt food-web structure/function in aquatic ecosystem in the RA area. Personal opinion- no data The taxon no impacts on ecosystem services in the RA area. Yes, the taxon may be a host or vector of known pests and infectious agents endemic to RA area. Because in every area exist infectious agents and pests.	Medium Very high Medium Low Low
<u>4. (</u> 14 15 16 17 17 18 19 20	4.01 4.02 4.03 4.04 4.05 4.06	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 ti 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 No Yes No	no data no The taxon is adaptable of climatic and other environmental conditions. The taxon not disrupt food-web structure/function in aquatic ecosystem in the RA area. Personal opinion- no data The taxon no impacts on ecosystem services in the RA area. Yes, the taxon may be a host or vector of known pests and infectious agents endemic to RA area. Because in every area exist infectious agents. The ability of T. thymallus to carry an infection for long periods	Medium Very high Medium Low
<u>4. (</u> 14 15 16 17 17 18 19 20	<u>Indesir</u> 4.01 4.02 4.03 4.04 4.05 4.06 4.07	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	No No Yes No Yes	no data no The taxon is adaptable of climatic and other environmental conditions. The taxon not disrupt food-web structure/function in aquatic ecosystem in the RA area. Personal opinion- no data The taxon no impacts on ecosystem services in the RA area. Yes, the taxon may be a host or vector of known pests and infectious agents endemic to RA area. Because in every area exist infectious agents and pests. The ability of T. thymallus to carry an infection for long periods increases the potential transfer of G. salaris to other susceptible	Medium Very high Medium Low Low
<u>4. (</u> 14 15 16 17 17 18 19 20	<u>Indesir</u> 4.01 4.02 4.03 4.04 4.05 4.06 4.07	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	No No Yes No Yes	no data no The taxon is adaptable of climatic and other environmental conditions. The taxon not disrupt food-web structure/function in aquatic ecosystem in the RA area. Personal opinion- no data The taxon no impacts on ecosystem services in the RA area. Yes, the taxon may be a host or vector of known pests and infectious agents endemic to RA area. Because in every area exist infectious agents and pests. The ability of T. thymallus to carry an infection for long periods increases the potential transfer of G. salaris to other susceptible hosts. (Paladini, G., Hansen, H., Williams, C. F., Taylor, N. G.,	Medium Very high Medium Low Low
<u>4. (</u> 14 15 16 17 17 18 19 20	<u>Indesir</u> 4.01 4.02 4.03 4.04 4.05 4.06 4.07	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	No No Yes No Yes	no data no The taxon is adaptable of climatic and other environmental conditions. The taxon not disrupt food-web structure/function in aquatic ecosystem in the RA area. Personal opinion- no data The taxon no impacts on ecosystem services in the RA area. Yes, the taxon may be a host or vector of known pests and infectious agents endemic to RA area. Because in every area exist infectious agents and pests. The ability of T. thymallus to carry an infection for long periods increases the potential transfer of G. salaris to other susceptible hosts. (Paladini, G., Hansen, H., Williams, C. F., Taylor, N. G., Rubio-Mejía, O. L., Denholm, S. J., & Shinn, A. P. (2014).	Medium Very high Medium Low Low
<u>4. (</u> 14 15 16 17 17 18 19 20	<u>Indesir</u> 4.01 4.02 4.03 4.04 4.05 4.06 4.07	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	No No Yes No Yes	no data no The taxon is adaptable of climatic and other environmental conditions. The taxon not disrupt food-web structure/function in aquatic ecosystem in the RA area. Personal opinion- no data The taxon no impacts on ecosystem services in the RA area. Yes, the taxon may be a host or vector of known pests and infectious agents endemic to RA area. Because in every area exist infectious agents and pests. The ability of T. thymallus to carry an infection for long periods increases the potential transfer of G. salaris to other susceptible hosts. (Paladini, G., Hansen, H., Williams, C. F., Taylor, N. G., Rubio-Mejía, O. L., Denholm, S. J., & Shinn, A. P. (2014). Reservoir hosts for Gyrodactylus salaris may play a more	Medium Very high Medium Low Low
4. U 14 15 16 17 18 19 20 21	<u>Indesir</u> 4.01 4.02 4.03 4.04 4.05 4.06 4.07	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 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 No Yes No Yes	no data no The taxon is adaptable of climatic and other environmental conditions. The taxon not disrupt food-web structure/function in aquatic ecosystem in the RA area. Personal opinion- no data The taxon no impacts on ecosystem services in the RA area. Yes, the taxon may be a host or vector of known pests and infectious agents endemic to RA area. Because in every area exist infectious agents and pests. The ability of T. thymallus to carry an infection for long periods increases the potential transfer of G. salaris to other susceptible hosts. (Paladini, G., Hansen, H., Williams, C. F., Taylor, N. G., Rubio-Mejía, O. L., Denholm, S. J., & Shinn, A. P. (2014).	Medium Very high Medium Low Low
4. U 14 15 16 17 18 19 20 21 21	Indesir 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?	No No Yes No Yes Yes	no data no The taxon is adaptable of climatic and other environmental conditions. The taxon not disrupt food-web structure/function in aquatic ecosystem in the RA area. Personal opinion- no data The taxon no impacts on ecosystem services in the RA area. Yes, the taxon may be a host or vector of known pests and infectious agents endemic to RA area. Because in every area exist infectious agents endemic to RA area. Because in every area exist infectious agents and pests. The ability of T. thymallus to carry an infection for long periods increases the potential transfer of G. salaris to other susceptible hosts. (Paladini, G., Hansen, H., Williams, C. F., Taylor, N. G., Rubio-Mejía, O. L., Denholm, S. J., & Shinn, A. P. (2014). Reservoir hosts for Gyrodactylus salaris may play a more significant role in epidemics than previously thought. Parasites & large fish	Medium Very high Medium Low Low Low Very high
4. U 14 15 16 17 18 19 20 21 21	<u>Indesir</u> 4.01 4.02 4.03 4.04 4.05 4.06 4.06 4.07	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 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 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 it likely that the taxon will achieve a body size that will make it more likely to be	No No Yes No Yes Yes	no data no The taxon is adaptable of climatic and other environmental conditions. The taxon not disrupt food-web structure/function in aquatic ecosystem in the RA area. Personal opinion- no data The taxon no impacts on ecosystem services in the RA area. Yes, the taxon may be a host or vector of known pests and infectious agents endemic to RA area. Because in every area exist infectious agents and pests. The ability of T. thymallus to carry an infection for long periods increases the potential transfer of G. salaris to other susceptible hosts. (Paladini, G., Hansen, H., Williams, C. F., Taylor, N. G., Rubio-Mejía, O. L., Denholm, S. J., & Shinn, A. P. (2014). Reservoir hosts for Gyrodactylus salaris may play a more significant role in epidemics than previously thought. Parasites &	Medium Very high Medium Low Low Low High
4. <u>(</u> 14 15 16 17 18 19 20 21 21 22 23	Indesir 4.01 4.02 4.03 4.04 4.04 4.05 4.06 4.07 4.08 4.09 4.10	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 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)?	No No Yes No Yes Yes No	no data no The taxon is adaptable of climatic and other environmental conditions. The taxon not disrupt food-web structure/function in aquatic ecosystem in the RA area. Personal opinion- no data The taxon no impacts on ecosystem services in the RA area. Yes, the taxon may be a host or vector of known pests and infectious agents endemic to RA area. Because in every area exist infectious agents and pests. The ability of T. thymallus to carry an infection for long periods increases the potential transfer of G. salaris to other susceptible hosts. (Paladini, G., Hansen, H., Williams, C. F., Taylor, N. G., Rubio-Mejía, O. L., Denholm, S. J., & Shinn, A. P. (2014). Reservoir hosts for Gyrodactylus salaris may play a more significant role in epidemics than previously thought. Parasites & large fish usually live in running waters but there is lacustrine populations too	Medium Very high Medium Low Low Low Very high High
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25	4.12	Is the taxon likely to maintain a viable	Yes	Population crash with expolatation eg. angling	Very high
		population even when present in low			
		densities (or persisting in adverse conditions			
	2000/10/	by way of a dormant form)?			
		Is the taxon likely to consume threatened or	No	Thymallus t. not consume threatened of protected native taxa in	Low
0	5.01	protected native taxa in the RA area?	NO	the RA area.	LOW
7	5.02	Is the taxon likely to sequester food	Not applicable	not applicable	High
<i>,</i>	5.02	resources (including nutrients) to the	Not applicable		ingn
		detriment of native taxa in the RA area?			
. 1	Reprodu				
		Is the taxon likely to exhibit parental care	Yes	Males defending terrritories at spawning site	Very high
		and/or to reduce age-at-maturity in response			, 5
		to environmental conditions?			
9	6.02	Is the taxon likely to produce viable gametes	Yes	yes	Very high
		or propagules (in the RA area)?			, 5
C	6.03	Is the taxon likely to hybridise naturally with	Yes	In Slovakia and Czech republic was introduced T. baicalensis and	High
		native taxa?		they produce hybrids	-
1	6.04	Is the taxon likely to be hermaphroditic or to	No	no	Very high
		display asexual reproduction?			
2	6.05	Is the taxon dependent on the presence of	No	no	Very high
		another taxon (or specific habitat features)			
		to complete its life cycle?			
3	6.06	Is the taxon known (or likely) to produce a	Yes	Female grayling can lay between 421 – 36,000 eggs per breeding	Very high
		large number of propagules or offspring		season (Peter Jørgen Tønnessen Haddeland, 2012 MSc thesis)	
		within a short time span (e.g. < 1 year)?			
ł	6.07	How many time units (days, months, years)	2	kottelat and Freyhof	Very high
		does the taxon require to reach the age-at-			
		first-reproduction?			L
		al mechanisms			
ś	7.01	How many potential internal	>1	1. human impact (fishing) 2. flooding 3. followed by natural	Medium
		vectors/pathways could the taxon use to		spread via natural and manmade watercourses	
_		disperse within the RA area (with suitable			
Ś	7.02	Will any of these vectors/pathways bring the	Yes	All of this vectors/pathways bring taxon in protected areas.	Low
		taxon in close proximity to one or more			
		protected areas (e.g. MCZ, MPA, SSSI)?			
7	7.03	Does the taxon have a means of actively	No	no	Low
		attaching itself to hard substrata (e.g. ship			
		hulls, pilings, buoys) such that it enhances			
		the likelihood of dispersal?			
3	7.04	Is natural dispersal of the taxon likely to	No	They have nests	Very high
		occur as eggs (for animals) or as propagules			
		(for plants: seeds, spores) in the RA area?			
Ð	7.05	Is natural dispersal of the taxon likely to	Yes	Larvae live in open water below surface	High
		occur as larvae/juveniles (for animals) or as			
		fragments/seedlings (for plants) in the RA			
_	7.00	area?	×		N/ 1 · 1
U	7.06	Are older life stages of the taxon likely to	Yes	Adults makes short spawning migrations	Very high
	7.07	migrate in the RA area for reproduction?			N/ 1 · 1
T	7.07	Are propagules or eggs of the taxon likely to	No	no	Very high
2	7.08	be dispersed in the RA area by other animals?	Yes	There is a possibility of a high rate of spread of taxa. Eg. if a	Low
Z	7.08	Is dispersal of the taxon along any of the	res		LOW
		vectors/pathways mentioned in the previous		fertilized individual enters a new area by any means of expansion.	
		seven questions (35–41; i.e. both			
2	7.00	unintentional or intentional) likely to be Is dispersal of the taxon density dependent?	No	no	Vory bigh
			NO		Very high
		ce attributes Is the taxon able to withstand being out of	No	very sensitive	Very high
r	0.01	water for extended periods (e.g. minimum of			very mgn
		one or more hours) at some stage of its life			
		cycle?			
5	8.02	Is the taxon tolerant of a wide range of	No	Very sensitive to pollution	Very high
5	0.02	water quality conditions relevant to that			Jery mgn
		taxon? [In the Justification field, indicate the			
		relevant water quality variable(s) being			
6	8.03	Can the taxon be controlled or eradicated in	Not applicable	no regulation	Very high
-	5.55	the wild with chemical, biological, or other			,gii
		agents/means?			
7	8.04	Is the taxon likely to tolerate or benefit from	No	no	Very high
		environmental/human disturbance?			, 5
8	8.05	Is the taxon able to tolerate salinity levels	No	only freshwater	Very high
		that are higher or lower than those found in			
		its usual environment?			
9	8.06	Are there effective natural enemies	No	Cormorants are present there and probably their pressure are high	Medium
		(predators) of the taxon present in the RA			
(Climate	e change			
		change			
)	9.01	Under the predicted future climatic	Not applicable	not applicable	High
		conditions, are the risks of entry into the RA			
		area posed by the taxon likely to increase,			
	L	decrease or not change?			
	9.02	Under the predicted future climatic	Decrease	The risks of establishing self-sustaining populations are in	High
1		conditions, are the risks of establishment		decrease. Grayling show high sensitivity to high temperature	-
1		posed by the taxon likely to increase,		(Ibbotson et al. 2001; Jonsson and Jonsson 2009).	
1			I	· · · · · · · · · · · · · · · · · · ·	
1		decrease or not change?			
	9.03	decrease or not change? Under the predicted future climatic	Decrease	The risks of dispersal within the RA area is decreased. Under	Medium
	9.03		Decrease	The risks of dispersal within the RA area is decreased. Under conditions of climate change, the projections for 2050 predict	Medium
	9.03	Under the predicted future climatic	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	Future potential impacts on biodiversity/ecological status is lower.	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	The future potential impacts on ecosystem structure or function is lower.	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	Future potential impacts on ecosystem services/socio-economic factors is lower.	Low

Sta	

Statistics	
BRA	13.0
BRA Outcome	13.0
BRA+CCA	3.0
BRA+CCA Outcome	-
Score partition A. Biogeography/Historical	4.0
	4.0 2.0
1. Domestication/Cultivation 2. Climate, distribution and introduction risk	0.0
3. Invasive elsewhere	2.0
B. Biology/Ecology	9.0
4. Undesirable (or persistence) traits	5.0
5. Resource exploitation	0.0
6. Reproduction	4.0
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 B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2
6. Reproduction	9
7. Dispersal mechanisms	6
8. Tolerance attributes	
C. Climate change	6
9. Climate change Sectors affected	0
	2
Commercial	3
Environmental	-3
Species or population nuisance traits	6
Thresholds	
BRA	-
BRA+CCA	-
Confidence	
	0.73
BRA+CCA	
BRA+CCA BRA CCA	0.77 0.46

	BRA+CCA	0.73
	BRA	0.77
	CCA	0.46
Date and Time		
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