Taxon and Assessor details				
Category	Plantae (freshwater)			
Taxon name	Azolla cristata			
Common name	-			
Assessor	Mihaela Britvec			
Risk screening context				
Reason and socio-economic benefits				
Risk assessment area	Mediterranean region			
Taxonomy				
Native range				
Introduced range				
URL				

	_		Response	Justification (references and/or other information)	Confidence
		graphy/Historical ication/Cultivation	_		_
L		Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	Azolla cristata is of commercial importance in cultivation in southern and eastern Asia as a bio-fertilizer, valued for its nitrogen-fixing ability, which benefits crops such as rice when the fern is grown under it and reduces the need for artificial fertilizer addition. The thick mat of fronds also suppresses weed growth. Harvested fronds are also used as a food for fish and poultry. It is also often used as a floating plant in both coldwater and tropical actuation accurate in an in a subset of the start o	High
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	acuaria. as well as in outdoor ponds. doi: Harvested fronds are also used as a food for fish and poultry. It is also often used as a floating plant in both coldwater and tropical aquaria, as well as in outdoor ponds.	High
3	1.03	Does the taxon have invasive races,	Yes	It is closely related to Azolla filiculoides.	Very high
, (	limate	varieties, sub-taxa or congeners? , distribution and introduction risk			
	2.01	How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range?	High	doi: 10.1111/j.1365-3180.2012.00926.x	High
;	2.02	What is the quality of the climate matching data?	High	doi: 10.1111/j.1365-3180.2012.00926.x	High
5	2.03	Is the taxon already present outside of captivity in the RA area?	No	https://hirc.botanic.hr/fcd/	Low
'	2.04	How many potential vectors could the taxon use to enter in the RA area?	>1	soil, sand and gravel	High
3	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)?	Yes	doi: 10.1111/j.1365-3180.2012.00926.x	High
		e elsewhere	L		l
)	3.01	Has the taxon become naturalised (established viable populations) outside its	Yes	A. cristata is native to the America, but has been recorded as an invasive species in Kashmir, India, and South Africa.	High
0	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	Azolla species have negatively impacts animal health (https://www.cabi.org/isc/datasheet/8119#toriskAndImpactFactors	Low
1	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	Yes	A. cristata reduce the light and oxygen levels in water bodies.	Medium
2	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	Yes	Azolla species are known to be able to damaged ecosystem services and lead to ecosystem change/ habitat alteration.	Medium
3	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	Yes	Social impacts of Azolla species have centred around the reduction of useful water surface area for recreation (fishing, swimming and water skiing) and water transport.	Medium
		y/Ecology			
		able (or persistence) traits Is it likely that the taxon will be poisonous or	No	No physical threats to humans were found.	Low
4	4.01	pose other risks to human health?	NO	https://www.fws.gov/fisheries/ANS/erss/highrisk/ERSS-Azolla- cristata-FINAL-July2021.pdf	LOW
5	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	Multiple peer-reviewed reports document competing with other plants. https://www.fws.gov/fisheries/ANS/erss/highrisk/ERSS- Azolla-cristata-FINAL-July2021.pdf	Medium
6	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	no reference	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?	Yes	https://www.fws.gov/fisheries/ANS/erss/highrisk/ERSS-Azolla- cristata-FINAL-July2021.pdf	Medium
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	Yes	A. cristata form thick mats.	Low
9	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes	Multiple peer-reviewed reports document negative impacts of introduction including forming thick mats, competing with other plants, blocking navigation, and increasing difficulty and costs to commercial fishing. https://www.fws.gov/fisheries/ANS/erss/highrisk/ERSS-Azolla- cristata-FINAL-July2021.pdf	Medium
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	No	no reference	Low
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?	No	no reference	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 reference	Low
23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g.	No	This species inhabits in still or slow moving water of lakes, ponds, and streams.	Medium
24	1 1 1	versatile in habitat use)? Is it likely that the taxon's mode of existence	Vac	https://www.fws.gov/fisheries/ANS/erss/highrisk/ERSS-Azolla-	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	Multiple peer-reviewed reports document negative impacts of introduction including forming thick mats and competing with other plants.	High
		native taxa?		https://www.fws.gov/fisheries/ANS/erss/highrisk/ERSS-Azolla-	
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	ne reference	Low
5 6	Pecouro	e exploitation			1
		Is the taxon likely to consume threatened or protected native taxa in the RA area?	Not applicable	A. cristata is not carnivore.	High
	5.02	Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?	Yes	competing with other plants: https://www.fws.gov/fisheries/ANS/erss/highrisk/ERSS-Azolla- cristata-FINAL-July2021.pdf	Medium
	Reprodu				
28	6.01	Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?	Not applicable	no evedence	High
29	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	No	no reference	Low
	6.03	Is the taxon likely to hybridise naturally with native taxa?	No	no reference	Low
	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	No	no reference	Low
12	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	Yes	This fern is a nitrogen fixer.	High
	6.06	Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)?	Yes	Has high reproductive potential.	Medium
34	6.07	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	2	2 days: The plants most usually reproduce asexually by fragmentation of the fronds as frequently as every two days. https://www.fws.gov/fisheries/ANS/erss/highrisk/ERSS-Azolla- cristata-FINAL-July2021.pdf	High
'. 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 habitats nearby)?	>1	Although waterfowl dispersal was regarded as a possible vector, the urban location of these occurrences [in Ottawa, Ontario and Gatineau, Quebec] suggested to those investigators that the 2003 occurrence most likely resulted from the dumping of home aquaria (Darbyshire and Thomson 2004) https://www.fws.gov/fisheries/ANS/erss/highrisk/ERSS-Azolla- cristata-FINAL-Julv2021.odf	Medium
36	7.02	Will any of these vectors/pathways bring the taxon in close proximity to one or more	Yes	through water flow between the organism's locations, cleaning of home aquaria	Medium
37	7.03	protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances	No	no reference of actively attaching	Medium
0	7.04	the likelihood of dispersal? Is natural dispersal of the taxon likely to	Yes	In winter, Azella curvives as either speresares, which fall to the	Medium
50	7.04	occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?	Tes	In winter, Azolla survives as either sporocarps, which fall to the bottom of water bodies, or as sporophytes that float. https://www.fws.gov/fisheries/ANS/erss/highrisk/ERSS-Azolla- cristata-FINAL-July2021.pdf	healan
39	7.05	Is natural dispersal of the taxon likely to	Yes	A. cristata is able to undergo rapid vegetative reproduction by the	High
	7.05	occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?		elongation and fragmentation of the small fronds.	ingn
10	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	Not applicable	has not active dispersal mechanisms	High
11	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	Yes	fragments can be dispersed by animals between water bodies	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	A. cristata is able to undergo rapid vegetative reproduction throughout the year by the elongation and fragmentation.	Medium
17	7.09	unintentional or intentional) likely to be	No	no reference	Modium
		Is dispersal of the taxon density dependent? ce attributes	No	no reference	Medium
		Is the taxon able to withstand being out of	No	no reference	Low
	0.01	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 water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being	No	Still or slow moving water of lakes, ponds, and streams.	Medium
46	8.03	Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	Yes	data for taxonomically-related species A. fiiliculoides: https://www.cabi.org/isc/datasheet/8119#topreventionAndControl	Low
47	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	Yes	Seasonal flooding can also result in the spread of the organism locally. Still another possibility involves common use of Azolla as a freshwater aquarium plant; when aquarium water is released it may be transported into sewers and waterways (Whitley et al. 1999). https://www.fws.gov/fisheries/ANS/erss/highrisk/ERSS- Azolla-cristata-FINAL-July2021.pdf	High

40	8.05	To the tayon able to televate calinity levels	No	no evidence	Low
48	0.05	Is the taxon able to tolerate salinity levels	NO		Low
		that are higher or lower than those found in			
		its usual environment?			
49	8.06	Are there effective natural enemies	No	no evidence	Low
		(predators) of the taxon present in the RA			
		e change			
9. (	Climate	change			
50	9.01	Under the predicted future climatic	Increase	https://www.fws.gov/fisheries/ANS/erss/highrisk/ERSS-Azolla-	High
		conditions, are the risks of entry into the RA		cristata-FINAL-July2021.pdf	
		area posed by the taxon likely to increase,			
		decrease or not change?			
51	9.02	Under the predicted future climatic	Increase	professional judgement	Medium
		conditions, are the risks of establishment			
		posed by the taxon likely to increase,			
		decrease or not change?			
52	9.03	Under the predicted future climatic	Increase	professional judgement	Medium
		conditions, are the risks of dispersal within		F	
		the RA area posed by the taxon likely to			
		increase, decrease or not change?			
53	9.04	Under the predicted future climatic	Higher	professional judgement	High
55	5.01	conditions, what is the likely magnitude of	riigiici	professional judgement	ingn
		future potential impacts on biodiversity			
		and/or ecological integrity/status?			
E 4	9.05	Under the predicted future climatic	Higher	professional judgement	High
54	9.05		riighei		nign
		conditions, what is the likely magnitude of			
		future potential impacts on ecosystem			
	0.04	structure and/or function?			
55	9.06	Under the predicted future climatic	Higher	professional judgement	Medium
		conditions, what is the likely magnitude of			
		future potential impacts on ecosystem			
		services/socio-economic factors?			

Statistics	
Scores	
BRA	32.0
BRA Outcome	High
BRA+CCA	44.0
BRA+CCA Outcome	High
Score partition	
A. Biogeography/Historical	23.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	18.0
B. Biology/Ecology	9.0
4. Undesirable (or persistence) traits	5.0
5. Resource exploitation	2.0
6. Reproduction	-2.0
7. Dispersal mechanisms	4.0
8. Tolerance attributes	0.0
C. Climate change	12.0
9. Climate change	12.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3 5 5 <b>36</b>
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	5
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12 2 7 9 6
5. Resource exploitation	2
6. Reproduction	7
7. Dispersal mechanisms	9
8. Tolerance attributes	
C. Climate change	6
9. Climate change	6
Sectors affected	
Commercial	20
Environmental	12
Species or population nuisance traits	16
Thresholds	
BRA BRA+CCA	24.75 24.75

BICA	24.73
BRA+CCA	24.75
Confidence	
BRA+CCA	0.52
BRA	0.51
CCA	0.63
Date and Time	
10/12/2	021 12:04:24

Taxon and Assessor details					
Category	Plantae (freshwater)				
Taxon name	Azolla filiculoides				
Common name	Pacific mosquitofern				
Assessor	Mihaela Britvec				
Risk screening context					
Reason and socio-economic benefits					
Risk assessment area	Mediterranean region				
Taxonomy					
Native range					
Introduced range					
URL					

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			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
		ication/Cultivation		Manakana of the second Applic and while ad the such that would for	LU-h
11	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20	Yes	Members of the genus Azolla are utilized throughout the world for a wide variety of purposes besides its widespread uses as an	High
		generations?		ornamental in fish ponds and tanks (Lumpkin and Plucknett,	
		generations:		1980; 1982). A. filiculoides is used as a green manure in rice	
				paddies, mainly in Asia, as an inhibitor of weed growth in rice	
				cultivation in China and Vietnam (Kröck and Alkämper, 1991), and	
				as an alternative high protein fodder for cattle, swine, poultry and	
				fish, and possibly as an alternative food source for humans, again,	
				mainly in Asia. It has also been used as a nitrate-rich compost	
				which potentially increases soil organic nitrogen levels and cation	
				exchange capacity. It is used for purification of water, removal of	
				heavy metals (Sanyahumbi et al., 1998) and removal of nitrogen	
				and phoshorous from wastewater (Forni et al., 2001). It has also	
				been used variously as an ingredient in soap production, a cure	
				for sore throats and as a control for mosquitoes in southern India	
2	1.02	Is the taxon harvested in the wild and likely	Yes	as complete mats disrupt larval development (Raiendran and Members of the genus Azolla are utilized throughout the world for	High
2	1.02	to be sold or used in its live form?	103	a wide variety of purposes besides its widespread uses as an	ingn
				ornamental in fish ponds and tanks (Lumpkin and Plucknett,	
				1980; 1982). A. filiculoides is used as a green manure in rice	
				paddies, mainly in Asia, as an inhibitor of weed growth in rice	
				cultivation in China and Vietnam (Kröck and Alkämper, 1991), and	
				as an alternative high protein fodder for cattle, swine, poultry and	
				fish, and possibly as an alternative food source for humans, again,	
				mainly in Asia. It has also been used as a nitrate-rich compost	
				which potentially increases soil organic nitrogen levels and cation	
				exchange capacity. It is used for purification of water, removal of	
				heavy metals (Sanyahumbi et al., 1998) and removal of nitrogen	
				and phoshorous from wastewater (Forni et al., 2001). It has also	
				been used variously as an ingredient in soap production, a cure	
				for sore throats and as a control for mosquitoes in southern India	
3	1.03	Does the taxon have invasive races,	Yes	It is closely related to Azolla cristata and other species within the	High
		varieties, sub-taxa or congeners?		genus Azolla	-
				(https://www.cabi.org/isc/datasheet/8119#tosimilaritiesToOtherSp	
				eciesOrConditions).	
	<i>limate,</i> 2.01	distribution and introduction risk	liah	A. filiculoides is a small fern native to the Americas which has	Medium
4	2.01	How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's	High	spread widely throughout the world. Climatic requirements include	Medium
		native range?		suitably warm months for sporocarp development, adequate	
		nutive runge.		Surably warm months for sporocarp acveropment, adequate	
				radiation and light intensity for vegetative growth, and adequate	
				radiation and light intensity for vegetative growth, and adequate amounts of rainfall to prevent its aquatic habitat from drying up.	
				amounts of rainfall to prevent its aquatic habitat from drying up.	
				amounts of rainfall to prevent its aquatic habitat from drying up. This species of tropical origin is thought to have evolved a cold-	
				amounts of rainfall to prevent its aquatic habitat from drying up. This species of tropical origin is thought to have evolved a cold- tolerant strain since its introduction into Britain (Janes, 1998b) and South Africa (McConnachie, 2003). A. filiculoides may be able to survive temperatures as low as -10°C before death occurs.	
5	2.02	What is the quality of the climate matching	High	amounts of rainfall to prevent its aquatic habitat from drying up. This species of tropical origin is thought to have evolved a cold- tolerant strain since its introduction into Britain (Janes, 1998b) and South Africa (McConnachie, 2003). A. filiculoides may be able	High
		data?	-	amounts of rainfall to prevent its aquatic habitat from drying up. This species of tropical origin is thought to have evolved a cold- tolerant strain since its introduction into Britain (Janes, 1998b) and South Africa (McConnachie, 2003). A. filiculoides may be able to survive temperatures as low as -10°C before death occurs. doi: 10.1016/j.limno.2014.05.003	-
		data? Is the taxon already present outside of	High Yes	amounts of rainfall to prevent its aquatic habitat from drying up. This species of tropical origin is thought to have evolved a cold- tolerant strain since its introduction into Britain (Janes, 1998b) and South Africa (McConnachie, 2003). A. filiculoides may be able to survive temperatures as low as -10°C before death occurs.	High
6	2.03	data? Is the taxon already present outside of captivity in the RA area?	Yes	amounts of rainfall to prevent its aquatic habitat from drying up. This species of tropical origin is thought to have evolved a cold- tolerant strain since its introduction into Britain (Janes, 1998b) and South Africa (McConnachie, 2003). A. filiculoides may be able to survive temperatures as low as -10°C before death occurs. doi: 10.1016/j.limno.2014.05.003	High
6		data? Is the taxon already present outside of captivity in the RA area? How many potential vectors could the taxon	-	amounts of rainfall to prevent its aquatic habitat from drying up. This species of tropical origin is thought to have evolved a cold- tolerant strain since its introduction into Britain (Janes, 1998b) and South Africa (McConnachie, 2003). A. filiculoides may be able to survive temperatures as low as -10°C before death occurs. doi: 10.1016/j.limno.2014.05.003	-
6 7	2.03 2.04	data? Is the taxon already present outside of captivity in the RA area? How many potential vectors could the taxon use to enter in the RA area?	Yes >1	amounts of rainfall to prevent its aquatic habitat from drying up. This species of tropical origin is thought to have evolved a cold- tolerant strain since its introduction into Britain (Janes, 1998b) and South Africa (McConnachie, 2003). A. filiculoides may be able to survive temperatures as low as -10°C before death occurs. doi: 10.1016/j.limno.2014.05.003 doi: 10.1016/j.limno.2014.05.003 https://www.cabi.org/isc/datasheet/8119#topathwayVectors	High High
6 7	2.03 2.04	data? Is the taxon already present outside of captivity in the RA area? How many potential vectors could the taxon use to enter in the RA area? Is the taxon currently found in close	Yes >1	amounts of rainfall to prevent its aquatic habitat from drying up. This species of tropical origin is thought to have evolved a cold- tolerant strain since its introduction into Britain (Janes, 1998b) and South Africa (McConnachie, 2003). A. filiculoides may be able to survive temperatures as low as -10°C before death occurs. doi: 10.1016/j.limno.2014.05.003	High
6 7	2.03 2.04	data? Is the taxon already present outside of captivity in the RA area? How many potential vectors could the taxon use to enter in the RA area? Is the taxon currently found in close proximity to, and likely to enter into, the RA	Yes >1	amounts of rainfall to prevent its aquatic habitat from drying up. This species of tropical origin is thought to have evolved a cold- tolerant strain since its introduction into Britain (Janes, 1998b) and South Africa (McConnachie, 2003). A. filiculoides may be able to survive temperatures as low as -10°C before death occurs. doi: 10.1016/j.limno.2014.05.003 doi: 10.1016/j.limno.2014.05.003 https://www.cabi.org/isc/datasheet/8119#topathwayVectors	High High
6 7 8	2.03 2.04 2.05	data? Is the taxon already present outside of captivity in the RA area? How many potential vectors could the taxon use to enter in the RA area? Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)?	Yes >1	amounts of rainfall to prevent its aquatic habitat from drying up. This species of tropical origin is thought to have evolved a cold- tolerant strain since its introduction into Britain (Janes, 1998b) and South Africa (McConnachie, 2003). A. filiculoides may be able to survive temperatures as low as -10°C before death occurs. doi: 10.1016/j.limno.2014.05.003 doi: 10.1016/j.limno.2014.05.003 https://www.cabi.org/isc/datasheet/8119#topathwayVectors	High High
6 7 8 <i>3. Ir</i>	2.03 2.04 2.05	data? Is the taxon already present outside of captivity in the RA area? How many potential vectors could the taxon use to enter in the RA area? Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)? e elsewhere	Yes >1 Not applicable	amounts of rainfall to prevent its aquatic habitat from drying up. This species of tropical origin is thought to have evolved a cold- tolerant strain since its introduction into Britain (Janes, 1998b) and South Africa (McConnachie, 2003). A. filiculoides may be able to survive temperatures as low as -10°C before death occurs. doi: 10.1016/j.limno.2014.05.003 doi: 10.1016/j.limno.2014.05.003 https://www.cabi.org/isc/datasheet/8119#topathwayVectors doi: 10.1016/j.limno.2014.05.003	High High Medium
6 7 8 <i>3. Ir</i>	2.03 2.04 2.05	data? Is the taxon already present outside of captivity in the RA area? How many potential vectors could the taxon use to enter in the RA area? Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)? elsewhere Has the taxon become naturalised	Yes >1	amounts of rainfall to prevent its aquatic habitat from drying up. This species of tropical origin is thought to have evolved a cold- tolerant strain since its introduction into Britain (Janes, 1998b) and South Africa (McConnachie, 2003). A. filiculoides may be able to survive temperatures as low as -10°C before death occurs. doi: 10.1016/j.limno.2014.05.003 doi: 10.1016/j.limno.2014.05.003 https://www.cabi.org/isc/datasheet/8119#topathwayVectors doi: 10.1016/j.limno.2014.05.003 A. filiculoides is native to the Rocky Mountain states of the	High High
6 7 8 <i>3. Ir</i>	2.03 2.04 2.05	data? Is the taxon already present outside of captivity in the RA area? How many potential vectors could the taxon use to enter in the RA area? Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)? <i>e elsewhere</i> Has the taxon become naturalised (established viable populations) outside its	Yes >1 Not applicable	amounts of rainfall to prevent its aquatic habitat from drying up. This species of tropical origin is thought to have evolved a cold- tolerant strain since its introduction into Britain (Janes, 1998b) and South Africa (McConnachie, 2003). A. filiculoides may be able to survive temperatures as low as -10°C before death occurs. doi: 10.1016/j.limno.2014.05.003 doi: 10.1016/j.limno.2014.05.003 https://www.cabi.org/isc/datasheet/8119#topathwayVectors doi: 10.1016/j.limno.2014.05.003 A. filiculoides is native to the Rocky Mountain states of the western USA and Canada, through Central America and to most of	High High Medium
6 7 8 <i>3. Ir</i>	2.03 2.04 2.05	data? Is the taxon already present outside of captivity in the RA area? How many potential vectors could the taxon use to enter in the RA area? Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)? elsewhere Has the taxon become naturalised	Yes >1 Not applicable	amounts of rainfall to prevent its aquatic habitat from drying up. This species of tropical origin is thought to have evolved a cold- tolerant strain since its introduction into Britain (Janes, 1998b) and South Africa (McConnachie, 2003). A. filiculoides may be able to survive temperatures as low as -10°C before death occurs. doi: 10.1016/j.limno.2014.05.003 doi: 10.1016/j.limno.2014.05.003 https://www.cabi.org/isc/datasheet/8119#topathwayVectors doi: 10.1016/j.limno.2014.05.003 A. filiculoides is native to the Rocky Mountain states of the western USA and Canada, through Central America and to most of South America. It has been introduced to Europe, North and sub-	High High Medium
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6 7 8 <u>3. Ir</u> 9	2.03 2.04 2.05 <i>nvasive</i> 3.01	data? Is the taxon already present outside of captivity in the RA area? How many potential vectors could the taxon use to enter in the RA area? Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)? e elsewhere Has the taxon become naturalised (established viable populations) outside its native range?	Yes >1 Not applicable Yes	amounts of rainfall to prevent its aquatic habitat from drying up. This species of tropical origin is thought to have evolved a cold- tolerant strain since its introduction into Britain (Janes, 1998b) and South Africa (McConnachie, 2003). A. filiculoides may be able to survive temperatures as low as -10°C before death occurs. doi: 10.1016/j.limno.2014.05.003 doi: 10.1016/j.limno.2014.05.003 https://www.cabi.org/isc/datasheet/8119#topathwayVectors doi: 10.1016/j.limno.2014.05.003 A. filiculoides is native to the Rocky Mountain states of the western USA and Canada, through Central America and to most of South America. It has been introduced to Europe, North and sub- Saharan Africa, China, Japan, New Zealand, Australia, the Caribbean and Hawaii.	High High Medium Very high
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6 7 8 3. In 9 10	2.03 2.04 2.05 <i>nvasive</i> 3.01 3.02	data? Is the taxon already present outside of captivity in the RA area? How many potential vectors could the taxon use to enter in the RA area? Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)? elsewhere Has the taxon become naturalised (established viable populations) outside its native range? In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes >1 Not applicable Yes	amounts of rainfall to prevent its aquatic habitat from drying up. This species of tropical origin is thought to have evolved a cold- tolerant strain since its introduction into Britain (Janes, 1998b) and South Africa (McConnachie, 2003). A. filiculoides may be able to survive temperatures as low as -10°C before death occurs. doi: 10.1016/j.limno.2014.05.003 doi: 10.1016/j.limno.2014.05.003 https://www.cabi.org/isc/datasheet/8119#topathwayVectors doi: 10.1016/j.limno.2014.05.003 A. filiculoides is native to the Rocky Mountain states of the western USA and Canada, through Central America and to most of South America. It has been introduced to Europe, North and sub- Saharan Africa, China, Japan, New Zealand, Australia, the Caribbean and Hawaii. Negatively impacts animal health	High High Medium Very high
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6 7 8 <u>3. 1//</u> 9 10 11	2.03 2.04 2.05 3.01 3.02 3.03	data? Is the taxon already present outside of captivity in the RA area? How many potential vectors could the taxon use to enter in the RA area? Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)? e elsewhere Has the taxon become naturalised (established viable populations) outside its native range? In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? In the taxon's introduced range, are there known adverse impacts to aquaculture?	Yes Yes Yes Yes	amounts of rainfall to prevent its aquatic habitat from drying up. This species of tropical origin is thought to have evolved a cold- tolerant strain since its introduction into Britain (Janes, 1998b) and South Africa (McConnachie, 2003). A. filiculoides may be able to survive temperatures as low as -10°C before death occurs. doi: 10.1016/j.limno.2014.05.003 doi: 10.1016/j.limno.2014.05.003 https://www.cabi.org/isc/datasheet/8119#topathwayVectors doi: 10.1016/j.limno.2014.05.003 A. filiculoides is native to the Rocky Mountain states of the western USA and Canada, through Central America and to most of South America. It has been introduced to Europe, North and sub- Saharan Africa, China, Japan, New Zealand, Australia, the Caribbean and Hawaii. Negatively impacts animal health (https://www.cabi.org/isc/datasheet/8119#toriskAndImpactFactors ). It has commonly been utilised as an ornamental in fishponds and tanks and has spread from these foci, exhibiting a weedy phenology in nutrient enriched reservoirs and roadside canals (T. Center, Senior Researcher, Aquatic Weeds, United States Department of Agriculture, personal communication).	High High Medium Very high High Medium
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17	3 05	In the taxon's introduced range, are their	Voc	Drimarily social impacts of A filiculaidos have contrad around the	High
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	Yes	Primarily, social impacts of A. filiculoides have centred around the reduction of useful water surface area for recreation (fishing,	High
				swimming and water skiing) and water transport.	
		y/Ecology	_		_
		able (or persistence) traits Is it likely that the taxon will be poisonous or	Yes	Negatively impacts human health: A. filiculoides, coupled with the	Very high
		pose other risks to human health?		lack of light penetration, creates an anaerobic environment which can reduce the quality of drinking water and make survival for other organisms in the water impossible.	very mgn
15	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protocted)2	Yes	A. filiculoides, coupled with the lack of light penetration, creates an anaerobic environment which make survival for other	Very high
16	4.03	protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in	No	organisms in the water impossible. no reference	Medium
17	4.04	the RA area?			LU - b
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	Highly adaptable to different environments (https://www.cabi.org/isc/datasheet/8119#toriskAndImpactFactors ).	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	In eutrophic water systems, A. filiculoides grows rapidly, easily outcompeting indigenous vegetation. Decaying root and leaf matter below a mat of A. filiculoides, and the lack of light protecting groater an anarchic environment	High
19	4.06	area? Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes	penetration, creates an anaerobic environment. Primarily, social impacts of A. filiculoides have centred around the reduction of useful water surface area for recreation (fishing,	High
20	4.07	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and	No	swimming and water skiing) and water transport. no reference	Low
21	4.08	infectious agents that are endemic in the RA Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area?	No	no reference	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 reference	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	A. filiculoides in its native areas (South America and western North America) is a plant of slow flowing streams and rivers, ponds and lakes (Reed, 1962; Lumpkin and Plucknett, 1980;	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	In eutrophic water systems, A. filiculoides grows rapidly, easily outcompeting indigenous vegetation. Decaying root and leaf matter below a mat of A. filiculoides, coupled with the lack of light penetration, creates an anaerobic environment which can reduce the quality of drinking water and make survival for other organisms in the water impossible.	High
25	4.12	Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)?	Yes	Has propagules that can remain viable for more than one year.	High
		e exploitation			
		Is the taxon likely to consume threatened or protected native taxa in the RA area? Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?	No Yes	Azolla filiculoides is not cornivore. In eutrophic water systems, A. filiculoides grows rapidly, easily outcompeting indigenous vegetation.	High High
	Reprodu		<b>.</b>		
28	6.01	Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?	Not applicable	no evedence	High
		Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with	Yes	has propangules no reference	High Medium
		native taxa? Is the taxon likely to be hermaphroditic or to	No	no evidence	Medium
		display asexual reproduction?			
		Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	Yes	A. filiculoides grows in association with the heterocystous cyanobacterium (blue-green alga) Anabaena azollae (Nostocales: Nostocaceae), within the dorsal leaf lobe cavities (Ashton and Walmsley, 1984). The alga has the ability to fix atmospheric nitrogen and is able to fulfil the nitrogen requirements of the fern making it successful in nitrogen-deficient waters (Ashton, 1982).	Very high
		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	has high reproductive potential, has propagules	High
		How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	1	1 months	Medium
		al mechanisms	>1	https://www.cabi.org/isc/datachaot/0110#tapathway//ata	High
		How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of taxes vectors (asthways bring the	>1 Yes	https://www.cabi.org/isc/datasheet/8119#topathwayVectors	High
		Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)?		through water flow between the organism's locations	High
	7.03	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship	No	no reference of actively attaching	High
	7.04	hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to	Yes	has propangules	High

39					
	7.05	Is natural dispersal of the taxon likely to	Yes	A. filiculoides is able to undergo rapid vegetative reproduction	High
		occur as larvae/juveniles (for animals) or as		throughout the year by the elongation and fragmentation of the	
		fragments/seedlings (for plants) in the RA		small fronds.	
		area?			
40	7.06	Are older life stages of the taxon likely to	Not applicable	has not active dispersal mechanisms	High
		migrate in the RA area for reproduction?			
41	7.07	Are propagules or eggs of the taxon likely to	Yes	fragments can be dispersed by animals between water bodies	Medium
		be dispersed in the RA area by other animals?			
42	7.08	Is dispersal of the taxon along any of the	Yes	A. filiculoides is able to undergo rapid vegetative reproduction	High
		vectors/pathways mentioned in the previous		throughout the year by the elongation and fragmentation of the	
		seven questions (35-41; i.e. both		small fronds.	
		unintentional or intentional) likely to be			
-	7.09	Is dispersal of the taxon density dependent?	No	no reference	Medium
		ce attributes			
44	8.01	Is the taxon able to withstand being out of	Yes	Tolerates fire.	Medium
		water for extended periods (e.g. minimum of			
		one or more hours) at some stage of its life			
		cvcle?			
45	8.02	Is the taxon tolerant of a wide range of	No	A. filiculoides is a plant of slow flowing streams and rivers, ponds	High
	1	water quality conditions relevant to that		and lakes.	
	1	taxon? [In the Justification field, indicate the			
	0.67	relevant water quality variable(s) being			
46	8.03	Can the taxon be controlled or eradicated in	Yes	https://www.cabi.org/isc/datasheet/8119#topreventionAndControl	High
	1	the wild with chemical, biological, or other			
	1	agents/means?			
47	8.04	Is the taxon likely to tolerate or benefit from	Yes	Seasonal flooding can also result in the spread of the organism	Medium
	1	environmental/human disturbance?		locally.	
48	8.05	Is the taxon able to tolerate salinity levels	No	no evidence	Medium
		that are higher or lower than those found in			
		its usual environment?			
49	8.06	Are there effective natural enemies	No	Host records from around the globe show that the genus Azolla is	Medium
		(predators) of the taxon present in the RA		attacked by generalist herbivores and that very few specialist	
		area?		insect species have evolved on these plants (Hill, 1997). However,	
				four beetle species, the weevils Stenopelmus rufinasus and S.	
				brunneus and the two flea beetles Pseudolampsis guttata and P.	
				darwinii, appear to have specialized on the genus Azolla	
				(Richerson and Grigarick, 1967; Habeck, 1979; Hill, 1999) and	
				were identified as potential biological control agents for A.	
				filiculoides in South Africa (Hill, 1997). Following host range	
				testing, Stenopelmus rufinasus was released in 1997 as a	
				biocontrol of A. filiculoides in South Africa (McConnachie et al.	
		e change			
		change	r		
50	9.01	Under the predicted future climatic	Increase	https://doi.org/10.1016/j.sajb.2015.07.017	High
50	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA	Increase	https://doi.org/10.1016/j.sajb.2015.07.017	High
50	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase,	Increase	https://doi.org/10.1016/j.sajb.2015.07.017	High
		Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?			
	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic	Increase Increase	https://doi.org/10.1016/j.sajb.2015.07.017 professional judgement	High Medium
		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			
		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	9.02	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?			
51		Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic			
51	9.02	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	Increase	professional judgement	Medium
51	9.02	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic	Increase	professional judgement	Medium
51	9.02	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within	Increase	professional judgement	Medium
51	9.02	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	professional judgement	Medium
51	9.02	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change?	Increase Increase	professional judgement professional judgement	Medium High
51	9.02	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic	Increase Increase	professional judgement professional judgement	Medium High
51	9.02	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of	Increase Increase	professional judgement professional judgement	Medium High
51 52 53	9.02	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity	Increase Increase	professional judgement professional judgement	Medium High
51 52 53	9.02 9.03 9.04	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	Increase Increase Higher	professional judgement professional judgement professional judgement	Medium High High
51 52 53	9.02 9.03 9.04	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of	Increase Increase Higher	professional judgement professional judgement professional judgement	Medium High High
51 52	9.02 9.03 9.04	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic	Increase Increase Higher	professional judgement professional judgement professional judgement	Medium High High
51 52 53	9.02 9.03 9.04 9.05	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem	Increase Increase Higher	professional judgement professional judgement professional judgement	Medium High High
51 52 53	9.02 9.03 9.04	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Increase Increase Higher Higher	professional judgement professional judgement professional judgement	Medium High High Medium
51 52 53	9.02 9.03 9.04 9.05	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Increase Increase Higher Higher	professional judgement professional judgement professional judgement	Medium High High Medium
51 52 53	9.02 9.03 9.04 9.05	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? Under the predicted future climatic	Increase Increase Higher Higher	professional judgement professional judgement professional judgement	Medium High High Medium

Statistics	
Scores	
BRA	39.0
BRA Outcome	High
BRA+CCA	51.0
BRA+CCA Outcome	High
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	15.0
4. Undesirable (or persistence) traits	7.0
5. Resource exploitation	2.0
6. Reproduction	0.0
7. Dispersal mechanisms	4.0
8. Tolerance attributes	2.0
C. Climate change	12.0
9. Climate change	12.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3

2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	5
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2
6. Reproduction	7
7. Dispersal mechanisms	9
8. Tolerance attributes	6 6
C. Climate change	6
9. Climate change	6
Sectors affected	
Commercial	21
Environmental	12
Species or population nuisance traits	23
Thresholds	
BRA	24.75
BRA+CCA	24.75
Confidence	
	0.67
Confidence	0.67
Confidence BRA+CCA	
Confidence BRA+CCA BRA	0.67
Confidence BRA+CCA BRA	0.67

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Faxon and Assessor details					
Category	Plantae (freshwater)				
Taxon name	Cabomba caroliniana				
Common name	Carolina fanwort				
Assessor	Tena Radočaj				
Risk screening context					
Reason and socio-economic benefits					
Risk assessment area	Mediterranean region				
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	C. caroliniana is a highly adaptable submersed aquatic macrophyte whose attractive flowers and finely dissected leaves have lead to widespread use and trade in the aquatic industry	High
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	C. caroliniana is a highly adaptable submersed aquatic macrophyte whose attractive flowers and finely dissected leaves have lead to widespread use and trade in the aquatic industry	High
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	No	no data available	Low
2. (		, distribution and introduction risk	1		
4	2.01	How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range?	Medium	The similarity of climatic conditions between native areas and the RA area is medium (Climatch)	Medium
5	2.02	What is the quality of the climate matching data?	Medium	I used climatch and distribution map of CABI	Medium
6	2.03	Is the taxon already present outside of captivity in the RA area?	No	C. caroliniana 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	Aircraft, Aquaculture stock, Machinery and equipment, Ship structures above the water line (CABI, 2020)	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	<ul> <li>C. caroliniana is present in Hungary and Serbia (Király, G., Steták,</li> <li>D., &amp; Bányász, Á. (2007). Spread of invasive macrophytes in</li> <li>Hungary. Neobiota, 7, 123-131.) Vukov, D., Jurca, T., Rućando,</li> <li>M., Igić, R., &amp; Miljanović, B. (2013). Cabomba caroliniana A. Gray</li> <li>1837: A new, alien and potentially invasive species in Serbia.</li> <li>Archives of Biological Sciences, 65(4), 1515-1520.</li> </ul>	High
<i>3.1</i>	1	e elsewhere	14		Tue 1
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	It is a popular aquarium plant native to South America (Brazil, Uruguay, Paraguay, and northeastern Argentina) and, according to some authors, to southeastern United States. It was introduced into the rest of the USA, Canada, Australia, Asia (China, Malaysia, India, Japan), and in many regions of its new range it is considered an invasive and noxious aquatic weed. In Europe, it was found in the United Kingdom (introduced to England), Belgium, the Netherlands, and Hungary. Newly recorded populations in Serbia are restricted to the canals in Bačka. Populations are established only on two localities (Mali Stapar and Odžaci). (Vukov, D., Jurca, T., Rućando, M., Igić, R., & Miljanović, B. (2013). Cabomba caroliniana A. Gray 1837: A new, alien and notentially invasive species in Serbia. Archives of Biological	High
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	It has a different ecological niche than most other aquatic plants, thus impacting native species (Zhang et al., 2003). C. caroliniana populations are often associated with areas with decreased species diversity (Cao et al., 2006). Hogsden et al. (2007) showed that while native macrophytes could be found in C. caroliniana beds, their abundance was both low and uneven (CABI, 2020)	High
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	no data available	Low
	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem services?	Yes	In Queensland, C. caroliniana have been shown to negatively impact water quality. The winter dieback that occurs in harsher areas of its range can cause substantial nutrient release, especially manganese pulses. This sudden manganese release can impact the manganese cycle and impact water quality. Additionally dense stands can cause water loss through seepage and overflow, thus impacting hydrological regimes (Mackey,	High
		In the taxon's introduced range, are there known adverse socio-economic impacts?	Yes	In natural systems the plant can cause substantial nuisance to recreational users by impeding navigation, tangling fishing line and wrapping motor propellers. Thick vegetation can also decrease aesthetic value. This species can also reduce swimming access and potentially cause human health safety issues (CABI.	High
		//Ecology			
		able (or persistence) traits Is it likely that the taxon will be poisonous or	No	No (CABI, 2020)	Medium
		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	Smothers and outcompetes native species, and reduces the overall species diversity in aquatic systems (Weibert, C. (2015). Weed Risk Assessment for Cabomba caroliniana A. Gray (Cabombaceae)–Carolina fanwort.)	High
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	no data available	High

17	1		I		1
1/	4.04	Is the taxon adaptable in terms of climatic	Yes	The plant prefers warm sub-tropical climates with temperatures	High
		and other environmental conditions, thus		from 13-27 degrees C (ISSG, 2008), although it can tolerate	
		enhancing its potential persistence if it has		below freezing temperatures. This species is able to adapt to a	
		invaded or could invade the RA area?		wide variety of climates, and can successfully overwinter in areas	
				that are too cold for continuous growth. (Weibert, C. (2015).	
0	4.05	To the town likely to dismuch food web		Weed Risk Assessment for Cabomba caroliniana A. Gray	11
8	4.05	Is the taxon likely to disrupt food-web	Yes	C. caroliniana is an aggressive plant, and in many instances has	High
		structure/function in aquatic ecosystems if it		seriously impacted biodiversity. C. caroliniana has a broader niche	
_	1.00	has invaded or is likely to invade the RA		than, and may pose a threat to, native species (CABI, 2020)	
.9	4.06	Is the taxon likely to exert adverse impacts	Yes	This species can also reduce swimming access and potentially	High
		on ecosystem services in the RA area?		cause human health safety issues. In natural systems the plant	
				can cause substantial nuisance to recreational users by impeding	
				navigation, tangling fishing line and wrapping motor propellers	
20	4.07	Is it likely that the taxon will host, and/or	No	Matthews, J., van der Velde, G., Collas, F. P., de Hoop, L.,	Medium
		act as a vector for, recognised pests and		Koopman, K. R., Hendriks, A. J., & Leuven, R. S. (2017).	
		infectious agents that are endemic in the RA		Inconsistencies in the risk classification of alien species and	
-	4.00	area?	NI-	implications for risk assessment in the European Union.	Ma di una
1	4.08	Is it likely that the taxon will host, and/or	No	Matthews, J., van der Velde, G., Collas, F. P., de Hoop, L.,	Medium
		act as a vector for, recognised pests and		Koopman, K. R., Hendriks, A. J., & Leuven, R. S. (2017).	
		infectious agents that are absent from (novel		Inconsistencies in the risk classification of alien species and	
	4.00	to) the RA area?		implications for risk assessment in the European Union.	1
22	4.09	Is it likely that the taxon will achieve a body	Yes	Global Invasive Species Database (2021) Species profile:	Low
	1	size that will make it more likely to be		Cabomba caroliniana. Downloaded from	1
1	4.10	released from captivity?	Ne	http://www.iucngisd.org/gisd/species.php?sc=402	Madium
23	4.10	Is the taxon capable of sustaining itself in a	No	It grows rooted in the mud of stagnant to slow flowing water	Medium
	1	range of water velocity conditions (e.g.		including streams, and smaller rivers (Global Invasive Species	1
	1	versatile in habitat use)?		Database (2021) Species profile: Cabomba caroliniana.	1
	4.11	Is it likely that the tayon's model of evid	Voc	Downloaded from	High
:4	4.11	Is it likely that the taxon's mode of existence	165	In Queensland, C. caroliniana have been shown to negatively	High
	1	(e.g. excretion of by-products) or behaviours		impact water quality. The winter dieback that occurs in harsher	1
	1	(e.g. feeding) will reduce habitat quality for		areas of its range can cause substantial nutrient release,	1
		native taxa?		especially manganese pulses. This sudden manganese release can	
	1			impact the manganese cycle and impact water quality.	1
	1			Additionally dense stands can cause water loss through seepage	1
) F	4 1 7	Is the taxon likely to maintain a visible	Voc	and overflow, thus impacting hydrological regimes (Mackey,	Modium
20	4.12	Is the taxon likely to maintain a viable	Yes	Király, G., Steták, D., & Bányász, Á. (2007). Spread of invasive	Medium
	1	population even when present in low		macrophytes in Hungary. Neobiota, 7, 123-131.	1
	1	densities (or persisting in adverse conditions			1
5	Recour	by way of a dormant form)?			l
	5.01	Is the taxon likely to consume threatened or	Not applicable	Not applicable	Very high
.0	5.01	protected native taxa in the RA area?	and applicable		very mgn
7	5.02	Is the taxon likely to sequester food	No	No information	Low
	10.02	IN THE LANDIT TINGTY TO SECURESTED TOOL			
			NO		LOW
		resources (including nutrients) to the			LOW
	Reprodu	resources (including nutrients) to the detriment of native taxa in the RA area?			
5. 1	Reprodi	resources (including nutrients) to the detriment of native taxa in the RA area? uction			
5. 1	R <i>eprodi</i> 6.01	resources (including nutrients) to the detriment of native taxa in the RA area? uction Is the taxon likely to exhibit parental care		Not applicable	Very high
5. 1		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			
5. 28	6.01	resources (including nutrients) to the detriment of native taxa in the RA area? <u>uction</u> Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?	Not applicable	Not applicable	Very high
5. 28		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		Not applicable Global Invasive Species Database (2021) Species profile:	
5. 28	6.01	resources (including nutrients) to the detriment of native taxa in the RA area? <u>uction</u> Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?	Not applicable	Not applicable Global Invasive Species Database (2021) Species profile: Cabomba caroliniana. Downloaded from	Very high
5. 28 29	6.01 6.02	resources (including nutrients) to the detriment of native taxa in the RA area? <i>uction</i> Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Not applicable Yes	Not applicable Global Invasive Species Database (2021) Species profile: Cabomba caroliniana. Downloaded from http://www.iucngisd.org/gisd/species.php?sc=402	Very high High
5. 28 29	6.01	resources (including nutrients) to the detriment of native taxa in the RA area? <i>uction</i> Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with	Not applicable	Not applicable Global Invasive Species Database (2021) Species profile: Cabomba caroliniana. Downloaded from http://www.iucngisd.org/gisd/species.php?sc=402 Global Invasive Species Database (2021) Species profile:	Very high
5. 28 29	6.01 6.02	resources (including nutrients) to the detriment of native taxa in the RA area? <i>uction</i> Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Not applicable Yes	Not applicable Global Invasive Species Database (2021) Species profile: Cabomba caroliniana. Downloaded from http://www.iucngisd.org/gisd/species.php?sc=402 Global Invasive Species Database (2021) Species profile: Cabomba caroliniana. Downloaded from	Very high High
5. 28 29	6.01 6.02 6.03	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?	Not applicable Yes No	Not applicable Global Invasive Species Database (2021) Species profile: Cabomba caroliniana. Downloaded from http://www.iucngisd.org/gisd/species.php?sc=402 Global Invasive Species Database (2021) Species profile: Cabomba caroliniana. Downloaded from http://www.iucngisd.org/gisd/species.php?sc=402	Very high High Medium
5. 28 29	6.01 6.02	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 Yes	Not applicable Global Invasive Species Database (2021) Species profile: Cabomba caroliniana. Downloaded from http://www.iucngisd.org/gisd/species.php?sc=402 Global Invasive Species Database (2021) Species profile: Cabomba caroliniana. Downloaded from http://www.iucngisd.org/gisd/species.php?sc=402 Cabomba can spread locally via vegetative (asexual) or sexual	Very high High
5. 28 29 30	6.01 6.02 6.03	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?	Not applicable Yes No	Not applicable Global Invasive Species Database (2021) Species profile: Cabomba caroliniana. Downloaded from http://www.iucngisd.org/gisd/species.php?sc=402 Global Invasive Species Database (2021) Species profile: Cabomba caroliniana. Downloaded from http://www.iucngisd.org/gisd/species.php?sc=402 Cabomba can spread locally via vegetative (asexual) or sexual reproduction (Weibert, C. (2015). Weed Risk Assessment for	Very high High Medium
5. 28 29 30	6.01 6.02 6.03 6.04	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 Yes No Yes	Not applicable Global Invasive Species Database (2021) Species profile: Cabomba caroliniana. Downloaded from http://www.iucngisd.org/gisd/species.php?sc=402 Global Invasive Species Database (2021) Species profile: Cabomba caroliniana. Downloaded from http://www.iucngisd.org/gisd/species.php?sc=402 Cabomba can spread locally via vegetative (asexual) or sexual reproduction (Weibert, C. (2015). Weed Risk Assessment for Cabomba caroliniana A. Gray (Cabombaceae)-Carolina fanwort).	Very high High Medium High
5. 28 29 30	6.01 6.02 6.03	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? Is the taxon dependent on the presence of	Not applicable Yes No	Not applicable Global Invasive Species Database (2021) Species profile: Cabomba caroliniana. Downloaded from http://www.iucngisd.org/gisd/species.php?sc=402 Global Invasive Species Database (2021) Species profile: Cabomba caroliniana. Downloaded from http://www.iucngisd.org/gisd/species.php?sc=402 Cabomba can spread locally via vegetative (asexual) or sexual reproduction (Weibert, C. (2015). Weed Risk Assessment for Cabomba caroliniana A. Gray (Cabombaceae)–Carolina fanwort). Global Invasive Species Database (2021) Species profile:	Very high High Medium
5. 1 28 29 30	6.01 6.02 6.03 6.04	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? Is the taxon dependent on the presence of another taxon (or specific habitat features)	Not applicable Yes No Yes	Not applicable Global Invasive Species Database (2021) Species profile: Cabomba caroliniana. Downloaded from http://www.iucngisd.org/gisd/species.php?sc=402 Global Invasive Species Database (2021) Species profile: Cabomba caroliniana. Downloaded from http://www.iucngisd.org/gisd/species.php?sc=402 Cabomba can spread locally via vegetative (asexual) or sexual reproduction (Weibert, C. (2015). Weed Risk Assessment for Cabomba caroliniana A. Gray (Cabombaceae)-Carolina fanwort). Global Invasive Species Database (2021) Species profile: Cabomba caroliniana. Downloaded from	Very high High Medium High
5. 28 29 30 31	<ul><li>6.01</li><li>6.02</li><li>6.03</li><li>6.04</li><li>6.05</li></ul>	resources (including nutrients) to the detriment of native taxa in the RA area? <i>uction</i> Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	Not applicable Yes No Yes No	Not applicable Global Invasive Species Database (2021) Species profile: Cabomba caroliniana. Downloaded from http://www.iucngisd.org/gisd/species.php?sc=402 Global Invasive Species Database (2021) Species profile: Cabomba caroliniana. Downloaded from http://www.iucngisd.org/gisd/species.php?sc=402 Cabomba can spread locally via vegetative (asexual) or sexual reproduction (Weibert, C. (2015). Weed Risk Assessment for Cabomba caroliniana A. Gray (Cabombaceae)–Carolina fanwort). Global Invasive Species Database (2021) Species profile: Cabomba caroliniana. Downloaded from http://www.iucngisd.org/gisd/species.php?sc=402	Very high High Medium High High
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5.       28         299       0         331       31         332       333         333       344         7.       1         355       355         366       377         388       389	6.01 6.02 6.03 6.04 6.05 6.06 6.07 7.01 7.01 7.02 7.03 7.04	resources (including nutrients) to the detriment of native taxa in the RA area? <i>vaction</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? <b>al mechanisms</b> How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable 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)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?	Not applicable Yes No Yes No Yes 1 >1 Yes Yes Yes No Yes	Not applicable         Global Invasive Species Database (2021) Species profile:         Cabomba caroliniana. Downloaded from         http://www.iucngisd.org/gisd/species.php?sc=402         Global Invasive Species Database (2021) Species profile:         Cabomba caroliniana. Downloaded from         http://www.iucngisd.org/gisd/species.php?sc=402         Cabomba can spread locally via vegetative (asexual) or sexual         reproduction (Weibert, C. (2015). Weed Risk Assessment for         Cabomba caroliniana A. Gray (Cabombaceae)-Carolina fanwort).         Global Invasive Species Database (2021) Species profile:         Cabomba caroliniana. Downloaded from         http://www.iucngisd.org/gisd/species.php?sc=402         Global Invasive Species Database (2021) Species profile:         Cabomba caroliniana. Downloaded from         http://www.iucngisd.org/gisd/species.php?sc=402         Global Invasive Species Database (2021) Species profile:         Cabomba caroliniana. Downloaded from         http://www.iucngisd.org/gisd/species.php?sc=402         Interconnected waterways, Humans are the main vectors of         dispersal, probably introducing the plant by either intentional         water garden plantings or through inappropriate disposal.         Additionally, since the plant reproduces via fragmentation, boating         activity facilitates the spread of the plant; fragmenta are	Very high High Medium High High Medium High Medium High

41	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	Yes	No evidence, but The plant has been reported to be a source of food for water fowl. (CABI, 2020)	Medium
42	7.08	Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or intentional) likely to be	Yes	boating activity facilitates the spread of the plant (cabi, 2020)	Medium
43	7.09	Is dispersal of the taxon density dependent?	Yes	Global Invasive Species Database (2021) Species profile: Cabomba caroliniana. Downloaded from http://www.iucngisd.org/gisd/species.php?sc=402	Medium
8. 7	oleran	ce attributes			
	8.01	Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle?	No	No evidence	Medium
45	8.02	Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being considered.]	Yes	It can grow in water with pH from 5.7-9.2, is highly tolerant of anaerobic conditions and can survive in high alkalinity water (USDA-NRCS, 2008) and/or water with high turbidity. Growth is highest at medium turbidities, but the plant still thrives in high- turbidity water, and moderate-to-high turbidity water facilitates the production of adventitious roots (Mackey, 1996). The plant prefers warm sub-tropical climates with temperatures from 13-27 degrees C (ISSG, 2008), although it can tolerate below freezing temperatures (CABI. 2020)	High
	8.03	Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	Yes	In the north American region herbicide treatments have been used for cabomba control. Endothall provides excellent control but it is a contact herbicide only (Global Invasive Species Database (2021) Species profile: Cabomba caroliniana. Downloaded from http://www.iucngisd.org/gisd/species.php?sc=402)	Medium
47	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	Yes	Flooding and other natural disasters (CABI, 2020)	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 evidence	Low
49	8.06	Are there effective natural enemies (predators) of the taxon present in the RA	Yes	C. caroliniana does serve as a source of food for wildlife. (CABI, 2020)	Medium
		e change			
	1	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 by the taxon are likely to no change. (Matthews, J., Beringen, R., Lamers, L. P. M., Odé, B., Pot, R., Velde, G., & Leuven, R. S. (2013). Risk analysis of the non-native Fanwort (Cabomba caroliniana) in the Netherlands.)	Medium
51	9.02	Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	Increase	Potential future changes as a result of e.g. a rise in water temperature due to climate change, may i no change the suitability and area of C. caroliniana habitat and establishment (Matthews, J., Beringen, R., Lamers, L. P. M., Odé, B., Pot, R., Velde, G., & Leuven, R. S. (2013). Risk analysis of the non- native Fanwort (Cabomba caroliniana) in the Netherlands.)	High
52	9.03	Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change?	Increase	Potential future changes as a result of e.g. a rise in water temperature due to climate change, may i no change the suitability and area of C. caroliniana habitat and establishment (Matthews, J., Beringen, R., Lamers, L. P. M., Odé, B., Pot, R., Velde, G., & Leuven, R. S. (2013). Risk analysis of the non- native Fanwort (Cabomba caroliniana) in the Netherlands.)	High
	9.04	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	Higher	Matthews, J., Beringen, R., Lamers, L. P. M., Odé, B., Pot, R., Velde, G., & Leuven, R. S. (2013). Risk analysis of the non- native Fanwort (Cabomba caroliniana) in the Netherlands.)	Medium
54	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Higher	Matthews, J., Beringen, R., Lamers, L. P. M., Odé, B., Pot, R., Velde, G., & Leuven, R. S. (2013). Risk analysis of the non- native Fanwort (Cabomba caroliniana) in the Netherlands.)	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	Matthews, J., Beringen, R., Lamers, L. P. M., Odé, B., Pot, R., Velde, G., & Leuven, R. S. (2013). Risk analysis of the non- native Fanwort (Cabomba caroliniana) in the Netherlands.)	Medium

Statistics

Statistics	
Scores	
BRA	29.5
BRA Outcome	High
BRA+CCA	39.5
BRA+CCA Outcome	High
Score partition	
A. Biogeography/Historical	13.5
1. Domestication/Cultivation	2.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	10.5
B. Biology/Ecology	16.0
4. Undesirable (or persistence) traits	7.0
5. Resource exploitation	0.0
6. Reproduction	4.0
7. Dispersal mechanisms	5.0
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	<b>13</b> 3 5 5
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	14
Environmental	11
Species or population nuisance traits	19
Species or population nuisance traits	19
Species or population nuisance traits Thresholds	19
	24.75
Thresholds	
Thresholds BRA	24.75
Thresholds BRA BRA+CCA	24.75
Thresholds BRA BRA+CCA Confidence BRA+CCA BRA	24.75 24.75 0.62 0.63
Thresholds BRA BRA+CCA Confidence BRA+CCA	24.75 24.75 0.62
Thresholds BRA BRA+CCA Confidence BRA+CCA BRA	24.75 24.75 0.62 0.63
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Taxon and Assessor details					
Category	Plantae (freshwater)				
Taxon name	Egeria densa				
Common name	Brazilian waterweed				
Assessor	Mihaela Britvec				
Risk screening context					
Reason and socio-economic benefits					
Risk assessment area	Mediterranean region				
Taxonomy					
Native range					
Introduced range					
URL					

A 1	Piegoo	graphy/Historical	Response	Justification (references and/or other information)	Confidence
		ication/Cultivation			
		Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	It is a well known and popular plant for use in aquaria and small ponds, not only for its attractiveness and resilience, but also for its oxygenating capacity which benefits the fish contained therein.	High
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	https://fau.digital.flvc.org/islandora/object/fau%3A33564/datastre am/OBJ/view/Culture_of_the_Aquatic_Plant_Egeria_densa_in_a_Cl osed_SystemFinal_Report_for_Contract_No_021065Submitte d_to_the_Division_of_AquacultureFlorida_Department_of_Agricu lture_and_Consumer_Services.pdf	
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	It is closely related to Elodea species.	High
2. (	Climate,	, distribution and introduction risk			
1	2.01	How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range?	High	https://doi.org/10.1016/j.limno.2005.01.001	Medium
5	2.02	What is the quality of the climate matching data?	High	https://doi.org/10.1016/j.limno.2005.01.001	Medium
5	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	doi: 10.3391/bir.2018.7.4.05	High
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	>1	https://www.cabi.org/isc/datasheet/20491#topathwayVectors	Medium
3	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)?	Not applicable	doi: 10.3391/bir.2018.7.4.05	Medium
3. I	nvasive	e elsewhere			
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	E. densa is native to parts of Argentina, Brazil and Uruguay. Being one of the most common plants for aquaria, it has been widely distributed around the world. In many regions it has escaped and has become an invasive aquatic weed. Most reports come from Central and North America, Europe and Australasia.	High
.0	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	No	E. densa is an environmental weed not affecting cultivated crops to any extent, though may impact on agriculture by the blockage of irrigation channels.	Medium
1	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	Yes	Although there are positive economic impacts resulting in the trade in aquarium plants including E. densa, this is strongly countered by the costs of control as exercised in many areas where it has become a serious problem. Removal of E. densa from lakes and reservoirs in the USA costs some states several million	High
.2	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem services?	Yes	damaged ecosystem services, ecosystem change/ habitat alteration (https://www.cabi.org/isc/datasheet/20491#toriskAndImpactFacto	Medium
3	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	Yes	Dense mats of E. densa will deleteriously affect recreational activities such as fishing, swimming or boating.	Medium
B. I	Biology	//Ecology		addreide bach ab honnig swinning of boating.	
		able (or persistence) traits			
4	4.01	Is it likely that the taxon will be poisonous or pose other risks to human health?	No	no reference	Low
.5	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	E. densa can out-compete and displace native vegetation (https://www.cabi.org/isc/datasheet/20491#toimpactBiodiversity).	High
.6	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	no reference	Medium
.7	4.04	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?	Yes	E. densa is native to parts of Argentina, Brazil and Uruguay. Being one of the most common plants for aquaria, it has been widely distributed around the world.	High
		Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA area?	Yes	When dense mats of E. densa have formed, native species are displaced, oxygen may be depleted and the character of stream and lakes may be changed. The effects on the environment may be substantial, affecting the hydrology also.	High
9	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes	negatively impacts tourism, reduced amenity values, reduced recreative options	Medium
20	4.07	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA	No	no reference	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 reference	Medium
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	E. densa formed dense mats.	Medium

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84         1.1. Is i linkly that the trackers mode of existence track according the production of the production of the hardness in the hardness in the field of the hardness in the field of the production of the hardness in the field of the production of the hardness in the field of the resource of the hardness in the field of the hardness in the field of the resource of the hardness in the field of the hardness in the field of the resource of the hardness in the hardness in the resource of the hardness in the hardness in the resource of the hardness in the hardness in the resource of the resource of the hardness in the hardness in thardness in the hardness in the hardness in the hardness	23	4.10	range of water velocity conditions (e.g.	Yes		Medium
Image: Subject of a structure of the structure of t	24	4.11	Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours	Yes	displaced, oxygen may be depleted and the character of stream	High
Image: Section of the sectio	25	4.12	native taxa?	No	be substantial, affecting the hydrology also.	Medium
By vary of a domain from 7         Image: Control application of a domain from 7           8         15.00         Experts application of the control interval in						
55         15         Is the taxon likely to consume threatened in the set of a start with a relation to any likely in adjusted for a start with a relation to adjusted for ad						
Important of antive taxes in the RA area?         Yes         Excess is a plant with a great capacity of photosynthesizing when illuminate and relaxes great quantities of avyes. When illuminate and relaxes great quantities of avyes. When is illuminate and relaxes great quantities of avyes. When is illuminate and relaxes great quantities of avyes. When is illuminate and relaxes great quantities of avyes. When is a difference is a plant with a great capacity of photosynthesizing when illuminate and relaxes great quantities of avyes. When is a difference is a plant with a great capacity of photosynthesizing when illuminate and relaxes great quantities of avyes. When is a difference is a great of the character of stream and lakes may be chanced.         Implementation of the character of stream and lakes may be chanced.         Implementation of avyes. When is a great of the character of stream and lakes may be chanced.         Implementation of the character of stream and lakes may be chanced.         Implementation of the character of stream and lakes may be chanced.         Implementation of the character of stream and lakes may be chanced.         Implementation of the character of stream and lakes may be chanced.         Implementation of the character of stream and lakes may be chanced.         Implementation of the character of stream and lakes may be chanced.         Implementation of the character of stream and lakes may be chanced.         Implementation of the character of stream and lakes may be chanced.         Implementation of the character of stream and lakes may be chanced.         Implementation of the character of stream and lakes may be chanced.         Implementation of the character of stream and lakes may be chanced.         Implementation of the character of stream and lakes may be chanced.         Implementation of th					- · · · ·	
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Bit Reproduction         Not applicable no reference         High           6 50.1         Set the toxon likely to overhibit parental care and/or to reduce ape 4-maturity in response         Not applicable no reference         Low           6 0.2         Set the toxon likely to overhibit parental care and/or to reduce ape 4-maturity in response         Not applicable no reference         Low           6 0.2         Set the toxon likely to overhibit enturally with No         no reference         Medium           1 0.0         and/or to reduce ape 4-maturity in response         No         no reference         Medium           2 0.05         Set the toxon likely to byerhibit enturally with No         no reference         Medium           2 0.05         Set the toxon dependent on the presence of toxon over the presence of toxon over the presence of toxon over the monor over the presence or toxon over the presence or toxon over the toxon requite to toxon the presence or toxon over the monor over the presence over the pr	27	5.02	resources (including nutrients) to the	Yes	when illuminated and releases great quantities of oxygen. When dense mats of E. densa have formed, oxygen may be depleted	High
85         50.         15. the taxon likely to achibit parental care and/or tracking act-structuring in companyation or companying in the 5A area (2) or comp	6. R	eprodu	action		and the character of stream and lakes may be changed.	
IDE         Solution         Instruction         Inst			Is the taxon likely to exhibit parental care	Not applicable	no reference	High
10     D.5.03     is the taxao     Medium       11     5.04     Discretized     Medium       12     6.04     Statuscon Help to hybridise naturely with for a specific habitat E. densa cannot tolerate shaded water.     High       13     6.05     Statuscon Help to hybridise naturely with for a specific habitat E. densa cannot tolerate shaded water.     High       14     6.07     Normal to specific habitat Faturely and the specific habitat E. densa cannot tolerate shaded water.     High       14     6.07     Normal to specific habitat E. densa cannot tolerate shaded water.     High       15     10.07     Normal to be nach the specific habitat E. densa cannot tolerate shaded water.     High       16     7.07     Normal the specific habitat E. densa cannot tolerate shaded water.     High       16     7.07     Normal the specific habitat E. densa cannot tolerate shaded water.     High       16     7.07     Normal the specific habitat E. densa cannot tolerate shaded water.     High       16     7.07     Normal the specific habitat E. densa cannot tolerate shaded water.     High       17     7.07     Normal the specific habitat E. densa cannot tolerate shaded water.     High       16     7.07     Normal the specific habitat E. densa cannot tolerate shaded water.     High       17     7.03     Does the staon habit enhanose of the specific habitat enhanose of the	29	6.02		No	no reference	Low
Institute trava?         Institute trava?         Institute trava?         No         In or reference         Medium           6.04         Ext texts consignation of the bala factorities?         No         no reference         Medium           1         1.05         Is the text consignation of the bala factorities?         Yes         specific habitat: E. densa cannot tolerate shaded water.         High           1         1.06         Is the text constraint of the bala factorities?         Yes         Has high reproductive potential.         High           1         1.06         The constraint text constraint of text the age-traint text text constraint text text text text text text text te	30	6.03		No	no reference	Medium
display aexual reproduction?         ves         specific habitat is conditioned in the presence of another taxon (or specific habitat returnes)         ves         specific habitat is conditioned in the presence of another taxon (or specific habitat returnes)         High           32         6.65         is the taxon (accordence of the habitat returnes)         Yes         Has high reproductive potential.         High           32         6.65         is the taxon (accordence of the accordence accordence actordence of the accordence accordence actordence of the accordence of the accordence actordence of the accordence of the accordence of the accordence actordence of the accordence actordence of the accordence of the accordence actordence accordenc			native taxa?			
another taxon (or specific habitat retaurres)         notifier taxon (ar specific habitat retaurres)         notifier taxon (ar specific habitat retaurres)           33         6.60         16s the taxon (hown (ar likely) to produce a large number of prospaulics or disports or disports)         High           46         6.07         Not may the num (a Giver, a < 1, velve1?)			display asexual reproduction?			
33       6.05       Is the taxon known (or likely) to produce a large number of programs is or dfspring within a short time span (e.g., < 1 year)?	∠د	0.05	another taxon (or specific habitat features)	185	Specific Habitat; E. Gensa Cannot tolerate Shaded Water.	riigii
within a short time spin (e.g., < 1 year)?         Medium           6.07         How may time units (days, monthy, years)         3         3         months         Medium           7, Discretar mechanisms         Medium         Medium         Medium         Medium           7, Discretar mechanisms         Medium         Normal potential internal weak of the sace state (with state the sace state (with state the sace (with state the sace state (with state the sace state (with state the sace (with state the sace state (with state the sace (with state the sace state (with state the sace state (with state the sace (with y to one or more mere arrotocate of actively attaching state the state state (with state the sace (with y to one or more the sace (with state the sace (with y to one or more sage) (for states) or sage) (for states) (for states) or sage) (for states) (for states) or sage) (for states) (	33	6.06	Is the taxon known (or likely) to produce a	Yes	Has high reproductive potential.	High
desc the laxon require to reach the age-at- first-production?         desc the laxon require to reach the age-at- first-production?           7. Dispersive methods         The prevent method of the taxon use to disperse within the Ad area (with suitable.         >1         https://www.cabi.org/sc/datasheet/20491 #toriskAndImpactPactor         High           67         7.02         Will any of these vectors/pathways bring the toor in codes positivity. We of SSID         Yes         through water flow between the organism's locations         Medium           70.7         One stel taxon have a means of activity attaching tistef to hand substrata (e.g., ship hulls, pillings, buoys) such that it enhances the likelihood of dispersit?         No         no reference of actively attaching         High           87         7.05         Is natural dispersit of the taxon likely to occur as larve@/uveniles (for animals) or as fragmentation of stems.         Medium           107         7.05         Is natural dispersit of the taxon likely to occur as larve@/uveniles (for animals) or as fragmentation of stems.         High           117         7.04         Are propagules or eggs of the taxon likely to migrate in the RA area for regroduction?         Not applicable feed and fragments can be dispersed by animals between water wet causes or eggs of the taxon likely to migrate in the RA area tax by other animals?         Not applicable feed and fragments can be dispersed by animals between water wet causes of the taxon likely to migrate in the RA area tax by other animals?         Not applicable feed and fragments can be dispersed			within a short time span (e.g. < 1 year)?			
Inst-reproduction?         Inst-reproduction?           55         7.01         How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable taxon in close proximity to one or more provide drass (c.g. MCZ, MPA, SSS))?         Intps://www.cabi.org/isc/datasheet/20491#toriskAndImpactFactor taxon in close proximity to one or more provide drass (c.g. MCZ, MPA, SSS))?         Medium           7         7.03         Does the taxon in close proximity to one or more provide drass (c.g. MCZ, MPA, SSS))?         No         no reference of actively attaching         High           87         7.04         Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propayules (for plants: seeds, spore) in the RA area?         Yes         Plants can reproduce by seeds.         Medium           99         7.05         Is natural dispersal of the taxon likely to occur as lawae/juvenils (for animals) or as fragments/seedlings (for plants) in the RA area?         Yes         The principal means of reproduction is vegetative, by fragments/seedlings (for plants) or the principal migrate link taxa area for reproduction?         High           10         7.06         Are older just area for reproduction?         Seeds and fragments can be dispersed by animals between water wectors/pathways mentioned in the previous seven question (33-41; i.e. both unintentional or intentional) likely to be experiate artification intentional) likely to experiate artification intentional integration intentional seven question (33-41; i.e. both unintentional or intentional) likely to be experiate artification inton premovel seven qu	34	6.07		3	3 months	Medium
57       7.0.1       How many potential internal vectors/pathways fould the taxon use of disperse within the RA area (with suitable disperse within the RA area (with suitable disperse) and the taxon in close proximity to one or more protected areas (e.g., MCZ, MPA, SSB17       Hind         77       7.0.2       Will any of these vectors/pathways fould by the vectors areas of actively attaching disperse within users of actively attaching disperse of the taxon have a means of actively attaching disperse of the taxon have a means of actively attaching disperse of the taxon likely to excurs a signs (for animals) or as propagules for a signs of animals) or as propagules for a signs of animals or as propagules for a signs of the taxon likely to excurs a larwacy/uvenlike (for animals) or as fragmentation of stems.       High         10       7.0.5       Is natural dispersal of the taxon likely to animals or as propagules for the axon likely to a signs of animals or as propagules for the taxon along any of the vectors/pathways method in the previous seven questions (33-41; i.e. both unintend or intertioned in the previous seven questions (33-41; i.e. both uninted) in the taxon along any of the vectors/pathways for available to withstand being out of water for extended perse of the taxon dense of the taxon along any of the vectors/pathways method (e.g., minimal)       No       No       No reference       Low         13       1.0.2       Is dispersal of the taxon along any of t	7 5	licno	first-reproduction?			
disperse within the RA area (with suitable         disperse           7.02         Will any of these vector/pathways bring the taxon in close proximity to one or more protected areas (e.g., dec., ship, hulls, pilings, boys) such that it enhances the likelihood of dispersal?         No         no reference of actively attaching         High           87         7.03         Dest the taxon have a means of actively attaching itself to hard substrate (e.g., ship, hulls, pilings, boys) such that it enhances the likelihood of dispersal?         No         no reference of actively attaching         High           87         7.04         Is natural dispersal of the taxon likely to occur as larvae/juveniles (for rainatis) or as progules (for plants: seeds, spores) in the RA area?         Plants can reproduce by seeds.         Medium           87         7.04         Is natural dispersal of the taxon likely to occur as larvae/juveniles (for rainatis) or as fragmentation of stems.         High           87         7.05         Is natural dispersal of the taxon likely to mighter in the RA area by other narinata?         Yes         The principal means of reproduction in program in the RA area by other narinata?         High           10         7.05         Is dispersal of the taxon likely to be dispersal of the taxon likely to be in the An area by other narinata?         Seeds and fragments can be dispersed by animals between water holies.         High           12         7.05         Is dispersal of the taxon likely to be in the with charal dispersal of the taxon likely t			How many potential internal	>1		High
taxon in close proximity to one or more         in the construction of the			disperse within the RA area (with suitable			
7     7.0     Does the taxon have a means of actively attaching test fo hard substrat (e.g., ship hulls, pillings, buoys) such that it enhances the likelihood of dispersal of the taxon likely to occur as eggs (for animals) or as progules (for plants: seeds, spores) in the RA area?     Plants can reproduce by seeds.     Medium       87     7.05     Is natural dispersal of the taxon likely to occur as larvac/juveniles (for animals) or as fragmentation of stems.     Medium       87     7.05     Is natural dispersal of the taxon likely to occur as larvac/juveniles (for animals) or as fragmentation of stems.     High       7.05     7.06     Are older life stages of the taxon likely to migrate in the RA area for reproductor?     Not applicable     Egeria densa has not active dispersal mechanisms.     High       7.07     7.07     Are propagules or eggs of the taxon likely to migrate in the RA area for reproductor?     Not applicable     Egeria densa has not active dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. bot unintentional or intentional) likely to be     High       13     7.09     Is dispersal of the taxon flexing of of mor or more hours) at some stage of its life cycle?     No     no reference     Medium       13     7.09     Is the taxon bole out of mater quality conditions relevant to that taxon?     No     no reference     Medium       14     8.01     Is the taxon ble to withstand being out of mater quality conditions relevant to that taxon?     No     no reference <t< td=""><td>36</td><td>7.02</td><td></td><td>Yes</td><td>through water flow between the organism's locations</td><td>Medium</td></t<>	36	7.02		Yes	through water flow between the organism's locations	Medium
attaching itself to hard substrate (e.g. ship hulls; plings, burys) such that it enhances the likelihood of dispersal?       Medium         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?       Plants can reproduce by seeds.       Medium         97       7.05       Is natural dispersal of the taxon likely to magnetize in the RA area?       Yes       Plants can reproduce by seeds.       High         107       7.05       Area dider life stages of the taxon likely to migrate in the RA area?       Not applicable       Egeria dense has not active dispersal mechanisms.       High         11       7.07       Are propagules or eggs of the taxon likely to migrate in the RA area for reproduction?       Not applicable       Seeds and fragments can be dispersed by animals between water bodies.       Hedium         12       7.08       Is dispersal of the taxon likely to migrate in the RA area for reproduction?       Yes       Seeds and fragments can be dispersed by animals between water bodies.       Hedium         13       7.09       Is dispersal of the taxon likely to be unintentional or intertional) likely to be dispersal of the taxon density dependent?       No       no reference       Medium         13       7.09       Is dispersal of the taxon likely to tole area of the dispersal of the taxon likely to be dispersal of the taxon likely at some stage of the like on erace ora more houre; J to and the arage of water quality cond	37	7.03		No	no reference of actively attaching	Hiah
Ite likelihood of dispersal?         Ite likelihood of dispersal?         Medium           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?         Plants can reproduce by seeds.         Medium           97         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?         The principal means of reproduction is vegetative, by fragmentation of stems.         High           107         7.05         Are older life stages of the taxon likely to ves beeds and fragments can be dispersal mechanisms.         High           11         7.07         Are propagules or eggs of the taxon likely to ves seeds and fragments can be dispersed by animals between water be dispersal of the taxon along any of the previous serve questions (35–41; i.e. both unimetritonal or intentional) likely to be         Yes         Has high reproductive potential, Highly mobile locally         High           13         7.09         Is dispersal of the taxon diensity dependent?         No         no reference         Medium           14         8.01         Is the taxon due on due of the taxon due o			attaching itself to hard substrata (e.g. ship			5
occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?         The principal means of reproduction is vegetative, by fragmentalion of stems.           99         7.05         Is natural dispensal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?         Not applicable         Egeria densa has not active dispersal mechanisms.         High           10         7.06         Are older life stages of the taxon likely to migrate in the RA area for reproduction?         Not applicable         Egeria densa has not active dispersal mechanisms.         High           11         7.07         Are propagules or ggs of the taxon likely to be dispersed in the RA area by other animals?         Yes         Seeds and fragments can be dispersed by animals between water bodies.         High           12         7.08         Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or intentional) likely to be         Yes         Seeds and fragments can be dispersed by animals between water         Medium           13         7.09         Is dispersal of the taxon density dependent?         No         no reference         Medium           14         8.01         Is the taxon tolerant to that taxon? In the Justification field, indicate the relevant water callity variable(5) being         No         no reference         Medium           16         8.03         Can th						
(for plants: seeds, spores) in the RA area?         (for plants: seeds, spores) in the RA area?           97         7.05         Is instruid lighersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA         Yes         The principal means of reproduction is vegetative, by fragmentation of stems.         High           10         7.06         Are older life stages of the taxon likely to multiple taxon likely to multiple seed in the RA area by other animals?         Not applicable         Egeria densa has not active dispersal mechanisms.         High           11         7.07         Are propagules or eggs of the taxon likely to vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional) likely to be         Yes         Seeds and fragments can be dispersed by animals between water dispersed in the taxon density dependent?         No         no reference         Medium           3.         7.09         Is dispersal of the taxon density dependent?         No         no reference         Medium           4.         8.01         Is the taxon density dependent?         No         no reference         Low           5.         0/crance attributes         Yes         cannot tolerate shaded water         Medium           6.02         Is the taxon olicitaction of a lindicate the relevent to that taxos controlled or aradicated in the wild with chemical, biological, or other agents/means?         Yes         Mechanical	38	7.04	Is natural dispersal of the taxon likely to	Yes	Plants can reproduce by seeds.	Medium
occur as larvier/juveniles (for animals) or as fragments/seedings (for plants) in the RA area?         fragmenta/seedings (for plants) in the RA area?           10         7.06         Are older life stages of the taxon likely to migrate in the RA area for reproduction?         Not applicable         Egeria densa has not active dispersed by animals between water beddes.         High           11         7.07         Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?         Yes         Seeds and fragments can be dispersed by animals between water beddes.         Medium           12         7.08         Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both uninitational or intentional) likely to be         Yes         Has high reproductive potential, Highly mobile locally         High           13         7.09         Is dispersal of the taxon density dependent?         No         no reference         Medium           3         7.09         Is dispersal of the taxon density dependent?         No         no reference         Low           4         8.01         Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon. To a redicated in the vector controlled or redicated in the wild with chemical, biological, or other agents/means?         Yes         Mechanical removal such as cutting, hand pulling or netting is feasible for small infestations, though the ability to propagate from small stem fragments means that repeat Cleaning will be	20	7.05	(for plants: seeds, spores) in the RA area?	Vec	The principal means of reproduction is vegetative, by	High
10       7.05       Are older life stages of the taxon likely to migrate in the RA area for reproduction?       Not applicable       Egeria densa has not active dispersal mechanisms.       High         11       7.07       Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?       Seeds and fragments can be dispersed by animals between water bodies.       Medium         12       7.08       Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (53-41; i.e. both unintentional or intentional) likely to be       Yes       Seeds and fragments can be dispersed by animals between water bodies.       High         37       7.09       Is dispersal of the taxon density dependent?       No       no reference       Medium         37       Jolerance attributes       Is the taxon able to withstand being out of one or more hours) at some stage of ecycle?       No       no reference       Low         15       8.02       Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being       Yes       Cannot tolerate shaded water       Medium         16       8.03       Can the taxon be controlled or readicated in the wild with chemical, biological, or other agents/means?       Yes       Mechanical removal such as cutting, hand pulling or netting is feasible for small infestations, though the ability to propagate from small stem fragments means that repeated cleari		/.05	occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA			
1       7.07       Are propagules or eggs of the taxon likely to vess bedispersed in the RA area by other animals?       Seeds and fragments can be dispersed by animals between water bodies.       Medium         22       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) rintentional) likely to be       Has high reproductive potential, Highly mobile locally       High         13       7.09       Is dispersal of the taxon density dependent?       No       no reference       Medium         13       7.09       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 reference       Low         14       8.01       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) beind       Yes       Cannot tolerate shaded water       Medium         16       8.02       Is the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?       Yes       Cannot tolerate shaded water       Medium         17       8.04       Is the taxon likely to tolerate or benefit from environmental risks. The stocking with certain fish such as grass carp has been suggested, as E. densa is highly palatable, but there are no remores for this method.       High         18       8.05       Is the taxon likely to tolerate or bene	40	7.06	Are older life stages of the taxon likely to	Not applicable	Egeria densa has not active dispersal mechanisms.	High
12       7.08       Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be       Yes       Has high reproductive potential, Highly mobile locally       High         12       7.09       Is dispersal of the taxon density dependent?       No       no reference       Medium         3.       7.09       Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle?       No       no reference       Low         15       8.02       Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being       Yes       cannot tolerate shaded water       Medium         16       8.03       Can the taxon lecontrolled or eradicated in the wild with chemical, biological, or other agents/means?       Yes       Mechanical removal such as cutting, hand pulling or netting is feasible for small infestations, though the ability to propagate from small stem fragments means that repeat clearing will be required, or even that infestations way spread if removal is not adequate. Use of the herbicide diguat has been recommended, although using chemicals in water bodies leads to evident environmental/numan disturbance?       Ves       Seasonal flooding can also result in the spread of the organism environmental/numan disturbance?         17       8.04       Is the taxon likely to tolerate or benefit from envinonmental/numan disturbance?	41	7.07	Are propagules or eggs of the taxon likely to	Yes		Medium
seven questions (35–41; i.e. both unintentional or intentional) likely to be         Medium           37.09         Is dispersal of the taxon density dependent?         No         no reference         Medium           3. Toterarce attributes         Is the taxon able to withstand being out of one or more hours) at some stage of its life cycle?         No         no reference         Low           41         8.01         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) beind to ach te taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?         Yes         Mechanical removal such as cutting, hand pulling or netting is feasible for small infestations, though the ability to propagate from small stem fragments means that repeat clearing will be required, or even that infestations may spread if removal is not adequate. Use of the herbicide diquat has been recommended, although using chemicals in water bodies leads to evident environmental risks. The stocking with certain fish such as grass carp has been suggested, as E. densa is highly palatable, but there are no renorks as to the effectiveness of this method.         Low           17         8.04         Is the taxon able to tolerate or benefit from environmental risks. The stocking with certain fish such as grass carp has been suggested, as E. densa is highly palatable, but there are no renorks as to the effectiveness of this method.         Low           18         8.05         Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environmen	42	7.08	Is dispersal of the taxon along any of the	Yes		High
13       7.09       Is dispersal of the taxon density dependent?       No       no reference       Medium         3. Toterance attributes			seven questions (35-41; i.e. both			
3. Tolerance attributes       Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle?       No       no refernce       Low         45       8.02       Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being       Yes       cannot tolerate shaded water       Medium         46       8.03       Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?       Yes       Mechanical removal such as cutting, hand pulling or netting is feasible for small infestations, though the ability to propagate from small stem fragments means that repeat clearing will be required, or even that infestations may spread if removal is not adequate. Use of the herbicide diquat has been recommended, although using chemicals in water bodies leads to evident environmental risks. The stocking with certain fish such as grass carp has been suggested, as E. densa is highly palatable, but there are no reports as to the effectiveness of this method.         47       8.04       Is the taxon ble to tolerate or benefit from environmental risks. The stocking with certain fish such as grass carp has been suggested, as E. densa is highly palatable, but there are no reports as to the effectiveness of this method.         48       8.05       Is the taxon able to tolerate solunity levels that are higher or lower than those found in its usual environment?       Yes       doi: 10.3391/bir.2018.7.4.05       High         49       8.06       Are there effective natu	12	7.00		No	no reference	Medium
44       8.01       Is the taxon able to withstand being out of water for extended periods (e.g., minimum of vater quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being       No       no reference       Low         45       8.02       Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being       Yes       cannot tolerate shaded water       Medium         46       8.03       Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?       Yes       Mechanical removal such as cutting, hand pulling or netting is feasible for small infestations, though the ability to propagate from small stem fragments means that repeat clearing will be required, or even that infestations may spread if removal is not adequate. Use of the herbicide diquat has been recommended, although using chemicals in water bodies leads to evident environmental risks. The stocking with certain fish such as grass carp has been suggested, as E. densa is highly palatable, but there are no reports as to the effectiveness of this method.         47       8.04       Is the taxon able to tolerate or benefit from environment?       Yes       Seasonal flooding can also result in the spread of the organism locally.       Low         48       8.05       Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?       <						
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) beinq       Yes       cannot tolerate shaded water       Medium         46       8.03       Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?       Yes       Mechanical removal such as cutting, hand pulling or netting is feasible for small infestations, though the ability to propagate from small stem fragments means that repeat clearing will be required, or even that infestations may spread if removal is not adequate. Use of the herbicide diquat has been recommended, although using chemicals in water bodies leads to evident environmental risks. The stocking with certain fish such as grass carp has been suggested, as E. densa is highly palatable, but there are no reports as to the effectiveness of this method.       Low         47       8.04       Is the taxon likely to tolerate or benefit from environmental/human disturbance?       Yes       deai: 10.3391/bir.2018.7.4.05       High         48       8.05       Is there are higher or lower than those found in its usual environment?       Yes       doi: 10.3391/bir.2018.7.4.05       High         49       8.06       Are there effective natural enemies (predators) of the taxon present in the RA       No       no reference       Low         C. Climate change       Kes       No       no reference       Low			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 refernce	Low
taxon? [In the Justification field, indicate the relevant water quality variable(s) being       Mechanical removal such as cutting, hand pulling or netting is feasible for small infestations, though the ability to propagate from small stem fragments means that repeat clearing will be required, or even that infestations may spread if removal is not adequate. Use of the herbicide diquat has been recommended, although using chemicals in water bodies leads to evident environmental/human disturbance?       High         17       8.04       Is the taxon able to tolerate or benefit from environmental/human disturbance?       Yes       Seasonal flooding can also result in the spread of the organism locally.       Low         18       8.05       Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?       Yes       doi: 10.3391/bir.2018.7.4.05       High         19       8.06       Are there effective natural enemies (predators) of the taxon present in the RA       No       no reference       Low	45	8.02	Is the taxon tolerant of a wide range of	Yes	cannot tolerate shaded water	Medium
46       8.03       Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?       Yes       Mechanical removal such as cutting, hand pulling or netting is feasible for small infestations, though the ability to propagate from small stem fragments means that repeat clearing will be required, or even that infestations may spread if removal is not adequate. Use of the herbicide diquat has been recommended, although using chemicals in water bodies leads to evident environmental risks. The stocking with certain fish such as grass carp has been suggested, as E. densa is highly palatable, but there are no renorts as to the effectiveness of this method.       Low         17       8.04       Is the taxon likely to tolerate or benefit from environmental/human disturbance?       Yes       Seasonal flooding can also result in the spread of the organism locally.       Low         18       8.05       Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?       Yes       Seasonal flooding can also result in the spread of the organism locally.       Low         19       8.06       Are there effective natural enemies (predators) of the taxon present in the RA       No       no reference       Low         Calimate charge       Low       Low       Low       Low       Low			water quality conditions relevant to that taxon? [In the Justification field, indicate the			
agents/means?       from small stem fragments means that repeat clearing will be required, or even that infestations may spread if removal is not adequate. Use of the herbicide diquat has been recommended, although using chemicals in water bodies leads to evident environmental risks. The stocking with certain fish such as grass carp has been suggested, as E. densa is highly palatable, but there are no reports as to the effectiveness of this method.         17       8.04       Is the taxon likely to tolerate or benefit from environmental/human disturbance?       Yes       Seasonal flooding can also result in the spread of the organism locally.         18       8.05       Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?       Yes       doi: 10.3391/bir.2018.7.4.05       High         19       8.06       Are there effective natural enemies (predators) of the taxon present in the RA       No       no reference       Low	46	8.03	Can the taxon be controlled or eradicated in	Yes		High
although using chemicals in water bodies leads to evident environmental risks. The stocking with certain fish such as grass carp has been suggested, as E. densa is highly palatable, but there are no reports as to the effectiveness of this method.         V7       8.04       Is the taxon likely to tolerate or benefit from environmental/human disturbance?       Yes         V8       8.05       Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?       Yes         V9       8.06       Are there effective natural enemies (predators) of the taxon present in the RA       No         No       no reference         Low         C. Climate change					from small stem fragments means that repeat clearing will be required, or even that infestations may spread if removal is not	
a       carp has been suggested, as E. densa is highly palatable, but         47       8.04       Is the taxon likely to tolerate or benefit from environmental/human disturbance?       Yes       Seasonal flooding can also result in the spread of the organism locally.       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       doi: 10.3391/bir.2018.7.4.05       High         49       8.06       Are there effective natural enemies (predators) of the taxon present in the RA       No       no reference       Low         C. Climate change       Carp has been suggested, as E. densa is highly palatable, but there are no renorts as to the effective natural enemies       No       no reference       Low					although using chemicals in water bodies leads to evident	
47       8.04       Is the taxon likely to tolerate or benefit from environmental/human disturbance?       Yes       Seasonal flooding can also result in the spread of the organism locally.         48       8.05       Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?       Yes       doi: 10.3391/bir.2018.7.4.05       High         49       8.06       Are there effective natural enemies (predators) of the taxon present in the RA       No       no reference       Low					carp has been suggested, as E. densa is highly palatable, but	
18       8.05       Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?       Yes       doi: 10.3391/bir.2018.7.4.05       High         19       8.06       Are there effective natural enemies (predators) of the taxon present in the RA       No       no reference       Low         C. Climate change       Ves       Ves       Ves       Ves       Ves       Ves	47	8.04		Yes	there are no reports as to the effectiveness of this method. Seasonal flooding can also result in the spread of the organism	Low
that are higher or lower than those found in its usual environment?       Image: Constraint of the state of	48	8.05		Yes		High
49     8.06     Are there effective natural enemies     No     no reference     Low       (predators) of the taxon present in the RA     C. Climate change     C. Climate change     C. Climate change			that are higher or lower than those found in			
C. Climate change	49	8.06	Are there effective natural enemies	No	no reference	Low
). Climate change			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,	Increase	professional judgement	Medium
		decrease or not change?			
51	9.02	Under the predicted future climatic	Increase	professional judgement	Medium
		conditions, are the risks of establishment			
		posed by the taxon likely to increase,			
		decrease or not change?			
52	9.03	Under the predicted future climatic	Increase	professional judgement	Medium
		conditions, are the risks of dispersal within			
		the RA area posed by the taxon likely to			
		increase, decrease or not change?			
53	9.04	Under the predicted future climatic	Higher	professional judgement (E. densa can out-compete and displace	High
		conditions, what is the likely magnitude of		native vegetation)	
		future potential impacts on biodiversity			
		and/or ecological integrity/status?			
54	9.05	Under the predicted future climatic	Higher	professional judgement	Medium
		conditions, what is the likely magnitude of			
		future potential impacts on ecosystem			
		structure and/or function?			
55	9.06	Under the predicted future climatic	Higher	professional judgement	Low
		conditions, what is the likely magnitude of			
		future potential impacts on ecosystem			
		services/socio-economic factors?			

Statistics

Statistics	
Scores	
BRA	36.0
BRA Outcome	High
BRA+CCA	48.0
BRA+CCA Outcome	High
Score partition	
A. Biogeography/Historical	20.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	2.0
3. Invasive elsewhere	14.0
B. Biology/Ecology	16.0
4. Undesirable (or persistence) traits	7.0
5. Resource exploitation	2.0
6. Reproduction	-2.0
7. Dispersal mechanisms	4.0
8. Tolerance attributes	5.0
C. Climate change	12.0
9. Climate change	12.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3 5 5 <b>36</b>
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	6
C. Climate change	<b>6</b>
9. Climate change Sectors affected	6
Sectors affected Commercial	17
Environmental	17
Species or population nuisance traits	24
species of population nuisance traits	24
Thresholds	
BRA	24.75
BRA+CCA	24.75
Confidence	
BRA+CCA	0.57
BRA	0 58

	BRA+CCA	0.57
	BRA	0.58
	CCA	0.50
Date and Time		
	08/12/20	21 12:03:03

raxon and Assessor details					
Category	Plantae (freshwater)				
Taxon name	Elodea canadensis				
Common name	Canadian waterweed				
Assessor	Mihaela Britvec				
Risk screening context					
Reason and socio-economic benefits					
Risk assessment area	Mediterranean region				
Taxonomy					
Native range					
Introduced range					
URL					

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
1. L		ication/Cultivation	1		r
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20	Yes	https://www.cabi.org/isc/datasheet/20759#touses	High
2	1.02	generations? Is the taxon harvested in the wild and likely	Yes	https://www.cabi.org/isc/datasheet/20759#touses	High
3	1.03	to be sold or used in its live form? Does the taxon have invasive races,	Yes	It is closely related to Elodea nuttallii.	Very high
		varieties, sub-taxa or congeners?			
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	https://www.cabi.org/isc/datasheet/20759#toclimate	High
5	2.02	What is the quality of the climate matching data?	High	https://www.cabi.org/isc/datasheet/20759#toclimate	High
6 7 8	2.03 2.04 2.05	Is the taxon already present outside of captivity in the RA area? How many potential vectors could the taxon use to enter in the RA area? Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional	Yes >1 Not applicable	Elodea canadensis originates from North America, concentrated around the St Lawrence Valley and the Great Lakes regions and the Pacific West Coast (Bowmer et al., 1995), but now occurs throughout the USA. The plant was introduced to the UK in the mid-1800s and has spread eastwards through Western Europe with the apparent exception, so far, of Iberia and northern Scandinavia. It is considered an invasive plant in Europe and has been reported as one of the most widespread invasive species in Russia (Vinogradova et al., 2018). E. canadensis is widespread and abundant in New Zealand (Bowmer et al., 1995) and is ranked as a medium risk with a weed potential score of 46 in New Zealand by the Aquatic Weed Risk Assessment Model (AWRM) (Champion et al., 2007). It has become naturalized in water bodies in the south-eastern parts of Australia, particularly in areas near major cities. It is most common in southern and eastern New South Wales, Victoria and Tasmania. It is also recorded from south-eastern South Australia and is sparingly naturalized in https://www.cabi.org/isc/datasheet/20759#topathwayVectors Hussner, A. (2012). Alien aquatic plant species in European countries. Weed Research, 52 (4), 297-306.	High High High
		and intentional introductions)?			
3. I		e elsewhere	1		
9	3.01	Has the taxon become naturalised	Yes	https://www.cabi.org/isc/datasheet/20759#todistribution	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 commercial taxa?	Yes	https://www.cabi.org/isc/datasheet/20759#toimpactEconomic	Medium
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	https://doi.org/10.1046/j.1365-2427.1999.00390.x	Low
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	Yes	https://www.cabi.org/isc/datasheet/20759#toimpactEnvironmental	Medium
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	Yes	https://www.cabi.org/isc/datasheet/20759#toimpactSocial	Medium
<b>D</b> 1	Biology	v/Ecology	1		
		able (or persistence) traits			
		Is it likely that the taxon will be poisonous or pose other risks to human health?	Yes	Species of Elodea are known to accumulate metals from the sediment and release them into the waterbody.	Low
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/20759#toimpactEnvironmental	Very 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.cabi.org/isc/datasheet/20759#tosummaryOfInvasiven ess	Medium

	1		h.,		
1/	4.04	Is the taxon adaptable in terms of climatic and other environmental conditions, thus	Yes	Evidence shows that this plant is very adaptable and has can spread under a wide range of conditions and nutrient	Very high
		enhancing its potential persistence if it has		concentrations ranging from oligotrophic to eutrophic (Cook and	
		invaded or could invade the RA area?		Urmi-König 1985; Simpson, 1990). E. canadensis has a wide	
		Invaded of could invade the KA area?		climatic tolerance (it is present from Alaska to Puerto Rico),	
				though it may be less common at the extremes of its range, being	
				predominant in temperate areas of North America and Europe. In	
				studies of maximum depths at which a number of submerged	
				aquatic plants were found, the maximum recorded for any species	
				was 12-14 m for Elodea (Sheldon and Boylen, 1977; Pip and	
				Simmons, 1986; Wells et al., 1997). Its average height is about	
				1.2 m, having a maximum height of 2.5 m (Wells et al., 1997). In	
				Europe it can survive in water depths of up to 4 m (McGavigan,	
				2012) in slow moving water. This species can survive and even	
				grow slowly under ice cover (Bowmer et al., 1995). In North	
				America it has been recorded in neutral to slightly alkaline inland	
				waters and in fresh to slightly brackish coastal waters (Holm et	
				al., 1997). Riis et al. (2012), compared the effects of temperature	
				and light availability on the growth and morphology of E.	
				canadensis, Egeria densa and Lagarosiphon major and suggested	
				that, in general, subject to variations due to timing of	
				introductions, E. densa will dominate warmer, shallower waters, L.	
				major will dominate in colder, clear-water lakes, whilst E.	
				canadensis will continue its role as a pioneer species which is	
				rapidly replaced by the two taller species after their arrival. Elodea	
				canadensis prefers clean water with a current from 0 to 1 m/s.	
				Optimum water temperatures range from 10 to 20°C, and silty	
				water or water with organic sediment is preferred to a sandy	
	1			substrate (Bowmer et al., 1995, Barrat-Segretain et al., 2002).	
				The habitat preference of E. canadensis in lakes is towards large	
				and deep lakes located at high altitudes, with long water-retention	
				times and high water quality (Kolada and Kutyła 2016). E.	
				canadensis exhibits positive growth under experimental conditions	
				of high-salt concentrations (Stoler et al., 2018). Consequently,	
18	4.05	Is the taxon likely to disrupt food-web	Yes	https://doi.org/10.1899/03-097.1	Medium
		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	Yes	Elodea canadensis can form large and dense stands that interfere	High
		on ecosystem services in the RA area?		with boating, fishing and thereby adversely affect recreation	
				activities (McGavigan, 2017). It makes it difficult for boats to	
				travel through invaded waterways (Bowmer et. al., 1995) reduces	
				recreational opportunities and diminishes aesthetics for the	
20	4.07		Ne	recreational opportunities and diminishes aesthetics for the environment (Josefsson and Andersson, 2001).	Madisser
20	4.07	Is it likely that the taxon will host, and/or	No	recreational opportunities and diminishes aesthetics for the	Medium
20	4.07	act as a vector for, recognised pests and	No	recreational opportunities and diminishes aesthetics for the environment (Josefsson and Andersson, 2001).	Medium
		act as a vector for, recognised pests and infectious agents that are endemic in the RA		recreational opportunities and diminishes aesthetics for the environment (Josefsson and Andersson, 2001). doi: 10.1111/j.1600-0587.2013.00296.x	
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21	4.08	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?		recreational opportunities and diminishes aesthetics for the environment (Josefsson and Andersson, 2001). doi: 10.1111/j.1600-0587.2013.00296.x doi: 10.1111/j.1600-0587.2013.00296.x	Medium
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25		Is the taxon likely to maintain a viable population even when present in low	Yes	Elodea canadensis is dioecious and male plants are less common than female in its native range. Only female plants are currently	Very high
		densities (or persisting in adverse conditions by way of a dormant form)?		found in Europe, and male plants have not been reported since 1903 (Cook and Urmi-König, 1985), so reproduction is only vegetative, involving vegetative fragments and turions (overwintering buds). Very small plant fragments are able to form roots from nodes and start growing (McGavigan, 2017). The main growing season is between mid-April and October. Plants die back	
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				downstream to form new stands. This method of propagation gives E. canadensis a considerable advantage over annual species and resulted in its rapid correct throughout Europe following its	
	5.01	e exploitation Is the taxon likely to consume threatened or protected native taxa in the RA area?	Not applicable	E. canadensis is not carnivore species.	Very high
27	5.02	Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?	Yes	https://www.cabi.org/isc/datasheet/20759#toriskAndImpactFactor s	High
	<i>eprodu</i> 6.01		Not applicable	no references	Medium
20		Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?	Not applicable	no references	Medium
	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	https://www.cabi.org/isc/datasheet/20759#toriskAndImpactFactor s	-
		Is the taxon likely to hybridise naturally with native taxa?	No	no reference	Medium
		Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of	No	no reference	Medium Medium
		another taxon (or specific habitat features) to complete its life cycle?			
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	Elodea canadensis is dioecious and male plants are less common than female in its native range. Only female plants are currently found in Europe, and male plants have not been reported since 1903 (Cook and Urmi-König, 1985), so reproduction is only vegetative, involving vegetative fragments and turions (overwintering buds). Very small plant fragments are able to form roots from nodes and start growing (McGavigan, 2017). The main growing season is between mid-April and October. Plants die back in Autumn. Turions or short, densely-leaved resistant stems, develop then break off to float around the water body before they sink to the bottom over winter, where they rest until they re-grow in spring (Millane and Caffrey, 2014). Over-wintering buds and fragments of the brittle branches are easily detached by waves, currents, foraging animals and boat traffic. New roots develop quickly on the nodes of these fragments which are carried downstream to form new stands. This method of propagation	Very high
34		How many time units (days, months, years) does the taxon require to reach the age-at-	3	gives E. canadensis a considerable advantage over annual species and resulted in its ranid spread throughout Europe following its 3 months	Medium
7. D		first-reproduction? al mechanisms			
	7.01	How many potential internal vectors/pathways could the taxon use to	>1	https://www.cabi.org/isc/datasheet/20759#topathwayVectors	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	https://doi.org/10.20302/NC.2018.27.25	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 reference of acitively attaching	Medium
	7.04	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?	No	Elodea canadensis is dioecious and male plants are less common than female in its native range. Only female plants are currently found in Europe, and male plants have not been reported since 1903 (Cook and Urmi-König, 1985), so reproduction is only vegetative, involving vegetative fragments and turions	Medium
		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	Elodea canadensis is dioecious and male plants are less common than female in its native range. Only female plants are currently found in Europe, and male plants have not been reported since 1903 (Cook and Urmi-König, 1985), so reproduction is only vegetative, involving vegetative fragments and turions	Very high
		Are older life stages of the taxon likely to migrate in the RA area for reproduction?		E. canadensis has not active dispersal mechanisms.	High
		Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the	Yes Yes	Over-wintering buds and fragments of the brittle branches are easily detached by waves, currents, foraging animals and boat Over-wintering buds and fragments of the brittle branches are	Very high High
72		vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be rapid?	100	easily detached by waves, currents, foraging animals and boat traffic. New roots develop quickly on the nodes of these fragments which are carried downstream to form new stands. This method of propagation gives E. canadensis a considerable advantage over	
				annual species and resulted in its rapid spread.	1

4 .	0.61	• • • • • • • • • • • • • • •	N/		M I
44	8.01	Is the taxon able to withstand being out of	Yes	This species can survive and even grow slowly under ice cover	Medium
		water for extended periods (e.g. minimum of		(Bowmer et al., 1995).	
		one or more hours) at some stage of its life			
		cycle?			
45	8.02	Is the taxon tolerant of a wide range of	Yes	https://www.cabi.org/isc/datasheet/20759#towaterTolerances	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	https://www.cabi.org/isc/datasheet/20759#topreventionAndContro	High
		the wild with chemical, biological, or other			
		agents/means?			
47	8.04	Is the taxon likely to tolerate or benefit from	Yes	Seasonal flooding can also result in the spread of the organism	High
		environmental/human disturbance?		locally (Barrat-Segretain and Elger, 2004).	
48	8.05	Is the taxon able to tolerate salinity levels	Yes	E. canadensis exhibits positive growth under experimental	High
		that are higher or lower than those found in		conditions of high-salt concentrations (Stoler et al., 2018).	
		its usual environment?		Consequently, salt marshes and brackish waters are likely to be	
				invaded by this species if salt concentration is lower than to 3 g/l	
				of salt (Thouvenot and Thiébaut, 2018).	
49	8.06	Are there effective natural enemies	Yes	Control by aquatic herbivores has been investigated in numerous	Medium
1		(predators) of the taxon present in the RA	1	countries (National Academy of Sciences, 1976). Species tested	
		area?		include Tilapia melanopleura, T. mossambica and the Chinese	
				grass carp Ctenopharyngodon idella. Since the latter is an exotic	
				species, introduction is only allowed when the species can be	
				confined to a particular waterbody and, therefore, investment in	
				fences is a prerequisite. Nevertheless, several successful	
				examples of control are known from Western Europe and the USA	
				(Stott et al. 1971; Willey et al., 1974; Mitzner, 1978; Fowler,	
				1984) and more recent experiments have found medium	
				efficiency in the use of stocking grass carps (Bonar et al., 2002,	
				efficiency in the use of stocking grass carps (Bonar et al., 2002,	
				efficiency in the use of stocking grass carps (Bonar et al., 2002, Pipalová, 2006). There are some disadvantages in using grass	
		e change		efficiency in the use of stocking grass carps (Bonar et al., 2002, Pípalová, 2006). There are some disadvantages in using grass carp, as these fish are generalist feeders and may also damage	
9. (	Climate	change	Increase	efficiency in the use of stocking grass carps (Bonar et al., 2002, Pípalová, 2006). There are some disadvantages in using grass carp, as these fish are generalist feeders and may also damage native plant species (see Vernon and Hamilton, 2011 for further	High
9. (		change Under the predicted future climatic	Increase	efficiency in the use of stocking grass carps (Bonar et al., 2002, Pípalová, 2006). There are some disadvantages in using grass carp, as these fish are generalist feeders and may also damage	High
9. (	Climate	e change Under the predicted future climatic conditions, are the risks of entry into the RA	Increase	efficiency in the use of stocking grass carps (Bonar et al., 2002, Pípalová, 2006). There are some disadvantages in using grass carp, as these fish are generalist feeders and may also damage native plant species (see Vernon and Hamilton, 2011 for further	High
9. (	Climate	e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase,	Increase	efficiency in the use of stocking grass carps (Bonar et al., 2002, Pípalová, 2006). There are some disadvantages in using grass carp, as these fish are generalist feeders and may also damage native plant species (see Vernon and Hamilton, 2011 for further	High
<i>9.</i> ( 50	<i>Climate</i> 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?		efficiency in the use of stocking grass carps (Bonar et al., 2002, Pípalová, 2006). There are some disadvantages in using grass carp, as these fish are generalist feeders and may also damage native nlant species (see Vernon and Hamilton 2011 for further doi: 10.3897/neobiota.49.34318	
<u>9.</u> 50	Climate	e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic	Increase	efficiency in the use of stocking grass carps (Bonar et al., 2002, Pípalová, 2006). There are some disadvantages in using grass carp, as these fish are generalist feeders and may also damage native plant species (see Vernon and Hamilton, 2011 for further	High
<u>9.</u> 50	<i>Climate</i> 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		efficiency in the use of stocking grass carps (Bonar et al., 2002, Pípalová, 2006). There are some disadvantages in using grass carp, as these fish are generalist feeders and may also damage native nlant species (see Vernon and Hamilton 2011 for further doi: 10.3897/neobiota.49.34318	
<u>9.</u> 50	<i>Climate</i> 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,		efficiency in the use of stocking grass carps (Bonar et al., 2002, Pípalová, 2006). There are some disadvantages in using grass carp, as these fish are generalist feeders and may also damage native nlant species (see Vernon and Hamilton 2011 for further doi: 10.3897/neobiota.49.34318	
<u>9.</u> 50 51	9.01 9.02	e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	Increase	efficiency in the use of stocking grass carps (Bonar et al., 2002, Pípalová, 2006). There are some disadvantages in using grass carp, as these fish are generalist feeders and may also damage native nlant species (see Vernon and Hamilton 2011 for further         doi: 10.3897/neobiota.49.34318         doi: 10.3897/neobiota.49.34318	High
<u>9.</u> 50 51	<i>Climate</i> 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, decrease or not change? Under the predicted future climatic		efficiency in the use of stocking grass carps (Bonar et al., 2002, Pípalová, 2006). There are some disadvantages in using grass carp, as these fish are generalist feeders and may also damage native nlant species (see Vernon and Hamilton 2011 for further doi: 10.3897/neobiota.49.34318	
<u>9.</u> 50 51	9.01 9.02	e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within	Increase	efficiency in the use of stocking grass carps (Bonar et al., 2002, Pípalová, 2006). There are some disadvantages in using grass carp, as these fish are generalist feeders and may also damage native nlant species (see Vernon and Hamilton 2011 for further         doi: 10.3897/neobiota.49.34318         doi: 10.3897/neobiota.49.34318	High
<u>9.</u> 50 51	9.01 9.02	e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to	Increase	efficiency in the use of stocking grass carps (Bonar et al., 2002, Pípalová, 2006). There are some disadvantages in using grass carp, as these fish are generalist feeders and may also damage native nlant species (see Vernon and Hamilton 2011 for further         doi: 10.3897/neobiota.49.34318         doi: 10.3897/neobiota.49.34318	High
<u>9. (</u> 50 51 52	9.01 9.02 9.03	e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change?	Increase Increase	efficiency in the use of stocking grass carps (Bonar et al., 2002, Pípalová, 2006). There are some disadvantages in using grass carp, as these fish are generalist feeders and may also damage native nlant species (see Vernon and Hamilton 2011 for further         doi: 10.3897/neobiota.49.34318         doi: 10.3897/neobiota.49.34318         professional judgement	High Medium
<u>9. (</u> 50 51 52	9.01 9.02	e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic	Increase	efficiency in the use of stocking grass carps (Bonar et al., 2002, Pípalová, 2006). There are some disadvantages in using grass carp, as these fish are generalist feeders and may also damage native nlant species (see Vernon and Hamilton 2011 for further         doi: 10.3897/neobiota.49.34318         doi: 10.3897/neobiota.49.34318	High
<u>9. (</u> 50 51 52	9.01 9.02 9.03	e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of	Increase Increase	efficiency in the use of stocking grass carps (Bonar et al., 2002, Pípalová, 2006). There are some disadvantages in using grass carp, as these fish are generalist feeders and may also damage native nlant species (see Vernon and Hamilton 2011 for further         doi: 10.3897/neobiota.49.34318         doi: 10.3897/neobiota.49.34318         professional judgement	High Medium
<u>9. (</u> 50 51 52	9.01 9.02 9.03	e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic	Increase Increase	efficiency in the use of stocking grass carps (Bonar et al., 2002, Pípalová, 2006). There are some disadvantages in using grass carp, as these fish are generalist feeders and may also damage native nlant species (see Vernon and Hamilton 2011 for further         doi: 10.3897/neobiota.49.34318         doi: 10.3897/neobiota.49.34318         professional judgement	High Medium
<u>9. (</u> 50 51 52	9.01 9.02 9.03	e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of	Increase Increase	efficiency in the use of stocking grass carps (Bonar et al., 2002, Pípalová, 2006). There are some disadvantages in using grass carp, as these fish are generalist feeders and may also damage native nlant species (see Vernon and Hamilton 2011 for further         doi: 10.3897/neobiota.49.34318         doi: 10.3897/neobiota.49.34318         professional judgement	High Medium
9. ( 50 51 52 53	9.01 9.02 9.03	e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity	Increase Increase	efficiency in the use of stocking grass carps (Bonar et al., 2002, Pípalová, 2006). There are some disadvantages in using grass carp, as these fish are generalist feeders and may also damage native nlant species (see Vernon and Hamilton 2011 for further         doi: 10.3897/neobiota.49.34318         doi: 10.3897/neobiota.49.34318         professional judgement	High Medium
9. ( 50 51 52 53	9.01 9.02 9.03 9.04	e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic	Increase Increase Higher	efficiency in the use of stocking grass carps (Bonar et al., 2002, Pipalová, 2006). There are some disadvantages in using grass carp, as these fish are generalist feeders and may also damage native nlant snecies (see Vernon and Hamilton 2011 for further         doi: 10.3897/neobiota.49.34318         doi: 10.3897/neobiota.49.34318         professional judgement         professional judgement	High Medium High
9. ( 50 51 52 53	9.01 9.02 9.03 9.04	e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of	Increase Increase Higher	efficiency in the use of stocking grass carps (Bonar et al., 2002, Pipalová, 2006). There are some disadvantages in using grass carp, as these fish are generalist feeders and may also damage native nlant snecies (see Vernon and Hamilton 2011 for further         doi: 10.3897/neobiota.49.34318         doi: 10.3897/neobiota.49.34318         professional judgement         professional judgement	High Medium High
9. ( 50 51 52 53	9.01 9.02 9.03 9.04	e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem	Increase Increase Higher	efficiency in the use of stocking grass carps (Bonar et al., 2002, Pipalová, 2006). There are some disadvantages in using grass carp, as these fish are generalist feeders and may also damage native nlant snecies (see Vernon and Hamilton 2011 for further         doi: 10.3897/neobiota.49.34318         doi: 10.3897/neobiota.49.34318         professional judgement         professional judgement	High Medium High
9. ( 50 51 52 53 54	Climate           9.01           9.02           9.03           9.04           9.05	e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Increase Increase Higher Higher	efficiency in the use of stocking grass carps (Bonar et al., 2002, Pipalová, 2006). There are some disadvantages in using grass carp, as these fish are generalist feeders and may also damage native nlant snecies (see Vernon and Hamilton 2011 for further         doi: 10.3897/neobiota.49.34318         doi: 10.3897/neobiota.49.34318         professional judgement         professional judgement	High Medium High Medium
9. ( 50 51 52 53 54	9.01 9.02 9.03 9.04	<ul> <li>change</li> <li>Under the predicted future climatic</li> <li>conditions, are the risks of entry into the RA</li> <li>area posed by the taxon likely to increase,</li> <li>decrease or not change?</li> <li>Under the predicted future climatic</li> <li>conditions, are the risks of establishment</li> <li>posed by the taxon likely to increase,</li> <li>decrease or not change?</li> <li>Under the predicted future climatic</li> <li>conditions, are the risks of establishment</li> <li>posed by the taxon likely to increase,</li> <li>decrease or not change?</li> <li>Under the predicted future climatic</li> <li>conditions, are the risks of dispersal within</li> <li>the RA area posed by the taxon likely to</li> <li>increase, decrease or not change?</li> <li>Under the predicted future climatic</li> <li>conditions, what is the likely magnitude of</li> <li>future potential impacts on biodiversity</li> <li>and/or ecological integrity/status?</li> <li>Under the predicted future climatic</li> <li>conditions, what is the likely magnitude of</li> <li>future potential impacts on ecosystem</li> <li>structure and/or function?</li> <li>Under the predicted future climatic</li> </ul>	Increase Increase Higher	efficiency in the use of stocking grass carps (Bonar et al., 2002, Pipalová, 2006). There are some disadvantages in using grass carp, as these fish are generalist feeders and may also damage native nlant snecies (see Vernon and Hamilton 2011 for further         doi: 10.3897/neobiota.49.34318         doi: 10.3897/neobiota.49.34318         professional judgement         professional judgement	High Medium High
<u>9.</u> 50 51 52 53 54	Climate           9.01           9.02           9.03           9.04           9.05	e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Increase Increase Higher Higher	efficiency in the use of stocking grass carps (Bonar et al., 2002, Pipalová, 2006). There are some disadvantages in using grass carp, as these fish are generalist feeders and may also damage native nlant snecies (see Vernon and Hamilton 2011 for further         doi: 10.3897/neobiota.49.34318         doi: 10.3897/neobiota.49.34318         professional judgement         professional judgement	High Medium High Medium
<u>9. (</u> 50 51 52 53	Climate           9.01           9.02           9.03           9.04           9.05	<ul> <li>change</li> <li>Under the predicted future climatic</li> <li>conditions, are the risks of entry into the RA</li> <li>area posed by the taxon likely to increase,</li> <li>decrease or not change?</li> <li>Under the predicted future climatic</li> <li>conditions, are the risks of establishment</li> <li>posed by the taxon likely to increase,</li> <li>decrease or not change?</li> <li>Under the predicted future climatic</li> <li>conditions, are the risks of establishment</li> <li>posed by the taxon likely to increase,</li> <li>decrease or not change?</li> <li>Under the predicted future climatic</li> <li>conditions, are the risks of dispersal within</li> <li>the RA area posed by the taxon likely to</li> <li>increase, decrease or not change?</li> <li>Under the predicted future climatic</li> <li>conditions, what is the likely magnitude of</li> <li>future potential impacts on biodiversity</li> <li>and/or ecological integrity/status?</li> <li>Under the predicted future climatic</li> <li>conditions, what is the likely magnitude of</li> <li>future potential impacts on ecosystem</li> <li>structure and/or function?</li> <li>Under the predicted future climatic</li> </ul>	Increase Increase Higher Higher	efficiency in the use of stocking grass carps (Bonar et al., 2002, Pipalová, 2006). There are some disadvantages in using grass carp, as these fish are generalist feeders and may also damage native nlant snecies (see Vernon and Hamilton 2011 for further         doi: 10.3897/neobiota.49.34318         doi: 10.3897/neobiota.49.34318         professional judgement         professional judgement	High Medium High Medium

Statistics	
Scores	
BRA	39.0
BRA Outcome	High
BRA+CCA	51.0
BRA+CCA Outcome	High
Score partition	
A. Biogeography/Historical	20.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	2.0
3. Invasive elsewhere	14.0
B. Biology/Ecology	19.0
4. Undesirable (or persistence) traits	9.0
5. Resource exploitation	2.0
6. Reproduction	1.0
7. Dispersal mechanisms	2.0
8. Tolerance attributes	5.0
C. Climate change	12.0
9. Climate change	12.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3 5 5
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	5
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	12 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	17
Environmental	12
Species or population nuisance traits	27
Thresholds	
BRA	24.75
BRA+CCA	24.75
Confidence	
BRA+CCA	0.68
BRA	0.69
CCA	0.63
Date and Time	
08/12/20	21 08:26:12

Taxon and Assessor details						
Category	Plantae (freshwater)					
Taxon name	Elodea nuttallii					
Common name	western waterweed					
Assessor	Mihaela Britvec					
Risk screening context	Risk screening context					
Reason and socio-economic benefits						
Risk assessment area	Mediterranean region					
Taxonomy						
Native range						
Introduced range						
URL						

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
<i>1. 1</i> 1		ication/Cultivation Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	E. nuttallii is used in cool water aquariums. Elodea species are often a preferred food for waterfowl or crayfish (Lodge, 1991; van Donk and Otte, 1996), and can also be used as shelter for small	High
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	fishes and aquatic invertebrates. Elodea species are often a preferred food for waterfowl or crayfish (Lodge, 1991; van Donk and Otte, 1996), and can also be used as shelter for small fishes and aquatic invertebrates. E. nuttallii is	High
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	used in cool water aquariums. It is closely related to Elodea canadensis and Egereia densa. https://www.cabi.org/isc/datasheet/20761#tosimilaritiesToOtherS peciesOrConditions	Very 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?	High	https://www.cabi.org/isc/datasheet/20761#toclimate	High
5	2.02	What is the quality of the climate matching data?	Medium	https://www.cabi.org/isc/datasheet/20761#toclimate	Medium
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	https://doi.org/10.4462/annbotrm-10207	High
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	>1	https://www.cabi.org/isc/datasheet/20761#topathwayCauses	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	https://doi.org/10.4462/annbotrm-10207	High
3. I 0		e elsewhere Has the taxon become naturalised	Yes	E. nuttallii is native to temperate North America common	Very high
2	5.01	(established viable populations) outside its native range?	Tes	throughout most of the USA and south Canada and has a similar distribution to E. canadensis (eFloras, 2009; USDA-ARS, 2009; USDA-ARS, 2009). In its non-native distribution, it is found in central and western Europe and Japan (Cook and Urmi-König,	very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	No	no reference	Low
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	Yes	negatively impacts aquaculture (https://www.cabi.org/isc/datasheet/20761#toriskAndImpactFacto rs)	Medium
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem services?	Yes	damaged ecosystem services, ecosystem change (https://www.cabi.org/isc/datasheet/20761#toriskAndImpactFacto rs)	Medium
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	Yes	It is a submerged plant, and just like E. canadensis it forms large and dense stands that interfere with boating, fishing and adversely affect recreation activities.	Medium
		//Ecology			
		able (or persistence) traits Is it likely that the taxon will be poisonous or	Vec	Species of Elodea are known to accumulate metals from the	Low
		Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	Sediment and release them into the waterbody. It often forms dense, monospecific stands and displaces other aquatic plants from many localities (Simpson, 1984, 1990; Barrat- Segretain, 2005). Threat to/ loss of native species (https://www.cabi.org/isc/datasheet/20761#toriskAndImpactFacto rs).	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 reference	Medium
17	4.04	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?	Yes	Waterweeds are competitive and well adapted to a broad array of environmental conditions (Cook and Urmi-König, 1985; Simpson, 1990).	Very high
	4.05	Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA area?	Yes	The spread of E. nuttallii has resulted in displacement of E. canadensis (itself an invasive alien from N. America) from many localities where the latter had previously become well established in Europe (Simpson, 1990; Thiébaut et al., 1997; Barrat- Segretain, 2001; Larson, 2007). E. nuttallii is itself being replaced by Lagarosiphon major. Where it establishes it can form exceptionally dense monocultures, excluding native species	High
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes	E. nuttallii have the potential to develop into dense submerged beds, which prevent the use of water for recreational and professional purposes (Larson, 2003), navigation and port infrastructure (CPS-SKEW, 2008). The plant can also clog and impede drainage waterways.	Very high

<ul> <li>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 F</li> <li>4.08 Is it likely that the taxon will host, and/or to to the RA area?</li> <li>24 4.09 Is tilkely that the taxon will achieve a box size that will make it more likely to be released from captivity?</li> <li>23 4.10 Is the taxon capable of sustaining itself in range of water velocity conditions (e.g. versatile in habitat use)?</li> <li>24 4.11 Is it likely that the taxon's mode of exister (e.g. excretion of by-products) or behaviou (e.g. feeding) will reduce habitat quality for native taxa?</li> <li>25 4.12 Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditio by way of a dormant form)?</li> <li>5. Resource exploitation</li> <li>26 5.01 Is the taxon likely to consume threatened protected native taxa in the RA area?</li> <li>26 5.01 Is the taxon likely to consume threatened entiment of native taxa in the RA area?</li> <li>27 5.02 Is the taxon likely to curve viable gamel or propagules (in the RA area?)</li> <li>28 6.01 Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in resport to environmental conditions?</li> <li>29 6.02 Is the taxon likely to be hermaphroditic or display asexual reproduction?</li> <li>20 6.03 Is the taxon likely to be hermaphroditic or display asexual reproduce viable gamel or propagules (in the RA area)?</li> <li>31 6.04 Is the taxon likely to be hermaphroditic or display asexual reproduction?</li> <li>32 6.05 Is the taxon known (or likely) to produce all arge number of propagules or offspring within a short time span (e.g. &lt; 1 year)?</li> <li>34 6.07 How many time units (days, months, year first-reproduction?</li> <li>35 7.01 How many tothesi vectors/pathways that it enhances the likelihood of dispersal?</li> <li>37 7.03 Does the taxon have a means of actively attaching itself to hard substrata (e.g. shigh hulls, pillings, buoys) such that it e</li></ul>			
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 (noto) the RA area?         22       4.09       Is it likely that the taxon will achieve a boot size that will make it more likely to be released from captivity?         23       4.10       Is the taxon capable of sustaining itself in range of water velocity conditions (e.g. versatile in habitat use)?         24       4.11       Is it likely that the taxon's mode of exister (e.g. excretion of by-products) or behaviou (e.g. feeding) will reduce habitat quality for native taxa?         25       4.12       Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditio by way of a dormant form)?         26       5.01       Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in resport to environmental conditions?         27       5.02       Is the taxon likely to be hermaptroditic or display asexual reproduction?         28       6.01       Is the taxon likely to be hermaptroditic or display asexual reproduction?         30       6.03       Is the taxon likely to be hermaptroditic or display asexual reproduction?         31       6.04       How many potential internal vectors/pathways bring than as hort time span (e.g. < 1 year)?	No	doi: 10.1111/j.1600-0587.2013.00296.x	Low
to) the RA area?           10         Is it likely that the taxon will achieve a book size that will make it more likely to be released from captivity?           23         4.10         Is the taxon capable of sustaining itself in range of water velocity conditions (e.g. versatile in habitat use)?           24         4.11         Is it likely that the taxon's mode of exister (e.g. excretion of by-products) or behaviou (e.g. feeding) will reduce habitat quality for antive taxa?           25         4.12         Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditio by way of a dormant form)?           26         5.01         Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?           27         5.02         Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in resport to environmental conditions?           29         6.01         Is the taxon likely to hybridise naturally win native taxa?           30         6.03         Is the taxon likely to hybridise naturally win native taxa?           31         6.04         Is the taxon likely to be hermaphroditic or display asexual reproduction?           32         6.07         How many time units (days, months, years does the taxon nown (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)?	No	doi: 10.1111/j.1600-0587.2013.00296.x	Low
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range of water velocity conditions (e.g. versatile in habitat use)?         24       4.11       Is it likely that the taxon's mode of exister (e.g. excretion of by-products) or behaviou (e.g. feeding) will reduce habitat quality for native taxa?         25       4.12       Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditio by way of a dormant form)?         5. Resource exploitation       26         26       5.01       Is the taxon likely to consume threatened protected native taxa in the RA area?         27       5.02       Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?         28       6.01       Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in resport to environmental conditions?         29       6.02       Is the taxon likely to produce viable gamet or propagules (in the RA area)?         30       6.03       Is the taxon likely to hybridise naturally w native taxa?         31       6.04       Is the taxon likely to be hermaphroditic or display asexual reproduction?         32       6.05       Is the taxon knewn (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)?	y Yes	Introduced E. nuttallii exposed to environmental stresses show great phenotypic plasticity variations with increasing water nutrient enrichment and increases in leaf area with decreases in internode length, while the shorter broad-leaved phenotype typically occurs in shallow streams, whereas the longer spacer narrow-leaved phenotype occurs in lakes. Larger leaf width and higher number of lateral shoots - when nutrients are not limiting -	High
(e.g. excretion of by-products) or behaviou         (e.g. feeding) will reduce habitat quality for native taxa?         25       4.12         Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse condition by way of a dormant form)?         5. Resource exploitation         26       5.01         Is the taxon likely to consume threatened protected native taxa in the RA area?         27       5.02         Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?         6. Reproduction         28       6.01         18 the taxon likely to exhibit parental care and/or to reduce age-at-maturity in resport to environmental conditions?         29       6.02         19       6.03         19       16.04         19       16 the taxon likely to hybridise naturally w native taxa?         31       6.04         19       15 the taxon likely to be hermaphroditic or display asexual reproduction?         32       6.05         19       16 the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)?	Yes	may enhance plant performance (Simpson. 1988: Vanderpoorten E. nuttallii has been found growing in a wide range of water bodies, in general in quiet water such as shorelines of lakes, reservoirs and ponds, along rivers and streams, and also in wetlands, canals and ditches (Hickman, 1993). In England, it has been recorded in lowland habitats only (Preston and Croft, 1997).	High
(e.g. excretion of by-products) or behaviou         (e.g. feeding) will reduce habitat quality for native taxa?         25       4.12         15 the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse condition by way of a dormant form)?         5. Resource exploitation         26       5.01         16 the taxon likely to consume threatened protected native taxa in the RA area?         27       5.02         18 the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?         6. Reproduction         28       6.01         18 the taxon likely to exhibit parental care and/or to reduce age-at-maturity in resport to environmental conditions?         29       6.02         18 the taxon likely to hybridise naturally win native taxa?         30       6.03         18 the taxon likely to be hermaphroditic or display asexual reproduction?         31       6.04         19 the taxon dependent on the presence of another taxon (or specific habitat features); to complete its life cycle?         33       6.06         18 the taxon require to reach the age-at first-reproduction?         34       6.07         19 How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable andins) or a propagules of the taxon likely to oncore prot	e Yes	Modification of nutrient regime	Medium
<ul> <li>25 4.12 Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditio by way of a dormant form)?</li> <li>5. Resource exploitation</li> <li>26 5.01 Is the taxon likely to consume threatened protected native taxa in the RA area?</li> <li>27 5.02 Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?</li> <li>6. Reproduction</li> <li>28 6.01 Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in resport to environmental conditions?</li> <li>29 6.02 Is the taxon likely to produce viable gamet or propagules (in the RA area)?</li> <li>30 6.03 Is the taxon likely to produce viable gamet or propagules (in the RA area)?</li> <li>31 6.04 Is the taxon likely to be hermaphroditic or display asexual reproduction?</li> <li>32 6.05 Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?</li> <li>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. &lt; 1 year)?</li> <li>7. Dispersal mechanisms</li> <li>35 7.01 How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable</li> <li>36 7.02 Will any of these vectors/pathways bring ti taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)?</li> <li>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?</li> <li>38 7.04 Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or a fragments/seedlings (for plants) in the RA area?</li> <li>39 7.05 Are older life stages of the taxon likely to migrate in the RA area for reproduction?</li> <li>40 7.06 Are older life stages of the taxon likely to noccur as larvae/juveniles (for animals) or a fragments/seedlings (for plants) in the RA area?</li> <td>rs</td><td>(https://www.cabi.org/isc/datasheet/20761#toriskAndImpactFactors).</td><td></td></ul>	rs	(https://www.cabi.org/isc/datasheet/20761#toriskAndImpactFactors).	
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protected native taxa in the RA area?           27         5.02         Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?           6. Reproduction         28         6.01         Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in respor to environmental conditions?           29         6.02         Is the taxon likely to produce viable gamed or propagules (in the RA area)?           30         6.03         Is the taxon likely to bybridise naturally w native taxa?           31         6.04         Is the taxon likely to be hermaphroditic or display asexual reproduction?           32         6.05         Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?           33         6.06         Is the taxon require to reach the age-at first-reproduction?           34         6.07         How many time units (days, months, years does the taxon require to reach the age-at first-reproduction?           35         7.01         How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable           36         7.02         Will any of these vectors/pathways bring ti 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 hulls, pilings, buoys) such that it enhances the li	r Not applicable	E. nuttallii is not carnivore species.	Very high
resources (including nutrients) to the detriment of native taxa in the RA area?         6. Reproduction         28       6.01         15       the taxon likely to exhibit parental care and/or to reduce age-at-maturity in resport to environmental conditions?         29       6.02       Is the taxon likely to produce viable gamet or propagules (in the RA area)?         30       6.03       Is the taxon likely to hybridise naturally win native taxa?         31       6.04       Is the taxon likely to be hermaphroditic or display asexual reproduction?         32       6.05       Is the taxon dependent on the presence of another taxon (or specific habitat features); to complete its life cycle?         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)?		· · · · · · · · · · · · · · · · · · ·	, -
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and/or to reduce age-at-maturity in resport         to environmental conditions?         29       6.02         Is the taxon likely to produce viable gamel         or propagules (in the RA area)?         30       6.03         31       6.04         32       6.05         33       6.04         34       6.05         35       15 the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?         33       6.06         34       6.07         35       7.01         36       7.01         37       7.03         38       7.02         39       7.03         30       6.04         37       7.03         38       7.04         39       7.03         30       6.06         31       6.07         32       6.07         33       6.07         34       6.07         35       7.01         36       7.01         37       10         38       7.01         39       7.03         30       10			1 .
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native taxa?           31         6.04         Is the taxon likely to be hermaphroditic or display asexual reproduction?           32         6.05         Is the taxon dependent on the presence of another taxon (or specific habitat features; to complete its life cycle?           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)?	es Yes	Vegetative reproduction seems to be the dominant method of propagation - essentially by fragmentation and division of the stems and the production of winter buds from stem tips (Preston and Croft, 1997).	High
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to complete its life cycle?           33         6.06           Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)?	No	no reference	Medium
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<ol> <li>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)?</li> <li>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?</li> <li>7.04 Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagulu (for plants: seeds, spores) in the RA area?</li> <li>7.05 Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or a fragments/seedlings (for plants) in the RA area?</li> <li>40 7.06 Are older life stages of the taxon likely to migrate in the RA area for reproduction?</li> <li>41 7.07 Are propagules or eggs of the taxon likely</li> </ol>	>1	https://www.cabi.org/isc/datasheet/20761#topathwayCauses, https://www.cabi.org/isc/datasheet/20761#topathwayVectors	High
<ul> <li>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?</li> <li>38 7.04 Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagul (for plants: seeds, spores) in the RA area?</li> <li>39 7.05 Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or a fragments/seedlings (for plants) in the RA area?</li> <li>40 7.06 Are older life stages of the taxon likely to migrate in the RA area for reproduction?</li> <li>41 7.07 Are propagules or eggs of the taxon likely</li> </ul>	e Yes	through water flow between the organism's locations	High
<ul> <li>38 7.04 Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagul. (for plants: seeds, spores) in the RA area?</li> <li>39 7.05 Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or a fragments/seedlings (for plants) in the RA area?</li> <li>40 7.06 Are older life stages of the taxon likely to migrate in the RA area for reproduction?</li> <li>41 7.07 Are propagules or eggs of the taxon likely</li> </ul>	No	no reference of acitively attaching	Medium
<ul> <li>39 7.05 Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or a fragments/seedlings (for plants) in the RA area?</li> <li>40 7.06 Are older life stages of the taxon likely to migrate in the RA area for reproduction?</li> <li>41 7.07 Are propagules or eggs of the taxon likely</li> </ul>	s No	Vegetative reproduction seems to be the dominant method of propagation - essentially by fragmentation and division of the stems and the production of winter buds from stem tips.	Medium
40         7.06         Are older life stages of the taxon likely to migrate in the RA area for reproduction?           41         7.07         Are propagules or eggs of the taxon likely	Yes	Vegetative reproduction of winter buds from stem tips. Vegetative reproduction seems to be the dominant method of propagation - essentially by fragmentation.	Very high
		E. nuttallii has not active dispersal mechanisms.	High
		Several traits of the species are typical of successful invaders: rapid growth, vegetative reproduction through fragments and easily dispersed by waterfowl.	Very high
42 7.08 Is dispersal of the taxon along any of the vectors/pathways mentioned in the previou seven questions (35–41; i.e. both unintentional or intentional) likely to be	Yes s	fast growing, has high reproductive potential, reproduces asexually	High
43 7.09 Is dispersal of the taxon density dependen 8. Tolerance attributes	? No	no reference	Medium

44	8.01	Is the taxon able to withstand being out of	Yes	Telerates fire, for example	Low
	0.01	water for extended periods (e.g. minimum of	res	Tolerates fire, for example.	LUW
l		one or more hours) at some stage of its life cycle?			
45	8.02	Is the taxon tolerant of a wide range of	Yes	Waterweeds are competitive and well adapted to a broad array of	Very high
	5.02	water quality conditions relevant to that		environmental conditions (Cook and Urmi-König, 1985; Simpson,	. c. , mgn
		taxon? [In the Justification field, indicate the		1990). E. nuttallii is able to grow in turbid, highly eutrophic	
		relevant water quality variable(s) being		waters (Cook and Urmi-König, 1985; Ozimek et al., 1993;	
		considered.]		Thiébaut and Muller, 1999), as well as in clear oligo-mesotrophic	
		considered.]		waters (Thiébaut et al., 1997; Barrat-Segretain, 2001; Nagasaka,	
				2004) with a certain degree of organic pollution (Best et al.,	
				1996). Growth of E. nuttallii is stimulated by fertilization with	
				nitrogen and benefits from an excess of ammonia (Dendène et al.,	
				1993). It can occur to depths of 3 m (Simpson, 1990) and 5 m	
				(Ikusima, 1984) where it develops into dense pure stands, but it	
				is most frequently found in shallow water. Optimum pH has been found to be between 7 and 0 (Japan et al., 1003). It is talerant of	
				found to be between 7 and 9 (Jones et al., 1993). It is tolerant of	
				disturbance, oil pollution and is typically found in calcareous	
				water, from fresh to slightly brackish coastal water (St John, 1965) up to 14 ppt salinity, and in fine sediment soil, where it is	
46	8.03	Can the taxon be controlled or eradicated in	Yes	https://www.cabi.org/isc/datasheet/20761#topreventionAndContro	High
		the wild with chemical, biological, or other			-
		agents/means?			
47	8.04	Is the taxon likely to tolerate or benefit from	Yes	Seasonal flooding can also result in the spread of the organism	Medium
		environmental/human disturbance?		locally.	
48	8.05	Is the taxon able to tolerate salinity levels	Yes	highly adaptable to different environments, habitat generalist	Medium
		that are higher or lower than those found in			
		its usual environment?			
49	8.06	Are there effective natural enemies	No	no reference	Low
_		(predators) of the taxon present in the RA	<u> </u>		
		e change			
		change			
		change	Increase	professional judgement	Very high
55	9.01	Under the predicted future climatic	Increase	professional judgement	Very high
		Under the predicted future climatic conditions, are the risks of entry into the RA	Increase	professional judgement	Very high
		Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase,	Increase	professional judgement	Very high
	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?			, ,
		Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic	Increase Increase	professional judgement (E. nuttallii is highly adaptable to different	, ,
	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment			, ,
	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic		professional judgement (E. nuttallii is highly adaptable to different	, ,
51	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase,		professional judgement (E. nuttallii is highly adaptable to different	, ,
51	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	Increase	professional judgement (E. nuttallii is highly adaptable to different environments).	Very high
51	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic	Increase	professional judgement (E. nuttallii is highly adaptable to different environments).	Very high
51	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within	Increase	professional judgement (E. nuttallii is highly adaptable to different environments).	Very high
51	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to	Increase	professional judgement (E. nuttallii is highly adaptable to different environments).	Very high
51	9.01 9.02 9.03	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change?	Increase Increase	professional judgement (E. nuttallii is highly adaptable to different environments). professional judgement	Very high Medium
51	9.01 9.02 9.03	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic	Increase Increase	professional judgement (E. nuttallii is highly adaptable to different environments). professional judgement	Very high Medium
51 52 53	9.01 9.02 9.03 9.04	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	Increase Increase Higher	professional judgement (E. nuttallii is highly adaptable to different environments). professional judgement professional judgement	Very high Medium High
51 52 53	9.01 9.02 9.03	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic	Increase Increase	professional judgement (E. nuttallii is highly adaptable to different environments).         professional judgement         professional judgement         professional judgement	Very high Medium
51 52 53	9.01 9.02 9.03 9.04	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of	Increase Increase Higher	professional judgement (E. nuttallii is highly adaptable to different environments). professional judgement professional judgement	Very high Medium High
51 52 53	9.01 9.02 9.03 9.04	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem	Increase Increase Higher	professional judgement (E. nuttallii is highly adaptable to different environments).         professional judgement         professional judgement         professional judgement	Very high Medium High
51 52 53	9.01 9.02 9.03 9.04 9.05	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Increase Increase Higher Higher	professional judgement (E. nuttallii is highly adaptable to different environments).         professional judgement         professional judgement         professional judgement         (https://www.cabi.org/isc/datasheet/20761#toriskAndImpactFactors)	Very high Medium High
51 52 53	9.01 9.02 9.03 9.04	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? Under the predicted future climatic	Increase Increase Higher	professional judgement (E. nuttallii is highly adaptable to different environments).         professional judgement         professional judgement         professional judgement         (https://www.cabi.org/isc/datasheet/20761#toriskAndImpactFactors)         professional judgement (negatively impacts aquaculture/fisheries,	Very high Medium High
51 52 53	9.01 9.02 9.03 9.04 9.05	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Increase Increase Higher Higher	professional judgement (E. nuttallii is highly adaptable to different environments).         professional judgement         professional judgement         professional judgement         (https://www.cabi.org/isc/datasheet/20761#toriskAndImpactFacto rs)         professional judgement (negatively impacts aquaculture/fisheries, negatively impacts tourism, reduced amenity values, reduced	Very high Medium High
51 52 53	9.01 9.02 9.03 9.04 9.05	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? Under the predicted future climatic	Increase Increase Higher Higher	professional judgement (E. nuttallii is highly adaptable to different environments).         professional judgement         professional judgement         professional judgement         (https://www.cabi.org/isc/datasheet/20761#toriskAndImpactFactors)         professional judgement (negatively impacts aquaculture/fisheries,	Very high Medium High

Statistics	
Scores	
BRA	41.0
BRA Outcome	High
BRA+CCA	53.0
BRA+CCA Outcome	High
Score partition	
A. Biogeography/Historical	20.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	2.0
3. Invasive elsewhere	14.0
B. Biology/Ecology	21.0
4. Undesirable (or persistence) traits	9.0
5. Resource exploitation	2.0
6. Reproduction	1.0
7. Dispersal mechanisms	2.0
8. Tolerance attributes	7.0
C. Climate change	12.0
9. Climate change	12.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3 5 5 <b>36</b>
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	12 2 7 9 6
7. Dispersal mechanisms	9
8. Tolerance attributes	6
C. Climate change	6
9. Climate change	6
Sectors affected	

Commercial	17			
Environmental	12			
Species or population nuisance traits	29			
Thresholds				
BRA	24.75			
BRA+CCA	24.75			
Confidence				
BRA+CCA	0.68			
BRA	0.67			
CCA	0.75			
Date and Time				
08/12/2021 08:25:59				

Faxon and Assessor details						
Category	Plantae (freshwater)					
Taxon name	Gymnocoronis spilanthoides					
Common name	Senegal tea plant					
Assessor	Marina Piria					
Risk screening context						
Reason and socio-economic benefits						
Risk assessment area	Mediterranean region					
Taxonomy						
Native range						
Introduced range						
URL						

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
<u>1. l</u>	1	ication/Cultivation			lue i
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	https://www.cabi.org/isc/datasheet/26246#topathwayCauses	High
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	No	https://www.cabi.org/isc/datasheet/26246#topathwayCauses	Medium
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	No	https://bioone.org/journals/willdenowia/volume-46/issue- 2/wi.46.46208/Gymnocoronis-spilanthoides-Asteraceae- Eupatorieae-a-new-naturalized-and-potentially- invasive/10.3372/wi.46.46208.full	Low
2. (	Climate	, distribution and introduction risk			
4	2.01	How similar are the climatic conditions of the	High	native to Peru, N Argentina, Bolivia, Paraguay, Uruguay and S	High
		Risk Assessment (RA) area and the taxon's native range?		Brazil. Climatch used and with the most of regions climatic conditions matches	
5	2.02	What is the quality of the climate matching data?	High	Climatch	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	No	https://bioone.org/journals/willdenowia/volume-46/issue- 2/wi.46.46208/Gymnocoronis-spilanthoides-Asteraceae- Eupatorieae-a-new-naturalized-and-potentially- invasive/10.3372/wi.46.46208.full	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	>1	Escape, flooding, pet trade https://www.cabi.org/isc/datasheet/26246#toidentity	Very high
8	2.05	Is the taxon currently found in close	Yes	Hungary, Italy	Low
U	2.05	proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)?	103	https://www.cabi.org/isc/datasheet/26246#toidentity	LOW
3. 1	Invasive	e elsewhere			
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	In Hungary from 1988; New Zealand from 1980s https://bioone.org/journals/willdenowia/volume-46/issue- 2/wi.46.46208/Gymnocoronis-spilanthoides-Asteraceae- Eupatorieae-a-new-naturalized-and-potentially- linvasive/10.3372/wi.46.46208.full	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	No	Gymnocoronis spilanthoides forms large and dense populations but only in habitats modified by human activities, https://bioone.org/journals/willdenowia/volume-46/issue- 2/wi.46.46208/Gymnocoronis-spilanthoides-Asteraceae- Eupatorieae-a-new-naturalized-and-potentially- invasive/10.3372/wi.46.46208.full	Medium
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	https://www.cabi.org/isc/datasheet/26246#toidentity	Low
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	Yes	Recreational activities, irrigation and navigation may also be affected. https://www.cabi.org/isc/datasheet/26246#toidentity	High
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	Yes	https://www.cabi.org/isc/datasheet/26246#toidentity	High
В.	Biology	y/Ecology			
		able (or persistence) traits			
		Is it likely that the taxon will be poisonous or pose other risks to human health?	Yes	https://www.cabi.org/isc/datasheet/26246#toidentity	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/26246#toidentity	High
	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	https://www.cabi.org/isc/datasheet/26246#toidentity	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	5.5-8 pH https://www.cabi.org/isc/datasheet/26246#toidentity	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	https://www.cabi.org/isc/datasheet/26246#toidentity	Low
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes	https://www.cabi.org/isc/datasheet/26246#toidentity	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/26246#toidentity	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	https://www.cabi.org/isc/datasheet/26246#toidentity	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	grow 15 cm per week up to 1.5m high https://www.cabi.org/isc/datasheet/26246#toidentity	High

. Clillat	e change			
Climat	e change	I		
9 8.06	Are there effective natural enemies (predators) of the taxon present in the RA	No	https://www.cabi.org/isc/datasheet/26246#toidentity	Low
8 8.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	No	Eupatorieae-a-new-naturalized-and-potentially- invasive/10.3372/wi.46.46208.full cannot tolerate saline or brackish water. https://www.cabi.org/isc/datasheet/26246#toidentity	Very high
7 8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	Yes	Gymnocoronis spilanthoides forms large and dense populations but only in habitats modified by human activities. https://bioone.org/journals/willdenowia/volume-46/issue- 2/wi.46.46208/Gymnocoronis-spilanthoides-Asteraceae- Funatoriage-a-pew-naturalized-and-potentially-	Medium
	the wild with chemical, biological, or other agents/means?		only on the upper parts of the plant, as submerged parts are not killed and can regrow. Following repeated efforts, glyphosate has proven to be ineffective in south Queensland, and it shows some resistance to the most commonly approved aquatic herbicides <a href="https://www.cabi.org/isc/datasheet/26246#toidentity">https://www.cabi.org/isc/datasheet/26246#toidentity</a>	
6 8.03	water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in	No	https://www.cabi.org/isc/datasheet/26246#toidentity G. spilanthoidesis very hard to kill and herbicides are effective	High
5 8.02	one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of	Yes	Low pH and persistant to chemicals	High
<u>    1 oleran</u> 4   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/26246#toidentity	Low
3 7.09		No	https://www.cabi.org/isc/datasheet/26246#toidentity	Low
2 7.08	Is dispersed in the two along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be	No	https://www.cabi.org/isc/datasheet/26246#toidentity	Low
1 7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	Yes	https://www.cabi.org/isc/datasheet/26246#toidentity	Medium
0 7.06	area? Are older life stages of the taxon likely to migrate in the RA area for reproduction?	Not applicable	https://www.cabi.org/isc/datasheet/26246#toidentity	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	Yes	https://www.cabi.org/isc/datasheet/26246#toidentity	High
8 7.04	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?	Yes	https://www.cabi.org/isc/datasheet/26246#toidentity	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	No	https://www.cabi.org/isc/datasheet/26246#toidentity	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	Personal opinion	Medium
5 7.01	How many potential internal vectors/pathways could the taxon use to	>1	water, flodding,pet trade https://www.cabi.org/isc/datasheet/26246#toidentity	Very high
Dispers	first-reproduction? al mechanisms			
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-	1	https://www.cabi.org/isc/datasheet/26246#toidentity	Very high
3 6.06	another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring	Yes	https://www.cabi.org/isc/datasheet/26246#toidentity	High
2 6.05	display asexual reproduction? Is the taxon dependent on the presence of	No	https://www.cabi.org/isc/datasheet/26246#toidentity https://www.cabi.org/isc/datasheet/26246#toidentity	Very high
1 6.04	native taxa? Is the taxon likely to be hermaphroditic or to	Yes	can reproduce by seeds and vegetatively from stem fragments	Very high
0 6.03	or propagules (in the RA area)? Is the taxon likely to hybridise naturally with	No	https://www.cabi.org/isc/datasheet/26246#toidentity	Very high
9 6.02	and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes	Yes	https://www.cabi.org/isc/datasheet/26246#toidentity	Very high
. <i>Reprod</i> 8 6.01		Not applicable	https://www.cabi.org/isc/datasheet/26246#toidentity	Very high
7 5.02	Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?	INO	https://www.cablorg/isc/datasneet/20246#toluentity	Low
5 5.01	Is the taxon likely to consume threatened or protected native taxa in the RA area?	Not applicable	https://www.cabi.org/isc/datasheet/26246#toidentity https://www.cabi.org/isc/datasheet/26246#toidentity	Very high
	by way of a dormant form)? ce exploitation	Neteralizable		) (am chiala
5 4.12	Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions	No	https://www.cabi.org/isc/datasheet/26246#toidentity	Low
	(e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa?		with slower growing native plants and affecting wetland birds and other animals depend upon them. Native species can also be submerged causing death.	
4 4.11	range of water velocity conditions (e.g. versatile in habitat use)? Is it likely that the taxon's mode of existence	Yes	It can invade and degrade natural wetlands, competing strongly	High

50	9.01	Under the predicted future climatic	Increase	https://bioone.org/journals/willdenowia/volume-46/issue-	Very high
		conditions, are the risks of entry into the RA		2/wi.46.46208/Gymnocoronis-spilanthoides-Asteraceae-	, -
		area posed by the taxon likely to increase,		Eupatorieae-a-new-naturalized-and-potentially-	
		decrease or not change?		invasive/10.3372/wi.46.46208.full	
51	9.02	Under the predicted future climatic	Increase	neotropical species	High
		conditions, are the risks of establishment		https://bioone.org/journals/willdenowia/volume-46/issue-	
		posed by the taxon likely to increase,		2/wi.46.46208/Gymnocoronis-spilanthoides-Asteraceae-	
		decrease or not change?		Eupatorieae-a-new-naturalized-and-potentially-	
52	9.03	Under the predicted future climatic	No change	https://bioone.org/journals/willdenowia/volume-46/issue-	Medium
		conditions, are the risks of dispersal within		2/wi.46.46208/Gymnocoronis-spilanthoides-Asteraceae-	
		the RA area posed by the taxon likely to		Eupatorieae-a-new-naturalized-and-potentially-	
		increase, decrease or not change?		invasive/10.3372/wi.46.46208.full	
53	9.04	Under the predicted future climatic	Higher	https://bioone.org/journals/willdenowia/volume-46/issue-	High
		conditions, what is the likely magnitude of		2/wi.46.46208/Gymnocoronis-spilanthoides-Asteraceae-	
		future potential impacts on biodiversity		Eupatorieae-a-new-naturalized-and-potentially-	
		and/or ecological integrity/status?		invasive/10.3372/wi.46.46208.full	
54	9.05	Under the predicted future climatic	Higher	https://bioone.org/journals/willdenowia/volume-46/issue-	High
		conditions, what is the likely magnitude of		2/wi.46.46208/Gymnocoronis-spilanthoides-Asteraceae-	
		future potential impacts on ecosystem		Eupatorieae-a-new-naturalized-and-potentially-	
		structure and/or function?		invasive/10.3372/wi.46.46208.full	
55	9.06	Under the predicted future climatic	Higher	https://bioone.org/journals/willdenowia/volume-46/issue-	High
		conditions, what is the likely magnitude of		2/wi.46.46208/Gymnocoronis-spilanthoides-Asteraceae-	
		future potential impacts on ecosystem		Eupatorieae-a-new-naturalized-and-potentially-	
		services/socio-economic factors?		invasive/10.3372/wi.46.46208.full	

Statistics

Scores	
BRA	28.0
BRA Outcome	High
BRA+CCA	38.0
BRA+CCA Outcome	High
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	17.0
4. Undesirable (or persistence) traits	6.0
5. Resource exploitation	0.0
6. Reproduction	4.0
7. Dispersal mechanisms	3.0
8. Tolerance attributes	4.0
C. Climate change	10.0
9. Climate change	10.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3
2. Climate, distribution and introduction risk	3 5 5 <b>36</b>
3. Invasive elsewhere	5
B. Biology/Ecology	
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2
6. Reproduction	7
7. Dispersal mechanisms	9 6
8. Tolerance attributes	
C. Climate change	6
9. Climate change	6
Sectors affected	
Commercial	9
Environmental	11
Species or population nuisance traits	21
Thresholds	
BRA	24.75
BRA+CCA	24.75
Confidence	
BRA+CCA	0.65
BRAŦCCA	0.63

BRA+CCA	0.65
BRA	0.63
CCA	0.75
23/11/20	21 16:57:37
	BRA CCA

Taxon and Assessor details						
Category	Plantae (freshwater)					
Taxon name	Hygrophila polysperma					
Common name	Indian swampweed					
Assessor	Marina Piria					
Risk screening context						
Reason and socio-economic benefits						
Risk assessment area	Mediterranean region					
Taxonomy						
Native range						
Introduced range						
URL						

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical	_		_
<u>1. L</u>		<i>ication/Cultivation</i> Has the taxon been the subject of	No.		1 li a h
T	1.01	domestication (or cultivation) for at least 20 generations?	Yes	Aquarium plant https://www.cabi.org/isc/datasheet/28135	High
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	for aquarium purposes https://www.cabi.org/isc/datasheet/28135	Medium
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	Eleven of the taxa characterised as high risk (Cyperus papyrus, C. sp., Hygrophila difformis, H. balsamica, H. corymbosa, H. sp., Microsorum pteropus, Spathiphyllum sp., Taxiphyllum barbieri, Teucrium scordium and Typha minima) should be restricted from use. If these taxa are not restricted, based on their establishment and dispersal characteristics, they have a high risk of becoming invasive. https://onlinelibrary.wiley.com/doi/full/10.1111/wre.12135?casa_t oken=ZGBeRf6xub0AAAAA%3A2bED9v6GI1xd1alX3U38rTvoRIcNOo	
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	Mediterranean climate matches with India, Bangladesh using climatch	High
5	2.02	What is the quality of the climate matching data?	High	climatch tolerate Cs - Warm temperate climate with dry summer - which is present in Adriatic basin	Medium
6	2.03	Is the taxon already present outside of captivity in the RA area?	No	Not in RA area; H. polysperma has recently been reported in Europe for the first time, where plants were found in North Rhine- Westphalia, Germany and Hungary https://www.cabi.org/isc/datasheet/28135#totaxonomicTree	High
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	>1	biofouling, water, mail, debris https://www.cabi.org/isc/datasheet/28135#totaxonomicTree	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	has recently been reported in Europe for the first time, where plants were found in North Rhine-Westphalia and Hungary	Low
3. I		e elsewhere	T		T
9	3.01	Has the taxon become naturalised	Yes	Germany, USA	Very high
10	3.02	(established viable populations) outside its In the taxon's introduced range, are there	Yes	https://www.cabi.org/isc/datasheet/28135#totaxonomicTree H. polysperma reduces biodiversity by competing with and	Very high
		known adverse impacts to wild stocks or commercial taxa?		displacing native vegetation, and is capable of changing the fauna and flora of an ecosystem. H. polysperma can form dense monocultures which exclude all native plants and do not provide habitat or food for wildlife. H. polysperma is an excellent competitor due to its low light compensation and saturation points, which allow it to start growing in low light conditions before other native plants do. H. polysperma is also able to rapidly change resource acquisition in response to changing environmental conditions, allowing it to outcompete many other species (Spencer and Bowes, 1985). Decomposing mats of H. nolvsnerma also have the ability to cause fish kills by creating low	
	3.03 3.04	In the taxon's introduced range, are there known adverse impacts to aquaculture?	Yes Yes	Negatively impacts aquaculture/fisheries, dense populations; H. polysperma has limited water flow in irrigations channels and flood-control systems (UFL-IFAS, 2005). H. polysperma is also reported as being a threat to rice fields (Krombholz, 1996). CABI unsightly mats of vegetation decrease aesthetic values. These declares decrease decrease decrease decrease decrease.	Very high Very high
13	3.05	known adverse impacts to ecosystem services? In the taxon's introduced range, are there	Yes	declines in recreational and aesthetic values can decrease tourism, which can be a major source of livelihood within the community. H. polysperma can form dense mats that impede recreational	Very high
		known adverse socio-economic impacts?		activities such as boating, fishing, swimming, water skiing, canoeing, and kayaking. Herbicides typically used in controlling H. polysperma are estimated at costing between US\$988 to US\$1482 per hectare (US \$400 to US \$600 per acre), and total costs are even higher when labour and equipment are included (Cuda and Sutton, 2000). In an extreme case involving the use of fluridone in flowing water, control was achieved for a period of 20 months at a cost of US \$34,580 per hectare (Sutton, 1996).	
		<b>//Ecology</b> able (or persistence) traits			
		Is it likely that the taxon will be poisonous or pose other risks to human health?	No	https://www.cabi.org/isc/datasheet/28135#totaxonomicTree	Very high
	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/28135#totaxonomicTree	Very 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.cabi.org/isc/datasheet/28135#totaxonomicTree	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	Low oxygen conditions https://www.cabi.org/isc/datasheet/28135#totaxonomicTree	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	https://www.cabi.org/isc/datasheet/28135#totaxonomicTree	High
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes	https://www.cabi.org/isc/datasheet/28135#totaxonomicTree	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	Not evidences https://www.cabi.org/isc/datasheet/28135#totaxonomicTree	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	No	No information https://www.cabi.org/isc/datasheet/28135#totaxonomicTree	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	up to 3 m high https://www.cabi.org/isc/datasheet/28135#totaxonomicTree	High
23	4.10	Tereased from capability of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)?	Yes	H. polysperma can grow submersed in water up to 3m (10 ft) deep and as an immersed plant along banks, preferring flowing waters, but also found growing in slow-moving systems such as lakes, marshes, canals, rivers, swamps, wetlands, and irrigation ditches (FNW Disseminules, 2007).	High
24	4.11	Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa?	Yes	reduces level of oxygen	High
25	4.12	Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)?	Yes	probably yes https://www.cabi.org/isc/datasheet/28135#tohabitat	Medium
	1	e exploitation			
	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	Not applicable Yes	https://www.cabi.org/isc/datasheet/28135#tohabitat https://www.cabi.org/isc/datasheet/28135#tohabitat	Very high Medium
27	5.02	resources (including nutrients) to the detriment of native taxa in the RA area?	res	nttps://www.cabi.org/isc/uatasneet/28135#tonabitat	Mediam
	Reprodu 6.01	<i>iction</i> Is the taxon likely to exhibit parental care	Not applicable	https://www.cabi.org/isc/datasheet/28135#tohabitat	Very high
20	0.01	and/or to reduce age-at-maturity in response to environmental conditions?		https://www.cabi.org/isc/datasneet/20155#tonabitat	very nigh
29	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	https://www.cabi.org/isc/datasheet/28135#tohabitat	High
	6.03	Is the taxon likely to hybridise naturally with native taxa?	No	No data	Medium
31	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	Yes	asexual reproduction https://www.cabi.org/isc/datasheet/28135#tohabitat	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	https://www.cabi.org/isc/datasheet/28135#tohabitat	Very high
33	6.06	Is the taxon known (or likely) to produce a large number of propagules or offspring	Yes	inFlorida high spore production https://www.cabi.org/isc/datasheet/28135#tohabitat	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-	1	1 year https://www.cabi.org/isc/datasheet/28135#tohabitat	High
7 7		first-reproduction?			
		al mechanisms How many potential internal	>1	water, pet trade, biofouling	Very high
		vectors/pathways could the taxon use to disperse within the RA area (with suitable		https://www.cabi.org/isc/datasheet/28135#tohabitat	, 5
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	Not yet present	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	Yes	https://www.cabi.org/isc/datasheet/28135#tohabitat	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, code, control in the DA area?	Yes	https://www.cabi.org/isc/datasheet/109069	Very high
39	7.05	(for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to	Yes	https://www.cabi.org/isc/datasheet/109069	Medium
		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 migrate in the RA area for reproduction?	Not applicable	it is not migratory species	Very high
41	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	Yes	H. polysperma can be transported with wildlife and carried to new locations (DCR, 2003).	Medium
42	7.08	Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or intentional) likely to be	Yes	Has high reproductive potential, Has propagules that can remain viable for more than one year	Medium
		Is dispersal of the taxon density dependent?	No	It is not density dependent	High
		<i>ce attributes</i> Is the taxon able to withstand being out of	Yes	Has propagulas that can remain viable for more than one 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?	165	Has propagules that can remain viable for more than one year	High

	8.02	Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being considered.] Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	Yes	. polysperma is an excellent competitor due to its low light compensation and saturation points, which allow it to start growing in low light conditions before other native plants do. H. polysperma is also able to rapidly change resource acquisition in response to changing environmental conditions, allowing it to outcompete many other species (Spencer and Bowes, 1985). Decomposing mats of H. polysperma also have the ability to cause fish kills by creating low oxygen levels in the water (DCR. 2003). Herbicides typically used in controlling H. polysperma are estimated at costing between US\$988 to US\$1482 per hectare (US \$400 to US \$600 per acre), and total costs are even higher when labour and equipment are included (Cuda and Sutton, 2000). In an extreme case involving the use of fluridone in	High
				flowing water, control was achieved for a period of 20 months at a cost of US \$34.580 per hectare (Sutton, 1996).	
	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	No	https://www.cabi.org/isc/datasheet/28135#tohabitat	Low
48	8.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	No	No data, but probably can't	Low
49	8.06	Are there effective natural enemies (predators) of the taxon present in the RA area?	Yes	Introduced grass carp can control it http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.1059.7 979&rep=rep1&type=pdf; https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1095- 8649.1981.tb02&09.x	Medium
С. С	Climate	e change			
		change	1		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?	No change	Prefered climate is worm temperate climate and tropical wet and dry	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 optimum temperature for H. polysperma is 22-28°C (71-82°F), with a minimum temperature of 4°C (39°F), and maximum temperature of 30°C (	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	https://www.cabi.org/isc/datasheet/28135#tohabitat	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	H. polysperma reduces biodiversity by competing with and displacing native vegetation, and is capable of changing the fauna and flora of an ecosystem. H. polysperma can form dense monocultures which exclude all native plants and do not provide habitat or food for wildlife.;	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 dense stands and mats of vegetation that are characteristic of this species when introduced outside of its native range can decrease the oxygen levels by limiting water circulation and increased decomposition of dead plants. Damaged ecosystem	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	Medium

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Scores	
BRA	40.0
BRA Outcome	High
BRA+CCA	44.0
BRA+CCA Outcome	High
Score partition	
A. Biogeography/Historical	23.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	18.0
B. Biology/Ecology	17.0
4. Undesirable (or persistence) traits	8.0
5. Resource exploitation	2.0
6. Reproduction	4.0
7. Dispersal mechanisms	5.0
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	
2. Climate, distribution and introduction risk	
2. Climate, distribution and introduction risk 3. Invasive elsewhere	3 5 5
2. Climate, distribution and introduction risk 3. Invasive elsewhere <b>B. Biology/Ecology</b>	3 5 5 <b>36</b>
2. Climate, distribution and introduction risk 3. Invasive elsewhere <b>B. Biology/Ecology</b> 4. Undesirable (or persistence) traits	3 5 5 <b>36</b>
2. Climate, distribution and introduction risk 3. Invasive elsewhere <b>B. Biology /Ecology</b> 4. Undesirable (or persistence) traits 5. Resource exploitation	3 5 5 <b>36</b>
2. Climate, distribution and introduction risk 3. Invasive elsewhere <b>B. Biology/Ecology</b> 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction	3 5 5 <b>36</b>
2. Climate, distribution and introduction risk 3. Invasive elsewhere <b>B. Biology/Ecology</b> 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms	3 5 5 <b>36</b>
2. Climate, distribution and introduction risk 3. Invasive elsewhere <b>B. Biology/Ecology</b> 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes	3 5 5 36 12 2 7 7 9 6
2. Climate, distribution and introduction risk 3. Invasive elsewhere <b>B. Biology/Ecology</b> 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes <b>C. Climate change</b>	3 5 36 12 2 7 9 9 6 6
2. Climate, distribution and introduction risk 3. Invasive elsewhere <b>B. Biology/Ecology</b> 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes <b>C. Climate change</b> 9. Climate change	3 5 5 36 12 2 7 7 9 6
2. Climate, distribution and introduction risk 3. Invasive elsewhere <b>B. Biology/Ecology</b> 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes <b>C. Climate change</b> 9. Climate change	3 5 5 36 12 2 2 7 9 6 6 6 6
2. Climate, distribution and introduction risk 3. Invasive elsewhere <b>B. Biology/Ecology</b> 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes <b>C. Climate change</b> 9. Climate change <b>Sectors affected</b> <b>Commercial</b>	3 5 36 12 2 7 9 6 6 6 6 18
2. Climate, distribution and introduction risk 3. Invasive elsewhere <b>B. Biology/Ecology</b> 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes <b>C. Climate change</b> 9. Climate change	3 5 5 36 12 2 2 7 9 6 6 6 6

Thresholds	
BRA	24.75
BRA+CCA	24.75
Confidence	
BRA+CCA	0.69
BRA	0.70
CCA	0.58
Date and Time	
23/11/20	21 16:58:33

Taxon and Assessor details					
Category	Plantae (freshwater)				
Taxon name	Lemna aequinoctialis				
Common name	lesser duckweed				
Assessor	Marina Piria				
Risk screening context					
Reason and socio-economic benefits					
Risk assessment area	Mediterranean region				
Taxonomy					
Native range					
Introduced range					
URL					

			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	Lemna aequinoctialis has been introduced to temperate areas in Europe, central North America, northern China and Japan through rice cultivation, as fish food and for ornamental purposes (Bengtsson et al., 1999; Ryman and Anderberg, 1999). I	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	Lemna aequinoctialis has been introduced to temperate areas in Europe, central North America, northern China and Japan through rice cultivation, as fish food and for ornamental purposes (Bengtsson et al., 1999; Ryman and Anderberg, 1999). I	Very high
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	Lemna minuta https://www.cabi.org/isc/datasheet/108968	Very 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	Preferred climate Cs - Warm temperate climate with dry summer similar as RA	High
5	2.02	What is the quality of the climate matching data?	High	Climatch	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	No	https://www.cabi.org/isc/datasheet/121132#tosimilaritiesToOther SpeciesOrConditions	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	>1	Aquaculture, debris, animals, https://www.cabi.org/isc/datasheet/121132#topathwayVectors	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	Hungary aturalized https://www.cabi.org/isc/datasheet/121132#tointroductions	Low
		and intentional introductions)?			
		e elsewhere			
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	Germany, Hungary https://www.cabi.org/isc/datasheet/121132#38a70df6-0555-43c1- 9d8d-fd2304676293	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	L. aequinoctialis is one of the species that restricts the proper functioning of ponds, and contributes to eutrophication (Sengupta et al., 2010). Generally, invasive aquatic plants can affect microinvertebrate communities (Lukács et al., 2016).	Medium
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	Yes	L. aequinoctialis is one of the species that restricts the proper functioning of ponds, and contributes to eutrophication (Sengupta et al., 2010).	Medium
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	Yes	amenities https://www.cabi.org/isc/datasheet/121132#38a70df6- 0555-43c1-9d8d-fd2304676293	High
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	Yes	can impact human activities such as boating, swimming and hydroelectric power plants (Hussner et al., 2010).	Very high
<b>B.</b>	Biology	y/Ecology			
4. l	Indesir	able (or persistence) traits			
		Is it likely that the taxon will be poisonous or pose other risks to human health?	No	The species is useful as an indicator of phytotoxic contaminants in irrigation water in urbanized areas (Bengtsson et al., 1999). It is a good food source for humans and livestock due to its high protein content and high digestibility (Leng et al., 1995; Appenroth et al., 2017).	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	Dense aggregations of duckweeds in eutrophic waters can reduce light penetration and pond aeration causing anoxia and fish death (Benatsson et al., 1999)	Medium
	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	https://www.cabi.org/isc/datasheet/121132#38a70df6-0555-43c1- 9d8d-fd2304676293	
17	4.04	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?	Yes	It will tolerate temperatures from 6 to 33°C and pH from 3.2 to 9; optimal growth occurs at 20-28°C and pH 6.5-7.5. A minimum water depth of 0.30 m is desirable and levels of 60 mg/l of soluble nitrogen and 1 mg/l of phosphorus are required for normal growth (Gherardi, 2007). It grows abundantly at high phosphorus and chlorophyll a concentrations (Mukhopadhyay and Dewanji, 2005). Cs - Warm temperate climate with dry summer Preferred Warm average temp. > 10°C. Cold average temp. > 0°C. dry summers	Medium
	4.05	Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA area?	Yes	the submerged vegetation is reduced when L. aequinoctialis cover is higher than 40% (Sengupta et al., 2010). Dense aggregations of duckweeds in eutrophic waters can reduce light penetration and pond aeration causing anoxia and fish death (Bengtsson et al., 1999). Generally, invasive aquatic plants can affect microinvertebrate communities (Lukács et al., 2016).	High
	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes	nvasive aquatic plants can impact human activities such as boating, swimming and hydroelectric power plants (Hussner et al.,	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	Nodata https://www.cabi.org/isc/datasheet/121132#38a70df6- 0555-43c1-9d8d-fd2304676293	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 datahttps://www.cabi.org/isc/datasheet/121132#38a70df6- 0555-43c1-9d8d-fd2304676293	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	a tiny free-floating aquatic plan	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	can be found in mesotrophic to eutrophic lentic waters of lakes, pools, ponds, rice fields and ditches and warm-temperate to tropical climates from sea level to 2800 m (Landolt, 1992; Beentje and Lansdown, 2018; Flora of China Editorial Committee, 2017).	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?	Yes	Dense aggregations of duckweeds in eutrophic waters can reduce light penetration and pond aeration causing anoxia and fish death (Bengtsson et al., 1999).	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)?	Yes	the species has a high reproductive capability that is advantageous in eutrophic lentic water (Appenroth et al., 2013).	High
		te exploitation Is the taxon likely to consume threatened or	Not applicable	https://www.cabi.org/isc/datasheet/121132#tohabitat	Very high
7	5.02	protected native taxa in the RA area? Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?	No	https://www.cabi.org/isc/datasheet/121132#tohabitat	Low
	Reprodu	uction			
		Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?		https://www.cabi.org/isc/datasheet/121132#tohabitat	Very high
9	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	https://www.cabi.org/isc/datasheet/121132#tohabitat	High
0	6.03	Is the taxon likely to hybridise naturally with native taxa?	Yes	Vegetative reproduction occurs but natural hybridization is likely possible https://link.springer.com/article/10.1007/s00425-014-	Low
1	6.04	Is the taxon likely to be hermaphroditic or to	Yes	reproduces vegetatively by plant buds	Very high
2	6.05	display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	No	https://www.cabi.org/isc/datasheet/121132#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/121132#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	https://www.cabi.org/isc/datasheet/121132#tobiologyAndEcology	Very high
		al mechanisms	Г. <b>.</b>		
5	7.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable	>1	water, debris, birds and ducks, aquaculture https://www.cabi.org/isc/datasheet/121132#tobiologyAndEcology	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	It is not yet present in captivity of RA	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	it is floating plant	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	may be introduced to new water areas by slow-moving water along interconnected watercourses and by floods (Hicks, 1937).	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	may be introduced to new water areas by slow-moving water along interconnected watercourses and by floods (Hicks, 1937).	Medium
0	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	Not applicable	it is not migratory species	Very high
1	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	Yes	Lemna species can be distributed by birds, fish and mammals over short distances (Hicks, 1937; Flora of North America Editorial	High
				Committee, 2017).	
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	Committee, 2017).	High
	7.08	Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous	Yes	Committee, 2017). Duckweeds may be introduced to new water areas by slow-moving water along interconnected watercourses and by floods (Hicks, 1937). https://www.cabi.org/isc/datasheet/121132#tomeansOfMovement	5
3	7.09	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		Committee, 2017). Duckweeds may be introduced to new water areas by slow-moving water along interconnected watercourses and by floods (Hicks, 1937).	
3	7.09 Toleran	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		Committee, 2017). Duckweeds may be introduced to new water areas by slow-moving water along interconnected watercourses and by floods (Hicks, 1937). https://www.cabi.org/isc/datasheet/121132#tomeansOfMovement	
3 <u>. 7</u> 4	7.09 Toleran	Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the	No	Committee, 2017). Duckweeds may be introduced to new water areas by slow-moving water along interconnected watercourses and by floods (Hicks, 1937). https://www.cabi.org/isc/datasheet/121132#tomeansOfMovement AndDispersal	Medium
13 14 15	7.09 Foleran 8.01	Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that	No	Committee, 2017). Duckweeds may be introduced to new water areas by slow-moving water along interconnected watercourses and by floods (Hicks, 1937). https://www.cabi.org/isc/datasheet/121132#tomeansOfMovement AndDispersal seeds probably yes can be found in mesotrophic to eutrophic lentic waters of lakes, pools, ponds, rice fields and ditches and warm-temperate to	Medium

48	8.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in	No	Can tolerate but not clear if can persist in brackish water https://link.springer.com/article/10.1007/s00425-015-2264-x	Low
49	8.06	its usual environment? Are there effective natural enemies (predators) of the taxon present in the RA	Yes	Waterbodies in adriatic basin are not all connected, so introduced herbivoreouus are present only in limited numberof waterbodies.	Low
С.	Climat	e change		incronvorcours are present only in inniced numberor waterboares.	
		e change			
_		Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?	Increase	Environmental requirements limit its spread into temperate areas (Crawford et al., 2001), but climate change could potentially expand the range of distribution.Vélez-Gavilán J, 2017. Lemna aequinoctialis (lesser duckweed). Invasive Species Compendium.	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	Wallingford, UK: CABI. DOI:10.1079/ISC.121132.20203483098 Environmental requirements limit its spread into temperate areas (Crawford et al., 2001), but climate change could potentially expand the range of distribution. Establishment likely will increase but no evidence for RA	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	Environmental requirements limit its spread into temperate areas (Crawford et al., 2001), but climate change could potentially expand the range of distribution. Probably not change because waterbodies are not connected	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	Environmental requirements limit its spread into temperate areas (Crawford et al., 2001), but climate change could potentially expand the range of distribution.	Low
54	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Higher	Environmental requirements limit its spread into temperate areas (Crawford et al., 2001), but climate change could potentially expand the range of distribution.	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	Environmental requirements limit its spread into temperate areas (Crawford et al., 2001), but climate change could potentially expand the range of distribution.Preferred climate is Cs - Warm temperate climate with dry summer which already exist in Adriatic basin but risk can be higher if this climate expand its range by	Medium

Statistics	
Scores	
BRA	40.0
BRA Outcome	High
BRA+CCA	48.0
BRA+CCA Outcome	High
Score partition	
A. Biogeography/Historical	23.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	18.0
B. Biology/Ecology	17.0
4. Undesirable (or persistence) traits	6.0
5. Resource exploitation	0.0
6. Reproduction	6.0
7. Dispersal mechanisms	3.0
8. Tolerance attributes	2.0
C. Climate change	8.0
9. Climate change	8.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	3 5 5 36 12
B. Biology/Ecology	36
1 Undesirable (or parsistence) traits	
4. Undesirable (or persistence) traits	
5. Resource exploitation	2
5. Resource exploitation 6. Reproduction	<u> </u>
5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms	2 7 9
5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes	2 7 9 6
5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms	6
5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes <b>C. Climate change</b> 9. Climate change	
5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes <b>C. Climate change</b> 9. Climate change <b>Sectors affected</b>	<b>6</b> 6
5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes <b>C. Climate change</b> 9. Climate change <b>Sectors affected</b> <b>Commercial</b>	6 6 20
5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes <b>C. Climate change</b> 9. Climate change <b>Sectors affected</b> <b>Commercial</b> <b>Environmental</b>	6 6 20 9
5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes <b>C. Climate change</b> 9. Climate change <b>Sectors affected</b> <b>Commercial</b>	6 6 20
5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes <b>C. Climate change</b> 9. Climate change <b>Sectors affected</b> <b>Commercial</b> <b>Environmental</b>	6 6 20 9

Thresholds		
	BRA	24.75
	BRA+CCA	24.75
Confidence		
	BRA+CCA	0.70
	BRA	0.72
	CCA	0.46
-		
Date and Time		
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AS-ISK v2	
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Taxon and Assessor details					
Category	Plantae (freshwater)				
Taxon name	Lemna minuta				
Common name	least duckweed				
Assessor	Marina Piria				
Risk screening context					
Reason and socio-economic benefits					
Risk assessment area	Mediterranean region				
Taxonomy					
Native range					
Introduced range					
URL					

			Response	Justification (references and/or other information)	Confidence
A. Bio	ogeo	graphy/Historical	-		
1. Doi		ication/Cultivation			
1 1.	.01	Has the taxon been the subject of	Yes	reared in garden ponds and escaped	Very high
		domestication (or cultivation) for at least 20		https://www.cabi.org/isc/datasheet/108968#todescription	
	0.0	generations?			
2 1.	.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	for garden ponds https://www.cabi.org/isc/datasheet/108968#todescription	High
3 1.	.03	Does the taxon have invasive races,	Yes	Lemna aequinocitalis, L. turionifera	Very high
5 1.		varieties, sub-taxa or congeners?	105	https://www.tandfonline.com/doi/full/10.1080/11263504.2014.98	very mgn
		rancies, cas taxa er congenerer		7846	
2. Clir	imate,	, distribution and introduction risk			
4 2.	2.01		High	This is cosmopilitan species native of temperate and subtropical	Very high
		Risk Assessment (RA) area and the taxon's		areas of North and South America. From South America extending	
		native range?		through to Central America and West Indies extended northward	
				along the high mountains to Mexico and California (Flora of North	
				America, 2008; Armstrong, 2009). Very common throughout the	
				southeastern and southwestern United States (USDA-ARS, 2009)	
				with some scarce distribution in the centre of the country (Flora of North America, 2008). Larson and Searcy (2007) reported its	
				presence in Massachussetts recently (2005). The species has been	
				introduced in western Europe and Japan (Landolt, 1986; Reveal,	
				1990) and may well be expected to be discovered elsewhere	
				(Reveal, 1990) because it is almost certainly under-recorded, due	
				its similarity with L. minor (Preston and Croft, 1997).	
5 2.	2.02	What is the quality of the climate matching	High	It occurs in temperate to subtropical regions with relatively mild	Very high
		data?		winters (Flora of North America, 2008) and prefers a	
62.	.03	Is the taxen already present systems of	Yes	Mediterranean climate (Landolt, 1986) with high water	Vony hich
0 Z.	.05	Is the taxon already present outside of captivity in the RA area?	res	https://www.cabi.org/isc/datasheet/108968#todescription	Very high
7 2	2.04	How many potential vectors could the taxon	>1	water, wind, pet trade	Very high
, L.		use to enter in the RA area?	- 1	https://www.cabi.org/isc/datasheet/108968#todescription	very mgn
8 2.	2.05	Is the taxon currently found in close	Yes	Hungary - Danube basin, Poland, Germany	Low
		proximity to, and likely to enter into, the RA			
		area in the near future (e.g. unintentional			
		and intentional introductions)?			
		e elsewhere			
9 3.	8.01	Has the taxon become naturalised	Yes	https://www.cabi.org/isc/datasheet/108968#todescription	Very high
10 3.	02	(established viable populations) outside its In the taxon's introduced range, are there	No	https://www.cabi.org/isc/datasheet/108968#todescription	Low
10 5.		known adverse impacts to wild stocks or	110		2011
		commercial taxa?			
11 3.	8.03	In the taxon's introduced range, are there	No	https://www.cabi.org/isc/datasheet/108968#todescription	Low
		known adverse impacts to aquaculture?			
12 3.	8.04	In the taxon's introduced range, are there	Yes	Reduced amenity values	High
				https://www.cabi.org/isc/datasheet/108968#todescription	
		known adverse impacts to ecosystem			
13 5.	8.05	In the taxon's introduced range, are there	Yes	Carpets (mats) can occasionally impede activities (navigation,	High
13 5	8.05		Yes	Carpets (mats) can occasionally impede activities (navigation, bathing, fishing) and are sometimes perceived by the local	High
15 5	8.05	In the taxon's introduced range, are there	Yes	Carpets (mats) can occasionally impede activities (navigation, bathing, fishing) and are sometimes perceived by the local residents as a symbol of contamination of waters;	High
		In the taxon's introduced range, are there	Yes	Carpets (mats) can occasionally impede activities (navigation, bathing, fishing) and are sometimes perceived by the local	High
<b>B. Bic</b> 4. Und	ology odesira	In the taxon's introduced range, are there known adverse socio-economic impacts? //Ecology able (or persistence) traits		Carpets (mats) can occasionally impede activities (navigation, bathing, fishing) and are sometimes perceived by the local residents as a symbol of contamination of waters; https://www.cabi.org/isc/datasheet/108968#todescription	
<b>B. Bic</b> 4. Und	ology odesira	In the taxon's introduced range, are there known adverse socio-economic impacts? //Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or		Carpets (mats) can occasionally impede activities (navigation, bathing, fishing) and are sometimes perceived by the local residents as a symbol of contamination of waters;	High
<b>B. Bic</b> 4. Und 14 4.	ology desira	In the taxon's introduced range, are there known adverse socio-economic impacts? //Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health?	No	Carpets (mats) can occasionally impede activities (navigation, bathing, fishing) and are sometimes perceived by the local residents as a symbol of contamination of waters; https://www.cabi.org/isc/datasheet/108968#todescription https://www.cabi.org/isc/datasheet/108968#todescription	High
<b>B. Bic</b> 4. Und	ology desira	In the taxon's introduced range, are there known adverse socio-economic impacts? //Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or		Carpets (mats) can occasionally impede activities (navigation, bathing, fishing) and are sometimes perceived by the local residents as a symbol of contamination of waters; https://www.cabi.org/isc/datasheet/108968#todescription https://www.cabi.org/isc/datasheet/108968#todescription often grows with the other duckweeds (e.g., Spirodela, Landoltia,	
<b>B. Bic</b> 4. Und 14 4.	ology desira	In the taxon's introduced range, are there known adverse socio-economic impacts? //Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or	No	Carpets (mats) can occasionally impede activities (navigation, bathing, fishing) and are sometimes perceived by the local residents as a symbol of contamination of waters; https://www.cabi.org/isc/datasheet/108968#todescription https://www.cabi.org/isc/datasheet/108968#todescription often grows with the other duckweeds (e.g., Spirodela, Landoltia, Wolffia, Wolffiella) and occupy a similar niche to Azolla filiculoides	High
<b>B. Bic</b> 4. Uno 14 4. 15 4.	ology adesira 1.01	In the taxon's introduced range, are there known adverse socio-economic impacts? //Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	No	Carpets (mats) can occasionally impede activities (navigation, bathing, fishing) and are sometimes perceived by the local residents as a symbol of contamination of waters; https://www.cabi.org/isc/datasheet/108968#todescription https://www.cabi.org/isc/datasheet/108968#todescription often grows with the other duckweeds (e.g., Spirodela, Landoltia, Wolffia, Wolffiella) and occupy a similar niche to Azolla filiculoides (Armstrong, 2009).	High Medium
<b>B. Bic</b> 4. Und 14 4.	ology adesira 1.01	In the taxon's introduced range, are there known adverse socio-economic impacts? //Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa	No	Carpets (mats) can occasionally impede activities (navigation, bathing, fishing) and are sometimes perceived by the local residents as a symbol of contamination of waters; https://www.cabi.org/isc/datasheet/108968#todescription https://www.cabi.org/isc/datasheet/108968#todescription often grows with the other duckweeds (e.g., Spirodela, Landoltia, Wolffia, Wolffiella) and occupy a similar niche to Azolla filiculoides	High
<b>B. Bic</b> 4. Uno 14 4. 15 4.	ology adesira 1.01	In the taxon's introduced range, are there known adverse socio-economic impacts? //Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	No	Carpets (mats) can occasionally impede activities (navigation, bathing, fishing) and are sometimes perceived by the local residents as a symbol of contamination of waters; https://www.cabi.org/isc/datasheet/108968#todescription https://www.cabi.org/isc/datasheet/108968#todescription often grows with the other duckweeds (e.g., Spirodela, Landoltia, Wolffia, Wolffiella) and occupy a similar niche to Azolla filiculoides (Armstrong, 2009).	High Medium
<b>B. Bic</b> 4. Uno 14 4. 15 4.	ology adesira 1.01 1.02	In the taxon's introduced range, are there known adverse socio-economic impacts? //Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in	No	Carpets (mats) can occasionally impede activities (navigation, bathing, fishing) and are sometimes perceived by the local residents as a symbol of contamination of waters; https://www.cabi.org/isc/datasheet/108968#todescription https://www.cabi.org/isc/datasheet/108968#todescription often grows with the other duckweeds (e.g., Spirodela, Landoltia, Wolffia, Wolffiella) and occupy a similar niche to Azolla filiculoides (Armstrong, 2009).	High Medium
<b>B. Bic</b> 4. Uno 14 4. 15 4. 16 4.	ology adesira 1.01 1.02	In the taxon's introduced range, are there known adverse socio-economic impacts? //Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No No No	Carpets (mats) can occasionally impede activities (navigation, bathing, fishing) and are sometimes perceived by the local residents as a symbol of contamination of waters; https://www.cabi.org/isc/datasheet/108968#todescription https://www.cabi.org/isc/datasheet/108968#todescription often grows with the other duckweeds (e.g., Spirodela, Landoltia, Wolffia, Wolffiella) and occupy a similar niche to Azolla filiculoides (Armstrong, 2009). https://www.cabi.org/isc/datasheet/108968#todescription	High Medium Very high
<b>B. Bic</b> 4. Uno 14 4. 15 4. 16 4.	ology adesira 1.01 1.02	In the taxon's introduced range, are there known adverse socio-economic impacts? <b>//Ecology</b> 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 No	Carpets (mats) can occasionally impede activities (navigation, bathing, fishing) and are sometimes perceived by the local residents as a symbol of contamination of waters; https://www.cabi.org/isc/datasheet/108968#todescription https://www.cabi.org/isc/datasheet/108968#todescription often grows with the other duckweeds (e.g., Spirodela, Landoltia, Wolffia, Wolffiella) and occupy a similar niche to Azolla filiculoides (Armstrong, 2009). https://www.cabi.org/isc/datasheet/108968#todescription	High Medium Very high
<b>B. Bic</b> 4. Und 14 4. 15 4. 16 4. 17 4.	ology desira 1.01 1.02 1.03	In the taxon's introduced range, are there known adverse socio-economic impacts? <b>//Ecology able</b> (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	Carpets (mats) can occasionally impede activities (navigation, bathing, fishing) and are sometimes perceived by the local residents as a symbol of contamination of waters; https://www.cabi.org/isc/datasheet/108968#todescription https://www.cabi.org/isc/datasheet/108968#todescription often grows with the other duckweeds (e.g., Spirodela, Landoltia, Wolffia, Wolffiella) and occupy a similar niche to Azolla filiculoides (Armstrong, 2009). https://www.cabi.org/isc/datasheet/108968#todescription Prefer warm climates so Mediterrnean climate is tolerale	High Medium Very high High
<b>B. Bic</b> 4. Uno 14 4. 15 4. 16 4.	ology desira 1.01 1.02 1.03	In the taxon's introduced range, are there known adverse socio-economic impacts? <b>//Ecology</b> 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	No No No	Carpets (mats) can occasionally impede activities (navigation, bathing, fishing) and are sometimes perceived by the local residents as a symbol of contamination of waters; https://www.cabi.org/isc/datasheet/108968#todescription https://www.cabi.org/isc/datasheet/108968#todescription often grows with the other duckweeds (e.g., Spirodela, Landoltia, Wolffia, Wolffiella) and occupy a similar niche to Azolla filiculoides (Armstrong, 2009). https://www.cabi.org/isc/datasheet/108968#todescription Prefer warm climates so Mediterrnean climate is tolerale A blanketing growth over a large area leads to deoxygenation and	High Medium Very high
<b>B. Bic</b> 4. Und 14 4. 15 4. 16 4. 17 4.	ology desira 1.01 1.02 1.03	In the taxon's introduced range, are there known adverse socio-economic impacts? <b>//Ecology</b> 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 Yes	Carpets (mats) can occasionally impede activities (navigation, bathing, fishing) and are sometimes perceived by the local residents as a symbol of contamination of waters; https://www.cabi.org/isc/datasheet/108968#todescription https://www.cabi.org/isc/datasheet/108968#todescription often grows with the other duckweeds (e.g., Spirodela, Landoltia, Wolffia, Wolffiella) and occupy a similar niche to Azolla filiculoides (Armstrong, 2009). https://www.cabi.org/isc/datasheet/108968#todescription Prefer warm climates so Mediterrnean climate is tolerale A blanketing growth over a large area leads to deoxygenation and fish-kills in hot weather, as well as a decrease in invertebrate	High Medium Very high High
<b>B. Bic</b> 4. Und 14 4. 15 4. 16 4. 17 4.	ology desira 1.01 1.02 1.03	In the taxon's introduced range, are there known adverse socio-economic impacts? <b>//Ecology</b> 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	Carpets (mats) can occasionally impede activities (navigation, bathing, fishing) and are sometimes perceived by the local residents as a symbol of contamination of waters; https://www.cabi.org/isc/datasheet/108968#todescription https://www.cabi.org/isc/datasheet/108968#todescription often grows with the other duckweeds (e.g., Spirodela, Landoltia, Wolffial, Wolffiella) and occupy a similar niche to Azolla filiculoides (Armstrong, 2009). https://www.cabi.org/isc/datasheet/108968#todescription Prefer warm climates so Mediterrnean climate is tolerale A blanketing growth over a large area leads to deoxygenation and fish-kills in hot weather, as well as a decrease in invertebrate diversity (Bramley et al., 1995). These thick, floating mats of	High Medium Very high High
<b>B. Bic</b> 4. Und 14 4. 15 4. 16 4. 17 4.	ology desira 1.01 1.02 1.03	In the taxon's introduced range, are there known adverse socio-economic impacts? <b>//Ecology</b> 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 Yes	Carpets (mats) can occasionally impede activities (navigation, bathing, fishing) and are sometimes perceived by the local residents as a symbol of contamination of waters; https://www.cabi.org/isc/datasheet/108968#todescription https://www.cabi.org/isc/datasheet/108968#todescription often grows with the other duckweeds (e.g., Spirodela, Landoltia, Wolffia, Wolffiella) and occupy a similar niche to Azolla filiculoides (Armstrong, 2009). https://www.cabi.org/isc/datasheet/108968#todescription Prefer warm climates so Mediterrnean climate is tolerale A blanketing growth over a large area leads to deoxygenation and fish-kills in hot weather, as well as a decrease in invertebrate diversity (Bramley et al., 1995). These thick, floating mats of vegetation could reduce submerged plant diversity by selecting a	High Medium Very high High
B. Bic           4. Uno           14           15           4.           15           4.           16           17           4.           18           4.	<b>ology</b> <i>desira</i> 4.01 4.02 4.03 4.04	In the taxon's introduced range, are there known adverse socio-economic impacts?  //Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in 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 area?	No No Yes Yes	Carpets (mats) can occasionally impede activities (navigation, bathing, fishing) and are sometimes perceived by the local residents as a symbol of contamination of waters; https://www.cabi.org/isc/datasheet/108968#todescription https://www.cabi.org/isc/datasheet/108968#todescription often grows with the other duckweeds (e.g., Spirodela, Landoltia, Wolffia, Wolffiella) and occupy a similar niche to Azolla filiculoides (Armstrong, 2009). https://www.cabi.org/isc/datasheet/108968#todescription Prefer warm climates so Mediterrnean climate is tolerale A blanketing growth over a large area leads to deoxygenation and fish-kills in hot weather, as well as a decrease in invertebrate diversity (Bramley et al., 1995). These thick, floating mats of vegetation could reduce submerged plant diversity by selecting a few tolerant species (Janes et al., 1996).	High Medium Very high High Very high
<b>B. Bic</b> 4. Und 14 4. 15 4. 16 4. 17 4.	<b>ology</b> <i>desira</i> 4.01 4.02 4.03 4.04	In the taxon's introduced range, are there known adverse socio-economic impacts? <b>//Ecology</b> 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	Carpets (mats) can occasionally impede activities (navigation, bathing, fishing) and are sometimes perceived by the local residents as a symbol of contamination of waters; https://www.cabi.org/isc/datasheet/108968#todescription https://www.cabi.org/isc/datasheet/108968#todescription often grows with the other duckweeds (e.g., Spirodela, Landoltia, Wolffia, Wolffiella) and occupy a similar niche to Azolla filiculoides (Armstrong, 2009). https://www.cabi.org/isc/datasheet/108968#todescription Prefer warm climates so Mediterrnean climate is tolerale A blanketing growth over a large area leads to deoxygenation and fish-kills in hot weather, as well as a decrease in invertebrate diversity (Bramley et al., 1995). These thick, floating mats of vegetation could reduce submerged plant diversity by selecting a	High Medium Very high High
B. Bic           4. Uno           14           15           4.           15           4.           16           17           4.           18           4.	ology desire i.01 i.02 i.03 i.04 i.04	In the taxon's introduced range, are there known adverse socio-economic impacts? <i>//Ecology</i> <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? 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	No No Yes Yes	Carpets (mats) can occasionally impede activities (navigation, bathing, fishing) and are sometimes perceived by the local residents as a symbol of contamination of waters; https://www.cabi.org/isc/datasheet/108968#todescription https://www.cabi.org/isc/datasheet/108968#todescription often grows with the other duckweeds (e.g., Spirodela, Landoltia, Wolffia, Wolffiella) and occupy a similar niche to Azolla filiculoides (Armstrong, 2009). https://www.cabi.org/isc/datasheet/108968#todescription Prefer warm climates so Mediterrnean climate is tolerale A blanketing growth over a large area leads to deoxygenation and fish-kills in hot weather, as well as a decrease in invertebrate diversity (Bramley et al., 1995). These thick, floating mats of vegetation could reduce submerged plant diversity by selecting a few tolerant species (Janes et al., 1996).	High Medium Very high High Very high
B. Bic           4. Una           14           15           16           17           18           19	ology desire i.01 i.02 i.03 i.04 i.04	In the taxon's introduced range, are there known adverse socio-economic impacts? <b>//Ecology</b> 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?	No No Yes Yes	Carpets (mats) can occasionally impede activities (navigation, bathing, fishing) and are sometimes perceived by the local residents as a symbol of contamination of waters; https://www.cabi.org/isc/datasheet/108968#todescription https://www.cabi.org/isc/datasheet/108968#todescription often grows with the other duckweeds (e.g., Spirodela, Landoltia, Wolffial, Wolffiella) and occupy a similar niche to Azolla filiculoides (Armstrong, 2009). https://www.cabi.org/isc/datasheet/108968#todescription Prefer warm climates so Mediterrnean climate is tolerale A blanketing growth over a large area leads to deoxygenation and fish-kills in hot weather, as well as a decrease in invertebrate diversity (Bramley et al., 1995). These thick, floating mats of vegetation could reduce submerged plant diversity by selecting a few tolerant species (Janes et al., 1996). sports on the water, fishing	High Medium Very high High 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	Not enough data https://www.cabi.org/isc/datasheet/108968#todescription	Low
22	4.09	Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity?	No	small species	Very high
23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)?	Yes	grows in slow-moving, calm, freshwater ponds and marshes (Armstrong, 2009), and stagnant freshwater habitats such as wetlands like in the Pantanal (Brazil) (Pott and Cervi, 1999). It occurs in temperate to subtropical regions with relatively mild winters (Flora of North America, 2008) and prefers a Mediterranean climate (Landolt, 1986) with high water temperature in summer. L. minuta is found in its introduced areas in sluggishly moving waters of ponds, pools, lakes, swamps, streams, drainade ditches, canals, and sloughs (Preston and Croft.	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	It affects the ecology of its habitat by forming mats on the water surface, reducing sunlight penetration and oxygen exchange. In Poland, it has been found in a nature reserve (Banaszek and Musial, 2009). Mats of free-floating plants such as L. minuta are well known to cause physico-chemical changes in the water beneath them (e.g. Pokorny and Rejmankova, 1983).	Very high
	4.12	Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)?	Yes	Fast growing Has high reproductive potential Has propagules that can remain viable for more than one year Reproduces asexually	Very high
	5.01	te exploitation Is the taxon likely to consume threatened or	Not applicable	https://www.cabi.org/isc/datasheet/108968#tohabitat	Very high
77	5.02	protected native taxa in the RA area? Is the taxon likely to sequester food	Yes	Modification of nutrient regime	Very high
		resources (including nutrients) to the detriment of native taxa in the RA area?	Tes	https://www.cabi.org/isc/datasheet/108968#tohabitat	Very high
	eprodu 6.01	Iction Is the taxon likely to exhibit parental care	Not applicable	https://www.cabi.org/isc/datasheet/108968#tohabitat	Very high
		and/or to reduce age-at-maturity in response to environmental conditions?			
	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	Has propagules that can remain viable for more than one year	Very high
30	6.03	Is the taxon likely to hybridise naturally with native taxa?	No	Maybe possible, but not enough data https://link.springer.com/article/10.1007/s00425-014-2053-y	Low
31	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	Yes	asexual	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	https://www.cabi.org/isc/datasheet/108968#tohabitat	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	Fast growing Has high reproductive potential Has propagules that can remain viable for more than one year Reproduces asexually	Very high
34	6.07	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	1	https://www.cabi.org/isc/datasheet/108968#tohabitat	Very high
		al mechanisms			I
35	7.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable	>1	pet trade, by birds and mammals, fish restocking	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	not yet present	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?	Yes	fragments, seeds	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	Possibility of natural dispersal between basins is low,but could be possible by wind	Low
40	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	Not applicable	not migratory species	Very high
41	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	Yes	yes by birds and mammals	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 unintentional or intentional) likely to be	Yes	https://www.cabi.org/isc/datasheet/108968#tohabitat	High
	7.09	Is dispersal of the taxon density dependent?	No	https://www.cabi.org/isc/datasheet/108968#tohabitat	High
		ce attributes	Voc	leade	High
44	8.01	Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life	Yes	seeds	High
45	8.02	cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being	Yes	Highly adaptable to different environments Is a habitat generalist Tolerates, or benefits from, cultivation, browsing pressure, mutilation, fire etc Pioneering in disturbed areas Tolerant of shadeand, are strongly resistant to pollution	High

	8.03	Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	Yes	Destroying the duckweed layer with herbicides does not solve the problem of excess nutrients in the water. Because of the exponential growth rate of Lemnaceae, herbicides must be used repeatedly (perhaps several times a year). Ideally, it is best to eliminate the inflow of nutrients, and the repetitive removal of the duckweed layer will greatly reduce the growth of duckweeds (Armstrong, 2009). Biological control using ducks, fish, turtles and crustaceans (water shrimp, crayfish, ostracods, freshwater prawns, daphnia, amphipods, etc.) may also help to control duckweed populations. There are a number of species of freshwater fish that eat duckweeds to supplement their diets, including grass carp (Ctenopharyngodon idella) for example.	High
				Duckweeds are also eaten by pacu (Colossoma bidens), a	
47	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	Yes	Freshwater fish native to the Amazon River (Armstronn 2009) Tolerates, or benefits from, cultivation, browsing pressure, mutilation, fire etc Pioneering in disturbed areas Tolerant of shade Highly mobile locally Benefits from human association (i.e. it is a	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	https://link.springer.com/article/10.1007/s00425-015-2264-x	Low
49	8.06	Are there effective natural enemies (predators) of the taxon present in the RA area?	Yes	Biological control using ducks, fish, turtles and crustaceans (water shrimp, crayfish, ostracods, freshwater prawns, daphnia, amphipods, etc.) may also help to control duckweed populations. There are a number of species of freshwater fish that eat duckweeds to supplement their diets, including grass carp (Ctenopharyngodon idella) for example.	High
		e change			
	1	e change	No. ala		Medium
50	9.01	Under the predicted future climatic	No change	https://www.cabi.org/isc/datasheet/108968#tohabitat	
		conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?			neurum
51	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,	No change	https://www.cabi.org/isc/datasheet/108968#tohabitat	Medium
	9.02	conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment		https://www.cabi.org/isc/datasheet/108968#tohabitat https://www.cabi.org/isc/datasheet/108968#tohabitat	
52		conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity	No change		Medium
52 53	9.03	conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of	No change	https://www.cabi.org/isc/datasheet/108968#tohabitat	Medium Medium

Statistics	
Scores	
BRA	33.0
BRA Outcome	High
BRA+CCA	33.0
BRA+CCA Outcome	High
Score partition	
A. Biogeography/Historical	16.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	2.0
3. Invasive elsewhere	10.0
B. Biology/Ecology	17.0
4. Undesirable (or persistence) traits	6.0
5. Resource exploitation	2.0
6. Reproduction	4.0
7. Dispersal mechanisms	3.0
8. Tolerance attributes	2.0
C. Climate change	0.0
9. Climate change	0.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3 5 5
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 7 9 6
6. Reproduction	7
7. Dispersal mechanisms	9
8. Tolerance attributes	
C. Climate change	6
9. Climate change	6
Sectors affected	
Commercial	11
Environmental Species or population nuisance traits	7

Thresholds	
BRA	24.75
BRA+CCA	24.75
Confidence	
BRA+CCA	0.75
BRA	0.78
CCA	0.50
Date and Time	
23/11/20	21 17:00:08

Taxon and Assessor details					
Category	Plantae (freshwater)				
Taxon name	Lemna turionifera				
Common name	turion duckweed				
Assessor	Marina Piria				
Risk screening context					
Reason and socio-economic benefits					
Risk assessment area	Mediterranean region				
Taxonomy					
Native range					
Introduced range					
URL					

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
		ication/Cultivation	le e		
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	Used in aquaculture, animal feed etc https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1749- 7345.1981.tb00273.x	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://onlinelibrary.wiley.com/doi/abs/10.1111/j.1749- 7345.1981.tb00273.x	Very high
3	1.03	Does the taxon have invasive races,	Yes	Lemna aequinocitalis, L. minuta etc.	Very high
-		varieties, sub-taxa or congeners?		https://www.cabi.org/ISC/abstract/19992302892	
2. (		, distribution and introduction risk How similar are the climatic conditions of the	High	native in North America and northern Asia. In North America it	Vorschich
4	2.01	Risk Assessment (RA) area and the taxon's native range?	High	native in North America and northern Asia. In North America it occurs from Mexico north to Alaska and through much of Canada and the United States east to Nova Scotia, it is largely absent from the southeastern United States. In Asia it occurs in a broad band from Turkey, north and east across Russia to Kamchatka and Sakhalin Island (Landolt 1986). In Eurasia, the western limits of its distribution have been obscured by apparently non-native populations (Muller 2004), where it has been recorded from Austria, Belgium (Hoste & Bruinsma 2007; van Landuyt 2007), the Czech Republic, France (Muller 2004), Germany (Landolt 1986, Wolff and Ortschiedt 1993), Poland (Muller 2004), the Netherlands (Wolff & Bruinsma 2005), Sweden and Norwayhtths://citeseerx.ist.nsu.edu/viewdoc/download2doi=10.1.1	Very high
5	2.02	What is the quality of the climate matching data?	High	https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.667.41 94&rep=rep1&type=pdf Climatch confirmed	Very high
6	2.03	Is the taxon already present outside of captivity in the RA area?	No	It is horizon species	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	by migrating birds https://www.researchgate.net/profile/Zofija- Sinkeviciene/publication/270506254_FIRST_RECORDS_OF_LEMNA _TURIONIFERA_IN_LITHUANIA/links/54abcd750cf2bce6aa1dba11/ FIRST-RECORDS-OF-LEMNA-TURIONIFERA-IN-LITHUANIA.pdf	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	Hungary, B. A. Lukács, A. Mesterházy, R. Vidéki & G. Király (2014): Alien aquatic vascular plants in Hungary (Pannonian ecoregion): Historical aspects, data set and trends, Plant Biosystems - An International Journal Dealing with all Aspects of Plant Biology: Official Journal of the Societa Botanica Italiana, DOI: 10.1080/11263504.2014.987846	Medium
3. I		elsewhere			
9 10	3.01 3.02	Has the taxon become naturalised (established viable populations) outside its native range? In the taxon's introduced range, are there known adverse impacts to wild stocks or	Yes	https://www.researchgate.net/profile/Zofija- Sinkeviciene/publication/270506254_FIRST_RECORDS_OF_LEMNA _TURIONIFERA_IN_LITHUANIA/links/54abcd750cf2bce6aa1dba11/ FIRST-RECORDS-OF-LEMNA-TURIONIFERA-IN-LITHUANIA.pdf Probably similar as other Lemnacee	Very high
11	3.03	commercial taxa? In the taxon's introduced range, are there	No	no data.	Low
	5.05	known adverse impacts to aquaculture?		https://www.fao.org/ag/againfo/resources/documents/DW/dw2.ht	2011
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	No	Impact not recorded https://www.gbif.org/species/2867631	Low
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	Not recorded https://www.gbif.org/species/2867631	Low
		//Ecology			
	1	able (or persistence) traits		· · · · · · · · · · · · · · · · · · ·	
		Is it likely that the taxon will be poisonous or pose other risks to human health?		It is not poisonous and not pose risk to humans. Actually represents human food	Very high
	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	No	No data https://www.gbif.org/species/2867631	Low
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	it is not parasite	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	it is cosmopolitan https://www.researchgate.net/profile/Zofija- Sinkeviciene/publication/270506254_FIRST_RECORDS_OF_LEMNA _TURIONIFERA_IN_LITHUANIA/links/54abcd750cf2bce6aa1dba11/ FIRST-RECORDS-OF-LEMNA-TURIONIFERA-IN-LITHUANIA.pdf	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	No	No evidences	Low
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	No evidences	Low
20	4.07	Is it likely that the taxon will host, and/or	No	No data	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	Not known, usually used to remove pathogens and nutrients from polluted water https://link.springer.com/chapter/10.1007/978-1-4020-6027-4_10	Low
22	4.09		No	small bodied species	Very high
23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)?	No	typical for weetlands and tolerate up to 3 m/s	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	For other Lemna is known that reduce habitat quality but no evidence for this species.	Medium
25	4.12	Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)?	Yes	Its species name refers to the fact that it sometimes produces turions, vegetative plantlets that can disperse and go dormant for long periods.	Very high
		ce exploitation			
27	5.02	protected native taxa in the RA area? Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?	Yes	No predation behaviour Yes would exploit nutrients https://link.springer.com/chapter/10.1007/978-1-4020-6027-4_10	Very high Medium
	Reprodu 6.01		Not applicable		High
-		Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?	Not applicable		High
29	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	https://gobotany.nativeplanttrust.org/species/lemna/turionifera/	Very high
30	6.03	Is the taxon likely to hybridise naturally with native taxa?	Yes	with lemna minor https://d-nb.info/1236692624/34	Very high
31	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	Yes	Its species name refers to the fact that it sometimes produces turions, vegetative plantlets that can disperse and go dormant for long periods. https://gobotany.nativeplanttrust.org/species/lemna/turionifera/	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	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	Its species name refers to the fact that it sometimes produces turions, vegetative plantlets that can disperse and go dormant for long periods. https://gobotany.nativeplanttrust.org/species/lemna/turionifera/	Very high
34	6.07	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	1	when appear adequate conditions	Very high
		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	water, by migrating birds https://www.researchgate.net/profile/Zofija- Sinkeviciene/publication/270506254_FIRST_RECORDS_OF_LEMNA _TURIONIFERA_IN_LITHUANIA/links/54abcd750cf2bce6aa1dba11/	Very high
36	7.02	Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)?	No	It is not yet in RA area	Very high
37	7.03	Does the taxon have a means of actively	No	Probably not, not evidences	Medium
20		attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal?			Medium
	7.04	hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?	Yes	https://www.researchgate.net/profile/Zofija- Sinkeviciene/publication/270506254_FIRST_RECORDS_OF_LEMNA _TURIONIFERA_IN_LITHUANIA/links/54abcd750cf2bce6aa1dba11/ FIRST-RECORDS-OF-LEMNA-TURIONIFERA-IN-LITHUANIA.pdf	High
39	7.05	hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?	Yes	https://www.researchgate.net/profile/Zofija- Sinkeviciene/publication/270506254_FIRST_RECORDS_OF_LEMNA _TURIONIFERA_IN_LITHUANIA/links/54abcd750cf2bce6aa1dba11/ FIRST-RECORDS-OF-LEMNA-TURIONIFERA-IN-LITHUANIA.pdf Probably with water currents as other Lemna	High Low
39		hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA	Yes	https://www.researchgate.net/profile/Zofija- Sinkeviciene/publication/270506254_FIRST_RECORDS_OF_LEMNA _TURIONIFERA_IN_LITHUANIA/links/54abcd750cf2bce6aa1dba11/ FIRST-RECORDS-OF-LEMNA-TURIONIFERA-IN-LITHUANIA.pdf Probably with water currents as other Lemna not migratory	High
39 40	7.05	hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to	Yes	https://www.researchgate.net/profile/Zofija- Sinkeviciene/publication/270506254_FIRST_RECORDS_OF_LEMNA _TURIONIFERA_IN_LITHUANIA/links/54abcd750cf2bce6aa1dba11/ FIRST-RECORDS-OF-LEMNA-TURIONIFERA-IN-LITHUANIA.pdf Probably with water currents as other Lemna not migratory by migratory birds https://www.researchgate.net/profile/Zofija- Sinkeviciene/publication/270506254_FIRST_RECORDS_OF_LEMNA _TURIONIFERA_IN_LITHUANIA/links/54abcd750cf2bce6aa1dba11/	High Low
39 40 41	7.05	hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both	Yes Yes Not applicable	https://www.researchgate.net/profile/Zofija- Sinkeviciene/publication/270506254_FIRST_RECORDS_OF_LEMNA _TURIONIFERA_IN_LITHUANIA/links/54abcd750cf2bce6aa1dba11/ FIRST-RECORDS-OF-LEMNA-TURIONIFERA-IN-LITHUANIA.pdf Probably with water currents as other Lemna not migratory by migratory birds https://www.researchgate.net/profile/Zofija- Sinkeviciene/publication/270506254_FIRST_RECORDS_OF_LEMNA _TURIONIFERA_IN_LITHUANIA/links/54abcd750cf2bce6aa1dba11/ FIRST-RECORDS-OF-LEMNA-TURIONIFERA-IN-LITHUANIA.pdf by birds https://www.researchgate.net/profile/Zofija- Sinkeviciene/publication/270506254_FIRST_RECORDS_OF_LEMNA _TURIONIFERA_IN_LITHUANIA/links/54abcd750cf2bce6aa1dba11/ FIRST-RECORDS_OF_LEMNA-TURIONIFERA-IN_LITHUANIA.pdf	High Low Very high
39 40 41	7.05 7.06 7.07	hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be	Yes Yes Not applicable Yes	https://www.researchgate.net/profile/Zofija- Sinkeviciene/publication/270506254_FIRST_RECORDS_OF_LEMNA _TURIONIFERA_IN_LITHUANIA/links/54abcd750cf2bce6aa1dba11/ FIRST-RECORDS-OF-LEMNA-TURIONIFERA-IN-LITHUANIA.pdf Probably with water currents as other Lemna not migratory by migratory birds https://www.researchgate.net/profile/Zofija- Sinkeviciene/publication/270506254_FIRST_RECORDS_OF_LEMNA _TURIONIFERA_IN_LITHUANIA/links/54abcd750cf2bce6aa1dba11/ FIRST-RECORDS-OF-LEMNA-TURIONIFERA-IN-LITHUANIA.pdf by birds https://www.researchgate.net/profile/Zofija- Sinkeviciene/publication/270506254_FIRST_RECORDS_OF_LEMNA	High Low Very high Very high
39 40 41 42 43 8.7	7.05 7.06 7.07 7.08 7.09	hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>Ce attributes</i>	Yes Yes Not applicable Yes Yes	https://www.researchgate.net/profile/Zofija- Sinkeviciene/publication/270506254_FIRST_RECORDS_OF_LEMNA _TURIONIFERA_IN_LITHUANIA/links/54abcd750cf2bce6aa1dba11/ FIRST-RECORDS-OF-LEMNA-TURIONIFERA-IN-LITHUANIA.pdf Probably with water currents as other Lemna not migratory by migratory birds https://www.researchgate.net/profile/Zofija- Sinkeviciene/publication/270506254_FIRST_RECORDS_OF_LEMNA _TURIONIFERA_IN_LITHUANIA/links/54abcd750cf2bce6aa1dba11/ FIRST-RECORDS-OF-LEMNA-TURIONIFERA-IN-LITHUANIA.pdf by birds https://www.researchgate.net/profile/Zofija- Sinkeviciene/publication/270506254_FIRST_RECORDS_OF_LEMNA _TURIONIFERA_IN_LITHUANIA/links/54abcd750cf2bce6aa1dba11/ FIRST-RECORDS-OF-LEMNA-TURIONIFERA-IN-LITHUANIA.pdf by birds https://en.ukipedia.org/wiki/Lemna_turionifera	High Low Very high Very high High Very high
39 40 41 42 42 <u>43</u> 8.7	7.05 7.06 7.07 7.08 7.09	hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life	Yes Yes Not applicable Yes Yes	https://www.researchgate.net/profile/Zofija- Sinkeviciene/publication/270506254_FIRST_RECORDS_OF_LEMNA _TURIONIFERA_IN_LITHUANIA/links/54abcd750cf2bce6aa1dba11/ FIRST-RECORDS-OF-LEMNA-TURIONIFERA-IN-LITHUANIA.pdf Probably with water currents as other Lemna not migratory by migratory birds https://www.researchgate.net/profile/Zofija- Sinkeviciene/publication/270506254_FIRST_RECORDS_OF_LEMNA _TURIONIFERA_IN_LITHUANIA/links/54abcd750cf2bce6aa1dba11/ FIRST-RECORDS-OF-LEMNA-TURIONIFERA-IN-LITHUANIA.pdf by birds https://www.researchgate.net/profile/Zofija- Sinkeviciene/publication/270506254_FIRST_RECORDS_OF_LEMNA _TURIONIFERA_IN_LITHUANIA/links/54abcd750cf2bce6aa1dba11/ FIRST-RECORDS-OF-LEMNA-TURIONIFERA-IN-LITHUANIA.pdf	High Low Very high Very high High
39 40 41 42 43 <u>8, 7</u> 44	7.05 7.06 7.07 7.08 7.09	hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as 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 Yes Not applicable Yes Yes	https://www.researchgate.net/profile/Zofija- Sinkeviciene/publication/270506254_FIRST_RECORDS_OF_LEMNA _TURIONIFERA_IN_LITHUANIA/links/54abcd750cf2bce6aa1dba11/ FIRST-RECORDS-OF-LEMNA-TURIONIFERA-IN-LITHUANIA.pdf Probably with water currents as other Lemna not migratory by migratory birds https://www.researchgate.net/profile/Zofija- Sinkeviciene/publication/270506254_FIRST_RECORDS_OF_LEMNA _TURIONIFERA_IN_LITHUANIA/links/54abcd750cf2bce6aa1dba11/ FIRST-RECORDS-OF-LEMNA-TURIONIFERA-IN-LITHUANIA.pdf by birds https://www.researchgate.net/profile/Zofija- Sinkeviciene/publication/270506254_FIRST_RECORDS_OF_LEMNA _TURIONIFERA_IN_LITHUANIA/links/54abcd750cf2bce6aa1dba11/ FIRST-RECORDS-OF-LEMNA-TURIONIFERA-IN-LITHUANIA.pdf by birds https://www.researchgate.net/profile/Zofija- Sinkeviciene/publication/270506254_FIRST_RECORDS_OF_LEMNA _TURIONIFERA_IN_LITHUANIA/links/54abcd750cf2bce6aa1dba11/ FIRST-RECORDS-OF-LEMNA-TURIONIFERA-IN-LITHUANIA.pdf https://en.wikipedia.org/wiki/Lemna_turionifera	High Low Very high Very high High
39 40 41 42 43 8.7 44	7.05 7.06 7.07 7.08 7.09 7.09 6.01	hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that	Yes Not applicable Yes Yes No Yes	https://www.researchgate.net/profile/Zofija- Sinkeviciene/publication/270506254_FIRST_RECORDS_OF_LEMNA _TURIONIFERA_IN_LITHUANIA/links/54abcd750cf2bce6aa1dba11/ FIRST-RECORDS-OF-LEMNA-TURIONIFERA-IN-LITHUANIA.pdf Probably with water currents as other Lemna not migratory by migratory birds https://www.researchgate.net/profile/Zofija- Sinkeviciene/publication/270506254_FIRST_RECORDS_OF_LEMNA _TURIONIFERA_IN_LITHUANIA/links/54abcd750cf2bce6aa1dba11/ FIRST-RECORDS-OF-LEMNA-TURIONIFERA-IN-LITHUANIA.pdf by birds https://www.researchgate.net/profile/Zofija- Sinkeviciene/publication/270506254_FIRST_RECORDS_OF_LEMNA _TURIONIFERA_IN_LITHUANIA/links/54abcd750cf2bce6aa1dba11/ FIRST-RECORDS-OF-LEMNA-TURIONIFERA-IN-LITHUANIA.pdf by birds https://www.researchgate.net/profile/Zofija- Sinkeviciene/publication/270506254_FIRST_RECORDS_OF_LEMNA _TURIONIFERA_IN_LITHUANIA/links/54abcd750cf2bce6aa1dba11/ FIRST-RECORDS-OF-LEMNA-TURIONIFERA-IN-LITHUANIA.pdf https://en.wikipedia.org/wiki/Lemna_turionifera	High Low Very high Very high Very high

9 8. <b> Cli</b>	3.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	Yes	survival and reproduction of L. turionifera fronds can be influenced by specific stresses, e.g., salinity	High
. Cli	3.06			by specific stresses, e.g., salinity	
. Cli	3.06	its usual environment?			
. Cli	3.06			https://www.proquest.com/docview/2174512883?pq-	
. Cli	3.06			origsite=gscholar&fromopenview=true	
. Clir		Are there effective natural enemies	Yes	No information related to this species but grasss carp probably will	Low
. Clir		(predators) of the taxon present in the RA		take this Laminacce species too	
. Clir	imate	area? change		https://www.fao.org/ag/againfo/resources/documents/DW/dw2.ht	
		change			
		Under the predicted future climatic	Increase	https://pdf.sciencedirectassets.com/273182/1-s2.0-	Medium
		conditions, are the risks of entry into the RA		S1617138118X00053/1-s2.0-S1617138118300232/main.pdf?X-	
		area posed by the taxon likely to increase,		Amz-Security-	
	decrease or not change?		Token=IQoJb3JpZ2luX2VjEGkaCXVzLWVhc3QtMSJHMEUCIQDc8m2		
				PJnnbKZ42LpUSBfBoQegF7CSGzz8ITKl2PwKAqgIgZT7LRnEwkyfoC1	
				pJqm5DnwhYUI1ZBZWnL5qJGNe%2Ftxwq%2BgMIMRAEGgwwNTkw	
				MDM1NDY4NjUiDLCp1Blg4SPIedhM9SrXA5XmAGJcYVIfJYMG9002ui	
				MkSgrk%2BFoSkcpVCnGR24ao%2BhDtLBRANNmV7HpYQAZnrR2wF	
				2QI2O5TqJ2pr%2B72gP5djuFfbTTGDNTIOrXsU0Dh7w8V2hLQA%2F	
				M4utaQXG3ih%2BGw2n%2FwacOWTME%2FexjUcqMq%2F5pxmyZ	
				zITOjdS0bzxc1J0DhxMrnL11cWi4mzqYxg3PhBFcnLKAyBVY2%2BW0	
				8qYaThKh4HfGKofH2sT4WJfLi7odtm9ZwJkJKzRuXou1s%2FweqAm	
				G7JSBsBAzkd2txyLFAknM7ImVdKgqzf9kOl6QxiymEtpDe0R7Y9aurV	
				qSwlSLsMhL7fQgVTZ0ixSzfgUIsdHQ144pwsacCtBzkg6gS3BLL%2Fe eSXIkkKoSTIDsS2Dfzv7bBWYOvxYw854d2k6WIa4osE6FZMyO%2F4	
				eSXIKKK0S1IDSS2DIZV7DBW10VX1W854d2K6W1a40sE6F2My0%2F4 naDzSGmbWx%2FDnQwdAFFcuBwdLba1mbTSTdSJYXxCiSbFwQIh7	
				WixorP6vhJZLtdJkjYhtO4yi79XOC34%2BnwZOaiTCCS2sQGbBFvOZ	
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1 9.	9.02	Under the predicted future climatic	Increase	https://pdf.sciencedirectassets.com/273182/1-s2.0-	Medium
		conditions, are the risks of establishment	indicade	S1617138118X00053/1-s2.0-S1617138118300232/main.pdf?X-	
		posed by the taxon likely to increase,		Amz-Security-	
		decrease or not change?		Token=IQoJb3JpZ2luX2VjEGkaCXVzLWVhc3QtMSJHMEUCIQDc8m2	
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	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://pdf.sciencedirectassets.com/273182/1-s2.0- S1617138118X00053/1-s2.0-S1617138118300232/main.pdf?X- Amz-Security- Token=IQoJb3JpZluX2VjEGkaCXVzLWVhc3QtMSJHMEUCIQDc8m2 PJnnbKZ42LpUSBfBoQegF7CSGzz8ITKI2PwKAqgIgZT7LRnEwkyfoC1 pJgm5DnwhYUI1ZBZWnL5qJGNe%2Ftxwq%2BgMIMRAEGgwwNTkw MDM1NDY4NjUiDLCp1BIg4SPIedhM9SrXA5XmAGJcYVIfJYMG90O2ui MkSgrk%2BFo5KcpVCnGR24ao%2BhDtLBRANNmV7HpYQAZnrR2wF 2Ql2OSTqJ2pr%2B72gP5djuFfbTTGDNTIOrXsU0Dh7w8V2hLQA%2F M4utaQXG3ih%2BGw2n%2FwacOWTME%2FexjUcqMq%2F5pxmyZ zITOjdS0bzxc1J0DhXMrnL11cWi4mzqYxg3PhBFcnLKAyBVY2%2BW0 8qYaThKh4HfGKofH2ST4WJfLi7odtm9ZwJKJKZRUXou1s%2FweqAm G7JSBsBAzkd2txyLFAknM7ImVdKgqzf9kOl6QxiymEtpDe0R7Y9aurV gSUSLSMh17fQgVT20ixSzfgUIsdHQ144pwsacCtBzkg6gS3BLL%2Fe eSXIkKKoSTIDS52Dfzv7bBWVOvXYw854d2k6WIa4osE6FZMyO%2F4 naDzSGmbWx%2FDnQwdAFFcuBwdLba1mbTSTdSJYXxCi5bFwQIh7 WlxorP6vhJZLtdJkjYhtO4yi79XOC34%2BnwZ0aiTCCS2sQGbBFVOZ UWKUpC10yTxYTyQe%2B%2FSyDjfEXv1jDsW%2BpFoO5hDCLfPpiH IBO2T011IHmaMWybLu0UGUK4N%2BBdTczifJom0vzkK39yPl6etp0 k%2BJdRwlrDDegu%2BMBjqIAUpMAYHFnuj4vujKO5BxGXN3kTs7V4 TzLKFQh6dwGzxEQKsQZMk02dTOexVSNCIOjwCYVxgfAaPkyG%2Ft tN6mhrMtPxorL%2FdHS2D9QC1aoxV9IRAipOSoyqEdWPBV 9cW51cOLUtH0AgfHYtWC8AwShL2uND4wQ6fM1aPGTw%3D%3D& X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz- Expires=300&X-Amz- Credential=ASIAQ3PHCVTY2SYFFQ6V%2F20211122%2Fus-east- 1%2Fs3%2Faws4_request&X-Amz- Signature=3860ad8e3b8989785bcc56eb131bfc4007f3485e12a5c4 045371e5a28e9c93c2&hash=31366d759648af0f2181634335b9a79 6b84a9338b735c3ad907afd353479342e&host=68042c943591013a c2b2430a8b1270f6daf2c76d8dfd086a07176afe7c76c2c618bji=S161 7138118300232&tid=spdf-69f51aa4-e438-40bd-bf9b- fa86c1b46cf7&sid=05d25e953a1b1448e48be396c93b5408ff94gxrq	High
53	9.04	Under the predicted future climatic conditions, what is the likely magnitude of	No change	Probably will stay the same	Medium
		future potential impacts on biodiversity and/or ecological integrity/status?			
	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Higher No change	https://pdf.sciencedirectassets.com/273182/1-s2.0- S1617138118X00053/1-s2.0-S1617138118300232/main.pdf?X- Amz-Security- Token=IQoJb3JpZ2luX2VjEGkaCXVzLWVhc3QtMSJHMEUCIQDc8m2 PJnnbKZ42LpUSBfBoQegF7CSGzz8ITKI2PwKAqgIgZT7LRnEwkyfoC1 pJqm5DnwhYUI1ZBZWnL5qJGNe%2Ftxwq%2BgMIMRAEGgwwNTkw MDM1NDY4NJUIDLCp1BIg4SPIedhM9SrXA5XmAGJcYVIFJYMG90O2ui MkSgrk%2BFoSkcpVCnGR24ao%2BhDtLBRANNW7HpYQAZnrR2wF 2QI2O5Tq12pr%2B72gP5djuFfbTTGDNTIOrXsU0Dh7w8V2hLQA%2F M4utaQXG3ih%2BGw2n%2FwacOWTME%2FexjUcqMq%2F5pxmyZ zITOjdS0bzxc1J0DhxMrnL11cWi4mzqYxg3PhBFcnLKAyBVY2%2BW0 8qYaThKh4HfGKofH2ST4WJfLi7odtm9ZwJKJKZRuXou1s%2FweqAm G7JSB8BAzkd2txyLFAknM7ImVdKgqzf9kOl6QxiymEtpDe0R7Y9aurV qSwISLSMh17fQgVT20ixSzfgUIsdHQ144pwsacCtBzkg6gS3BLL%2Fe eSXIkkKoSTIDS2Dfzv7bBWV0vX7w854d2k6WIa4osE6FZMy0%2F4 naDzSGmbWx%2FDnQwdAFFcuBwdLba1mbTSTdSJYXxCiSbFwQIh7 WlxorP6vhJZLtdlkjYht04yi79XOC34%2BmvZoiTCCS2sQGbBFvOZ UWKUpC10yTXTyQe%2B%2FSyDjfEXv1jDs0%2BFFOShDCLfPpiH IBOzT011IHmaMWybLu0UGuIK4N%2BBdTCzifJ0m0vzkK39yPl6etp0 k%2BJdRwirDDegu%2BMBjlAUpMAYHFnuj4vujKO5bxGXNXsTs7V4 TzLKFQh6dwGzxEQKsQZMk02dT0exVSNCl0jwCYVxgfeAaPkyG%2Fi tN6mhrMtPxorl%2FdN9ZihI6dVkFQcQ2YJSCxBPuoNVRZ1Uw2mwttv fKc4HZf%2BqmeVN9UT%2FAHR5D0gC1aoxV9iRAipOSoyqEdWPBV 9cW51cULUH0AgfHYtWC8AwShL2uND4wQGfM1aPGTw%3D%3D& X-amz-Algorithm=AWS4-HMAC-SHA256&X-Amz- Date=20211122T162442Z&X-Amz-SignedHeaders=host&X-Amz- Expires=300&A-amz- Credential=ASIAQ3PHCVTY2SYFFQ6V%2F20211122%2Fus-east- 1%2Fs3%2Faws4_request&X-Amz- Signature=3860ad8e3b898785bcc56eb131bfc4007f3485e12a5c4 045371e5a28e9c93c2&hash=31366d759648af0f2181634335b9a79 6b84a9338b735C3ad907afd353479342&kost=68042c943591013a c2b2430a89b270f6af2c76d8dfd086a07176afe7c76c2c618pii=S161 7138118300232&tid=spdf-69f51aa4-e438-40bd-bf9b- fa86c1b46cf7&sid=05d25e953a1b1448e48be396c93b5408ff94gxrq Probably no change	Medium
55	9.00	conditions, what is the likely magnitude of	NO CHANGE		medium
		future potential impacts on ecosystem services/socio-economic factors?			

Statistics	
Scores	
BRA	20.0
BRA Outcome	Medium
BRA+CCA	26.0
BRA+CCA Outcome	High
Score partition	
A. Biogeography/Historical	6.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	0.0

3. Invasive elsewhere	2.0
B. Biology/Ecology	14.0
4. Undesirable (or persistence) traits	2.0
5. Resource exploitation	2.0
6. Reproduction	6.0
7. Dispersal mechanisms	3.0
8. Tolerance attributes	1.0
C. Climate change	6.0
9. Climate change	6.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3
2. Climate, distribution and introduction risk	3 5 5
3. Invasive elsewhere	
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2
6. Reproduction	
7. Dispersal mechanisms	9
8. Tolerance attributes	6
C. Climate change	6
9. Climate change	6
Sectors affected	
Commercial	5
Environmental	2
Species or population nuisance traits	21
Thresholds	
BRA	24.75
BRA+CCA	24.75
Confidence	
BRA+CCA	0.70
BRA	0.72
CCA	0.54

Date and Time 23/11/2021 17:00:42

Faxon and Assessor details					
Category	Plantae (freshwater)				
Taxon name	Ludwigia peploides				
Common name	floating primrose-willow				
Assessor	Tena Radočaj				
Risk screening context					
Reason and socio-economic benefits					
Risk assessment area	Mediterranean region				
Taxonomy					
Native range					
Introduced range					
URL					

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
	1	ication/Cultivation	I		
		Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	It is most likely that escape from aquaculture explains most of the adventive introductions; this plant is very commonly sold as an ornamental (CABI, 2020)	
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	It is most likely that escape from aquaculture explains most of the adventive introductions; this plant is very commonly sold as an ornamental (CABI, 2020)	High
3	1.03	Does the taxon have invasive races,	No	No evidence	Low
2 (	limato	varieties, sub-taxa or congeners? , distribution and introduction risk			
		How similar are the climatic conditions of the	Medium	The similarity of elimatic conditions between pative areas and the	Madium
	2.01	Risk Assessment (RA) area and the taxon's native range?	Medium	The similarity of climatic conditions between native areas and the RA area is low (Climatch)	Medium
5	2.02	What is the quality of the climate matching data?	Medium	Climatch and CABI	Medium
6	2.03	Is the taxon already present outside of captivity in the RA area?	No	Buzjak, S., & Sedlar, Z. (2018). Ludwigia peploides (Kunth.) PH Raven–Floating Water Primrose, a new species in Croatian flora from the list of invasive alien species of Union concern. Natura Croatica: Periodicum Musei Historiae Naturalis Croatici, 27(2),	Medium
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	>1	Machinery and equipment, Ornamental purposes, Horticulture (CABI, 2020)	Low
8	2.05	Is the taxon currently found in close	Yes	Italy (Galasso, G., Domina, G., Adorni, M., Ardenghi, N. M.,	Low
Ŭ	2.05	proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)?		Bonari, G., Buono, S., & Nepi, C. (2018). Notulae to the Italian alien vascular flora: 5. Italian Botanist, 5, 45).	
3. I	nvasive	e elsewhere			
	3.01	Has the taxon become naturalised	Yes	Verloove, F., & Alves, P. (2016). New vascular plant records for	High
		(established viable populations) outside its native range?		the western part of the Iberian Peninsula (Portugal and Spain). Folia Botanica Extremadurensis, (10), 5-23.	
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	This species causes declines in biodiversity. Due to the species' allelopathic activity, it poses a severe threat to vulnerable native flora (CABI, 2020)	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	This species has an allelopathic effect that impacts water quality throughout the year. Its tendency to grow in thick mats also contributes to physical alteration of the environment, making it unsuitable for sensitive species. (CABI, 2020)	High
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	Yes	This plant can grow very densely, impeding navigation and interfering with hunting, fishing and other recreational activities (CEH, 2007). (CABI, 2020)	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	No evidence	Low
15	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	RUAUX, B. (2008). Invasive plants in river corridors (biological characteristics, the impacts of Ludwigia peploides and L. grandiflora in the Middle Loire and the implications for	High
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	No evidence	Medium
17	4.04	It 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	Vuković, N., Šegota, V., Rimac, A., Koletić, N., & Alegro, A. (2021). New records of alien plants–Ludwigia peploides (Kunth) PH Raven, Reynoutria sachalinensis (F. Schmidt) Nakai and Nicotiana glauca Graham in Croatia. Natura Croatica: Periodicum Musei Historiae Naturalis Croatici, 30(1), 27-35.	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	For Croatia yet no information, but I think L. peploides will be adverse impact. It is generally considered a threat to biodiversity in its introduced range. (CABI, 2020)	Medium
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes	For Croatia yet no information, but I think L. peploides will be adverse impact. This plant can cause substantial nuisance to recreational users by impeding navigation and interfering with hunting, fishing and other recreational activities (CABI, 2020)	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 area?	No	No cases of pathogen pollution are reported for L. peploides (Robert, H., Lafontaine, RM., Beudels-Jamar, R.C., Delsinne, T. (2013). Risk analysis of the Water Primrose Ludwigia peploides (Kunth) P.H. Raven Risk analysis report of non-native organisms in Belgium from the Royal Belgian Institute of Natural Sciences for the Federal Public Service Health, Food chain safety and Environment. 35 p)	Medium

21	4.08	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area?	No	No cases of pathogen pollution are reported for L. peploides (Robert, H., Lafontaine, RM., Beudels-Jamar, R.C., Delsinne, T. (2013). Risk analysis of the Water Primrose Ludwigia peploides (Kunth) P.H. Raven Risk analysis report of non-native organisms in Belgium from the Royal Belgian Institute of Natural Sciences for the Federal Public Service Health, Food chain safety and Environment. 35 p)	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	Vuković, N., Šegota, V., Rimac, A., Koletić, N., & Alegro, A. (2021). New records of alien plants–Ludwigia peploides (Kunth) PH Raven, Reynoutria sachalinensis (F. Schmidt) Nakai and Nicotiana glauca Graham in Croatia. Natura Croatica: Periodicum Musei Historiae Naturalis Croatici, 30(1), 27-35.	Low
23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g.	No	L. peploides can be found in wetlands, on shorelines, in slow- flowing rivers, ponds, rice fields, marshes and in other freshwater	Medium
24	4.11	versatile in habitat use)? Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa?	Yes	environments (CABI, 2020) This species has an allelopathic effect that impacts water quality throughout the year. Where it is invasive, it often has far reaching and negative effects on multiple trophic levels (CABI, 2020)	Medium
25	4.12	Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)?	Yes	Vuković, N., Šegota, V., Rimac, A., Koletić, N., & Alegro, A. (2021). New records of alien plants–Ludwigia peploides (Kunth) PH Raven, Reynoutria sachalinensis (F. Schmidt) Nakai and Nicotiana glauca Graham in Croatia. Natura Croatica: Periodicum Musei Historiae Naturalis Croatici. 30(1). 27-35.	Medium
		e exploitation	Not applicable		Vorubiah
		Is the taxon likely to consume threatened or protected native taxa in the RA area?	Not applicable		Very high
	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	Medium
	eprodu 6.01	iction Is the taxon likely to exhibit parental care	Not applicable	Not applicable	Very high
		and/or to reduce age-at-maturity in response to environmental conditions?			
29	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	Vuković, N., Šegota, V., Rimac, A., Koletić, N., & Alegro, A. (2021). New records of alien plants–Ludwigia peploides (Kunth) PH Raven, Reynoutria sachalinensis (F. Schmidt) Nakai and Nicotiana glauca Graham in Croatia. Natura Croatica: Periodicum Musei Historiae Naturalis Croatici, 30(1), 27-35.	Medium
30	6.03	Is the taxon likely to hybridise naturally with	No	No evidence	Medium
31	6.04	native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction?	Yes	Reproduction in Ludwigia peploides includes both sexual and asexual reproduction (Ramstetter, J., Marlboro, V., & Mott-White,	Medium
	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	No	J. Ludwigia polycarpa Short & Peter. Many-Fruited False- This species can grow in a broad range of habitats due to its high degree of genetic polymorphism and phenotypic plasticity (CABI, 2020)	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	L. peploides is self-compatible and the species has a very high potential seed output (10,000 – 14,000 seeds per square metre) (CABI, 2020)	Medium
	6.07	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	1	Robert, H., Lafontaine, RM., Beudels-Jamar, R.C., Delsinne, T. (2013). Risk analysis of the Water Primrose Ludwigia peploides (Kunth) P.H. Raven Risk analysis report of non-native organisms in Belgium from the Royal Belgian Institute of Natural Sciences for the Federal Public Service Health, Food chain safety and Environment. 35 p.	Low
	<i>ispersa</i> 7.01	al mechanisms How many potential internal	>1	Botanical gardens and zoos, Flooding and other natural disasters,	Medium
		vectors/pathways could the taxon use to disperse within the RA area (with suitable	~1	Interconnected waterways. (CABI, 2020)	healann
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	Flooding, Interconnected waterways (CABI, 2020)	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 information	Low
38	7.04	(for plants: seeds, spores) in the RA area?	No	No evidence (Robert, H., Lafontaine, RM., Beudels-Jamar, R.C., Delsinne, T. (2013). Risk analysis of the Water Primrose Ludwigia peploides (Kunth) P.H. Raven Risk analysis report of non-native organisms in Belgium from the Royal Belgian Institute of Natural Sciences for the Federal Public Service Health, Food chain safety and Environment. 35 p).	Medium
	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	Stem fragments are spread by water currents, animals and humans (Robert, H., Lafontaine, RM., Beudels-Jamar, R.C., Delsinne, T. (2013). Risk analysis of the Water Primrose Ludwigia peploides (Kunth) P.H. Raven Risk analysis report of non-native organisms in Belgium from the Royal Belgian Institute of Natural Sciences for the Federal Public Service Health, Food chain safety and Environment. 35 p).	Medium
40	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	Not applicable		Medium
41	7.07	Are propagules or eggs of the taxon likely to	Yes	spread by animals, humans (CABI, 2020)	Medium
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 unintentional or intentional) likely to be	Yes	Flooding (CABI, 2020)	Medium

		Is dispersal of the taxon density dependent?	No	Robert, H., Lafontaine, RM., Beudels-Jamar, R.C., Delsinne, T. (2013). Risk analysis of the Water Primrose Ludwigia peploides (Kunth) P.H. Raven Risk analysis report of non-native organisms in Belgium from the Royal Belgian Institute of Natural Sciences for the Federal Public Service Health, Food chain safety and Environment. 35 p.	Medium
		ce attributes	D.		Madium
44	8.01	Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle?	No	No evidence	Medium
45	8.02	Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being	Yes	This species can grow in a broad range of habitats due to its high degree of genetic polymorphism and phenotypic plasticity (CABI, 2020).	Medium
46	8.03	Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	Yes	Several herbicides have been used with reported success, including halosulfuron-methyl, glyphosate and triclopyr (CABI, 2020). Sterile grass carp, Ctenopharyngodon idella, have been used to control L. peploides (CABI, 2020)	Medium
47	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	Yes	L. peploides can tolerate from environmental disturbance. It is also tolerant of flooding (CABI, 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	No evidence. Freshwater species	Medium
49	8.06	Are there effective natural enemies (predators) of the taxon present in the RA	Yes	Maybe, some insects	Medium
		e change			
		change	No. of		Madin
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	Vuković, N., Šegota, V., Rimac, A., Koletić, N., & Alegro, A. (2021). New records of alien plants-Ludwigia peploides (Kunth) PH Raven, Reynoutria sachalinensis (F. Schmidt) Nakai and Nicotiana glauca Graham in Croatia. Natura Croatica: Periodicum Musei Historiae Naturalis Croatici, 30(1), 27-35.	Medium
51	9.02	Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	Increase	The Mediterranean populations of L. peploides could be better adapted to rising temperature. These abilities could allow them to take advantage from climate warming if the temperature is not warming up to temperature above a critical threshold. (Thiébaut, G., Tarayre, M., Jambon, O., Le Bris, N., Colinet, H., & Renault, D. (2021). Variation of thermal plasticity for functional traits between populations of an invasive aquatic plant from two climatic regions. Hvdrobiologia. 848(9), 2077-2091.)	High
52	9.03	Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change?	Increase	The Mediterranean populations of L. peploides could be better adapted to rising temperature. These abilities could allow them to take advantage from climate warming if the temperature is not warming up to temperature above a critical threshold. (Thiébaut, G., Tarayre, M., Jambon, O., Le Bris, N., Colinet, H., & Renault, D. (2021). Variation of thermal plasticity for functional traits between populations of an invasive aquatic plant from two climatic regions. Hydrobiologia, 848(9), 2077-2091.)	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?	Higher	The Mediterranean populations of L. peploides could be better adapted to rising temperature. These abilities could allow them to take advantage from climate warming if the temperature is not warming up to temperature above a critical threshold. (Thiébaut, G., Tarayre, M., Jambon, O., Le Bris, N., Colinet, H., & Renault, D. (2021). Variation of thermal plasticity for functional traits between populations of an invasive aquatic plant from two climatic regions. Hvdrobiologia. 848(9), 2077-2091.)	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	The Mediterranean populations of L. peploides could be better adapted to rising temperature. These abilities could allow them to take advantage from climate warming if the temperature is not warming up to temperature above a critical threshold. (Thiébaut, G., Tarayre, M., Jambon, O., Le Bris, N., Colinet, H., & Renault, D. (2021). Variation of thermal plasticity for functional traits between populations of an invasive aquatic plant from two climatic regions. Hvdrobiologia. 848(9), 2077-2091.)	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	The Mediterranean populations of L. peploides could be better adapted to rising temperature. These abilities could allow them to take advantage from climate warming if the temperature is not warming up to temperature above a critical threshold. (Thiébaut, G., Tarayre, M., Jambon, O., Le Bris, N., Colinet, H., & Renault, D. (2021). Variation of thermal plasticity for functional traits between populations of an invasive aquatic plant from two climatic regions. Hydrobiologia. 848(9), 2077-2091.)	Medium

Statistics	
Scores	
BRA	26.5
BRA Outcome	High
BRA+CCA	36.5
BRA+CCA Outcome	High
Score partition	
A. Biogeography/Historical	13.5
1. Domestication/Cultivation	2.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	10.5
B. Biology/Ecology	13.0
4. Undesirable (or persistence) traits	7.0
5. Resource exploitation	0.0
6. Reproduction	4.0
7. Dispersal mechanisms	2.0
8. Tolerance attributes	0.0

C. Climata change	10.0
<b>C. Climate change</b> 9. Climate change	<b>10.0</b> 10.0
Answered Questions	10.0
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	
2. Climate, distribution and introduction risk	3 5
3. Invasive elsewhere	5
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	
6. Reproduction	<u>2</u> 7
7. Dispersal mechanisms	9
8. Tolerance attributes	6
C. Climate change	6
9. Climate change	6
Sectors affected	
Commercial	14
Environmental	11
Species or population nuisance traits	16
Thresholds	
BRA	24.75
BRA+CCA	24.75
Confidence	
BRA+CCA	0.52
BRA	0.52
CCA	0.54
Date and Time	
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Faxon and Assessor details					
Category	Plantae (freshwater)				
Taxon name	Myriophyllum heterophyllum				
Common name	twoleaf watermilfoil				
Assessor	Tena Radočaj				
Risk screening context					
Reason and socio-economic benefits					
Risk assessment area	Mediterranean region				
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	Aquaria and garden ponds (Global Invasive Species Database (2021) Species profile: Myriophyllum heterophyllum).	High
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	Aquaria and garden ponds (Global Invasive Species Database (2021) Species profile: Myriophyllum heterophyllum).	High
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	No	No evidence	Low
2. (	· · · · · · · · · · · · · · · · · · ·	distribution and introduction risk	1		
4	2.01	How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range?	Medium	The similarity of climatic conditions between native areas and the RA area is medium (Climatch)	Medium
5	2.02	What is the quality of the climate matching data?	Medium	I used climatch and distribution map of CABI	Low
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	Myriophyllum heterophyllum Michx. (Haloragaceae) has had the status of invasive species in freshwater ecosystems since 2012. During phytosociological research in the Neretva River Delta in July 2016 (Myriophyllum heterophyllum Michx. (Haloragaceae) u Hrvatskoj (str.99-103) European invasion in progress: Myriophyllum heterophyllum Michx. (Haloragaceae) in Croatia (str.99-103) engleskipdf 2 MB Nenad Jasprica, Anđelka Lasić, Dubravka Hafner. Ana Bratoš Cetinić)	Very 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.	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	No	It is present in the RA area.	Medium
		and intentional introductions)?			
		e elsewhere	1		
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	Myriophyllum heterophyllum is present as an alien species in nine European countries: Austria, Belgium, France, Germany, Hungary, the Netherlands, Spain, Switzerland and the United Kingdom (Jasprica, N., Lasić, A., Hafner, D., & Bratoš Cetinić, A. (2017). Myriophyllum heterophyllum Michx.(Haloragaceae) u Hrvatskoj. Natura Croatica: Periodicum Musei Historiae Naturalis Croatici,	High
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	Thick mats often out-competing native vegetation (Global Invasive Species Database (2021) Species profile: Myriophyllum heterophyllum.) Dense mono-specific growth of any aquatic plant species can incur impacts on native plant communities and other aquatic organisms such as invertebrates and fish.	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	M. heterophyllum is highly competitive and able to outcompete other aquatic plants. It forms dense mats of submergent vegetative material throughout the water column and at the water surface, which can prevent water flow, reduce sunlight and reduce oxygen availability. The resulting low oxygen conditions can harm or kill aquatic organisms (CABI, 2020)	Medium
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	Yes	M. heterophyllum forms dense stands in water bodies, which have negative effects on boating, swimming and aesthetics. (CABI,	Medium
		//Ecology			
		able (or persistence) traits	N	Clabel Investing Creating Database (2021) Carrier Cl	1
		Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or	No	Global Invasive Species Database (2021) Species profile: Myriophyllum heterophyllum. No evidence	Low
		more native taxa (that are not threatened or protected)?			
	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	No evidence	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?	Yes	It can tolerate high summer temperatures as well as cold winter temperatures where it can be covered by ice during the winter months.	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	M. heterophyllum is highly competitive and able to outcompete other aquatic plants. It forms dense mats of submergent vegetative material throughout the water column and at the water surface, which can prevent water flow, reduce sunlight and reduce oxygen availability. The resulting low oxygen conditions can harm or kill aquatic organisms (CABI, 2020)	Medium
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes	M. heterophyllum forms dense stands in water bodies, which have negative effects on boating, swimming and aesthetics. (CABI,	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 area?	No	No evidence (Global Invasive Species Database (2021) Species profile: Myriophyllum heterophyllum.) EPPO (2015) Pest risk analysis for Myriophyllum heterophyllum. EPPO, Paris. Available at http://www.eppo.int/QUARANTINE/Pest_Risk_Analysis/PRA_intro.h t	Medium
21	4.08	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area?	No	No evidence (Global Invasive Species Database (2021) Species profile: Myriophyllum heterophyllum.) EPPO (2015) Pest risk analysis for Myriophyllum heterophyllum. EPPO, Paris. Available at http://www.eppo.int/QUARANTINE/Pest_Risk_Analysis/PRA_intro.h t	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	, Global Invasive Species Database (2021) Species profile: Myriophyllum heterophyllum. EPPO (2015) Pest risk analysis for Myriophyllum heterophyllum. EPPO, Paris. Available at http://www.eppo.int/QUARANTINE/Pest_Risk_Analysis/PRA_intro.h t	Medium
23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g.	Yes	Suitable habitats for this species include freshwater ponds, lakes, ditches, standing and slow flowing waters (Global Invasive	Medium
24	4.11	versatile in habitat use)? Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa?	Yes	Species Database (2021) Species profile: Myriophyllum Dense mats of M. heterophyllum reduce light to other submerged plants and can affect water quality by reducing oxygen levels resulting in fish avoiding the infested area (EPPO (2015) Pest risk analysis for Myriophyllum heterophyllum. EPPO, Paris. Available at http://www.eppo.int/QUARANTINE/Pest_Risk_Analysis/PRA_intro.h t)	Medium
25	4.12	Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)?	Yes	Jasprica, N., Lasić, A., Hafner, D., & Bratoš Cetinić, A. (2017). Myriophyllum heterophyllum Michx.(Haloragaceae) u Hrvatskoj. Natura Croatica: Periodicum Musei Historiae Naturalis Croatici, 26(1), 99-103.	Medium
	Resourc 5.01	e exploitation Is the taxon likely to consume threatened or	Not applicable		Vony high
		protected native taxa in the RA area?		Not applicable	Very high
	5.02	Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?	No	No information	Low
	R <i>eprodu</i> 6.01	Iction Is the taxon likely to exhibit parental care	Not applicable	Not applicable	Very high
20	0.01	and/or to reduce age-at-maturity in response to environmental conditions?		посаррісале	very nigh
29	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	Jasprica, N., Lasić, A., Hafner, D., & Bratoš Cetinić, A. (2017). Myriophyllum heterophyllum Michx.(Haloragaceae) u Hrvatskoj. Natura Croatica: Periodicum Musei Historiae Naturalis Croatici, 26(1), 99-103.	Medium
30	6.03	Is the taxon likely to hybridise naturally with native taxa?	Yes	M. heterophyllum x M. laxum (Tavalire, H. F., Bugbee, G. E., LaRue, E. A., & Thum, R. A. (2012). Hybridization, cryptic diversity, and invasiveness in introduced variable-leaf watermilfoil. Evolutionary Applications, 5(8), 892-900).	Medium
31	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	Yes	Reproduction may occur through asexual vegetative propagation and also sexual reproduction (seed production). Asexual vegetative propagation is thought to be the dominant mode of reproduction in introduced populations (CABI, 2020)	Medium
32	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	No	EPPO (2015) Pest risk analysis for Myriophyllum heterophyllum. EPPO, Paris. Available at http://www.eppo.int/QUARANTINE/Pest_Risk_Analysis/PRA_intro.h t	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	EPPO (2015) Pest risk analysis for Myriophyllum heterophyllum. EPPO, Paris. Available at http://www.eppo.int/QUARANTINE/Pest_Risk_Analysis/PRA_intro.h tm	Medium
34	6.07	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	1	EPPO (2015) Pest risk analysis for Myriophyllum heterophyllum. EPPO, Paris. Available at http://www.eppo.int/QUARANTINE/Pest_Risk_Analysis/PRA_intro.h tm	Medium
		al mechanisms How many potential internal	>1	the aquatic plant trade, Ship hull fouling, Floating vegetation and	Medium
50	7.01	vectors/pathways could the taxon use to disperse within the RA area (with suitable habitats nearby)?	>1	debris (EPPO (2015) Pest risk analysis for Myriophyllum heterophyllum. EPPO, Paris. Available at http://www.eppo.int/QUARANTINE/Pest_Risk_Analysis/PRA_intro.h tm)	
	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	Ship hull fouling (EPPO (2015) Pest risk analysis for Myriophyllum heterophyllum. EPPO, Paris. Available at http://www.eppo.int/QUARANTINE/Pest_Risk_Analysis/PRA_intro.h tm)	Medium
	7.03	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal?	Yes	May be commonly transported among water bodies on boats and boat trailers (CABI, 2020)	Medium
38	7.04	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?	Yes	Seeds may also be dispersed by animal vectors. (CABI, 2020)	Medium
39	7.05	It natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?	Yes	M. heterophyllum is capable of spreading through vegetative fragments (CABI, 2020)	Medium
40	7.06	Are older life stages of the taxon likely to	Not applicable	Not applicable	Very high
41	7.07	migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	Yes	Seeds may also be dispersed by animal vectors. (CABI, 2020)	Medium
42	7.08	Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or intentional) likely to be	Yes	It can be moved around by any number of water and animal vectors and may be commonly transported among water bodies on boats and boat trailers. Seeds may also be dispersed by animal vectors. (CABI, 2020).	Medium

42	7.00	In dianowal of the tayon density dense 1, 12	No	EDDO (201E) Dest visit analysis for Music-bullium between U	Madium
43	7.09	Is dispersal of the taxon density dependent?	No	EPPO (2015) Pest risk analysis for Myriophyllum heterophyllum. EPPO, Paris. Available at	Medium
				http://www.eppo.int/QUARANTINE/Pest_Risk_Analysis/PRA_intro.h	
				tm	
		ce attributes			
44	8.01	Is the taxon able to withstand being out of	No	No evidence	Low
		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	Myriophyllum heterophyllum can grow in a wide range of physical	Medium
		water quality conditions relevant to that		and chemical conditions (EPPO (2015) Pest risk analysis for	
		taxon? [In the Justification field, indicate the		Myriophyllum heterophyllum. EPPO, Paris. Available at	
		relevant water quality variable(s) being		http://www.eppo.int/QUARANTINE/Pest_Risk_Analysis/PRA_intro.h	
46	8.03	considered.] Can the taxon be controlled or eradicated in	Yes	tm) Triclopyr may be another option. Results from Getsinger et al.	Medium
-0	5.05	the wild with chemical, biological, or other	103	(2003) suggest that triclopyr may be efficacious against M.	
		agents/means?		heterophyllum in the field over a wide range of concentrations and	
		-		exposure times. (Global Invasive Species Database (2021)	
				Species profile: Myriophyllum heterophyllum).	
47	8.04	Is the taxon likely to tolerate or benefit from	No	(EPPO (2015) Pest risk analysis for Myriophyllum heterophyllum.	Medium
		environmental/human disturbance?		EPPO, Paris. Available at http://www.eppo.int/QUARANTINE/Pest_Risk_Analysis/PRA_intro.h	
				Inttp://www.eppo.int/QUARANTINE/Pest_Risk_Analysis/PRA_Intro.n	
48	8.05	Is the taxon able to tolerate salinity levels	No	No evidence; Freshwater species	Medium
		that are higher or lower than those found in			
		its usual environment?			
49	8.06	Are there effective natural enemies (predators) of the taxon present in the RA	Yes	Insects (CABI, 2020)	Medium
C C	limate	change			
		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,			
51	9.02	decrease or not change? Under the predicted future climatic	Increase	The risk of establishment may potentially increase with	Medium
51	5.02	conditions, are the risks of establishment	111010030	temperature increases. Those areas which are currently unsuitable	
		posed by the taxon likely to increase,		for the occurrence of M. heterophyllum may become more suitable	
		decrease or not change?		with increased number of day degrees. Extreme weather events,	
				flooding etc., may increase the occurrence and potential areas of	
				establishment for the plant. (EPPO (2015) Pest risk analysis for	
				Myriophyllum heterophyllum. EPPO, Paris. Available at http://www.eppo.int/QUARANTINE/Pest_Risk_Analysis/PRA_intro.h	
				tm)	
52	9.03	Under the predicted future climatic	Increase	The risk of establishment may potentially increase with	Medium
		conditions, are the risks of dispersal within		temperature increases. Those areas which are currently unsuitable	
		the RA area posed by the taxon likely to		for the occurrence of M. heterophyllum may become more suitable	
		increase, decrease or not change?		with increased number of day degrees. Extreme weather events, flooding etc., may increase the occurrence and potential areas of	
				establishment for the plant. (EPPO (2015) Pest risk analysis for	
				Myriophyllum heterophyllum. EPPO, Paris. Available at	
				http://www.eppo.int/QUARANTINE/Pest_Risk_Analysis/PRA_intro.h	
<b>F</b> 2	0.07		l li ala i	tm)	Maralin.
53	9.04	Under the predicted future climatic	Higher	With increased temperature, CO2 levels and nitrogen deposition,	Medium
		conditions, what is the likely magnitude of future potential impacts on biodiversity		the impacts of M. heterophyllum may be more profound within native plant communities. M. heterophyllum has high phenotypic	
		and/or ecological integrity/status?		plasticity which will enable the species to persist and outcompete	
				species with restricted habitat requirements. (EPPO (2015) Pest	
				risk analysis for Myriophyllum heterophyllum. EPPO, Paris.	
				Available at	
E 4	0.05	Under the predicted future elimetic	Highor	http://www.eppo.int/OUARANTINE/Pest_Risk_Analysis/PRA_intro.h	Modium
54	9.05	Under the predicted future climatic conditions, what is the likely magnitude of	Higher	With increased temperature, C02 levels and nitrogen deposition, the impacts of M. heterophyllum may be more profound within	Medium
		future potential impacts on ecosystem		native plant communities. M. heterophyllum has high phenotypic	
		structure and/or function?		plasticity which will enable the species to persist and outcompete	
				species with restricted habitat requirements. (EPPO (2015) Pest	
				risk analysis for Myriophyllum heterophyllum. EPPO, Paris.	
				Available at	
55	9.06	Under the predicted future climatic	Higher	http://www.eppo.int/OUARANTINE/Pest_Risk_Analysis/PRA_intro.h	Medium
22	9.00	conditions, what is the likely magnitude of	Higher	(EPPO (2015) Pest risk analysis for Myriophyllum heterophyllum. EPPO, Paris. Available at	medium
		future potential impacts on ecosystem		http://www.eppo.int/QUARANTINE/Pest_Risk_Analysis/PRA_intro.h	
		services/socio-economic factors?		tm	

Statistics	
Scores	
BRA	27.5
BRA Outcome	High
BRA+CCA	37.5
BRA+CCA Outcome	High
Score partition	
A. Biogeography/Historical	12.5
1. Domestication/Cultivation	2.0
2. Climate, distribution and introduction risk	0.0
3. Invasive elsewhere	10.5
B. Biology/Ecology	15.0
4. Undesirable (or persistence) traits	7.0
5. Resource exploitation	0.0
6. Reproduction	6.0
7. Dispersal mechanisms	6.0
8. Tolerance attributes	-4.0
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	5
<i>3. Invasive elsewhere</i>	3 5 5
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	
5. Resource exploitation	12 2 7 9 6
6. Reproduction	7
7. Dispersal mechanisms	9
8. Tolerance attributes	6
C. Climate change	6
9. Climate change	6
Sectors affected	
Commercial	13
Environmental	11
Species or population nuisance traits	17
Thresholds	
BRA	24.75
BRA+CCA	24.75
Confidence	
BRA+CCA	0.53
BRA	0.52
CCA	0.58
Date and Time	
06/12/20	21 21:27:33

Taxon and Assessor details					
Category	Plantae (freshwater)				
Taxon name	Najas graminea				
Common name	ricefield waternymph				
Assessor	Tena Radočaj				
Risk screening context					
Reason and socio-economic benefits					
Risk assessment area	Mediterranean region				
Taxonomy					
Native range					
Introduced range					
URL					

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
1. l		ication/Cultivation	N/	This short is also assume that the data of the second state of the	LU -h
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	This plant is also commercialized in the aquarium trade. (U.S. Fish & Wildlife Service, August 2020 Revised, January 2021 Web Version, 3/26/2021)	High
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	This plant is also commercialized in the aquarium trade. (U.S. Fish & Wildlife Service, August 2020 Revised, January 2021 Web Version, 3/26/2021)	High
3	1.03	Does the taxon have invasive races,	No	No evidence	Low
2		varieties, sub-taxa or congeners?			
2. (		, distribution and introduction risk			ha i:
4	2.01	How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range?	Medium	The similarity of climatic conditions between native areas and the RA area is medium (Climatch)	Medium
5	2.02	What is the quality of the climate matching data?	Medium	I used climatch and distribution map of CABI	Low
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	N. graminea is present in the RA area. (Lansdown, R. V., Anastasiu, P., Barina, Z., Bazos, I., Çakan, H., Caković, D., & Király, G. (2016). Review of alien freshwater vascular plants in South-east Europe. ESENIAS Scientific Reports, 1, 137-154).	High
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	None	N. graminea is present in the RA area. (Lansdown, R. V., Anastasiu, P., Barina, Z., Bazos, I., Çakan, H., Caković, D., & Király, G. (2016). Review of alien freshwater vascular plants in South-east Europe. ESENIAS Scientific Reports, 1, 137-154).	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	N. graminea is present in the RA area. (Lansdown, R. V., Anastasiu, P., Barina, Z., Bazos, I., Çakan, H., Caković, D., & Király, G. (2016). Review of alien freshwater vascular plants in	High
3. 1	Invaciva	and intentional introductions)?		South-east Europe. ESENIAS Scientific Reports, 1, 137-154).	
9	3.01	Has the taxon become naturalised (established viable populations) outside its	Yes	It has become naturalised in Spain, Italy, Bulgaria, the Crimea (U.S. Fish & Wildlife Service, August 2020 Revised, January 2021	Medium
10	3.02	native range? In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	No	Web Version, 3/26/2021) No records of impacts from the introductions were found. With known established populations, but a lack of information on	Low
11	3.03	In the taxon's introduced range, are there	No	impacts, the history of invasiveness for this species U.S. Fish & Wildlife Service, August 2020 Revised, January 2021	Low
12	3.04	known adverse impacts to aquaculture? In the taxon's introduced range, are there	No	Web Version, 3/26/2021 No records of impacts from the introductions were found. With	Low
12	5.04	known adverse impacts to ecosystem services?	No	known established populations, but a lack of information on jimpacts, the history of invasiveness for this species	LOW
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	No records of impacts from the introductions were found. With known established populations, but a lack of information on impacts, the history of invasiveness for this species	Low
<b>B</b> .	Biology	//Ecology		impacts, the instory of invasiveness for this species	
		able (or persistence) traits			
14	4.01	Is it likely that the taxon will be poisonous or pose other risks to human health?	No	No information on threats to humans was found for Najas graminea. (U.S. Fish & Wildlife Service, August 2020 Revised, January 2021 Web Version, 3/26/2021)	Low
15	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	No	U.S. Fish & Wildlife Service, August 2020 Revised, January 2021 Web Version, 3/26/2021)	Low
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	U.S. Fish & Wildlife Service, August 2020 Revised, January 2021 Web Version, 3/26/2021)	Low
17	4.04		Yes	This species is wide-spread in tropical and subtropical regions. (U.S. Fish & Wildlife Service, August 2020 Revised, January 2021 Web Version, 3/26/2021)	Low
18	4.05	Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA	No	No records of impacts from the introductions were found. This species is wide-spread in tropical and subtropical regions, in the RA area climate is temperate.	Low
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	No records of impacts from the introductions were found. This species is wide-spread in tropical and subtropical regions, in the RA area climate is temperate.	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 records of diseases were found for Najas graminea. (U.S. Fish & Wildlife Service, August 2020 Revised, January 2021 Web Version, 3/26/2021)	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 records of diseases were found for Najas graminea. (U.S. Fish & Wildlife Service, August 2020 Revised, January 2021 Web Version, 3/26/2021)	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	Stems up to 60 cm high (U.S. Fish & Wildlife Service, August 2020 Revised, January 2021 Web Version, 3/26/2021)	Medium

6 5.0 7 5.0	<ul> <li>range of water velocity conditions versatile in habitat use)?</li> <li>11 Is it likely that the taxon's mode (e.g. excretion of by-products) or (e.g. feeding) will reduce habitat native taxa?</li> <li>.12 Is the taxon likely to maintain a population even when present in densities (or persisting in adverse by way of a dormant form)?</li> <li>source exploitation</li> <li>.01 Is the taxon likely to consume th protected native taxa in the RA a</li> <li>.02 Is the taxon likely to sequester for resources (including nutrients) to detriment of native taxa in the R. production</li> <li>.01 Is the taxon likely to exhibit pare and/or to reduce age-at-maturity to environmental conditions?</li> <li>.02 Is the taxon likely to produce via or propagules (in the RA area)?</li> </ul>	s (e.g. of existence N r behaviours quality for viable Y low e conditions rreatened or N urea? ood N o the A area?	/es	This aquatic plant grows in ponds, river, streams, lakes and paddy fields, usually in still or slow-moving water. (Zhuang X. 2017. Najas graminea. The IUCN Red List of Threatened Species 2017: e.T164296A67788915. Available: https://www.iucnredlist.org/species/164296/67788915) (Zhuang X. 2017. Najas graminea. The IUCN Red List of Threatened Species 2017: e.T164296A67788915. Available: https://www.iucnredlist.org/species/164296/67788915) (Zhuang X. 2017. Najas graminea. The IUCN Red List of Threatened Species 2017: e.T164296A67788915. Available: https://www.iucnredlist.org/species/164296/67788915. Available: https://www.iucnredlist.	Low Medium Medium Very high
5         4.1           . Resc         5           6         5.0           7         5.0           . Repr         8           6.0         9           0         6.0	(e.g. excretion of by-products) or (e.g. feeding) will reduce habitat native taxa?         .12       Is the taxon likely to maintain a population even when present in densities (or persisting in adverse by way of a dormant form)?         source exploitation       .01         .01       Is the taxon likely to consume th protected native taxa in the RA a         .02       Is the taxon likely to sequester for resources (including nutrients) to detriment of native taxa in the RA and/or to reduce age-at-maturity to environmental conditions?         .02       Is the taxon likely to exhibit pare and/or to reduce age-at-maturity to environmental conditions?         .02       Is the taxon likely to produce via or propagules (in the RA area)?	r behaviours quality for viable Y low e conditions rreatened or N urea? ood N o the A area?	Yes Not applicable	<ul> <li>(Zhuang X. 2017. Najas graminea. The IUCN Red List of Threatened Species 2017: e.T164296A67788915. Available: https://www.iucnredlist.org/species/164296/67788915)</li> <li>(Zhuang X. 2017. Najas graminea. The IUCN Red List of Threatened Species 2017: e.T164296A67788915. Available: https://www.iucnredlist.org/species/164296/67788915)</li> </ul>	Medium Very high
. Resc 6 5.0 7 5.0 . Repr 8 6.0 9 6.0 0 6.0	<ul> <li>(e.g. feeding) will reduce habitat native taxa?</li> <li>12 Is the taxon likely to maintain a population even when present in densities (or persisting in adverse by way of a dormant form)?</li> <li>source exploitation</li> <li>.01 Is the taxon likely to consume th protected native taxa in the RA a</li> <li>.02 Is the taxon likely to sequester for resources (including nutrients) to detriment of native taxa in the R production</li> <li>.01 Is the taxon likely to exhibit pare and/or to reduce age-at-maturity to environmental conditions?</li> <li>.02 Is the taxon likely to produce via or propagules (in the RA area)?</li> </ul>	requality for viable low e conditions rreatened or N rrea? ood N A area? ental care N	Not applicable	https://www.iucnredlist.org/species/164296/67788915) (Zhuang X. 2017. Najas graminea. The IUCN Red List of Threatened Species 2017: e.T164296A67788915. Available: https://www.iucnredlist.org/species/164296/67788915) Not applicable	Very high
. Resc 6 5.0 7 5.0 . Repr 8 6.0 9 6.0 0 6.0	<ul> <li>.12 Is the taxon likely to maintain a population even when present in densities (or persisting in adverse by way of a dormant form)?</li> <li><i>source exploitation</i></li> <li>.01 Is the taxon likely to consume th protected native taxa in the RA a</li> <li>.02 Is the taxon likely to sequester for resources (including nutrients) to detriment of native taxa in the R. <i>production</i></li> <li>.01 Is the taxon likely to exhibit pare and/or to reduce age-at-maturity to environmental conditions?</li> <li>.02 Is the taxon likely to produce via or propagules (in the RA area)?</li> </ul>	low e conditions rreatened or N rrea? ood N o the A area?	Not applicable	Threatened Species 2017: e.T164296A67788915. Available: https://www.iucnredlist.org/species/164296/67788915) Not applicable	Very high
6 5.0 7 5.0 . <i>Repr</i> 8 6.0 9 6.0 0 6.0	densities (or persisting in adverse by way of a dormant form)?         source exploitation         .01       Is the taxon likely to consume th protected native taxa in the RA a         .02       Is the taxon likely to sequester for resources (including nutrients) to detriment of native taxa in the R. production         .01       Is the taxon likely to exhibit pare and/or to reduce age-at-maturity to environmental conditions?         .02       Is the taxon likely to produce via or propagules (in the RA area)?	e conditions rreatened or roa? ood A area? ental care		https://www.iucnredlist.org/species/164296/67788915) Not applicable	, -
6 5.0 7 5.0 . <i>Repr</i> 8 6.0 9 6.0 0 6.0	by way of a dormant form)? source exploitation .01 Is the taxon likely to consume th protected native taxa in the RA a .02 Is the taxon likely to sequester for resources (including nutrients) to detriment of native taxa in the R production .01 Is the taxon likely to exhibit pare and/or to reduce age-at-maturity to environmental conditions? .02 Is the taxon likely to produce via or propagules (in the RA area)?	rreatened or N ood N o the A area?		Not applicable	, -
6 5.0 7 5.0 . <i>Repr</i> 8 6.0 9 6.0 0 6.0	<ul> <li>.01 Is the taxon likely to consume th protected native taxa in the RA a</li> <li>.02 Is the taxon likely to sequester for resources (including nutrients) to detriment of native taxa in the R. production</li> <li>.01 Is the taxon likely to exhibit pare and/or to reduce age-at-maturity to environmental conditions?</li> <li>.02 Is the taxon likely to produce via or propagules (in the RA area)?</li> </ul>	nrea? bod N b the A area? ental care N			, -
7 5.0 . Repr 8 6.0 9 6.0 0 6.0	protected native taxa in the RA a .02 Is the taxon likely to sequester for resources (including nutrients) to detriment of native taxa in the R. production .01 Is the taxon likely to exhibit pare and/or to reduce age-at-maturity to environmental conditions? .02 Is the taxon likely to produce via or propagules (in the RA area)?	nrea? bod N b the A area? ental care N			, -
8 6.0 9 6.0 0 6.0	resources (including nutrients) to detriment of native taxa in the Ru production .01 Is the taxon likely to exhibit pare and/or to reduce age-at-maturity to environmental conditions? .02 Is the taxon likely to produce via or propagules (in the RA area)?	o the A area?			Low
8 6.0 9 6.0 0 6.0	<ul> <li>.01 Is the taxon likely to exhibit pare and/or to reduce age-at-maturity to environmental conditions?</li> <li>.02 Is the taxon likely to produce via or propagules (in the RA area)?</li> </ul>				
9 6.0 0 6.0	and/or to reduce age-at-maturity to environmental conditions? .02 Is the taxon likely to produce via or propagules (in the RA area)?		lot applicable	Netapplicable	Vony high
0 6.0	.02 Is the taxon likely to produce via or propagules (in the RA area)?		vot applicable	Not applicable	Very high
		ble gametes	No	No evidence (Zhuang X. 2017. Najas graminea. The IUCN Red List	Medium
		_		of Threatened Species 2017: e.T164296A67788915. Available: https://www.iucnredlist.org/species/164296/67788915)	
1 6 0	.03 Is the taxon likely to hybridise na native taxa?	aturally with	No	No evidence (Zhuang X. 2017. Najas graminea. The IUCN Red List of Threatened Species 2017: e.T164296A67788915. Available: https://www.iucnredlist.org/species/164296/67788915)	Medium
- 0.0	.04 Is the taxon likely to be hermaph display asexual reproduction?	nroditic or to Y	(es	U.S. Fish & Wildlife Service, August 2020 Revised, January 2021 Web Version, 3/26/2021	Medium
2 6.0			۹o	No evidence (U.S. Fish & Wildlife Service, August 2020 Revised, January 2021 Web Version, 3/26/2021)	Medium
3 6.0	.06 Is the taxon known (or likely) to large number of propagules or of	fspring	(es	(U.S. Fish & Wildlife Service, August 2020 Revised, January 2021 Web Version, 3/26/2021)	Low
4 6.0	within a short time span (e.g. < 2 .07 How many time units (days, mon does the taxon require to reach t	nths, years) 1	L	(U.S. Fish & Wildlife Service, August 2020 Revised, January 2021 Web Version, 3/26/2021)	Low
	first-reproduction?	ine age-at-			
	spersal mechanisms				
5 7.0	.01 How many potential internal vectors/pathways could the taxor disperse within the RA area (with	n use to	>1	escape from pond gardens (U.S. Fish & Wildlife Service, August 2020 Revised, January 2021 Web Version, 3/26/2021)	Medium
6 7.0		ys bring the Y	(es	Interconnected waterways (Personal opinion, no information)	Medium
7 7.0	protected areas (e.g. MCZ, MPA, .03 Does the taxon have a means of		No	No evidence (U.S. Fish & Wildlife Service, August 2020 Revised,	Medium
, ,	attaching itself to hard substrata hulls, pilings, buoys) such that it	(e.g. ship		January 2021 Web Version, 3/26/2021)	headan
8 7.0	the likelihood of dispersal? .04 Is natural dispersal of the taxon l occur as eggs (for animals) or as		Vo	U.S. Fish & Wildlife Service, August 2020 Revised, January 2021 Web Version, 3/26/2021	Medium
9 7.0	occur as larvae/juveniles (for ani fragments/seedlings (for plants)	likely to Y mals) or as	/es	U.S. Fish & Wildlife Service, August 2020 Revised, January 2021 Web Version, 3/26/2021	Medium
0 7.0			Not applicable	Not applicable	Very high
1 7.0	migrate in the RA area for reprod .07 Are propagules or eggs of the tax be dispersed in the RA area by ot	con likely to	Vo	No evidence (U.S. Fish & Wildlife Service, August 2020 Revised, January 2021 Web Version, 3/26/2021)	Low
2 7.0		ny of the Y he previous	(es	Floods (Personal opinion)	Low
	unintentional or intentional) likel	y to be			
3 7.0	.09 Is dispersal of the taxon density density density of the taxon density of taxon	dependent?	No	No evidence	Medium
4 8.0	.01 Is the taxon able to withstand be water for extended periods (e.g. one or more hours) at some stag	minimum of	١o	No information	Low
5 8.0	.02 Is the taxon tolerant of a wide ra	inge of	(es	Silprasit K, Ngamniyom A, Kerksakul P, Thumajitsakul S. 2016.	Medium
	water quality conditions relevant taxon? [In the Justification field,	to that indicate the	-	Using morphology and genomic template stability (GTS) to track herbicide effect on some submersed aquatic plants. Applied	
6 8.0	.03 Can the taxon be controlled or er		No	Environmental Research 38:75–85 resistance to aquatic pesticides water (U.S. Fish & Wildlife	Low
0.0	the wild with chemical, biological agents/means?		iu	Service, August 2020 Revised, January 2021 Web Version, 3/26/2021)	
7 8.0			/es	This species resistance to aquatic pesticides; were found to be remained alive in glyphosate-contaminated water (U.S. Fish & Wildlife Service, August 2020 Revised, January 2021 Web Version,	Medium
8 8.0	that are higher or lower than tho		/es	3/26/2021) This species can tolerate high salinity waters (U.S. Fish & Wildlife Service, August 2020 Revised, January 2021 Web Version,	Medium
9 8.0	its usual environment? .06 Are there effective natural enemi (predators) of the taxon present		/es	3/26/2021) Probably some insects (Presonal opinion, no information)	Low
. Clin	imate change				۱ 

50	9.01	Under the predicted future climatic	No change	The risks of entry into the RA area by the taxon are likely to no	Medium
		conditions, are the risks of entry into the RA		change, only by human impact	
		area posed by the taxon likely to increase,			
		decrease or not change?			
51	9.02	Under the predicted future climatic	No change	The risks of establishment is no change, in the future	Medium
		conditions, are the risks of establishment		temperatures will not be high enough to achieve a stable	
		posed by the taxon likely to increase,		population (Parmesan, C., & Hanley, M. E. (2015). Plants and	
		decrease or not change?		climate change: complexities and surprises. Annals of botany,	
52	9.03	Under the predicted future climatic	No change	The risks of establishment is no change, in the future	Medium
		conditions, are the risks of dispersal within		temperatures will not be high enough to achieve a stable	
		the RA area posed by the taxon likely to		population (Parmesan, C., & Hanley, M. E. (2015). Plants and	
		increase, decrease or not change?		climate change: complexities and surprises. Annals of botany,	
53	9.04	Under the predicted future climatic	No change	Parmesan, C., & Hanley, M. E. (2015). Plants and climate change:	Medium
		conditions, what is the likely magnitude of		complexities and surprises. Annals of botany, 116(6), 849-864.	
		future potential impacts on biodiversity			
		and/or ecological integrity/status?			
54	9.05	Under the predicted future climatic	No change	Parmesan, C., & Hanley, M. E. (2015). Plants and climate change:	Medium
		conditions, what is the likely magnitude of		complexities and surprises. Annals of botany, 116(6), 849-864.	
		future potential impacts on ecosystem			
		structure and/or function?			
55	9.06	Under the predicted future climatic	No change	Parmesan, C., & Hanley, M. E. (2015). Plants and climate change:	Medium
		conditions, what is the likely magnitude of		complexities and surprises. Annals of botany, 116(6), 849-864.	
		future potential impacts on ecosystem			
		services/socio-economic factors?			

Statistics

Scores	
BRA	14.5
BRA Outcome	Medium
BRA+CCA	14.5
BRA+CCA Outcome	Medium
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	3.0
5. Resource exploitation	0.0
6. Reproduction	3.0
7. Dispersal mechanisms	0.0
8. Tolerance attributes	5.0
C. Climate change	0.0
9. Climate change Answered Questions	0.0
Answered Questions 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 <b>36</b>
4. Undesirable (or persistence) traits	12
5. Resource exploitation	12 2 7 9 6 6 6
6. Reproduction	7
7. Dispersal mechanisms	9
8. Tolerance attributes	6
C. Climate change	6
9. Climate change	6
Sectors affected	
Commercial	5
Environmental	1
Species or population nuisance traits	12
Thresholds	
BRA	24.75
BRA+CCA	24.75
Confidence	
BRA+CCA	0.45
BRA	0.44

	DIGALOGA	01-10
	BRA	0.44
	CCA	0.50
Date and Time		
	06/12/20	21 21:54:45

Faxon and Assessor details						
Category	Plantae (freshwater)					
Taxon name	Najas guadalupensis					
Common name	southern waternymph					
Assessor	Mihaela Britvec					
Risk screening context						
Reason and socio-economic benefits						
Risk assessment area	Mediterranean region					
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	No	no reference	Low
2	1.02	generations? Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	used in aquaria	High
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	for example Najas graminea, Najas gracillima and Najas orientalis	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	Medium	no reference	Low
5	2.02	native range? What is the quality of the climate matching data?	Medium	no reference	Low
6	2.03	Is the taxon already present outside of captivity in the RA area?	No	no data	Low
		How many potential vectors could the taxon use to enter in the RA area?	One	It produces a large amount of seed.	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	Hussner, A. (2012). Alien aquatic plant species in European countries. Weed Research, 52 (4), 297-306.	Medium
2 7	nunciu	and intentional introductions)?			
		Has the taxon become naturalised	Yes	Hussner, A. (2012). Alien aquatic plant species in European	High
<u> </u>	5.01	(established viable populations) outside its	105	countries. Weed Research, 52 (4), 297-306.	i iigii
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	No	no reference	Low
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	no reference	Low
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	No	no reference	Low
		In the taxon's introduced range, are there known adverse socio-economic impacts?	No	no reference	Low
		//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	no reference	Low
15	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or	Yes	sometimes forming mats	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 reference	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 reference	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 has invaded or is likely to invade the RA	Yes	Forms dense weed beds.	Low
19		Is the taxon likely to exert adverse impacts	Yes	Forms dense weed beds in shallow water interfering with	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	recreational activities. no reference	Low
<b>1</b> 1	4.08	infectious agents that are endemic in the RA	No		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	No	no reference	Low
22	4.09	to) the RA area? Is it likely that the taxon will achieve a body	Not applicable	no reference	Medium
		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	may be found in springs, fresh and brackish lakes, ponds, and canals	Medium
24	4.11	versatile in habitat use)? Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa?	Yes	Forms dense weed beds.	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	Species has dorminant form - seed.	Low

E D	Docourc	e exploitation			
		Is the taxon likely to consume threatened or	Not applicable	is not carnivore species	High
	0.01	protected native taxa in the RA area?	not approable		
27	5.02	Is the taxon likely to sequester food	Yes	The impacts of the plant are not well documented but they are	Low
		resources (including nutrients) to the		theorized to compete with native species by shading.	
65	Reprodu	detriment of native taxa in the RA area?			
		Is the taxon likely to exhibit parental care	Not applicable	no reference	Medium
		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 reference	Low
30	6.03	or propagules (in the RA area)? Is the taxon likely to hybridise naturally with	No	no reference	Low
50	0.05	native taxa?	NO		LOW
31	6.04	Is the taxon likely to be hermaphroditic or to	No	no reference	Low
		display asexual reproduction?			
32	6.05	Is the taxon dependent on the presence of	No	no reference	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	Najas guadalupensis is a fast-growing aquatic plant species that	High
		large number of propagules or offspring		produces a large amount of seed.	
		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-	6	6 months	Medium
		first-reproduction?			
7. E	Dispersa	al mechanisms			
	1	How many potential internal	One	seeds may be spread by waterfowl	Medium
1		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	no reference	Medium
50	1.02	taxon in close proximity to one or more			incuidin .
		protected areas (e.g. MCZ, MPA, SSSI)?			
37	7.03	Does the taxon have a means of actively	No	no reference of acitively attaching	Medium
1		attaching itself to hard substrata (e.g. ship			
1		hulls, pilings, buoys) such that it enhances the likelihood of dispersal?			
38	7.04	Is natural dispersal of the taxon likely to	Yes	seeds may be spread by waterfowl	High
		occur as eggs (for animals) or as propagules			5
		(for plants: seeds, spores) in the RA area?			
39	7.05	Is natural dispersal of the taxon likely to	Yes	as seeds and fragments	High
		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	Not applicable	has not active dispersal mechanisms	High
		migrate in the RA area for reproduction?			
41	7.07	Are propagules or eggs of the taxon likely to	Yes	pkants can be dispersed by animals between water bodies	High
42	7.08	be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the	Yes	Species is a fast growing plant.	High
	/.00	vectors/pathways mentioned in the previous			
		seven questions (35-41; i.e. both			
10		unintentional or intentional) likely to be			
	7.09	Is dispersal of the taxon density dependent? ce attributes	Yes	when its population density increases - increases the number of	High
		Is the taxon able to withstand being out of	No	no reference	Low
		water for extended periods (e.g. minimum of	-		-
		one or more hours) at some stage of its life			
45	0.02	cycle?	No	Consist in little to lowert on a fam for the set with the second set	Madium
40	8.02	Is the taxon tolerant of a wide range of water quality conditions relevant to that	No	Species is little tolerant on a few factors: light, temperature, and pH.	Medium
1		taxon? [In the Justification field, indicate the		P	
		relevant water quality variable(s) being			
46	8.03	Can the taxon be controlled or eradicated in	Yes	https://www.doc.govt.nz/documents/science-and-	Medium
1		the wild with chemical, biological, or other agents/means?		technical/sfc141.pdf	
47	8.04	Is the taxon likely to tolerate or benefit from	Yes	Seasonal flooding can also result in the spread of the organism	High
		environmental/human disturbance?		locally.	-
48	8.05	Is the taxon able to tolerate salinity levels	No	no reference	Low
1		that are higher or lower than those found in			
49	8.06	its usual environment? Are there effective natural enemies	No	no reference	Low
Ĺ		(predators) of the taxon present in the RA			
		e change			
		change	Incroses	Interfactional judgement	Modium
50	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA	Increase	professional judgement	Medium
		area posed by the taxon likely to increase,			
		decrease or not change?			
51	9.02	Under the predicted future climatic	Increase	professional judgement	High
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	Increase	professional judgement	High
		conditions, are the risks of dispersal within			-
		the RA area posed by the taxon likely to			
52	0.04	increase, decrease or not change?	Higher	nrofessional judgement	High
53	9.04	Under the predicted future climatic conditions, what is the likely magnitude of	Higher	professional judgement	High
1		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?	Higher	professional judgement	Medium
55	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	Higher	professional judgement	Low

Statistics	
Statistics	
BRA	13.5
BRA Outcome	Medium
BRA+CCA	25.5
BRA+CCA BRA+CCA Outcome	25.5 High
Score partition	nıgıl
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	10.0
4. Undesirable (or persistence) traits	5.0
5. Resource exploitation	2.0
6. Reproduction	-1.0
7. Dispersal mechanisms	4.0
8. Tolerance attributes	0.0
C. Climate change	12.0
9. Climate change	12.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	3 5 5 <b>36</b>
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	4
Environmental	8
Species or population nuisance traits	16
Thresholds	
BRA	24.75
BRA+CCA	24.75
Confidence	
BRA+CCA	0.46
BRA	0.44
	0.44
BRA CCA	
BRA CCA Date and Time	

axon and Assessor details					
Category	Plantae (freshwater)				
Taxon name	Nelumbo nucifera				
Common name	sacred lotus				
Assessor	Mihaela Britvec				
Risk screening context					
Reason and socio-economic benefits					
Risk assessment area	Mediterranean region				
Taxonomy					
Native range					
Introduced range					
URL					

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	Nelumbo nucifera has been in cultivation in China for more than 3,000 years, and has been grown not only for its cultural and ornamental value, but also for medicinal uses and for its edible 'seeds' and rhizomes. In China, Japan and India, for example, the rhizomes are roasted, pickled, candied or sliced and fried as chips. A paste made from the nutlets is used as a filling in 'mooncakes', traditional Chinese pastries. The young leaves, leaf stalks and flowers are eaten as vegetables in India.	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://nowo.science.kew.org/taxon/urn:lsid:inni.org:names:6054 Although abundant in cultivation, with many different cultivars having been bred over the centuries, local wild populations of sacred lotus in central mainland China have been greatly reduced due to the rapid development of the aquaculture industry. https://powo.science.kew.org/taxon/urn:lsid:ipni.org:names:6054	High
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	Nelumbo lutea, according https://invazivnevrste.haop.hr/katalog	High
2 (	limate	, 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?	Medium	N. nucifera prefers warm-temperate to tropical climates.	Medium
5	2.02	What is the quality of the climate matching data?	Low	lack of information	Medium
6	2.03	Is the taxon already present outside of captivity in the RA area?	No	no reference	Medium
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	via human translocations (https://www.fws.gov/fisheries/ANS/erss/uncertainrisk/Nelumbo- nucifera-FINAL-November2020.pdf)	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	doi: 10.1111/j.1365-3180.2012.00926.x	High
		e elsewhere			
9	3.01	Has the taxon become naturalised (established viable populations) outside its	Yes	Hussner, A. (2012). Alien aquatic plant species in European countries. Weed Research, 52 (4), 297-306.	High
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	No	No records were found of documented impacts from introductions. https://www.fws.gov/fisheries/ANS/erss/uncertainrisk/Nelumbo- nucifera-FINAL-November2020.pdf	Low
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	No records were found of documented impacts from introductions. https://www.fws.gov/fisheries/ANS/erss/uncertainrisk/Nelumbo- nucifera-FINAL-November2020.pdf	Low
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem services?	No	No records were found of documented impacts from introductions. https://www.fws.gov/fisheries/ANS/erss/uncertainrisk/Nelumbo- nucifera-FINAL-November2020.pdf	Low
	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	No records were found of documented impacts from introductions. https://www.fws.gov/fisheries/ANS/erss/uncertainrisk/Nelumbo- nucifera-FINAL-November2020.pdf	Low
		y/Ecology			
14	4.01	able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health?		No information on threat to humans was found. (https://www.fws.gov/fisheries/ANS/erss/uncertainrisk/Nelumbo- nucifera-FINAL-November2020.pdf)	Low
15	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	The impacts of the plant are not well documented but they are theorized to compete with native species by shading. https://www.fws.gov/fisheries/ANS/erss/uncertainrisk/Nelumbo-nucifera-FINAL-November2020.pdf	Medium
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	no reference	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?	Yes	Nelumbo nucifera is a species native to Japan, India, Australia, India and the surrounding areas. The species has been introduced to areas in Europe, North Africa, North America, and Europe. https://www.fws.gov/fisheries/ANS/erss/uncertainrisk/Nelumbo- nucifera-FINAL-November2020.pdf	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.fws.gov/fisheries/ANS/erss/uncertainrisk/Nelumbo- nucifera-FINAL-November2020.pdf	Low
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes	It is expected that sooner or later the physiognomy of the pond will become monotypic and be represented mainly by the tall and large surface covering plant, Nelumbo. (https://www.fws.gov/fisheries/ANS/erss/uncertainrisk/Nelumbo- nucifera-FINAL-November2020.pdf)	High

21					
	4.07	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and	No	no reference	Low
	4.00	infectious agents that are endemic in the RA	N		1
2	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 reference	Low
		to) the RA area?			
.2 '	4.09	Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity?	Not applicable	no reference	Low
3	4.10	Is the taxon capable of sustaining itself in a	No	N. nucifera are adapted to grow in the flood plains of slow-moving	Medium
5		range of water velocity conditions (e.g.		rivers, delta areas, wetland habitats, including flood plains, ponds,	- iculari
		versatile in habitat use)?		lakes, pools, lagoons, marshes, swamps and the backwaters of reservoirs.	
.4	4.11	Is it likely that the taxon's mode of existence	Yes	Nelumbo, which develops leaves on and above the pond's surface,	High
		(e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for		has the most advantage in the pond and the shade-intolerant species under cover are compelled to be eliminated. It is expected	
		native taxa?		that sooner or later the physiognomy of the pond will become	
				monotypic and be represented mainly by the tall and large surface	
				covering plant, Nelumbo.	
				https://www.fws.gov/fisheries/ANS/erss/uncertainrisk/Nelumbo- nucifera-FINAL-November2020.pdf	
.5	4.12	Is the taxon likely to maintain a viable	Yes	N. nucifera have remarkable power of dormancy and indeed the	Very high
		population even when present in low densities (or persisting in adverse conditions		proved longevity of its seeds exceeds that of any known species of flowering plant.	
		by way of a dormant form)?		https://www.fws.gov/fisheries/ANS/erss/uncertainrisk/Nelumbo-	
				nucifera-FINAL-November2020.pdf	
		e exploitation Is the taxon likely to consume threatened or	Yes	N. nucifera is not carnivore species.	Very high
		protected native taxa in the RA area?			, ,
./	5.02	Is the taxon likely to sequester food resources (including nutrients) to the	Yes	The impacts of the plant are not well documented but they are theorized to compete with native species by shading.	Medium
		detriment of native taxa in the RA area?		https://www.fws.gov/fisheries/ANS/erss/uncertainrisk/Nelumbo-	
	anradi	untion .		nucifera-FINAL-November2020.pdf	
	eprodu 6.01	Is the taxon likely to exhibit parental care	Not applicable	no reference	Medium
		and/or to reduce age-at-maturity in response			
9	6.02	to environmental conditions? Is the taxon likely to produce viable gametes	Yes	https://www.sciencedirect.com/science/article/abs/pii/S003194229	High
		or propagules (in the RA area)?		6008801	
0	6.03	Is the taxon likely to hybridise naturally with native taxa?	No	no reference	Low
1	6.04	Is the taxon likely to be hermaphroditic or to	No	no reference	Medium
_		display asexual reproduction?			
2	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features)	No	no reference	Medium
		to complete its life cycle?			
3	6.06	Is the taxon known (or likely) to produce a	Yes	Stands of lotus drop hundreds of thousands of seeds every year to the bottom of the pond.	Very high
		large number of propagules or offspring within a short time span (e.g. < 1 year)?		https://www.fws.gov/fisheries/ANS/erss/uncertainrisk/Nelumbo-	
_			-	nucifera-FINAL-November2020.pdf	
4	6.07	How many time units (days, months, years) does the taxon require to reach the age-at-	6	6 months	Medium
		first-reproduction?			
		al mechanisms How many potential internal	One	via human translocations	High
5	,.01	vectors/pathways could the taxon use to	one		i iigii
_	7.02	disperse within the RA area (with suitable			11:
	7.02	Will any of these vectors/pathways bring the taxon in close proximity to one or more	Yes	no reference	High
86		protected areas (e.g. MCZ, MPA, SSSI)?			
	7.03	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship	No	no reference of acitively attaching	High
		hulls, pilings, buoys) such that it enhances			
			1		1
37	7 0 4	the likelihood of dispersal?	Voc	This species propagates by cools and this	High
37	7.04	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules	Yes	This species propagates by seeds and rhizomes.	High
87 88		Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?			-
87 88	7.04	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules	Yes	This species propagates by seeds and rhizomes. This species propagates by seeds and rhizomes.	High High
87 88		Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA			-
37 38 39	7.05	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?	Yes	This species propagates by seeds and rhizomes.	High
37   37 38   39 39   30	7.05	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction?	Yes Not applicable	This species propagates by seeds and rhizomes. has not active dispersal mechanisms	High High
37   37 38   39 39   30	7.05	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to	Yes	This species propagates by seeds and rhizomes.	High
37 88 99 10	7.05	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction?	Yes Not applicable	This species propagates by seeds and rhizomes. has not active dispersal mechanisms	High High
37 88 99 10	7.05 7.06 7.07	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous	Yes Not applicable Yes	This species propagates by seeds and rhizomes. has not active dispersal mechanisms pkants can be dispersed by animals between water bodies	High High High
37 88 99 10	7.05 7.06 7.07	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both	Yes Not applicable Yes	This species propagates by seeds and rhizomes. has not active dispersal mechanisms pkants can be dispersed by animals between water bodies https://www.fws.gov/fisheries/ANS/erss/uncertainrisk/Nelumbo-	High High High
37   37 88   39 99   30 10   30 12   30 13   30	7.05 7.06 7.07 7.08 7.09	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent?	Yes Not applicable Yes	This species propagates by seeds and rhizomes. has not active dispersal mechanisms pkants can be dispersed by animals between water bodies https://www.fws.gov/fisheries/ANS/erss/uncertainrisk/Nelumbo- nucifera-FINAL-November2020.pdf	High High High
37 38 39 40 41 42 43 3. Teta	7.05 7.06 7.07 7.08 7.09 olerano	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? ce attributes	Yes Not applicable Yes Yes	This species propagates by seeds and rhizomes. has not active dispersal mechanisms pkants can be dispersed by animals between water bodies https://www.fws.gov/fisheries/ANS/erss/uncertainrisk/Nelumbo- nucifera-FINAL-November2020.pdf when its population density increases - increases the number of	High High High High
37 38 39 40 41 42 43 3. Teta	7.05 7.06 7.07 7.08 7.09 olerano	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as 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 Not applicable Yes Yes	This species propagates by seeds and rhizomes. has not active dispersal mechanisms pkants can be dispersed by animals between water bodies https://www.fws.gov/fisheries/ANS/erss/uncertainrisk/Nelumbo- nucifera-FINAL-November2020.pdf	High High High High
37 38 39 40 41 42 43 3. Teta	7.05 7.06 7.07 7.08 7.09 olerano	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as 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 Not applicable Yes Yes	This species propagates by seeds and rhizomes. has not active dispersal mechanisms pkants can be dispersed by animals between water bodies https://www.fws.gov/fisheries/ANS/erss/uncertainrisk/Nelumbo- nucifera-FINAL-November2020.pdf when its population density increases - increases the number of seeds can remain dormant for an extensive period of time as the pond silts in and dries out https://www.fws.gov/fisheries/ANS/erss/uncertainrisk/Nelumbo-	High High High High
37 38 39 40 41 42 43 3. To 44	7.05 7.06 7.07 7.08 7.09 0lerano 8.01	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle?	Yes Not applicable Yes Yes	This species propagates by seeds and rhizomes. has not active dispersal mechanisms pkants can be dispersed by animals between water bodies https://www.fws.gov/fisheries/ANS/erss/uncertainrisk/Nelumbo- nucifera-FINAL-November2020.pdf when its population density increases - increases the number of seeds can remain dormant for an extensive period of time as the pond silts in and dries out https://www.fws.gov/fisheries/ANS/erss/uncertainrisk/Nelumbo- nucifera-FINAL-November2020.pdf	High High High High Very high
37 38 39 40 41 42 43 3. To 44	7.05 7.06 7.07 7.08 7.09 olerano	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as 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 Not applicable Yes Yes Yes	This species propagates by seeds and rhizomes. has not active dispersal mechanisms pkants can be dispersed by animals between water bodies https://www.fws.gov/fisheries/ANS/erss/uncertainrisk/Nelumbo- nucifera-FINAL-November2020.pdf when its population density increases - increases the number of seeds can remain dormant for an extensive period of time as the pond silts in and dries out https://www.fws.gov/fisheries/ANS/erss/uncertainrisk/Nelumbo-	High High High High

46	8.03	Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	Yes	https://www.icid.org/weed_report.pdf	Low
47	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	Yes	Seasonal flooding can also result in the spread of the organism locally.	Medium
48	8.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	No	no reference	Low
		Are there effective natural enemies (predators) of the taxon present in the RA	Yes	https://www.cabi.org/isc/datasheet/68490#tohostPlants	Low
		e change change	_		
		Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?	Increase	professional judgement (https://www.fws.gov/fisheries/ANS/erss/uncertainrisk/Nelumbo- nucifera-FINAL-November2020.pdf)	Low
51	9.02	Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	Increase	professional judgement (https://www.fws.gov/fisheries/ANS/erss/uncertainrisk/Nelumbo- nucifera-FINAL-November2020.pdf)	Low
52	9.03	Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change?	Increase	professional judgement (https://www.fws.gov/fisheries/ANS/erss/uncertainrisk/Nelumbo- nucifera-FINAL-November2020.pdf)	Low
53	9.04	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	Higher	professional judgement	Medium
54	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Higher	professional judgement (https://www.fws.gov/fisheries/ANS/erss/uncertainrisk/Nelumbo- nucifera-FINAL-November2020.pdf)	Low
55	9.06	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	Higher	professional judgement (https://www.fws.gov/fisheries/ANS/erss/uncertainrisk/Nelumbo- nucifera-FINAL-November2020.pdf)	Low

Statistics	
Scores	
BRA	23.0
BRA Outcome	Medium
BRA+CCA	35.0
BRA+CCA Outcome	High
Score partition	
A. Biogeography/Historical	6.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	0.0
3. Invasive elsewhere	2.0
B. Biology/Ecology	17.0
4. Undesirable (or persistence) traits	6.0
5. Resource exploitation	7.0
6. Reproduction	0.0
7. Dispersal mechanisms	4.0
8. Tolerance attributes	0.0
C. Climate change	12.0
9. Climate change	12.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3
2. Climate, distribution and introduction risk	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	6
Environmental	13
Species or population nuisance traits	18
Thresholds	
BRA	24.75
BRA+CCA	24.75

24.73
24.75
0.54
0.57
0.29

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AS-ISK v2	2
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Taxon and Assessor details				
Category	Plantae (freshwater)			
Taxon name	Nymphaea candida			
Common name				
Assessor	Tena Radočaj			
Risk screening context				
Reason and socio-economic benefits				
Risk assessment area	Mediterranean region			
Taxonomy				
Native range				
Introduced range				
URL				

	_		Response	Justification (references and/or other information)	Confidence
		graphy/Historical ication/Cultivation			
<i>1. L</i> 1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	ornamental value (Nierbauer, K. U., Kanz, B., & Zizka, G. (2014). The widespread naturalisation of Nymphaea hybrids is masking the decline of wild-type Nymphaea alba in Hesse, Germany. Flora-	Medium
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	Morphology, Distribution, Functional Ecology of Plants, 209(2), ornamental value (Nierbauer, K. U., Kanz, B., & Zizka, G. (2014). The widespread naturalisation of Nymphaea hybrids is masking the decline of wild-type Nymphaea alba in Hesse, Germany. Flora- Morphology, Distribution, Functional Ecology of Plants, 209(2),	Medium
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	No	No evidence	Low
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?	Medium	The similarity of climatic conditions between native areas and the RA area is medium (Climatch)	Medium
5	2.02	What is the quality of the climate matching data?	Medium	Nowak, A., Nobis, M., Dajdok, Z., Zalewska-Galosz, J., Nowak, S., Nobis, A., & Krawczyk, R. (2010). Revision of Nymphaea candida range-new data on the distribution and habitat preferences of the species in southern Poland. Acta Societatis Botanicorum Poloniae, 79(4).	Medium
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	N. candida is present in the RA area. (Boršić I, Kutleša P, Desnica S, Bošnjak D, Slivar S, Wong L J, Pagad S (2021). Global Register of Introduced and Invasive Species- Croatia. Version 2.8. Invasive Species Specialist Group ISSG. Checklist dataset https://doi.org/10.15468/rhmen3 accessed via GBIF.org.)	High
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	None	N. candida is present in the RA area. (Boršić I, Kutleša P, Desnica S, Bošnjak D, Slivar S, Wong L J, Pagad S (2021). Global Register of Introduced and Invasive Species- Croatia. Version 2.8. Invasive Species Specialist Group ISSG. Checklist dataset https://doi.org/10.15468/rhmen3 accessed via GBIF.org.)	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	N. candida is present in the RA area. (Boršić I, Kutleša P, Desnica S, Bošnjak D, Slivar S, Wong L J, Pagad S (2021). Global Register of Introduced and Invasive Species- Croatia. Version 2.8. Invasive Species Specialist Group ISSG. Checklist dataset https://doi.org/10.15468/rhmen3 accessed via GBIF.org.)	Medium
3. I	nvasive	e elsewhere	•		
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	Czech Republic, Southern regions of Germany, eastern France, Switzerland, south-western Romania, Austria, Hungary (Nowak, A., Nobis, M., Dajdok, Z., Zalewska-Galosz, J., Nowak, S., Nobis, A., & Krawczyk, R. (2010). Revision of Nymphaea candida range-new data on the distribution and habitat preferences of the species in southern Poland. Acta Societatis Botanicorum Poloniae,	High
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	No	No evidence (Bilz, M., Kell, S.P., Maxted, N. and Lansdown, R.V. 2011. European Red List of Vascular Plants. Luxembourg: Publications Office of the European Union)	Low
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	No evidence (Bilz, M., Kell, S.P., Maxted, N. and Lansdown, R.V. 2011. European Red List of Vascular Plants. Luxembourg: Publications Office of the European Union)	Low
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem services?	No	No evidence (Bilz, M., Kell, S.P., Maxted, N. and Lansdown, R.V. 2011. European Red List of Vascular Plants. Luxembourg: Publications Office of the European Union)	Low
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	No evidence (Bilz, M., Kell, S.P., Maxted, N. and Lansdown, R.V. 2011. European Red List of Vascular Plants. Luxembourg: Publications Office of the European Union)	Low
		//Ecology			
		able (or persistence) traits	N		11
		Is it likely that the taxon will be poisonous or pose other risks to human health?	No	No evidence (Bilz, M., Kell, S.P., Maxted, N. and Lansdown, R.V. 2011. European Red List of Vascular Plants. Luxembourg: Publications Office of the European Union)	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 (Bilz, M., Kell, S.P., Maxted, N. and Lansdown, R.V. 2011. European Red List of Vascular Plants. Luxembourg: Publications Office of the European Union)	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 (Bilz, M., Kell, S.P., Maxted, N. and Lansdown, R.V. 2011. European Red List of Vascular Plants. Luxembourg: Publications Office of the European Union)	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?	Yes	Boršić I, Kutleša P, Desnica S, Bošnjak D, Slivar S, Wong L J, Pagad S (2021). Global Register of Introduced and Invasive Species- Croatia. Version 2.8. Invasive Species Specialist Group ISSG. Checklist dataset https://doi.org/10.15468/rhmen3	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 evidence	Low
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	No evidence	Low

<b>.</b> .					1.
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 evidence	Low
21	4.08	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area?	No	No evidence	Low
22	4.09	Is it likely that the taxon will achieve a body size that will make it more likely to be	Yes	Spread 60cm flower up to size 20 cm. (https://www.naturescape.co.uk/product/dwarf-white-water-lily-	Low
23	4.10	released from captivity? Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g.	No	bareroot/) The plant grows only in water, as it is an aquatic plant, mainly in ponds, lakes, and slow flowing streams	Medium
24	4.11	versatile in habitat use)? Is it likely that the taxon's mode of existence	No	(https://inaturalist.ca/taxa/196966-Nymphaea-candida No evidence (Bilz, M., Kell, S.P., Maxted, N. and Lansdown, R.V.	Low
		(e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa?		2011. European Red List of Vascular Plants. Luxembourg: Publications Office of the European Union)	
25	4.12	Is the taxon likely to maintain a viable population even when present in low	No	Nowak, A., Nobis, M., Dajdok, Z., Zalewska-Galosz, J., Nowak, S., Nobis, A., & Krawczyk, R. (2010). Revision of Nymphaea	Low
		densities (or persisting in adverse conditions by way of a dormant form)?		candida range-new data on the distribution and habitat preferences of the species in southern Poland. Acta Societatis	
		e exploitation			
	5.01	Is the taxon likely to consume threatened or protected native taxa in the RA area? Is the taxon likely to sequester food	Not applicable	Not applicable No information	Very high
		resources (including nutrients) to the detriment of native taxa in the RA area?			
	Reprodu 6.01	<i>iction</i> Is the taxon likely to exhibit parental care	Not applicable	Not applicable	Very high
		and/or to reduce age-at-maturity in response to environmental conditions?		Not applicable	
29	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	(Boršić I, Kutleša P, Desnica S, Bošnjak D, Slivar S, Wong L J, Pagad S (2021). Global Register of Introduced and Invasive Species- Croatia. Version 2.8. Invasive Species Specialist Group	Low
30	6.03	Is the taxon likely to hybridise naturally with native taxa?	Yes	ISSG. Checklist dataset https://doi.org/10.15468/rhmen3 Nymphaea alba – N. candida (Vít, P. (2017). Evolutionary and conservation consequences of interspecific hybridization in rare	Low
31	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	Yes	plant species.) Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795-	Low
32	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	No	Nowak, A., Nobis, M., Dajdok, Z., Zalewska-Galosz, J., Nowak, S., Nobis, A., & Krawczyk, R. (2010). Revision of Nymphaea candida range-new data on the distribution and habitat preferences of the species in southern Poland. Acta Societatis Botanicorum Poloniae, 79(4)	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	Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795- 804	Low
34	6.07	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	1	Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795- 804	Low
7. I	Dispersa	al mechanisms			
35	7.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable	One	the aquatic plant trade	Medium
36	7.02		No	No information	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 information	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?	Yes	Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795- 804.	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	Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795- 804.	Low
40	7.06	area? Are older life stages of the taxon likely to migrate in the RA area for reproduction?	Not applicable	Not applicable	Very high
41	7.07	Are propagules or eggs of the taxon likely to	No	Wiersema, J. H. (1988). Reproductive biology of Nymphaea	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	No	(Nymphaeaceae). Annals of the Missouri Botanical Garden, 795- Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795-	Low
43	7.09	seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent?	No	804. Wiersema, J. H. (1988). Reproductive biology of Nymphaea	Low
				(Nymphaeaceae). Annals of the Missouri Botanical Garden, 795-	
		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	Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795- 804.	Low
		cycle?	No	Wiersema, J. H. (1988). Reproductive biology of Nymphaea	Low
45	8.02	Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being		(Nymphaeaceae). Annals of the Missouri Botanical Garden, 795- 804.	

		Is the taxon likely to tolerate or benefit from environmental/human disturbance?	No	SKLIAR, I., SKLIAR, V., KLYMENKO, A., SHERSTIUK, M., & ZUBTSOVA, I. (2020). GROWTH SIGNS OF Nymphaea candida IN VARIOUS ECOLOGICAL AND CENOTIC CONDITIONS OF DESNA BASIN (UKRAINE). AgroLife Scientific Journal, 9(1), 316-323.	Low
48		Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	No	SKLIAR, I., SKLIAR, V., KLYMENKO, A., SHERSTIUK, M., & ZUBTSOVA, I. (2020). GROWTH SIGNS OF Nymphaea candida IN VARIOUS ECOLOGICAL AND CENOTIC CONDITIONS OF DESNA BASIN (UKRAINE). AgroLife Scientific Journal, 9(1), 316-323.	Medium
49	8.06	Are there effective natural enemies	No	No evidence	Low
		(predators) of the taxon present in the RA			
		change	_		
		change			
50		Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?		N. candida is present in the RA area. (Boršić I, Kutleša P, Desnica S, Bošnjak D, Slivar S, Wong L J, Pagad S (2021). Global Register of Introduced and Invasive Species- Croatia. Version 2.8. Invasive Species Specialist Group ISSG. Checklist dataset https://doi.org/10.15468/rhmen3 accessed via GBIF.org.)	Very high
51		Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	Increase	The risks of establishment is no change, in the future temperatures will not be high enough to achieve a stable population (Parmesan, C., & Hanley, M. E. (2015). Plants and climate change: complexities and surprises. Annals of botany,	Low
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?	Increase	The risks of establishment is no change, in the future temperatures will not be high enough to achieve a stable population (Parmesan, C., & Hanley, M. E. (2015). Plants and climate change: complexities and surprises. Annals of botany.	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	(Parmesan, C., & Hanley, M. E. (2015). Plants and climate change: complexities and surprises. Annals of botany, 116(6), 849-864.)	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	(Parmesan, C., & Hanley, M. E. (2015). Plants and climate change: complexities and surprises. Annals of botany, 116(6), 849-864.)	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	(Parmesan, C., & Hanley, M. E. (2015). Plants and climate change: complexities and surprises. Annals of botany, 116(6), 849-864.)	Low

Statistics	
Scores	
BRA	6.5
BRA Outcome	Medium
BRA+CCA	10.5
BRA+CCA Outcome	Medium
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	3.0
4. Undesirable (or persistence) traits	2.0
5. Resource exploitation	0.0
6. Reproduction	6.0
7. Dispersal mechanisms	-3.0
8. Tolerance attributes	-2.0
C. Climate change	4.0
9. Climate change	4.0
Answered Questions	
Total	55
A. Biogeography/Historical 1. Domestication/Cultivation	13
2. Climate, distribution and introduction risk	3
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	3
Environmental	0
Species or population nuisance traits	8
Thresholds	
BRA	24.75
BRA+CCA	24.75
Confidence	
BRA+CCA	0.37

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Date and Time		
	CCA	0.38
	BRA	0.37
	BRA+CCA	0.37

Taxon and Assessor details	
Category	Plantae (freshwater)
Taxon name	Nymphaea lotus
Common name	white Egyptian lotus
Assessor	Marina Piria
Risk screening context	
Reason and socio-economic benefits	
Risk assessment area	Mediterranean region
Taxonomy	
Native range	
Introduced range	
URL	

			Response	Justification (references and/or other information)	Confidence
		ography/Historical			
		tication/Cultivation Has the taxon been the subject of	Yes	The leaves, petioles, roots and seeds are all used in medicine in	Very high
1	1.01	domestication (or cultivation) for at least 20 generations?	163	Nigeria (Lim, 2014)	very night
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	Pet/aquarium trade https://www.cabi.org/isc/datasheet/115821#touses	High
3	1.03	Does the taxon have invasive races,	Yes	Nymphaea odorata http://www.columbia.edu/itc/cerc/danoff-	Medium
2 (		varieties, sub-taxa or congeners?		burg/invasion_bio/inv_spp_summ/Nymphaea_odorata.html	
2. C	2.01	<i>e, distribution and introduction risk</i> How similar are the climatic conditions of the	Medium	N. lotus is widespread in Africa and parts of temperate and	Medium
4	2.01	Risk Assessment (RA) area and the taxon's native range?	Medium	tropical Asia to which it is native (Plant Gene Resources of Canada, 2016) but tolerate Bs climate	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?	No	Horizon species, found in Hungary	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	>1	water, floating vegetation https://www.cabi.org/isc/datasheet/115821#topathwayVectors	Very high
8	2.05	Is the taxon currently found in close	Yes	in Hungary, Hussner et al 2012	Low
		proximity to, and likely to enter into, the RA			
		area in the near future (e.g. unintentional			
3 7	nyaciv	and intentional introductions)?	I		l
<i>3. 1.</i> 9	3.01	e elsewhere Has the taxon become naturalised	Yes	Costarika, Salvador	Very high
ĺ	5.51	(established viable populations) outside its		https://www.cabi.org/isc/datasheet/115821#todistribution	,
10	3.02	In the taxon's introduced range, are there	Yes	having moderate negative impacts on wildlife or natural	Low
		known adverse impacts to wild stocks or		communities in Louisiana, but of limited concern and/or extent	
		commercial taxa?			
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	Yes	The plant has also been reported as a weed of fish ponds in	Medium
12	3.04	In the taxon's introduced range, are there	Yes	Nigeria (Adesina et al., 2015). Negatively impacts livelihoods	Low
12	5.01	known adverse impacts to ecosystem	105	Regulively impacts inventious	2011
13	3.05	In the taxon's introduced range, are there	No	https://www.cabi.org/isc/datasheet/115821#toimpactSummary	Medium
		known adverse socio-economic impacts?			
		y/Ecology rable (or persistence) traits	_		_
		Is it likely that the taxon will be poisonous or	No	. lotus has many uses as a human food; th	Very high
		pose other risks to human health?			ver, mgn
15	4.02	Is it likely that the taxon will smother one or	No	N. lotus produces a dense mat-like canopy that is heavy enough	Medium
		more native taxa (that are not threatened or protected)?		to break tillers of rice during vegetative growth periods and can reduce crop yield, particularly in direct seeded rice (Mohamed and Serag, 2003). H	
16	4.03				
		Are there any threatened or protected taxa	No		Very high
1	-1.UJ	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	it is not parasite	Very high
17	4.03		No	https://www.cabi.org/isc/datasheet/115821#toimpactSummary	Very high High
17		that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus			
17		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			
	4.04	that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?	No	https://www.cabi.org/isc/datasheet/115821#toimpactSummary	High
		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		https://www.cabi.org/isc/datasheet/115821#toimpactSummary n Louisiana, USA, the plant is listed as a Tier II invasive species,	
	4.04	that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it	No	https://www.cabi.org/isc/datasheet/115821#toimpactSummary n Louisiana, USA, the plant is listed as a Tier II invasive species, (having moderate negative impacts on wildlife or natural	High
18	4.04	that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web	No	https://www.cabi.org/isc/datasheet/115821#toimpactSummary n Louisiana, USA, the plant is listed as a Tier II invasive species,	High
18 19	4.04 4.05 4.06	that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No Yes Yes	https://www.cabi.org/isc/datasheet/115821#toimpactSummary n Louisiana, USA, the plant is listed as a Tier II invasive species, (having moderate negative impacts on wildlife or natural communities in Louisiana, but of limited concern and/or extent), no evidences but potentially can affect fishery	High Medium Low
18 19	4.04 4.05 4.06	that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or	No	https://www.cabi.org/isc/datasheet/115821#toimpactSummary n Louisiana, USA, the plant is listed as a Tier II invasive species, (having moderate negative impacts on wildlife or natural communities in Louisiana, but of limited concern and/or extent),	High Medium
18 19	4.04 4.05 4.06	that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and	No Yes Yes	https://www.cabi.org/isc/datasheet/115821#toimpactSummary n Louisiana, USA, the plant is listed as a Tier II invasive species, (having moderate negative impacts on wildlife or natural communities in Louisiana, but of limited concern and/or extent), no evidences but potentially can affect fishery	High Medium Low
18 19 20	4.04 4.05 4.06 4.07	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 aqents that are endemic in the RA	No Yes Yes No	https://www.cabi.org/isc/datasheet/115821#toimpactSummary n Louisiana, USA, the plant is listed as a Tier II invasive species, (having moderate negative impacts on wildlife or natural communities in Louisiana, but of limited concern and/or extent), no evidences but potentially can affect fishery no evidence	High Medium Low Medium
18 19 20	4.04 4.05 4.06	that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and	No Yes Yes	https://www.cabi.org/isc/datasheet/115821#toimpactSummary n Louisiana, USA, the plant is listed as a Tier II invasive species, (having moderate negative impacts on wildlife or natural communities in Louisiana, but of limited concern and/or extent), no evidences but potentially can affect fishery	High Medium Low
18 19 20	4.04 4.05 4.06 4.07	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	No Yes Yes No	https://www.cabi.org/isc/datasheet/115821#toimpactSummary n Louisiana, USA, the plant is listed as a Tier II invasive species, (having moderate negative impacts on wildlife or natural communities in Louisiana, but of limited concern and/or extent), no evidences but potentially can affect fishery no evidence In Ghana, Annang and Addo-Boadu (2012) recorded twenty-eight	High Medium Low Medium
18 19 20 21	4.04 4.05 4.06 4.07 4.08	that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA Is ti likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area?	No Yes Yes No Yes	https://www.cabi.org/isc/datasheet/115821#toimpactSummary n Louisiana, USA, the plant is listed as a Tier II invasive species, (having moderate negative impacts on wildlife or natural communities in Louisiana, but of limited concern and/or extent), no evidences but potentially can affect fishery no evidence In Ghana, Annang and Addo-Boadu (2012) recorded twenty-eight genera of algae belonging to five phyla in association with N. lotus.	High Medium Low Medium Low
18 19 20 21	4.04 4.05 4.06 4.07	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 Yes Yes No	https://www.cabi.org/isc/datasheet/115821#toimpactSummary n Louisiana, USA, the plant is listed as a Tier II invasive species, (having moderate negative impacts on wildlife or natural communities in Louisiana, but of limited concern and/or extent), no evidences but potentially can affect fishery no evidence In Ghana, Annang and Addo-Boadu (2012) recorded twenty-eight	High Medium Low Medium
18 19 20 21 22	4.04 4.05 4.06 4.07 4.08	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	No Yes Yes No Yes	https://www.cabi.org/isc/datasheet/115821#toimpactSummary n Louisiana, USA, the plant is listed as a Tier II invasive species, (having moderate negative impacts on wildlife or natural communities in Louisiana, but of limited concern and/or extent), no evidences but potentially can affect fishery no evidence In Ghana, Annang and Addo-Boadu (2012) recorded twenty-eight genera of algae belonging to five phyla in association with N. lotus.	High Medium Low Medium Low
18 19 20 21 22 23	4.04 4.05 4.06 4.07 4.08 4.09 4.10	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 capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)?	No Yes No Yes Yes No	https://www.cabi.org/isc/datasheet/115821#toimpactSummary         https://www.cabi.org/isc/datasheet/115821#toimpactSummary         n Louisiana, USA, the plant is listed as a Tier II invasive species, (having moderate negative impacts on wildlife or natural communities in Louisiana, but of limited concern and/or extent), no evidences but potentially can affect fishery         no evidence         In Ghana, Annang and Addo-Boadu (2012) recorded twenty-eight genera of algae belonging to five phyla in association with N. lotus.         it is large plant         require calm, shallow (<2 m) water, full sunlight and neutral to slightly alkaline pH	High Medium Low Medium Low Medium
18 19 20 21 22 23	4.04 4.05 4.06 4.07 4.08 4.09	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 Yes Yes No Yes Yes	https://www.cabi.org/isc/datasheet/115821#toimpactSummary         https://www.cabi.org/isc/datasheet/115821#toimpactSummary         n Louisiana, USA, the plant is listed as a Tier II invasive species, (having moderate negative impacts on wildlife or natural communities in Louisiana, but of limited concern and/or extent), no evidences but potentially can affect fishery         no evidence         In Ghana, Annang and Addo-Boadu (2012) recorded twenty-eight genera of algae belonging to five phyla in association with N. lotus.         it is large plant         require calm, shallow (<2 m) water, full sunlight and neutral to	High Medium Low Medium Low Medium

25	4.12	Is the taxon likely to maintain a viable	No	Species of Nymphaea reproduce sexually though show variability	Very high
		population even when present in low		between species e.g. flower opening times, flower colour and	
		densities (or persisting in adverse conditions by way of a dormant form)?		function of the various flower parts. Agamospermous reproduction is not seen in species of Nymphaea, however several modes are	
		by way of a dormanc form)?		exhibited e.g. detachable tubers and stolon formation.	
. F	Resourc	ce exploitation	l.		
6	5.01	Is the taxon likely to consume threatened or	Not applicable	no	Very high
_	5 02	protected native taxa in the RA area?	×		
7	5.02	Is the taxon likely to sequester food	Yes	Probably	Low
		resources (including nutrients) to the detriment of native taxa in the RA area?			
. F	Reprodu				1
8	6.01	Is the taxon likely to exhibit parental care	Not applicable	no.	Very 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	Species of Nymphaea reproduce sexually though show variability	Medium
9	0.02	or propagules (in the RA area)?	165	between species e.g. flower opening times, flower colour and	Mediain
				function of the various flower parts. Agamospermous reproduction	
				is not seen in species of Nymphaea, however several modes are	
_	6.00			exhibited e.g. detachable tubers and stolon formation.	
0	6.03	Is the taxon likely to hybridise naturally with native taxa?	No	No evidence but other Nymphea species can hybridize https://pbsociety.org.pl/journals/index.php/asbp/article/view/asbp.	Low
				2015.016/0	
1	6.04	Is the taxon likely to be hermaphroditic or to	No	Species of Nymphaea reproduce sexually though show variability	Very high
		display asexual reproduction?		between species e.g. flower opening times, flower colour and	
				function of the various flower parts. Agamospermous reproduction	
				is not seen in species of Nymphaea, however several modes are exhibited e.g. detachable tubers and stolon formation.	
2	6.05	Is the taxon dependent on the presence of	Yes	https://www.cabi.org/isc/datasheet/115821#toimpactSummary	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	No	https://www.cabi.org/isc/datasheet/115821#toimpactSummary	Very high
		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)	1	https://www.cabi.org/isc/datasheet/115821#toimpactSummary	Very high
		does the taxon require to reach the age-at-			, 5
		first-reproduction?			
		al mechanisms	>1	debuie weten binde	) (am think
2	7.01	How many potential internal vectors/pathways could the taxon use to	>1	debris, water, birds	Very high
		disperse within the RA area (with suitable			
6	7.02	Will any of these vectors/pathways bring the	Yes	birds	Medium
		taxon in close proximity to one or more		https://www.cabi.org/isc/datasheet/115821#toimpactSummary	
7	7.02	protected areas (e.g. MCZ, MPA, SSSI)?	No		Madium
/	7.03	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship	No	no data https://www.cabi.org/isc/datasheet/115821#toimpactSummary	Medium
		hulls, pilings, buoys) such that it enhances			
		the likelihood of dispersal?			
8	7.04	Is natural dispersal of the taxon likely to	No	not yet present	Medium
		occur as eggs (for animals) or as propagules			
9	7.05	(for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to	No	not yet present	Medium
-	/ 100	occur as larvae/juveniles (for animals) or as			i iculuii
		fragments/seedlings (for plants) in the RA			
_		area?			
υ	7.06	Are older life stages of the taxon likely to	Not applicable	na	Very high
1	7.07	migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to	Yes	https://www.cabi.org/isc/datasheet/115821#toimpactSummary	Very high
-	,	be dispersed in the RA area by other animals?			, mgn
2	7.08	Is dispersal of the taxon along any of the	No	https://www.cabi.org/isc/datasheet/115821#toimpactSummary	Medium
		vectors/pathways mentioned in the previous			
		seven questions (35–41; i.e. both			
3	7.09	unintentional or intentional) likely to be Is dispersal of the taxon density dependent?	No	https://www.cabi.org/isc/datasheet/115821#toimpactSummary	Very high
		ce attributes			
		Is the taxon able to withstand being out of	No	https://www.cabi.org/isc/datasheet/115821#toimpactSummary	Very high
		water for extended periods (e.g. minimum of			
		one or more hours) at some stage of its life			
5	8.02	cycle? Is the taxon tolerant of a wide range of	No	https://www.cabi.org/isc/datasheet/115821#toimpactSummary	High
-	2.02	water quality conditions relevant to that			
		taxon? [In the Justification field, indicate the			
_	0.02	relevant water quality variable(s) being			1
b	8.03	Can the taxon be controlled or eradicated in	Yes	Herbicides if allowed	Low
		the wild with chemical, biological, or other agents/means?			
	8.04	Is the taxon likely to tolerate or benefit from	No	https://www.cabi.org/isc/datasheet/115821#toimpactSummary	Medium
7	0.04				
		environmental/human disturbance?		https://www.cabi.org/isc/datasheet/115821#toimpactSummary	High
	8.05	Is the taxon able to tolerate salinity levels	No		
		Is the taxon able to tolerate salinity levels that are higher or lower than those found in	No		
8	8.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?			Very high
8		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	no	Very high
8 9	8.05 8.06	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			Very high
8 9 . (	8.05 8.06 Climate	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	no	
8 9 . (	8.05 8.06	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			Very high High
8 9 . (	8.05 8.06 Climate	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	no	

51	9.02	Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	Increase	prefer warm temperatures	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	watercourses are not connected	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	if introduced with increase temp. have better chance fully establish	Low
54	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Higher	if there is better chance to establish and distribute than can have higher 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?	Higher	probably will affect fisheries	Low

### Statistics Scores BRA 14.5 **BRA Outcome** Medium BRA+CCA 24.5 Medium BRA+CCA Outcome Score partition A. Biogeography/Historical 15.5 1. Domestication/Cultivation 4.0 1.0 10.5 2. Climate, distribution and introduction risk 3. Invasive elsewhere 4. Undesirable (or persistence) traits -1.0 3.0 5. Resource exploitation 2.0 -1.0 6. Reproduction 7. Dispersal mechanisms -1.0 -4.0 **10.0** 10.0 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 13 Environmental 10 Species or population nuisance traits 5 Thresholds BRA BRA+CCA 24.75

	BRA+CCA	24.75
Confiden	ce	
	BRA+CCA	0.67
	BRA	0.69
	CCA	0.46
Date and 1	Time	
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Taxon and Assessor details				
Category	Plantae (freshwater)			
Taxon name	Pistia stratiotes			
Common name	water lettuce			
Assessor	Tena Radočaj			
Risk screening context				
Reason and socio-economic benefits				
Risk assessment area	Mediterranean region			
Taxonomy				
Native range				
Introduced range				
URL				

			Response	Justification (references and/or other information)	Confidence
A. E	Biogeo	graphy/Historical			
	1	ication/Cultivation			
	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	P. stratiotes is a popular ornamental plant, used in ponds and aquariums. (Global Invasive Species Database (2021) Species profile: Pistia stratiotes)	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	P. stratiotes is a popular ornamental plant, used in ponds and aquariums. (Global Invasive Species Database (2021) Species profile: Pistia stratiotes)	Very high
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	No	No evidence	Low
2. C	Climate,				
4	2.01	How similar are the climatic conditions of the	Low	The similarity of climatic conditions between native areas and the	Medium
		Risk Assessment (RA) area and the taxon's native range?		RA area is low (Climatch)	
	2.02	What is the quality of the climate matching data?	Medium	I used climatch and distribution map of CABI	Low
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	P. stratiotes is present in RA area (Boršić, I., Rubinić, T., 2018: First record of Pistia stratiotes L. (Araceae) in Croatia, with the consideration of possible introduction pathways. In: Jelaska, S.D. (ed.), Zbornik sažetaka 3. Hrvatskog simpozija o invazivnim vrstama, 96. Hrvatsko ekološko društvo, Zagreb)	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	None	P. stratiotes is present in RA area (Boršić, I., Rubinić, T., 2018: First record of Pistia stratiotes L. (Araceae) in Croatia, with the consideration of possible introduction pathways. In: Jelaska, S.D. (ed.), Zbornik sažetaka 3. Hrvatskog simpozija o invazivnim vrstama. 96. Hrvatsko ekološko društvo. Zaareb)	High
	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)?	No	P. stratiotes is present in RA area (Boršić, I., Rubinić, T., 2018: First record of Pistia stratiotes L. (Araceae) in Croatia, with the consideration of possible introduction pathways. In: Jelaska, S.D. (ed.), Zbornik sažetaka 3. Hrvatskog simpozija o invazivnim vrstama, 96. Hrvatsko ekološko društvo, Zagreb)	High
		e elsewhere			
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	It was introduced into Europe in the 20th century and has since spread to 15 European countries (Živković, M. M., Anđelković, A. A., Cvijanović, D. L., Novković, M. Z., Vukov, D. M., Šipoš, Š. Š., & Radulović, S. B. (2019). The beginnings of Pistia stratiotes L. invasion in the lower Danube delta: the first record for the Province of Vojvodina (Serbia). BioInvasions Record, 8(2))	Medium
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	Its growth habit can make it a weed in waterways, where it can kill native submerged plants and reduce biodiversity. (CABI, 2020)	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	Mats of P. stratiotes can also disrupt natural ecosystems. They can lead to a lower concentration of oxygen in covered waters and sediments by blocking air-water interface and root respiration. (Global Invasive Species Database (2021) Species profile: Pistia stratiotes.)	High
	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	Yes	P. stratiotes can inflict a severe impact on the environment and economy of infested areas. The dense mats created by connected rosettes of the plant lead to the majority of problems encountered with water lettuce. These mats can have a negative economic effect by blocking waterways, thus increasing the difficulty of navigation and hindering flood control efforts. (Global Invasive Species Database (2021) Species profile: Pistia stratiotes.)	High
		<b>//Ecology</b> able (or persistence) traits			
	4.01	Is it likely that the taxon will be poisonous or pose other risks to human health?	No	Harmless (Global Invasive Species Database (2021) Species profile: Pistia stratiotes.)	Low
	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	Such rigorous growth often leads to drastic reductions in the diversity of native aquatic plant and animal communities (Živković, M. M., Anđelković, A. A., Cvijanović, D. L., Novković, M. Z., Vukov, D. M., Šipoš, Š. Š., & Radulović, S. B. (2019). The beginnings of Pistia stratiotes L. invasion in the lower Danube delta: the first record for the Province of Vojvodina (Serbia).	High
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	No evidence (Global Invasive Species Database (2021) Species profile: Pistia stratiotes.	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	Its temperature tolerance limits are 15°C (59°F) and 35°C (95°F); the optimal growth temperature range for the plant is 22-30°C. Over the years it has been introduced to a number of European countries, e.g. Czech Republic, Spain and Russia but without forming self-replacing populations. (Živković, M. M., Andelković,	Low
				A. A., Cvijanović, D. L., Novković, M. Z., Vukov, D. M., Šipoš, Š. Š., & Radulović, S. B. (2019). The beginnings of Pistia stratiotes L. invasion in the lower Danube delta: the first record	
18	4.05	Is the taxon likely to disrupt food-web	Yes	for the Province of Voivodina (Serbia). BioInvasions Record. 8(2). In the RA area it cannot survive the winter, but it can probably	Low
10		structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA area?		have a adverse impact on the ecosystem in the short period when it is present. Ecological impacts of P. stratiotes and note that they include increased rates of siltation, slowing of water velocities, degradation of fish nesting sites, increased nutrient loading, thermal stratification, increase in alkalinity and fish and	
10	4.00		¥	macroinvertebrate mortality. (CABI, 2020)	1
	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes	Consequently, such dense stands of Pistia may have serious negative effects on the multifunctional human use of waterbodies. These harmful effects include impediment of the transport of irrigation and drainage water, interference with hydro-electric schemes from artificial lakes, hindering navigation and fishing and the creation of habitats favourable for the transmittance of water- borne diseases (CABI, 2020)	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 evidence (Global Invasive Species Database (2021) Species profile: Pistia stratiotes).	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 evidence (Global Invasive Species Database (2021) Species profile: Pistia stratiotes).	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	Živković, M. M., Anđelković, A. A., Cvijanović, D. L., Novković, M. Z., Vukov, D. M., Šipoš, Š. Š., & Radulović, S. B. (2019). The beginnings of Pistia stratiotes L. invasion in the lower Danube delta: the first record for the Province of Vojvodina (Serbia). BioInvasions Record, 8(2).	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	Pistia stratiotes grows in slow-moving rivers and reservoirs, irrigation channels, ponds, lakes, canals and ditches (Živković, M. M., Anđelković, A. A., Cvijanović, D. L., Novković, M. Z., Vukov, D. M., Šipoš, Š. Š., & Radulović, S. B. (2019). The beginnings of Pistia stratiotes L. invasion in the lower Danube delta: the first record for the Province of Vojvodina (Serbia). BioInvasions	Very high
24	4.11	Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa?	Yes	Ecological impacts of P. stratiotes and note that they include increased rates of siltation, slowing of water velocities, degradation of fish nesting sites, increased nutrient loading, thermal stratification, increase in alkalinity and fish and	High
25	4.12	Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)?	Yes	Zivković, M. M., Anđelković, A. A., Cvijanović, D. L., Novković, M. Z., Vukov, D. M., Šipoš, Š. Š., & Radulović, S. B. (2019). The beginnings of Pistia stratiotes L. invasion in the lower Danube delta: the first record for the Province of Vojvodina (Serbia). BioInvasions Record, 8(2).).	Low
	Resourd 5.01	<i>ce exploitation</i> Is the taxon likely to consume threatened or	Not applicable	Not applicable	Very high
	5.01				very mgn
27	5.02	protected native taxa in the RA area? Is the taxon likely to sequester food	No	No information	Low
27	5.02	protected native taxa in the RA area? Is the taxon likely to sequester food resources (including nutrients) to the		No information	Low
	5.02 Reprod	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 information	Low
6. F		protected native taxa in the RA area? Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?	No	No information	Low Very high
<u>6. F</u> 28 29	6.02	protected native taxa in the RA area? Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area? <i>uction</i> Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)?	No Not applicable Yes	Not applicable Maybe, (Global Invasive Species Database (2021) Species profile: Pistia stratiotes).	Very high Low
<u>6. F</u> 28 29 30	6.01 6.02 6.03	protected native taxa in the RA area? Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area? <i>uction</i> Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa?	No Not applicable Yes No	Not applicable Maybe, (Global Invasive Species Database (2021) Species profile: Pistia stratiotes). No information (CABI, 2020); Global Invasive Species Database (2021) Species profile: Pistia stratiotes.	Very high Low Low
<u>6. F</u> 28 29 30 31	6.02	protected native taxa in the RA area? Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area? <i>uction</i> Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of	No Not applicable Yes	Not applicable Maybe, (Global Invasive Species Database (2021) Species profile: Pistia stratiotes). No information (CABI, 2020); Global Invasive Species Database	Very high Low
<u>6. </u> 28 29 30 31 32	6.01 6.02 6.03 6.04 6.05	protected native taxa in the RA area? Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area? <i>uction</i> Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	No Not applicable Yes No Yes No	Not applicable Maybe, (Global Invasive Species Database (2021) Species profile: Pistia stratiotes). No information (CABI, 2020); Global Invasive Species Database (2021) Species profile: Pistia stratiotes. Reproduces asexually (CABI, 2020) ; Global Invasive Species Database (2021) Species profile: Pistia stratiotes. Global Invasive Species Database (2021) Species profile: Pistia stratiotes.	Very high Low Low High Low
6. F 28 29 30 31 32 33	Reprodu           6.01           6.02           6.03           6.04           6.05           6.06	protected native taxa in the RA area? Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area? <i>uction</i> Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)?	No Not applicable Yes No Yes No Yes	Not applicable Maybe, (Global Invasive Species Database (2021) Species profile: Pistia stratiotes). No information (CABI, 2020); Global Invasive Species Database (2021) Species profile: Pistia stratiotes. Reproduces asexually (CABI, 2020) ; Global Invasive Species Database (2021) Species profile: Pistia stratiotes. Global Invasive Species Database (2021) Species profile: Pistia	Very high Low Low High
6. F 28 29 30 31 32 33 33	Ceprod           6.01           6.02           6.03           6.04           6.05           6.06           6.07	protected native taxa in the RA area? Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area? <i>uction</i> Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete 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 Not applicable Yes No Yes No	Not applicable         Maybe, (Global Invasive Species Database (2021) Species profile:         Pistia stratiotes).         No information (CABI, 2020); Global Invasive Species Database (2021) Species profile: Pistia stratiotes.         Reproduces asexually (CABI, 2020) ; Global Invasive Species Database (2021) Species profile: Pistia stratiotes.         Global Invasive Species Database (2021) Species profile: Pistia stratiotes.         Rapid vegetative reproduction allows water lettuce to cover an entire lake, from shore to shore, with a dense mat of connected rosettes in a short period of time. (Global Invasive Species	Very high Low Low High Low
6. F 28 29 30 31 32 33 33 34	Reprod           6.01           6.02           6.03           6.04           6.05           6.06           6.07           Dispers	protected native taxa in the RA area? Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area? <i>uction</i> Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms	No Not applicable Yes No Yes 1	Not applicable         Maybe, (Global Invasive Species Database (2021) Species profile:         Pistia stratiotes).         No information (CABI, 2020); Global Invasive Species Database (2021) Species profile: Pistia stratiotes.         Reproduces asexually (CABI, 2020); Global Invasive Species Database (2021) Species profile: Pistia stratiotes.         Global Invasive Species Database (2021) Species profile: Pistia stratiotes.         Rapid vegetative reproduction allows water lettuce to cover an entire lake, from shore to shore, with a dense mat of connected rosettes in a short period of time. (Global Invasive Species Database (2021) Species profile: Pistia stratiotes         Global Invasive Species Database (2021) Species profile: Pistia stratiotes	Very high Low Low High Low High
6. F 28 29 30 31 32 33 33 34	Reprod           6.01           6.02           6.03           6.04           6.05           6.06           6.07           Dispers	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? 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 does the taxon source to reach the age-at- first-reproduction? How many potential internal yectors/pathways could the taxon use to	No Not applicable Yes No Yes No Yes	Not applicable         Maybe, (Global Invasive Species Database (2021) Species profile:         Pistia stratiotes).         No information (CABI, 2020); Global Invasive Species Database (2021) Species profile: Pistia stratiotes.         Reproduces asexually (CABI, 2020) ; Global Invasive Species Database (2021) Species profile: Pistia stratiotes.         Global Invasive Species Database (2021) Species profile: Pistia stratiotes.         Rapid vegetative reproduction allows water lettuce to cover an entire lake, from shore to shore, with a dense mat of connected rosettes in a short period of time. (Global Invasive Species Database (2021) Species profile: Pistia stratiotes         Global Invasive Species Database (2021) Species profile: Pistia stratiotes	Very high Low Low High Low High
6. F 28 29 30 31 32 33 33 34 7. L 35	Reprod           6.01           6.02           6.03           6.04           6.05           6.06           6.07           Dispers	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? Is the taxon lor 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	No Not applicable Yes No Yes 1	Not applicable         Maybe, (Global Invasive Species Database (2021) Species profile:         Pistia stratiotes).         No information (CABI, 2020); Global Invasive Species Database (2021) Species profile: Pistia stratiotes.         Reproduces asexually (CABI, 2020) ; Global Invasive Species Database (2021) Species profile: Pistia stratiotes.         Global Invasive Species Database (2021) Species profile: Pistia stratiotes.         Rapid vegetative reproduction allows water lettuce to cover an entire lake, from shore to shore, with a dense mat of connected rosettes in a short period of time. (Global Invasive Species Database (2021) Species profile: Pistia stratiotes         Global Invasive Species Database (2021) Species profile: Pistia stratiotes         Rapid vegetative reproduction allows water lettuce to cover an entire lake, from shore to shore, with a dense mat of connected rosettes in a short period of time. (Global Invasive Species Database (2021) Species profile: Pistia stratiotes         Global Invasive Species Database (2021) Species profile: Pistia stratiotes         Escape from confinement or garden escape, Ornamental purposes,	Very high Low Low High Low High
6. <i>F</i> 28 30 31 32 33 33 34 7. <i>L</i> 35 36	Reprod.           6.01           6.02           6.03           6.04           6.05           6.06           6.07           7.01	protected native taxa in the RA area? Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area? <i>uction</i> Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? 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 Not applicable Yes No Yes No Yes 1 >1	Not applicable         Maybe, (Global Invasive Species Database (2021) Species profile:         Pistia stratiotes).         No information (CABI, 2020); Global Invasive Species Database (2021) Species profile: Pistia stratiotes.         Reproduces asexually (CABI, 2020) ; Global Invasive Species Database (2021) Species profile: Pistia stratiotes.         Global Invasive Species Database (2021) Species profile: Pistia stratiotes.         Rapid vegetative reproduction allows water lettuce to cover an entire lake, from shore to shore, with a dense mat of connected rosettes in a short period of time. (Global Invasive Species Database (2021) Species profile: Pistia stratiotes         Global Invasive Species Database (2021) Species profile: Pistia stratiotes         Batabase (2021) Species profile: Pistia stratiotes         Global Invasive Species Database (2021) Species profile: Pistia stratiotes         Batabase (2021) Species profile: Pistia stratiotes         Global Invasive Species Database (2021) Species profile: Pistia stratiotes         Global Invasive Species Database (2021) Species profile: Pistia stratiotes         Batabase (2021) Species Database (2021) Species profile: Pistia stratiotes         Escape from confinement or garden escape, Ornamental purposes, Nursery trade (CABI, 2020)         Fragments, or whole plants, can be spread via boats or fishing equipment from an infested area to a clean body of water. (Global	Very high Low Low High Low High High

39       7.0       Is natural dispersal of the taxon likely to array to the taxon a larkary/uveniles (for animals) or as fragments/seedings (for plants) in the RA       No       Global Invasive Species Database (2021) Species profile: Pista stratiotes         40       7.06       Are older life stages of the taxon likely to maintain the RA area by other animals?       Not applicable         41       7.07       Are propagules or eggs of the taxon likely to maintaintonian or intentional integration seven questions (35–41; i.e. both unationation or more hours) at some stage of its life one more hours) at some stage of its life or one more hours) at some stage of its life cycle?       No         41       8.01       Is dispersal of the taxon disploy of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle?       No       CABI 2020; Global Invasive Species Database (2021) Species profile: Pista stratictes         45       8.02       Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? It in the uside to utilistation field, indicate the relevant water quality variable(s) being environmental/human dilicate the relevant water quality variable(s) being environment	Low				7.05	20
fragments/seedings (for plants) in the RA area?         Not applicable           40         7.06         Are older life stages of the taxon likely to Not applicable         Not applicable           41         7.07         Are propagules or eggs of the taxon likely to Not applicable         CABI 2020; Global Invasive Species Database (2021) Species           42         7.08         Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; 1.e. both unintentional or intentional likely to be unintentional or intentional likely to be any other the previous seven questions (35-41; 1.e. both unintentional or intentional likely to be any other the previous seven questions (25-41; 1.e. both unintentional contention density dependent?         No           43         7.09         Is dispersal of the taxon density dependent?         No         CABI 2020; Global Invasive Species Database (2021) Species profile: Pistia stratictes           44         8.01         Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life         Yes         It can survive for extended periods on moist soil. (CABI, 2020)           45         8.02         Is the taxon able to withstand being out of water quality conditions relevant to that taxon?         Yes         It can survive for extended periods on moist soil. (CABI, 2020)           45         8.02         Is the taxon able to bertofied or eradicated in Yes         No         It can survive for extended periods (e.g. minimum of one	1	Global Invasive Species Database (2021) Species profile: Pistia	No	Is natural dispersal of the taxon likely to	7.05	39
area?         Not applicable           2.06         Are Oter life stages of the taxon likely to migrate in the RA area for reproduction?         Not applicable           2.07         Are orpaguies or eggs of the taxon likely to be dispersal of the taxon alog any of the vectors/patiways mentioned in the previous seven question (S.3-41; i.e. both unintentional or intentional) likely to be         Ship ballast water; Floating vegetation and debris (CABI, 2020)           2.09         Is dispersal of the taxon density dependent?         No           2.09         Is dispersal of the taxon density dependent?         No           44         6.01         Is the taxon alog any of the vectors/patiways mentioned in the previous         Yes           5         Toerance attributes         It can survive for extended periods (c.g. minimum of one or more hours) at some stage of its life cockel?         It can survive for extended periods on moist soil. (CABI, 2020)           45         6.02         Is the taxon locarity in diversity dependent?         No           46         8.03         Can the taxon be controlled or enalicated in the wild with chemical, biological, or other apartification field, indicate the relevant water guality contilions relevant to that taxon? In the taxon abc otherate salinity levels that are higher or lower than those found in environmental/human disturbance?         No           47         8.04         S the taxon likely to tolerate salinity levels that are higher or lower than those found in environmental/human disturbance?         Not		stratiotes				
40       7.06       Are older iffe stages of the taxon likely to be dispersed in the RA area for promoution?       No       CABI 2020; Global Invasive Species Database (2021) Species profile: Pista stratiotes         41       7.08       Is dispersed in the RA area by orthore animals?       Profile: Pista stratiotes         42       7.08       Is dispersed of the taxon density dependent? vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or interitional) likely to be unintentional or interitional) likely to be       No       CABI 2020; Global Invasive Species Database (2021) Species profile: Pista stratiotes         8.       Tolerance attributes       No       CABI 2020; Global Invasive Species Database (2021) Species profile: Pista stratiotes         8.       Tolerance attributes       It can survive for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle?       No         45       8.02       Is the taxon tolerant of a wide range of water quality contidors relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) beinq       No       No information (CABI, 2020)         46       8.03       Can the taxon abe to tolerate or benefit from water widwith chemical, biological, or other agents/means?       No       No information (CABI, 2020)         47       8.04       Is the taxon able to tolerate salinity levels that are higher o lower than those found in its usual environment?       No       No         48						
migrate in the RÅ area for reproduction?         No         CARI 2020; Global Invasive Species Database (2021) Species profile: Pistia stratiotes           42         7.08         Is dispersal of the taxon along any of the animals?         Yes         Ship ballast water; Floating vegetation and debris (CABI, 2020)           42         7.08         Is dispersal of the taxon density dependent?         No         CABI 2020; Global Invasive Species Database (2021) Species profile: Pistia stratiotes           43         7.09         Is dispersal of the taxon density dependent?         No         CABI 2020; Global Invasive Species Database (2021) Species profile: Pistia stratiotes           6. Tolerance attributes         4         No         CABI 2020; Global Invasive Species Database (2021) Species profile: Pistia stratiotes           6. Tolerance attributes         4         No         CABI 2020; Global Invasive Species Database (2021) Species profile: Pistia stratiotes           8. Our Iss the taxon ble to withstand being out of water for extended periods on moist soil. (CABI, 2020)         Yes         It can survice for extended periods on moist soil. (CABI, 2020)           45         8.0.2         Is the taxon likely to tolerate or sendicated in the relevant water quality variable(s) being advice include the herbicide endothall, which can act quickly and kill all plant cells that it contacts. (Global Invasive Species Database (2021) Species profile: Pistia stratiotes           47         8.04         Is the taxon able to tolerate solinity levels had area	N/ 1 · 1				7.00	40
41       7.07       Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?       No       CABI 2020; Global Invasive Species Database (2021) Species profile: Pista arrationes         42       7.08       Is dispersal of the taxon dong any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intertional) likely to be       Yes       Ship ballast water; Floating vegetation and debris (CABI, 2020)         43       7.09       Is dispersal of the taxon density dependent?       No       CABI 2020; Global Invasive Species Database (2021) Species profile: Pista stratiotes         8. Tolerance attributes       Is the taxon able to withstand being out of one or more hours) at some stage of its life cycle?       Yes       It can survive for extended periods (e.g., minimum one or more hours) at some stage of its life cycle?       No       No information (CABI, 2020)         45       8.02       Is the taxon bleroutlors relevant to that taxon? In the Justification field, indicate the relevant water quality conditions relevant to that taxen?       Yes       Chemical control methods that have been successful in treating P. stratiotes include the herbicide endothall, which can act quickly and kill all plant cells that it contacts. Global Invasive Species profile: Pistia stratiotes         47       8.04       Is the taxon blerd to benet selinity levels that are higher or lower than those found in its usual environment?       No       P. stratiotes has a low salinity tolerance; salt concentrations of 1.66% are toxic to the plant (Haller et al., 1974).	Very high	Not applicable	Not applicable	5	7.06	40
be dispersed in the RA area by other animals?         profile: Pistia stratiotes           42         7.08         is 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         Ship ballast water; Floating vegetation and debris (CABI, 2020)           43         7.09         Is dispersed of the taxon density dependent?         No         CABI 2020; Global Invasive Species Database (2021) Species profile: Pistia stratiotes           8. Tolerance 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?         It can survive for extended periods on moist soil. (CABI, 2020)           5.02         Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? If the builtification field, indicate the relevant water quality variable(5) being the wild with chemical, biological, or other agents/means?         No         No information (CABI, 2020)           47         8.04         Is the taxon able to tolerate or benefit from environmental/human disturbance?         No         Global Invasive Species Database (2021) Species profile: Pistia stratiotes           48         8.05         Is the taxon able to tolerate salinity levels that are higher or lower than these found in its usual environment?         No         Formation (Habber Conditions, are the refet or lower than the RA           49         0.04         Is the taxon able to tolerate					7.07	
42       7.08       Is dispersal of the taxon along any of the yunitentional or intentional likely to be unitentional or intentional likely to be profile.       Ship ballast water; Floating vegetation and debris (CABI, 2020)         43       7.09       Is dispersal of the taxon along any of the wave dependent?       No       CABI 2020; Global Invasive Species Database (2021) Species profile: Pistia stratiotes         8. Tolerace attributes       Tolerace attributes       No       CABI 2020; Global Invasive Species Database (2021) Species profile: Pistia stratiotes         8. Tolerace attributes       Its the taxon able to withstand being out of one or more hours) at some stage of Its Ilfe cycle?       Yes       It can survive for extended periods on moist soil. (CABI, 2020)         44       8.01       Is the taxon tolerant of a wide range of wave quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being and kill all plant cells that it contacts. (Global Invasive Species profile: Pistia stratiotes)         47       8.04       Is the taxon likely to tolerate or benefit from environment?       No       No information (CABI, 2021) Species profile: Pistia stratiotes)         48       8.05       Is the taxon nikely to tolerate or benefit from its usual environment?       No       Global Invasive Species Database (2021) Species profile: Pistia stratiotes)         49       8.06       Are there effective natural enemies (predators) of the taxon pikely to increase, decrease or not change?       No       No	Medium		NO		/.0/	41
vectors/pathways mentioned in the previous seven questions (35–41; i.e. both         No         CABI 2020; Global Invasive Species Database (2021) Species profile: Pistia stratiotes           43         7.09         Is dispersal of the taxon density dependent?         No         CABI 2020; Global Invasive Species Database (2021) Species profile: Pistia stratiotes           6. Tolerance attributes         It can survive for extended periods on moist soil. (CABI, 2020)           44         8.01         Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle?         No         No           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 varabile(5) being         No         No information (CABI, 2020)           46         8.03         Can the taxon be controlled or eradicated in the wild with chemical, biological, or other environmental/human disturbance?         Yes         Chemical control methods that have been successful in treating P. stratiotes include the herbicide endothall, which can act quickly and kill all plant cells that it contacts. (Global Invasive Species Database (2021) Species profile: Pistia stratiotes           47         8.05         Is the taxon bie to tolerate salinity levels that are higher or lower than those found in its usual environment2         No         P. stratiotes has a low salinity tolerance; salt concentrations of 1.66% are toxic to the plant cupt here as table population (Parmesan, C., & H	+					
seven questions (35-41; i.e. both unintentional or intentional) likely to be         CABI 2020; Global Invasive Species Database (2021) Species profile: Pistia stratiotes           8. Tolerance attributes         • CABI 2020; Global Invasive Species Database (2021) Species profile: Pistia stratiotes           8. Tolerance attributes         • It can survive for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle?         • It can survive for extended periods on moist soil. (CABI, 2020)           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 conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality conditions relevant to the RA         Colobal Invasive Species profile: Pistia stratiotes           47         8.06         Are there effective natural enemies (Dredators) of the taxon present in the RA         No           5         9.01         Under the predicted futur	Low	Ship ballast water; Floating vegetation and debris (CABI, 2020)	Yes		7.08	42
unintentional or intentional) likely to be         CABI 2020; Global Invasive Species Database (2021) Species profile: Pistia stratiotes           8. Tolerance attributes         CABI 2020; Global Invasive Species Database (2021) Species profile: Pistia stratiotes           8. Tolerance attributes         It can survive for extended periods (e.g. minimum of one rom core hours) at some stage of Its life cycle?           44         8.01         Is the taxon oble to withstand being out of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being relevant water quality variable(s) being relevant water quality variable(s) being relevant water quality variable(s) due agents/means?         No         No information (CABI, 2020)           46         8.03         Can the taxon be controlied or eradicated in the wild with chemical, biological, or other agents/means?         No         Schein calls that it contacts. (Global Invasive Species Database (2021) Species profile: Pistia stratiotes           47         8.04         Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environmental/human disturbance?         No         Global Invasive Species Database (2021) Species profile: Pistia stratiotes           48         8.05         Far there effective natural enemies (breadarce) of the taxon present in the RA         No         No           50         9.01         Under the predicted future climatic conditions, are the risks of entry into the RA         No         No						
43       7.09       Is dispersal of the taxon density dependent?       No       CABI 2020; Global Invasive Species Database (2021) Species profile: Pistia stratiotes         8. Tolerance attributes       It can survive for extended periods (e.g. minimum of one or more hours) at some stage of its life c.vc/e?       It can survive for extended periods on moist soil. (CABI, 2020)         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 information (CABI, 2020)         46       8.03       Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?       Chemical control methods that have been successful in treating P. stratiotes include the herbicide endothall, which can at quickly and kill all plant cells that it contacts. (Global Invasive Species Database (2021) Species profile: Pistia stratiotes)         47       8.04       Is the taxon able to tolerate salinity levels that are higher o lower than those found in its usual environment?       No       P. stratiotes has a low salinity tolerance; salt concentrations of 1.66% are toxic to the plant (Haller et al., 1974).       1.66% are toxic to the plant (Haller et al., 1974).         48       8.06       It can survive for establishment is no change, in the future temperatures will not be high enough to achieve a stable population (Parmesan, C., & Hanley, M. E. (2015). Plants and climate change: conditions, are the risks of establishment to no change;       No change         51       9.						
8. Tolerance attributes           8. Tolerance attributes           8. Tolerance attributes           9. Tolerance attributes           9. Control 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?         It can survive for extended periods on moist soil. (CABI, 2020)           45         8.02         Is the taxon tolerant of a wide range of reveant water quality variable(s) being calls variable(s) calls calls variable(s) being calls variable(s) calls variable(s) being calls variable(s) calls variable(s) calls variable(s) calls variable(s) being calls variable(s) being calls variable(s) calls variable(s) being calls	1	CARL 2020, Clabel Investige Creaties Detabase (2021) Creaties	Na		7 00	42
8. Tolerance attributes           44         8.01         Is the taxon able to withstand being out of one or more hours) at some stage of its life (cycle?         Yes         It can survive for extended periods on moist soil. (CABI, 2020)           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 information (CABI, 2020)           46         8.03         Can the taxon be controlied or eradicated in the wild with chemical, biological, or other agents/means?         Yes         Chemical control methods that have been successful in treating P. stratiotes include the herbicide endothall, which can act quickly and kill all plant cells that it contacts. (Global Invasive Species Database (2021) Species profile: Pistia stratiotes           47         8.04         Is the taxon likely to tolerate or benefit from environmental/human disturbance?         No         P. stratiotes has a low salinity tolerance; salt concentrations of 1.66% are toxic to the plant (Haller et al., 1974).           48         8.05         Is the taxon present in the RA conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?         No tapplicable           50         9.02         Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change?         No change           51         9.02         Under the predicted futu	Low		INO	is dispersal of the taxon density dependent?	7.09	43
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?       It can survive for extended periods on moist soil. (CABI, 2020)         45       8.02       Is the taxon tolerant of a wide range of more hours) at some stage of its life cycle?       No       No information (CABI, 2020)         46       8.03       Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?       Yes       Chemical control methods that have been successful in treating P. stratiotes include the herbicide endothall, which can act quickly and kill all plant cells that it contacts. (Global Invasive Species Database (2021) Species profile: Pistia stratiotes)         47       8.04       Is the taxon likely to tolerate or benefit from environmental/human disturbance?       No       Global Invasive Species Database (2021) Species profile: Pistia stratiotes)         48       8.05       Is the taxon present in the RA       No       No       No         49       8.06       Are there effective natural enemies (predators) of the taxon present in the RA       No       No         50       9.01       Under the predicted future climatic conditions, are the risks of establishment is no change, in the future temperatures will not be high enough to achieve a stable population (Parmesan, C., & Hanley, M. E. (2015). Plants and climate change: complexities and surprises. Annals of botany.         51       9.02       Under the predicted future climatic con		oronie: Pistia stratiotes		a attributes	alarana	0 7
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cycle?           45         8.02         Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being 46         No         No information (CABI, 2020)           46         8.03         Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?         Yes         Chemical control methods that have been successful in treating P. stratiotes include the herbicide endothal, which can act quickly and kill all plant cells that it contacts. (Global Invasive Species Database (2021) Species profile: Pistia stratiotes           47         8.04         Is the taxon able to tolerate or benefit from to surgent are higher or lower than those found in its usual environment?         No         Global Invasive Species Database (2021) Species profile: Pistia stratiotes           48         8.05         Are there effective natural enemies (predators) of the taxon present in the RA are aposed by the taxon likely to increase, decrease or not change?         No         No           50         9.01         Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?         No change           51         9.02         Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change?         No change           52         9.03         Under the predicted future climatic conditions, what is the likel						
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Arr         Body         Database (2021) Species profile: Pistia stratiotes)           47         8.04         Is the taxon likely to tolerate or benefit from environmental/human disturbance?         No         Global Invasive Species Database (2021) Species profile: Pistia stratiotes           48         8.05         Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?         No         P. stratiotes has a low salinity tolerance; salt concentrations of 1.66% are toxic to the plant (Haller et al., 1974).           49         8.06         Are there effective natural enemies (predators) of the taxon present in the RA         No           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           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           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           53         9.04         Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecoloaical integrity/status?         No change						
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environmental/human disturbance?         stratiotes           48         8.05         Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?         No         P. stratiotes has a low salinity tolerance; salt concentrations of 1.66% are toxic to the plant (Haller et al., 1974).           49         8.06         Are there effective natural enemies (predators) of the taxon present in the RA         No         No           C. 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 tapplicable         No tapplicable           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         The risks of establishment is no change, in the future temperatures will not be high enough to achieve a stable population (Parmesan, C., & Hanley, M. E. (2015). Plants and climate change: complexities and surprises. Annals of botany, climate change: complexities and surprises. Annals o	Low		No	Is the taxon likely to tolerate or benefit from	8.04	47
48       8.05       Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?       No       P. stratiotes has a low salinity tolerance; salt concentrations of 1.66% are toxic to the plant (Haller et al., 1974).         49       8.06       Are there effective natural enemies (predators) of the taxon present in the RA       No       No         C. 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 thapplicable       No tapplicable         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       The risks of establishment is no change, in the future temperatures will not be high enough to achieve a stable population (Parmesan, C., & Hanley, M. E. (2015). Plants and climate change: complexities and surprises. Annals of botany,         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 risks of establishment is no change, in the future temperatures will not be high enough to achieve a stable population (Parmesan, C., & Hanley, M. E. (2015). Plants and climate change: complexities and surprises. Annals of botany,         53       9.04       Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecologicial integrity/status? <td></td> <td></td> <td>-</td> <td></td> <td></td> <td></td>			-			
its usual environment?       No         49       8.06       Are there effective natural enemies (predators) of the taxon present in the RA       No         C. Climate change       9. Climate change       9. Climate change         50       9.01       Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?       Not applicable       Not applicable         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       The risks of establishment is no change, in the future temperatures will not be high enough to achieve a stable population (Parmesan, C., & Hanley, M. E. (2015). Plants and climate change: complexities and surprises. Annals of botany,         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 risks of establishment is no change, in the future temperatures will not be high enough to achieve a stable population (Parmesan, C., & Hanley, M. E. (2015). Plants and climate change: complexities and surprises. Annals of botany,         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 risks of establishment is no change, in the future temperatures will not be high enough to achieve a stable population (Parmesan, C., & Ha	Medium	P. stratiotes has a low salinity tolerance; salt concentrations of	No	Is the taxon able to tolerate salinity levels	8.05	48
49       8.06       Are there effective natural enemies (predators) of the taxon present in the RA       No       No         C. Climate change       Science       Science       Science       Science       Science         9. Olimate 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       The risks of establishment is no change, in the future temperatures will not be high enough to achieve a stable population (Parmesan, C., & Hanley, M. E. (2015). Plants and climate change: complexities and surprises. Annals of botany,         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 risks of establishment is no change, in the future temperatures will not be high enough to achieve a stable population (Parmesan, C., & Hanley, M. E. (2015). Plants and climate change: complexities and surprises. Annals of botany,         53       9.04       Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecolog		1.66% are toxic to the plant (Haller et al., 1974).		that are higher or lower than those found in		
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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         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       The risks of establishment is no change, in the future temperatures will not be high enough to achieve a stable population (Parmesan, C., & Hanley, M. E. (2015). Plants and climate change: complexities and surprises. Annals of botany,         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 risks of establishment is no change, in the future temperatures will not be high enough to achieve a stable population (Parmesan, C., & Hanley, M. E. (2015). Plants and climate change: complexities and surprises. Annals of botany,         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 risks of establishment is no change, in the future temperatures will not be high enough to achieve a stable population (Parmesan, C., & Hanley, M. E. (2015). Plants and climate change: complexities and surprises. Annals of botany,				(predators) of the taxon present in the RA		
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         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       The risks of establishment is no change, in the future temperatures will not be high enough to achieve a stable population (Parmesan, C., & Hanley, M. E. (2015). Plants and climate change: complexities and surprises. Annals of botany,         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 risks of establishment is no change, in the future temperatures will not be high enough to achieve a stable population (Parmesan, C., & Hanley, M. E. (2015). Plants and climate change: complexities and surprises. Annals of botany,         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 risks of establishment is no change, in the future temperatures will not be high enough to achieve a stable population (Parmesan, C., & Hanley, M. E. (2015). Plants and climate change: complexities and surprises. Annals of botany,         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						
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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?         No change         The risks of establishment is no change, in the future temperatures will not be high enough to achieve a stable population (Parmesan, C., & Hanley, M. E. (2015). Plants and climate change: complexities and surprises. Annals of botany,           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 risks of establishment is no change, in the future temperatures will not be high enough to achieve a stable population (Parmesan, C., & Hanley, M. E. (2015). Plants and climate change: complexities and surprises. Annals of botany,           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 risks of establishment is no change, in the future temperatures will not be high enough to achieve a stable population (Parmesan, C., & Hanley, M. E. (2015). Plants and climate change: complexities and surprises. Annals of botany,						
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decrease or not change?         climate change: complexities and surprises. Annals of botany,           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 risks of establishment is no change, in the future temperatures will not be high enough to achieve a stable population (Parmesan, C., & Hanley, M. E. (2015). Plants and climate change: complexities and surprises. Annals of botany,           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 risks of establishment is no change, in the future temperatures will not be high enough to achieve a stable           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 risks of establishment is no change, in the future temperatures will not be high enough to achieve a stable population (Parmesan, C., & Hanley, M. E. (2015). Plants and climate change: complexities and surprises. Annals of botany, clima						
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and/or ecological integrity/status? climate change: complexities and surprises. Annals of botany,						
				,		
	Medium		No change		9.05	54
ico conditions, what is the likely magnitude of	liculum		no chunge		2.05	54
future potential impacts on ecosystem population (Parmesan, C., & Hanley, M. E. (2015). Plants and						
structure and/or function?				,		
55     9.06     Under the predicted future climatic     No change     The risks of establishment is no change, in the future	Medium		No change		9.06	55
conditions, what is the likely magnitude of temperatures will not be high enough to achieve a stable	i iculuili		to change		5.00	,,,
future potential impacts on ecosystem population (Parmesan, C., & Hanley, M. E. (2015). Plants and						
	1	limate change: complexities and surprises. Annals of botany,		services/socio-economic factors?		

Charlin Street	
Statistics	
Scores BRA	18.0
BRA Outcome	Medium
BRA+CCA	18.0
BRA+CCA Outcome	Medium
Score partition	Heard
A. Biogeography/Historical	9.0
1. Domestication/Cultivation	2.0
2. Climate, distribution and introduction risk	0.0
3. Invasive elsewhere	7.0
B. Biology/Ecology	9.0
4. Undesirable (or persistence) traits	7.0
5. Resource exploitation	0.0
6. Reproduction	4.0
7. Dispersal mechanisms	0.0
8. Tolerance attributes	-2.0
C. Climate change	0.0
9. Climate change	0.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3
2. Climate, distribution and introduction risk	3 5 5
3. Invasive elsewhere	5
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	12 2 7
6. Reproduction	/
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	6					
Thresholds						
BRA	24.75					
BRA+CCA	24.75					
Confidence						
BRA+CCA	0.51					
BRA	0.51					
CCA	0.50					
Date and Time						
07/12/20	021 08:00:17					

Taxon and Assessor details					
Category	Plantae (freshwater)				
Taxon name	Rotala macrandra				
Common name	-				
Assessor	Tena Radočaj				
Risk screening context					
Reason and socio-economic benefits					
Risk assessment area	Mediterranean region				
Taxonomy					
Native range					
Introduced range					
URL					

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
		<i>ication/Cultivation</i> Has the taxon been the subject of	Voc	Rotala macrandra is popular in the global aquarium trade (Weed	Very high
	1.01	domestication (or cultivation) for at least 20 generations?	Yes	Rotala macrandra is popular in the global aquarium trade (weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala)	very nign
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	Rotala macrandra is popular in the global aquarium trade (Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala)	Very high
3	1.03	Does the taxon have invasive races,	Yes	R. rotundifolia	Low
2 (	limate	varieties, sub-taxa or congeners? , distribution and introduction risk			
2. ( 4	2.01	How similar are the climatic conditions of the	Low	The similarity of climatic conditions between native areas and the	Medium
		Risk Assessment (RA) area and the taxon's native range?	2011	RA area is low (Climatch)	
5	2.02	What is the quality of the climate matching data?	Medium	Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala	Low
6	2.03	Is the taxon already present outside of captivity in the RA area?	No	R. macrandra is not present in the RA area	High
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	The aquarium trade (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala	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	Hungary (Hussner, A. (2012). Alien aquatic plant species in European countries. Weed Research, 52(4), 297-306	High
3 1	Invaciv	e elsewhere			
<i>3.</i> 1 9		Has the taxon become naturalised	Yes	It has escaped from cultivation in Hungary, where the plants	High
5	5.01	(established viable populations) outside its native range?	103	survive in thermal water bodies. (Hussner, A. (2012). Alien aquatic plant species in European countries. Weed Research,	Tingin
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	No	No evidence that R. macrandra has any negative impacts in natural environments, urban and suburban settings, or production systems. (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala)	Low
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	No evidence that R. macrandra has any negative impacts in natural environments, urban and suburban settings, or production systems. (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala)	Low
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem services?	No	No evidence that R. macrandra has any negative impacts in natural environments, urban and suburban settings, or production systems. (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala)	Low
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	No evidence that R. macrandra has any negative impacts in natural environments, urban and suburban settings, or production systems. (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala)	Low
B. I	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 (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala)	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 that R. macrandra has any negative impacts in natural environments, urban and suburban settings, or production systems. (Climatch and Weed Risk Assessment for Rotala macrandra Kophoe (Lythraceae) – Giant rad Rotala)	Low
	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	macrandra Koehne (Lythraceae) – Giant red Rotala) 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	Native area is India, and in Hungary survive in thermal water bodies. (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala	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 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	No	No evidence	Low
21	4.08	infectious agents that are endemic in the RA Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel	No	No evidence	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	The shoots of R. macrandra can grow 60 cm in length (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala)	Medium

23					
	4.10	Is the taxon capable of sustaining itself in a	No	R. macrandra occurs in streams, temporary ponds, and flooded	Low
		range of water velocity conditions (e.g. versatile in habitat use)?		paddy fields. (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala)	
24	4.11	Is it likely that the taxon's mode of existence	No	No evidence that R. macrandra has any negative impacts in	Low
2 '		(e.g. excretion of by-products) or behaviours		natural environments, urban and suburban settings, or production	2011
		(e.g. feeding) will reduce habitat quality for		systems. (Climatch and Weed Risk Assessment for Rotala	
		native taxa?		macrandra Koehne (Lythraceae) – Giant red Rotala	
25	4.12	Is the taxon likely to maintain a viable population even when present in low	Yes	Botond, M., and BD. Zoltan (eds.). 2004. Biologiai Invaziok Magyarorszagon: Ozonnovenyek [Biological Invasions in Hungary:	Low
		densities (or persisting in adverse conditions		Invasive Plants]. TermészetBÚVÁR Alapítvány Kiadó, Budapest.	
		by way of a dormant form)?		409 pp.,	
		ce exploitation			I
26	5.01	Is the taxon likely to consume threatened or protected native taxa in the RA area?	Not applicable	Not applicable	Very high
27	5.02	Is the taxon likely to sequester food	No	No information	Low
		resources (including nutrients) to the			
		detriment of native taxa in the RA area?			
	R <i>eprodu</i> 6.01	Is the taxon likely to exhibit parental care	Not applicable	Not applicable	Very high
20	0.01	and/or to reduce age-at-maturity in response			very nigh
		to environmental conditions?			
29	6.02	Is the taxon likely to produce viable gametes	No	No information- I think not, because of low temperatures in the	Low
30	6.03	or propagules (in the RA area)? Is the taxon likely to hybridise naturally with	No	RA area No evidence	Low
50	0.05	native taxa?	NO	No evidence	LOW
31	6.04	Is the taxon likely to be hermaphroditic or to	Yes	Botond, M., and BD. Zoltan (eds.). 2004. Biologiai Invaziok	Low
		display asexual reproduction?		Magyarorszagon: Ozonnovenyek [Biological Invasions in Hungary:	
				Invasive Plants]. TermészetBÚVÁR Alapítvány Kiadó, Budapest.	
32	6.05	Is the taxon dependent on the presence of	No	409 pp No evidence	Low
22	0.05	another taxon (or specific habitat features)			
		to complete its life cycle?			
33	6.06	Is the taxon known (or likely) to produce a	Yes	Botond, M., and BD. Zoltan (eds.). 2004. Biologiai Invaziok	Low
		large number of propagules or offspring within a short time span ( $a_1 < 1$ year)?		Magyarorszagon: Ozonnovenyek [Biological Invasions in Hungary:	
		within a short time span (e.g. < 1 year)?		Invasive Plants]. TermészetBÚVÁR Alapítvány Kiadó, Budapest. 409 pp.	
34	6.07	How many time units (days, months, years)	1	Botond, M., and BD. Zoltan (eds.). 2004. Biologiai Invaziok	Low
		does the taxon require to reach the age-at-		Magyarorszagon: Ozonnovenyek [Biological Invasions in Hungary:	
		first-reproduction?		Invasive Plants]. TermészetBÚVÁR Alapítvány Kiadó, Budapest.	
7 /	Disners	al mechanisms		409 pp.	
		How many potential internal	One	Escape from garden	Low
		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	Personal opinion- flood or boat	Low
50	7.02	taxon in close proximity to one or more	165		LOW
		protected areas (e.g. MCZ, MPA, SSSI)?			
37	7.03	Does the taxon have a means of actively	No	No evidence	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 evidence	Low
		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	No	No evidence	Low
39	1.05		NO	No evidence	
					LOW
		occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA			
		occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?			
40	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	Not applicable	Not applicable	Very high
	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 migrate in the RA area for reproduction?			Very high
_		occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to	Not applicable	Not applicable No evidence	
41	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 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			Very high
41	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 migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous	No	No evidence	Very high Low
41	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 migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both	No	No evidence	Very high Low
41 42	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 migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous	No	No evidence	Very high Low
41 42 43	7.06 7.07 7.08 7.09	occur as larvae/juveniles (for animals) or as 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 Yes	No evidence Floods	Very high Low Low
41 42 43 <i>8.</i>	7.06 7.07 7.08 7.09	occur as larvae/juveniles (for animals) or as 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 Yes No	No evidence Floods (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala)	Very high Low Low Low
41 42 43 <i>8.</i>	7.06 7.07 7.08 7.09	occur as larvae/juveniles (for animals) or as 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	No Yes	No evidence Floods (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala) (Climatch and Weed Risk Assessment for Rotala macrandra	Very high Low Low
41 42 43 <i>8.</i> 2	7.06 7.07 7.08 7.09	occur as larvae/juveniles (for animals) or as 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 Yes No	No evidence Floods (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala)	Very high Low Low Low
41 42 43 <u>8.</u> 44	7.06 7.07 7.08 7.09 7.09	occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cvcle?	No Yes No	No evidence Floods (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala) (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala)	Very high Low Low Low
41 42 43 <u>8.</u> 44	7.06 7.07 7.08 7.09	occur as larvae/juveniles (for animals) or as 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 cycele? Is the taxon tolerant of a wide range of	No Yes No	No evidence Floods (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala) (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala) (Climatch and Weed Risk Assessment for Rotala macrandra	Very high Low Low Low
41 42 43 <u>8.</u> 44	7.06 7.07 7.08 7.09 7.09	occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cvcle? Is the taxon tolerant of a wide range of water quality conditions relevant to that	No Yes No	No evidence Floods (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala) (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala)	Very high Low Low Low
41 42 43 <u>8.</u> 44	7.06 7.07 7.08 7.09 7.09	occur as larvae/juveniles (for animals) or as 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 <u>cvcle</u> ? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the	No Yes No	No evidence Floods (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala) (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala) (Climatch and Weed Risk Assessment for Rotala macrandra	Very high Low Low Low
41 42 43 8. 44	7.06 7.07 7.08 7.09 7.09	occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in	No Yes No	No evidence Floods (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala) (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala) (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala) (Climatch and Weed Risk Assessment for Rotala macrandra	Very high Low Low Low
41 42 43 8. 44	7.06 7.07 7.08 7.09 7.09 7.09 8.01 8.01	occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other	No Yes No No	No evidence Floods (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala) (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala) (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala)	Very high Low Low Low Low
41 42 43 44 45 46	7.06 7.07 7.08 7.09 7.09 8.01 8.01 8.02 8.03	occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	No Yes No No No	No evidence Floods (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala) (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala) (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala) (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala)	Very high Low Low Low Low Low
41 42 43 44 45 46	7.06 7.07 7.08 7.09 7.09 7.09 8.01 8.01	occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? Is the taxon able to withstand being out of water for extended periods (e.g. minimum of 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	No Yes No No	No evidence Floods (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala) (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala) (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala) (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala) (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala)	Very high Low Low Low Low
41 42 43 44 45 46 47	7.06 7.07 7.08 7.09 7.09 8.01 8.01 8.02 8.03	occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	No Yes No No No	No evidence Floods (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala) (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala) (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala) (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala)	Very high Low Low Low Low Low
41 42 43 44 45 46 47	7.06 7.07 7.08 7.09 7.09 7.09 8.01 8.01 8.02 8.03 8.04	occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Is the taxon able to tolerate or benefit from environmental/human disturbance?	No Yes No No No Yes	No evidence Floods (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala) (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala) (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala) (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala) Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala)	Very high Low Low Low Low Low Low
41 42 43 44 45 46 47 48	7.06 7.07 7.08 7.09 7.09 8.01 8.01 8.01 8.02 8.03 8.04 8.05	occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? Is the taxon able to withstand being out of water for extended periods (e.g. minimum of 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 lolerate salinity levels that are higher or lower than those found in lits usual environment?	No Yes No No Yes No	No evidence Floods (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala) (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala) (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala) (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala) Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala) Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).	Very high Low Low Low Low Low Low Low Low Low
41 42 43 44 45 46 47 48	7.06 7.07 7.08 7.09 7.09 7.09 8.01 8.01 8.02 8.03 8.04	occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Is the taxon likely to tolerate or benefit from environmental/human disturbance? 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 No No Yes	No evidence Floods (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala) (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala) (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala) (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala) (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala) Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala). Climatch and Weed Risk Assessment for Rotala macrandra Koehne	Very high Low Low Low Low Low Low
41 42 43 8. 44 45 46 47 48 49	7.06 7.07 7.08 7.09 7.09 8.01 8.01 8.02 8.03 8.04 8.05 8.06	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 migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? Is the taxon able to withstand being out of water for extended periods (e.g. minimum of 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 lolerate salinity levels that are higher or lower than those found in lits usual environment?	No Yes No No Yes No	No evidence Floods (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala) (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala) (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala) (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala) Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala) Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).	Very high Low Low Low Low Low Low Low Low Low

50	9.01	Under the predicted future climatic	No change	The risks of entry into the RA area by the taxon are likely to no	Medium
		conditions, are the risks of entry into the RA		change, only by human impact.	
		area posed by the taxon likely to increase,			
		decrease or not change?			
51	9.02	Under the predicted future climatic	No change	The risks of establishment is no change, in the future	Medium
		conditions, are the risks of establishment		temperatures will not be high enough to achieve a stable	
		posed by the taxon likely to increase,		population (Parmesan, C., & Hanley, M. E. (2015). Plants and	
		decrease or not change?		climate change: complexities and surprises. Annals of botany,	
52	9.03	Under the predicted future climatic	No change	The risks of establishment is no change, in the future	Medium
		conditions, are the risks of dispersal within		temperatures will not be high enough to achieve a stable	
		the RA area posed by the taxon likely to		population (Parmesan, C., & Hanley, M. E. (2015). Plants and	
		increase, decrease or not change?		climate change: complexities and surprises. Annals of botany,	
53	9.04	Under the predicted future climatic	No change	The risks of establishment is no change, in the future	Medium
		conditions, what is the likely magnitude of		temperatures will not be high enough to achieve a stable	
		future potential impacts on biodiversity		population (Parmesan, C., & Hanley, M. E. (2015). Plants and	
		and/or ecological integrity/status?		climate change: complexities and surprises. Annals of botany,	
54	9.05	Under the predicted future climatic	No change	The risks of establishment is no change, in the future	Medium
		conditions, what is the likely magnitude of		temperatures will not be high enough to achieve a stable	
		future potential impacts on ecosystem		population (Parmesan, C., & Hanley, M. E. (2015). Plants and	
		structure and/or function?		climate change: complexities and surprises. Annals of botany,	
55	9.06	Under the predicted future climatic	No change	The risks of establishment is no change, in the future	Medium
		conditions, what is the likely magnitude of		temperatures will not be high enough to achieve a stable	
		future potential impacts on ecosystem		population (Parmesan, C., & Hanley, M. E. (2015). Plants and	
		services/socio-economic factors?		climate change: complexities and surprises. Annals of botany,	

Statistics

Scores		
BRA	8.0	
BRA Outcome	Medium	
BRA+CCA	8.0	
BRA+CCA Outcome	Medium	
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	3.0	
4. Undesirable (or persistence) traits	1.0	
5. Resource exploitation	0.0	
6. Reproduction	3.0	
7. Dispersal mechanisms	-3.0	
8. Tolerance attributes	2.0	
C. Climate change	0.0	
9. Climate change	0.0	
Answered Questions		
Total	55	
A. Biogeography/Historical	13	
1. Domestication/Cultivation	3 5 5	
2. Climate, distribution and introduction risk	5	
3. Invasive elsewhere	5	
B. Biology/Ecology	36	
4. Undesirable (or persistence) traits	12 2 7 9 6	
5. Resource exploitation	2	
6. Reproduction	/	
7. Dispersal mechanisms	9	
8. Tolerance attributes	6	
C. Climate change	6	
9. Climate change Sectors affected	0	
Sectors affected Commercial	4	
Environmental	4	
Species or population nuisance traits	5	
species or population nuisance traits	5	
Thresholds		
BRA	24.75	
BRA+CCA	24.75	
Confidence	, 0	

Confidence		
	BRA+CCA	0.40
	BRA	0.39
	CCA	0.50
Date and Time		
07/12/2021 08:17:04		

Faxon and Assessor details						
Category	Plantae (freshwater)					
Taxon name	Rotala rotundifolia					
Common name	dwarf rotala					
Assessor	Tena Radočaj					
Risk screening context	Risk screening context					
Reason and socio-economic benefits						
Risk assessment area	Mediterranean region					
Taxonomy						
Native range						
Introduced range						
URL						

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
1. L		ication/Cultivation	İ.		1
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	It is widely grown as an aquarium plant (Weed Risk Assessment for Rotala rotundifolia (BuchHam. ex Roxb.) Koehne (Lythraceae) – Roundleaf toothcup)	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 widely grown as an aquarium plant (Weed Risk Assessment for Rotala rotundifolia (BuchHam. ex Roxb.) Koehne (Lythraceae) – Roundleaf toothcup)	Very high
3	1.03	Does the taxon have invasive races,	Yes	R.macrandra	Low
2 (	limate	varieties, sub-taxa or congeners? , 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	Rotala rotundifolia is native to South and Southeast Asia from Japan to India. (Weed Risk Assessment for Rotala rotundifolia (BuchHam. ex Roxb.) Koehne (Lythraceae) – Roundleaf toothcup) The similarity of climatic conditions between native areas and the RA area is low (Climatch)	Medium
5	2.02	What is the quality of the climate matching data?	Medium	Climatch and Weed Risk Assessment for Rotala rotundifolia (Buch Ham. ex Roxb.) Koehne (Lythraceae) – Roundleaf toothcup	Medium
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	R. rotundifolia 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?	One	Pet trade (Weed Risk Assessment for Rotala rotundifolia (Buch Ham. ex Roxb.) Koehne (Lythraceae) – Roundleaf toothcup)	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	Rotala rotundifolia has become naturalized iin thermal water bodies in Hungary (Weed Risk Assessment for Rotala rotundifolia (BuchHam. ex Roxb.) Koehne (Lythraceae) – Roundleaf toothcup)	Medium
3. I	nvasive	e elsewhere			
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	Rotala rotundifolia has become naturalized in Australia in Queensland and New South Wales and in thermal water bodies in Hungary (Weed Risk Assessment for Rotala rotundifolia (Buch Ham. ex Roxb.) Koehne (Lythraceae) – Roundleaf toothcup),	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	that shades out native vegetation (Weed Risk Assessment for Rotala rotundifolia (BuchHam. ex Roxb.) Koehne (Lythraceae) – Roundleaf toothcup)	Medium
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	Rotala rotundifolia is targeted for control in natural systems because this species forms a dense layer on the water surface and restricts water flow. It is prohibited in Western Australia, Tasmania and Honduras. Rotala rotundifolia is also controlled in residential areas because dense populations interfere with drainage, preventing water control canals from working properly. (Weed Risk Assessment for Rotala rotundifolia (BuchHam. ex Roxb.) Koehne (Lythraceae) – Roundleaf toothcup).	High
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	No evidence	Low
		//Ecology			
		able (or persistence) traits	T		1
		Is it likely that the taxon will be poisonous or pose other risks to human health?	No	No evidence	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	Native area to South and Southeast Asia from Japan to India, and in Hungary survive in thermal water bodies (Weed Risk Assessment for Rotala rotundifolia (BuchHam. ex Roxb.) Koehne (Lythraceae) – Roundleaf toothcup),	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	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	No	No evidence	Low
21	4.08	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area?	No	No evidence	Low
22	4.09	Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity?	Yes	Its stems can be creeping or floating and can grow to 70 cm long (Weed Risk Assessment for Rotala rotundifolia (BuchHam. ex Roxb.) Koehne (Lythraceae) – Roundleaf toothcup)	Medium

22	4.10	Is the taxon capable of sustaining itself in a	Yes	R. rotundifolia grows in marshes, swamps, and shallow ponds at	Low
23	4.10	range of water velocity conditions (e.g.	ies	high altitudes. (Weed Risk Assessment for Rotala rotundifolia	LOW
24	4.11	versatile in habitat use)? Is it likely that the taxon's mode of existence	Yes	(BuchHam. ex Roxb.) Koehne (Lythraceae) – Roundleaf toothcup)	High
24	4.11	(e.g. excretion of by-products) or behaviours	res	changes habitat light regime and slows water flow (Zlatković, B. K., & Bogosavljević, S. S. (2020). Risk analysis of alien plants	High
		(e.g. feeding) will reduce habitat quality for		recorded in thermal waters of Serbia. Weed Research, 60(1), 85-	
25	4.12	native taxa? Is the taxon likely to maintain a viable	No	95) No evidence	Low
		population even when present in low			
		densities (or persisting in adverse conditions by way of a dormant form)?			
		e exploitation			
26	5.01	Is the taxon likely to consume threatened or protected native taxa in the RA area?	Not applicable	Not applicable	Very high
27	5.02	Is the taxon likely to sequester food	No	No information	Low
		resources (including nutrients) to the detriment of native taxa in the RA area?			
	eprodu	iction	I		
28	6.01	Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response	Not applicable	Not applicable	Very high
		to environmental conditions?			
29	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	No	Low temperatures	Low
30	6.03		No	No evidence	Low
21	6.04	native taxa? Is the taxon likely to be hermaphroditic or to	Yes	Weed Risk Assessment for Rotala rotundifolia (BuchHam. ex	Medium
		display asexual reproduction?		Roxb.) Koehne (Lythraceae) – Roundleaf toothcup	
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	Yes	(Weed Risk Assessment for Rotala rotundifolia (BuchHam. ex	Low
		large number of propagules or offspring within a short time span (e.g. < 1 year)?		Roxb.) Koehne (Lythraceae) – Roundleaf toothcup)	
34	6.07	How many time units (days, months, years)	1	(Weed Risk Assessment for Rotala rotundifolia (BuchHam. ex	Low
		does the taxon require to reach the age-at- first-reproduction?		Roxb.) Koehne (Lythraceae) – Roundleaf toothcup)	
		al mechanisms			
35	7.01	How many potential internal vectors/pathways could the taxon use to	One	R. rotundifolia is known to disperse by water (Weed Risk Assessment for Rotala rotundifolia (BuchHam. ex Roxb.) Koehne	High
		disperse within the RA area (with suitable		(Lythraceae) – Roundleaf toothcup	
36	7.02	Will any of these vectors/pathways bring the taxon in close proximity to one or more	Yes	By water (Weed Risk Assessment for Rotala rotundifolia (Buch Ham. ex Roxb.) Koehne (Lythraceae) – Roundleaf toothcup)	Medium
		protected areas (e.g. MCZ, MPA, SSSI)?			
37	7.03	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship	No	No evidence	Low
		hulls, pilings, buoys) such that it enhances			
38	7.04	the likelihood of dispersal? Is natural dispersal of the taxon likely to	Yes	reproduce by seed (Weed Risk Assessment for Rotala rotundifolia	High
		occur as eggs (for animals) or as propagules		(BuchHam. ex Roxb.) Koehne (Lythraceae) – Roundleaf toothcup)	
39	7.05	(for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to	Yes	Fragments also can be dispersed easily in water bodies, providing	High
		occur as larvae/juveniles (for animals) or as		rapid distribution purely by vegetative means. (Ervin, G. N., &	
		fragments/seedlings (for plants) in the RA area?		White, R. A. Assessing vegetative growth potential of exotic Rotala rotundifolia (Roxb.) Koehne (roundleaf toothcup), in comparison	
				with Alternanthera philoxeroides (Mart.) Griseb.(alligator weed), a	
40	7.06	Are older life stages of the taxon likely to	Not annlicable	known successful invader.) Not applicable	Very high
		migrate in the RA area for reproduction?			, -
41	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No	Ervin, G. N., & White, R. A. Assessing vegetative growth potential of exotic Rotala rotundifolia (Roxb.) Koehne (roundleaf toothcup),	Medium
		and a spersee in the tot area by other animals!		in comparison with Alternanthera philoxeroides (Mart.)	
42	7.08	Is dispersal of the taxon along any of the	Yes	Griseb.(alligator weed), a known successful invader Water (Weed Risk Assessment for Rotala rotundifolia (BuchHam.	High
		vectors/pathways mentioned in the previous		ex Roxb.) Koehne (Lythraceae) – Roundleaf toothcup)	
		seven questions (35-41; i.e. both unintentional or intentional) likely to be			
		Is dispersal of the taxon density dependent?	No	No evidence	Low
		<i>ce attributes</i> Is the taxon able to withstand being out of	Yes	Rotala rotundifolia is a water-loving plant that can grow fully	High
••		water for extended periods (e.g. minimum of		submerged, as an emerged aquatic plant, and as a terrestrial	
		one or more hours) at some stage of its life cycle?		plant in dry gravel. (Weed Risk Assessment for Rotala rotundifolia (BuchHam. ex Roxb.) Koehne (Lythraceae) – Roundleaf toothcup)	
45	8.02	Is the taxon tolerant of a wide range of	Yes	This species has the potential to grow in a broad range of	High
		water quality conditions relevant to that taxon? [In the Justification field, indicate the		conditions (Ervin, G. N., & White, R. A. Assessing vegetative growth potential of exotic Rotala rotundifolia (Roxb.) Koehne	
		relevant water quality variable(s) being		(roundleaf toothcup), in comparison with Alternanthera	
16	8.03	considered.] Can the taxon be controlled or eradicated in	Yes	philoxeroides (Mart.) Griseb.(alligator weed), a known successful	High
-0	0.03	the wild with chemical, biological, or other	100	the contact herbicide diquat and the sys temic herbicides glyphosate, imazapyr, penoxsulam, and triclopyr are likely to	nigii
		agents/means?		provide effective control (Ervin, G. N. Roundleaf toothcup [Rotala	
		1	No	rotundifolia (Roxb.) Koehne].) No evidence	Low
17	8.04	Is the taxon likely to tolerate or benefit from			1
		environmental/human disturbance?		For show has seen in a	1
		environmental/human disturbance? Is the taxon able to tolerate salinity levels	No	Freshwater species	Low
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 environment?	No		
48		environmental/human disturbance? Is the taxon able to tolerate salinity levels that are higher or lower than those found in		Freshwater species No	Low

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 by humans	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	(Parmesan, C., & Hanley, M. E. (2015). Plants and climate change: complexities and surprises. Annals of botany, 116(6), 849-864.)	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	(Parmesan, C., & Hanley, M. E. (2015). Plants and climate change: complexities and surprises. Annals of botany, 116(6), 849-864.)	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	(Parmesan, C., & Hanley, M. E. (2015). Plants and climate change: complexities and surprises. Annals of botany, 116(6), 849-864.)	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	(Parmesan, C., & Hanley, M. E. (2015). Plants and climate change: complexities and surprises. Annals of botany, 116(6), 849-864.)	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	(Parmesan, C., & Hanley, M. E. (2015). Plants and climate change: complexities and surprises. Annals of botany, 116(6), 849-864.)	Medium

Statistics

Scores	
BRA	16.0
BRA Outcome	Medium
BRA+CCA	16.0
BRA+CCA Outcome	Medium
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	2.0
5. Resource exploitation	0.0
6. Reproduction	3.0
7. Dispersal mechanisms	1.0
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
2. Climate, distribution and introduction risk	5 5
3. Invasive elsewhere	5
B. Biology/Ecology	<b>36</b> 12
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2 7 9 6
6. Reproduction	7
7. Dispersal mechanisms	9
8. Tolerance attributes	6
C. Climate change	6
9. Climate change	6
Sectors affected	-
Commercial	7
Environmental	4
Species or population nuisance traits	8
Thresholds	
BRA	24.75
BRA+CCA	24.75
Confidence	
BRA+CCA	0.50

DK	ATULA	0.50
	BRA	0.50
	CCA	0.50
Date and Time		
07	/12/2021	08:35:33

Taxon and Assessor details					
Category	Plantae (freshwater)				
Taxon name	Sagittaria subulata				
Common name	awl-leaf arrowhead				
Assessor	Tena Radočaj				
Risk screening context					
Reason and socio-economic benefits					
Risk assessment area	Mediterranean region				
Taxonomy					
Native range					
Introduced range					
URL					

A. I			Response	Justification (references and/or other information)	Confidence
		ography/Historical			
		tication/Cultivation Has the taxon been the subject of	Yes	Garden ponds	High
	1.01	domestication (or cultivation) for at least 20 generations?	Tes	(http://freshwateraquariumplants.com/plantprofiles/narrowsag.ht ml)	підп
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	Garden ponds (http://freshwateraquariumplants.com/plantprofiles/narrowsag.ht	High
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	No	No evidence	Low
2. (	Climate	e, distribution and introduction risk			
4	2.01	How similar are the climatic conditions of the	Low	The similarity of climatic conditions between native areas and the	Low
		Risk Assessment (RA) area and the taxon's native range?		RA area is low (Climatch)	
5	2.02	What is the quality of the climate matching data?	Low	https://tropica.com/en/plants/plantdetails/Sagittariasubulata(079) /4530	Low
6	2.03	Is the taxon already present outside of captivity in the RA area?	No	S. subulata is not present in the RA area	High
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	Pet trade	Low
8	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA	Yes	Hungary (Brunel, S. (2009). Pathway analysis: aquatic plants imported in 10 EPPO countries. EPPO bulletin, 39(2), 201-213)	Low
		area in the near future (e.g. unintentional			
-	<u> </u>	and intentional introductions)?	L		
<i>3.1</i>		e elsewhere Has the taxon become naturalised	Ves	Slovakia (Hrivnák B. Moduceká I. Baláži B. Bubíková K.	High
У	3.01	(established viable populations) outside its	Yes	Slovakia (Hrivnák, R., Medvecká, J., Baláži, P., Bubíková, K., Oťaheľová, H., & Svitok, M. (2019). Alien aquatic plants in	High
1		native range?		Slovakia over 130 years: historical overview, current distribution	
10	3.02	In the taxon's introduced range, are there	Yes	and future perspectives. NeoBiota, 49, 37) Low risk (Brunel, S. (2009). Pathway analysis: aquatic plants	Low
10	5.02	known adverse impacts to wild stocks or commercial taxa?	105	imported in 10 EPPO countries. EPPO bulletin, 39(2), 201-213.)	2011
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	Low risk (Brunel, S. (2009). Pathway analysis: aquatic plants imported in 10 EPPO countries. EPPO bulletin, 39(2), 201-213.)	Low
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	No	Low risk (Brunel, S. (2009). Pathway analysis: aquatic plants imported in 10 EPPO countries. EPPO bulletin, 39(2), 201-213.)	Low
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	Low risk (Brunel, S. (2009). Pathway analysis: aquatic plants imported in 10 EPPO countries. EPPO bulletin, 39(2), 201-213.)	Low
B. I	Biolog	y/Ecology			
		rable (or persistence) traits			
14	4.01	Is it likely that the taxon will be poisonous or pose other risks to human health?	No	No information	Low
15	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or	No	Low risk (Brunel, S. (2009). Pathway analysis: aquatic plants imported in 10 EPPO countries. EPPO bulletin, 39(2), 201-213.)	Low
16	1				
10	4.03	protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in	No	No information	Low
	4.03	protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic	No	No information Native area is South America	Low
		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			
17		protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?			
17	4.04	protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has	No	Native area is South America	Low
17	4.04	protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it	No	Native area is South America	Low
17 18 19	4.04	protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA 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	Native area is South America No information	Low
17 18 19 20	4.04 4.05 4.06 4.07	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 No	Native area is South America         No information         No information         No information	Low Low Low
17 18 19 20	4.04 4.05 4.06	protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? 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	Native area is South America No information No information	Low Low
17 18 19 20 21	4.04 4.05 4.06 4.07 4.08	protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA Is ti likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area?	No No No No	Native area is South America         No information         No information         No information         No information         No information	Low Low Low Low
17 18 19 20 21	4.04 4.05 4.06 4.07	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 No	Native area is South America         No information         No information         No information         No information         Place individual plants 2-4 cm apart. This plant may cause problems because in certain conditions it suddenly grows to a	Low Low Low
17 18 19 20 21 22	4.04 4.05 4.06 4.07 4.08	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	No No No No	Native area is South America         No information         No information         No information         No information         No information         Place individual plants 2-4 cm apart. This plant may cause problems because in certain conditions it suddenly grows to a height of 50 cm when it grows older         The remaining alien plants were recorded in shallow or even very shallow waters (< 0.4 m, Sagittaria subulata). (Hrivnák, R., Medvecká, J., Baláži, P., Bubíková, K., Oťaheľová, H., & Svitok, M. (2019). Alien aquatic plants in Slovakia over 130 years: historical	Low Low Low Low
17 18 20 21 22 23	4.04 4.05 4.06 4.07 4.08 4.09	protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA Is ti likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area? Is 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.	No No No Yes No	Native area is South America         No information         No information         No information         No information         No information         Place individual plants 2-4 cm apart. This plant may cause problems because in certain conditions it suddenly grows to a height of 50 cm when it grows older         The remaining alien plants were recorded in shallow or even very shallow waters (< 0.4 m, Sagittaria subulata). (Hrivnák, R., Medvecká, J., Baláži, P., Bubíková, K., Oťaheľová, H., & Svitok, M.	Low Low Low Low Low

5	4.12	Is the taxon likely to maintain a viable	No	No information	Low
		population even when present in low densities (or persisting in adverse conditions			
		by way of a dormant form)?			
	7	ce exploitation			N/ 1 · 1
C	5.01	Is the taxon likely to consume threatened or protected native taxa in the RA area?	Not applicable	Not applicable	Very high
7	5.02	Is the taxon likely to sequester food	No	No information	Low
		resources (including nutrients) to the			
_		detriment of native taxa in the RA area?			
	Reprodu	Is the taxon likely to exhibit parental care	Not applicable	Not applicable	Very high
,	0.01	and/or to reduce age-at-maturity in response			very nigh
		to environmental conditions?			
Э	6.02	Is the taxon likely to produce viable gametes	No	Sutton, D. L. (1990). Growth of Sagittaria subulata and interaction	Low
	6.03	or propagules (in the RA area)? Is the taxon likely to hybridise naturally with	No	with hydrilla. Journal of Aquatic Plant Management, 28, 20-22. Sutton, D. L. (1990). Growth of Sagittaria subulata and interaction	Low
J	0.05	native taxa?	NO	with hydrilla. Journal of Aquatic Plant Management, 28, 20-22.	LOW
1	6.04	Is the taxon likely to be hermaphroditic or to	Yes	Sutton, D. L. (1990). Growth of Sagittaria subulata and interaction	Low
		display asexual reproduction?		with hydrilla. Journal of Aquatic Plant Management, 28, 20-22.	
2	6.05	Is the taxon dependent on the presence of	No	Sutton, D. L. (1990). Growth of Sagittaria subulata and interaction	Low
		another taxon (or specific habitat features) to complete its life cycle?		with hydrilla. Journal of Aquatic Plant Management, 28, 20-22.	
3	6.06	Is the taxon known (or likely) to produce a	No	Sutton, D. L. (1990). Growth of Sagittaria subulata and interaction	Low
		large number of propagules or offspring		with hydrilla. Journal of Aquatic Plant Management, 28, 20-22.	
4	6.07	within a short time span (e.g. < 1 year)?	1		Low
ŧ	6.07	How many time units (days, months, years) does the taxon require to reach the age-at-	1	Sutton, D. L. (1990). Growth of Sagittaria subulata and interaction with hydrilla. Journal of Aquatic Plant Management, 28, 20-22.	LOW
		first-reproduction?			
		al mechanisms			
5	7.01	How many potential internal	One	Pet trade	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 evidence	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?			
8	7.04	Is natural dispersal of the taxon likely to	No	No evidence	Low
		occur as eggs (for animals) or as propagules			
0	7.05	(for plants: seeds, spores) in the RA area?	No	No evidence	Low
9	7.05	Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as	NO	No evidence	LOW
		fragments/seedlings (for plants) in the RA			
		area?			
C	7.06	Are older life stages of the taxon likely to	Not applicable	Not applicable	Very high
1	7.07	migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to	No	Adair, R. J., Keener, B. R., Kwong, R. M., Sagliocco, J. L., &	Low
-	/.0/	be dispersed in the RA area by other animals?		Flower, G. E. (2012). The Biology of Australian weeds	LOW
				60.'Sagittaria platyphylla'(Engelmann) JG Smith and'Sagittaria	
_	7.00			calycina'Engelmann. Plant Protection Quarterly, 27(2), 47-58.	
2	7.08	Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous	No	Adair, R. J., Keener, B. R., Kwong, R. M., Sagliocco, J. L., & Flower, G. E. (2012). The Biology of Australian weeds	Low
		seven questions (35–41; i.e. both		60.'Sagittaria platyphylla'(Engelmann) JG Smith and'Sagittaria	
		unintentional or intentional) likely to be		calycina'Engelmann. Plant Protection Quarterly, 27(2), 47-58.	
3	7.09	Is dispersal of the taxon density dependent?	No	Adair, R. J., Keener, B. R., Kwong, R. M., Sagliocco, J. L., &	Low
				Flower, G. E. (2012). The Biology of Australian weeds	
				60. 'Sagittaria platyphylla' (Engelmann) JG Smith and 'Sagittaria calycina 'Engelmann. Plant Protection Quarterly, 27(2), 47-58.	
. 7	Toleran	ce attributes	·		
		Is the taxon able to withstand being out of	No	Adair, R. J., Keener, B. R., Kwong, R. M., Sagliocco, J. L., &	Low
		water for extended periods (e.g. minimum of		Flower, G. E. (2012). The Biology of Australian weeds	
		one or more hours) at some stage of its life cvcle?		60.'Sagittaria platyphylla'(Engelmann) JG Smith and'Sagittaria calycina'Engelmann. Plant Protection Quarterly, 27(2), 47-58.	
5	8.02	Is the taxon tolerant of a wide range of	No	Adair, R. J., Keener, B. R., Kwong, R. M., Sagliocco, J. L., &	Low
		water quality conditions relevant to that		Flower, G. E. (2012). The Biology of Australian weeds	
		taxon? [In the Justification field, indicate the		60.'Sagittaria platyphylla'(Engelmann) JG Smith and'Sagittaria	
6	8.03	relevant water quality variable(s) being Can the taxon be controlled or eradicated in	No	calycina'Engelmann. Plant Protection Quarterly, 27(2), 47-58. Adair, R. J., Keener, B. R., Kwong, R. M., Sagliocco, J. L., &	Low
J	0.03	the wild with chemical, biological, or other	NU	Flower, G. E. (2012). The Biology of Australian weeds	LOW
		agents/means?		60.'Sagittaria platyphylla'(Engelmann) JG Smith and'Sagittaria	
	L			calycina'Engelmann. Plant Protection Quarterly, 27(2), 47-58.	
_	8.04	Is the taxon likely to tolerate or benefit from	No	Adair, R. J., Keener, B. R., Kwong, R. M., Sagliocco, J. L., &	Low
7		environmental/human disturbance?		Flower, G. E. (2012). The Biology of Australian weeds 60.'Sagittaria platyphylla'(Engelmann) JG Smith and'Sagittaria	
7				calycina'Engelmann. Plant Protection Quarterly, 27(2), 47-58.	
7					Low
	8.05	Is the taxon able to tolerate salinity levels	Yes	Humphreys, A., Gorsky, A. L., Bilkovic, D. M., & Chambers, R. M.	
	8.05	that are higher or lower than those found in	Yes	(2021). Changes in plant communities of low-salinity tidal	
8		that are higher or lower than those found in its usual environment?		(2021). Changes in plant communities of low-salinity tidal marshes in response to sea-level rise. Ecosphere, 12(7), e03630.	
3	8.05	that are higher or lower than those found in its usual environment? Are there effective natural enemies	Yes	(2021). Changes in plant communities of low-salinity tidal	Low
3	8.06	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		(2021). Changes in plant communities of low-salinity tidal marshes in response to sea-level rise. Ecosphere, 12(7), e03630.	Low
3	8.06 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		(2021). Changes in plant communities of low-salinity tidal marshes in response to sea-level rise. Ecosphere, 12(7), e03630.	Low
8 9 . (	8.06 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		(2021). Changes in plant communities of low-salinity tidal marshes in response to sea-level rise. Ecosphere, 12(7), e03630.	Low Medium
3	8.06 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	No	(2021). Changes in plant communities of low-salinity tidal marshes in response to sea-level rise. Ecosphere, 12(7), e03630. No	

51	9.02	Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	No change	(Parmesan, C., & Hanley, M. E. (2015). Plants and climate change: complexities and surprises. Annals of botany, 116(6), 849-864.)	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	(Parmesan, C., & Hanley, M. E. (2015). Plants and climate change: complexities and surprises. Annals of botany, 116(6), 849-864.)	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	(Parmesan, C., & Hanley, M. E. (2015). Plants and climate change: complexities and surprises. Annals of botany, 116(6), 849-864.)	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	(Parmesan, C., & Hanley, M. E. (2015). Plants and climate change: complexities and surprises. Annals of botany, 116(6), 849-864.)	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	(Parmesan, C., & Hanley, M. E. (2015). Plants and climate change: complexities and surprises. Annals of botany, 116(6), 849-864.)	Medium

#### Statistics

Scores	
BRA	6.0
BRA Outcome	Medium
BRA+CCA	6.0
BRA+CCA Outcome	Medium
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	-2.0
4. Undesirable (or persistence) traits	0.0
5. Resource exploitation	0.0
6. Reproduction	2.0
7. Dispersal mechanisms	-5.0
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 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	7
Environmental	0
Species or population nuisance traits	-1
Thresholds	
BRA	24.75
BRA+CCA	24.75
Confidence	
BRA+CCA	0.36

Conndence	
BRA+CCA	0.36
BRA	0.34
CCA	0.50
Date and Time	
07/12/2	021 08:55:45

Taxon and Assessor details					
Category	Plantae (freshwater)				
Taxon name	Utricularia gibba				
Common name	humped bladderwort				
Assessor	Marina Piria				
Risk screening context					
Reason and socio-economic benefits					
Risk assessment area	Mediterranean region				
Taxonomy					
Native range					
Introduced range					
URL					

			Response	Justification (references and/or other information)	Confidence
A. I	Biogeo	graphy/Historical			
1. L		ication/Cultivation			
1		Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	U. gibba is commonly cultivated as an ornamental plant (Biosecurity New Zealand, 2008); it may have been introduced originally as an aquarium plant (Webb et al., 1988). I	Very high
2		Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	U. gibba is commonly cultivated as an ornamental plant (Biosecurity New Zealand, 2008); it may have been introduced originally as an aquarium plant (Webb et al., 1988). I	Medium
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	Utricularia aurea	Low
2 (	limate	distribution and introduction risk			
<u>2.</u> 4		How similar are the climatic conditions of the	High	prefer Cs - Warm temperate climate with dry summer	High
	2.01	Risk Assessment (RA) area and the taxon's native range?	i ligit		- ingli
5	2.02	What is the quality of the climate matching data?	High	Cs - Warm temperate climate with dry summer; Climatch	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	https://www.cabi.org/isc/datasheet/117747	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	>1	machinery, water,pet trade	Very high
8	2.05	Is the taxon currently found in close	Yes	Hungary; Husner 2012	Low
		proximity to, and likely to enter into, the RA			
		area in the near future (e.g. unintentional			
2		and intentional introductions)?			
_	1	e elsewhere	Vac	Nwe Zealand	Vom high
9		Has the taxon become naturalised (established viable populations) outside its	Yes		Very high
10	3.02	In the taxon's introduced range, are there	Yes	Impact on wild native species	Medium
		known adverse impacts to wild stocks or commercial taxa?		https://www.cabi.org/isc/datasheet/117747	
11	3.03	In the taxon's introduced range, are there	Yes	Has high reproductive potential, U. gibba forms mats over the	Medium
		known adverse impacts to aquaculture?		water surface; in New Zealand it has been reported that this could be a problem for irrigation and drainage (Champion and Clayton, 2000: Biosecurity New Zealand, 2008).	
12		In the taxon's introduced range, are there	Yes	Damaged ecosystem services	Medium
13		known adverse impacts to ecosystem In the taxon's introduced range, are there	No	. gibba is reported as a weed in botanic gardens throughout the	Low
15	5.05	known adverse socio-economic impacts?	110	World; it poses no known harm to human health (Biosecurity New Zealand, 2008).	Low
		/Ecology			
		able (or persistence) traits			<b>N</b>
14		Is it likely that the taxon will be poisonous or pose other risks to human health?	No	. gibba is reported as a weed in botanic gardens throughout the world; it poses no known harm to human health (Biosecurity New Zealand, 2008).	Very high
15	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or	Yes	Competition - monopolizing resources Competition - shading Rapid growth	Very high
16	4.03	protected)? Are there any threatened or protected taxa	No	it is not parasitic spec	Very high
10		that the non-native taxon would parasitise in the RA area?			i si y mgn
17	4.04	Is the taxon adaptable in terms of climatic and other environmental conditions, thus	Yes	U. gibba is specially adapted to low-nutrient environments such as bogs and swamps (Biosecurity New Zeland, 2008), and increases	Low
		enhancing its potential persistence if it has invaded or could invade the RA area?		in abundance when the conditions change from oligotrophic to mesotropic; however, with further change in that direction it decreases in abundance (Preston and Croft, 1997)	
18	4.05	Is the taxon likely to disrupt food-web	Yes	yes	High
		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	if introduced, yes	Medium
20	4.07	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and	No	no data	Medium
		infectious agents that are endemic in the RA			
21		Is it likely that the taxon will host, and/or act as a vector for, recognised pests and	No	no data	Medium
		infectious agents that are absent from (novel to) the RA area?			
22		Is it likely that the taxon will achieve a body	Yes	it has high growth potential	Medium
		size that will make it more likely to be released from captivity?			
23	4.10	Is the taxon capable of sustaining itself in a	No	U. gibba prefers slow-moving, warm water and has moderate	Very high
	1	range of water velocity conditions (e.g.		shade tolerance (NZPCN, 2010). These factors best explain the occurrence of U. gibba in New Zealand (Compton et al., 2012).	

24	4.11	Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for	No	no data	Medium
	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 flowers are hermaphrodite and pollinated either by insects or by self-pollination (Salmon, 2001). U. gibba regenerates naturally from seeds (Champion and Clayton, 2000; Compton, et al., 2012). The vegetative reproduction is by re-sprouts from stem fragments or from rhizomes (NZPCN, 2010). U. gibba differs from all these species in that it has no winter buds in its leaf axils, which are the most common propagation method for other species of Utricularia (Zhenvu and Cheek, 2011).	Medium
		te exploitation Is the taxon likely to consume threatened or	No	specialized carnivorous plant	Low
	5.02	protected native taxa in the RA area? Is the taxon likely to sequester food	Yes	Competition - monopolizing resources	High
		resources (including nutrients) to the detriment of native taxa in the RA area?			
	Reprodu				N/ 1 · 1
28	6.01	Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?	Not applicable	https://www.cabi.org/isc/datasheet/117747	Very high
29	6.02	Is the taxon likely to produce viable gametes	Yes	yes, similar conditions as part of New Zealand	High
30	6.03	or propagules (in the RA area)? Is the taxon likely to hybridise naturally with	No	no evidences	High
31	6.04	native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction?	Yes	The flowers are hermaphrodite and pollinated either by insects or by self-pollination (Salmon, 2001). U. gibba regenerates naturally from seeds (Champion and Clayton, 2000; Compton, et al., 2012). The vegetative reproduction is by re-sprouts from stem fragments or from rhizomes (NZPCN, 2010). U. gibba differs from all these species in that it has no winter buds in its leaf axils, which are the most common propagation method for other species of Utricularia (Zhenvu and Cheek. 2011).	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.	Very high
	6.06	Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)?	Yes	The flowers are hermaphrodite and pollinated either by insects or by self-pollination (Salmon, 2001). U. gibba regenerates naturally from seeds (Champion and Clayton, 2000; Compton, et al., 2012). The vegetative reproduction is by re-sprouts from stem fragments or from rhizomes (NZPCN, 2010). U. gibba differs from all these species in that it has no winter buds in its leaf axils, which are the most common propagation method for other species of Utricularia (Zhenyu and Cheek, 2011).	Very high
34	6.07	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	1	The flowers are hermaphrodite and pollinated either by insects or by self-pollination (Salmon, 2001). U. gibba regenerates naturally from seeds (Champion and Clayton, 2000; Compton, et al., 2012). The vegetative reproduction is by re-sprouts from stem fragments or from rhizomes (NZPCN, 2010). U. gibba differs from all these species in that it has no winter buds in its leaf axils, which are the most common propagation method for other species of Utricularia (Zhenyu and Cheek, 2011).	Very high
		al mechanisms		·····	) (am think
55	7.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable	>1	vector organisms, machinery, water	Very high
86	7.02	Will any of these vectors/pathways bring the taxon in close proximity to one or more	Yes	can be transferred by birds	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	passive yes, active no	High
	7.04	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?	Yes	The flowers are hermaphrodite and pollinated either by insects or by self-pollination (Salmon, 2001). U. gibba regenerates naturally from seeds (Champion and Clayton, 2000; Compton, et al., 2012). The vegetative reproduction is by re-sprouts from stem fragments or from rhizomes (NZPCN, 2010). U. gibba differs from all these species in that it has no winter buds in its leaf axils, which are the most common propagation method for other species of Utricularia (Zhenvu and Cheek, 2011).	Low
	7.05	Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?	Yes	The flowers are hermaphrodite and pollinated either by insects or by self-pollination (Salmon, 2001). U. gibba regenerates naturally from seeds (Champion and Clayton, 2000; Compton, et al., 2012). The vegetative reproduction is by re-sprouts from stem fragments or from rhizomes (NZPCN, 2010). U. gibba differs from all these species in that it has no winter buds in its leaf axils, which are the most common propagation method for other species of Utricularia (Zhenvu and Cheek. 2011).	Medium
40	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	Not applicable		Very high
11	7.07	Are propagules or eggs of the taxon likely to	Yes	yes	High
42	7.08	be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both	No	probably not	Low
	L	unintentional or intentional) likely to be			

8. 7	Folerand	Is dispersal of the taxon density dependent?	No	The flowers are hermaphrodite and pollinated either by insects or by self-pollination (Salmon, 2001). U. gibba regenerates naturally from seeds (Champion and Clayton, 2000; Compton, et al., 2012). The vegetative reproduction is by re-sprouts from stem fragments or from rhizomes (NZPCN, 2010). U. gibba differs from all these species in that it has no winter buds in its leaf axils, which are the most common propagation method for other species of Utricularia (Zhenvu and Cheek. 2011).	Very high
44	8.01	Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle?	Yes	Has propagules that can remain viable for more than one year	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	mezortophic cinditions, eutrophic cant stand	Medium
46	8.03	Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	No	No information is available on any chemical control methods attempted on this species. Only mechanical removal	Medium
47	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	No	probably not	Low
48	8.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	No	No data	Medium
49	8.06	Are there effective natural enemies (predators) of the taxon present in the RA	Yes	Rook (2004) reports that in America, U. gibba is occasionally eaten by muskrats, ducks and other waterfowl.	Low
с. с	Climate	e change			
9. (	Climate	change			
50	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not chance?	Increase	preferred warm climates	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	preferred warm climates	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	not connected waterbodies	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	U. gibba has been identified as outcompeting and threatening native, endangered bladderworts including U. dichotoma and U. delicatula, and sundews including Drosera auriculata, D. peltata and the forked sundew D. binate	Medium
54	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Higher	probably higher	Medium
55	9.06	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	Higher	on fishing activities	Medium

Statistics	
Scores	
BRA	32.0
BRA Outcome	High
BRA+CCA	42.0
BRA+CCA Outcome	High
Score partition	
A. Biogeography/Historical	20.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	2.0
3. Invasive elsewhere	14.0
B. Biology/Ecology	12.0
4. Undesirable (or persistence) traits	5.0
5. Resource exploitation	2.0
6. Reproduction	4.0
7. Dispersal mechanisms	3.0
8. Tolerance attributes	-2.0
C. Climate change	10.0
9. Climate change	10.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3
2. Climate, distribution and introduction risk	3 5 5
3. Invasive elsewhere	
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	12 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	16
Environmental	11
Species or population nuisance traits	19

Thresholds	
BRA	24.75
BRA+CCA	24.75
Confidence	
BRA+CCA	0.65
BRA	0.66
CCA	0.54
Date and Time	
23/11/2	021 17:02:46

	AS-ISK	v2
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Taxon and Assessor details	
Category	Plantae (freshwater)
Taxon name	Vallisneria australis
Common name	
Assessor	Marina Piria
Risk screening context	
Reason and socio-economic benefits	
Risk assessment area	Mediterranean region
Taxonomy	
Native range	
Introduced range	
URL	

_	_		Response	Justification (references and/or other information)	Confidence
		ography/Historical			
. [		tication/Cultivation Has the taxon been the subject of	Yes	For aquaria	Very high
L	1.01	domestication (or cultivation) for at least 20 generations?	res	https://www.sciencedirect.com/science/article/pii/S030437702100 0802?casa_token=hhN6- 6tALIAAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm q0xhr0Oz609qvYRKIq6w0ASqKq6x8Y	very nigh
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	for aquaria https://www.sciencedirect.com/science/article/pii/S030437702100 0802?casa_token=hhN6- 6tALIAAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm q0xhrO0z609qvYRKIq6w0ASqKq6x8Y	Low
	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	Valisneria neotropicalis https://www.sciencedirect.com/science/article/pii/S030437702100 0802?casa_token=hhN6- 6tALIAAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm q0xhr0Oz609qvYRKlq6w0ASqKq6x8Y	Very high
. (		e, distribution and introduction risk			
/	2.01	How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range?	Medium	climatch	Medium
;	2.02	What is the quality of the climate matching data?	Medium	climatch	High
5	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	Hungary, Germany but previously was misidentified as V. nana or V. americana https://www.sciencedirect.com/science/article/pii/S030437702100 0802?casa_token=hhN6- 6tALIAAAAAA;qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm q0xhrO0z609qvYRKIq6w0ASqKq6x8Y	Medium
	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	accidental, release from aquaria https://www.sciencedirect.com/science/article/pii/S030437702100 0802?casa_token=hhN6- 6tALIAAAAAA;qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm q0xhrO0z609qvYRKIq6w0ASqKq6x8Y	High
	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)?	Yes	Hungary https://www.sciencedirect.com/science/article/pii/S030437702100 0802?casa_token=hhN6- 6tALIAAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm q0xhr0Oz609qvYRKlq6w0ASqKq6x8Y	Low
	1	e elsewhere	1		
	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	https://www.sciencedirect.com/science/article/pii/S030437702100 0802?casa_token=hhN6- 6tALIAAAAAA;qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm q0xhrO0z609qvYRKIq6w0ASqKq6x8Y	, -
	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	No	no data https://www.sciencedirect.com/science/article/pii/S030437702100 0802?casa_token=hhN6- 6tALIAAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm a0xhr0Oz609avYRKIa6w0ASaKa6x8Y	Low
.1	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	probably displace other species of submerged hydrophytes )similarly as other Valisneria species <https: article="" pii="" s03043770210<br="" science="" www.sciencedirect.com="">00802?casa_token=hhN6- 6tALIAAAAAA;qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm q0xhrOOz609gvYRKIq6w0ASqKq6x8Y</https:>	Low
	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	No	probably Damage ecosystem services as other Valisneria sp. https://www.cabi.org/isc/datasheet/56573#toimpactSummary	Low
3	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	V. spiralis can impede water flow in irrigation canals and storage dams, affect drainage, choke hydro turbines, and impact on navigational, recreational and agricultural use of water bodies. Probably has similar effect	Low
		y/Ecology			
		able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health?	No	https://www.sciencedirect.com/science/article/pii/S030437702100 0802?casa_token=hhN6- 6tALIAAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm q0xhr0Oz609gvYRKIq6w0ASqKq6x8Y	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 data https://www.sciencedirect.com/science/article/pii/S030437702100 0802?casa_token=hhN6- 6tALIAAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm q0xhr00z609gvYRKlq6w0ASqKq6x8Y; According to our experience in Hungarian populations, this species is a very strong competitor	Low
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	and can replace other submerged invasive species (Hydrilla verticillata (L.f.) Royle, Cabomba caroliniana A. Gray) in thermal water canals. it is not parasitic https://www.sciencedirect.com/science/article/pii/S030437702100 0802?casa_token=hhN6- 6tALIAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm q0xhr02609qvYRKIq6w0ASqKq6x8Y#bib0090	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	even tropical species, found survived populations on -15 C https://www.sciencedirect.com/science/article/pii/S030437702100 0802?casa_token=hhN6- 6tALIAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm q0xhr02c609qvYRKIq6w0ASqKq6x8Y#bib0090	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	Other Valisneria spec disrupts - Ecosystem change/ habitat alteration https://www.cabi.org/isc/datasheet/56573#tohabitat ; According to our experience in Hungarian populations, this species is a very strong competitor and can replace other submerged invasive species (Hydrilla verticillata (L.f.) Royle, Cabomba	Medium
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	caroliniana A. Gray) in thermal water canals. Other valisneria - Damaged ecosystem services https://www.cabi.org/isc/datasheet/56573#tohabitat	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 area?	No	no data https://www.sciencedirect.com/science/article/pii/S030437702100 0802?casa_token=hhN6- 6tALIAAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm q0xhr00z609gvYRKlq6w0ASqKq6x8Y#bib0090	Medium
21	4.08	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area?	No	no data https://www.sciencedirect.com/science/article/pii/S030437702100 0802?casa_token=hhN6- 6tALIAAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm a0xhr0Oz609qvYRKlq6w0ASqKq6x8Y#bib0090	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	https://www.sciencedirect.com/science/article/pii/S030437702100 0802?casa_token=hhN6- 6tALIAAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm q0xhr0Oz609gvYRKIq6w0ASqKq6x8Y#bib0090	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	V. spiralis was found in stagnant, slow and fast running (up to 0.8 m/s) water to depths of 1 m, and on muddy, sandy or gravelly sediment (Hussner and Lösch, 2005). Probably is for V americana similar.	Low
24	4.11	Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa?	No	probably yes but no data for this species https://www.sciencedirect.com/science/article/pii/S030437702100 0802?casa_token=hhN6- 6tALIAAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm a0xhr02609avYRKIa6w0ASaKa6x8Y#bib0090	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	Probably yes because of releseas from aquaria usually occur in low densities https://www.sciencedirect.com/science/article/pii/S030437702100 0802?casa_token=hhN6- 6tALIAAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm	Low
-				a0xhr0Oz609avYRKla6w0ASaKa6x8Y#bib0090	
	5.01	te exploitation Is the taxon likely to consume threatened or protected native taxa in the RA area?	Not applicable	https://www.sciencedirect.com/science/article/pii/S030437702100 0802?casa_token=hhN6- 6tALIAAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm q0xhr00z609qvYRKIq6w0ASqKq6x8Y#bib0090	Very high
	5.02	Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?	Yes	probably yes as other Valisneria	Low
	R <i>eprod</i> 6.01	Is the taxon likely to exhibit parental care	Not applicable	https://www.sciencedirect.com/science/article/pii/S030437702100	Very high
20	6.02	and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes	Vac	0802?casa_token=hhN6- 6tALIAAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm q0xhr00z609gvYRKIq6w0ASqKq6x8Y#bib0090 https://www.sciapedicect.com/sciaped/acticle/bii/S020427202100	High
		or propagules (in the RA area)?	Yes	https://www.sciencedirect.com/science/article/pii/S030437702100 0802?casa_token=hhN6- 6tALIAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm a0xhr00z609qvYRKIq6w0ASqKq6x8Y#bib0090	
	6.03	Is the taxon likely to hybridise naturally with native taxa?	Yes	found in Japan https://www.sciencedirect.com/science/article/abs/pii/S030437701 5300176	
31	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	Yes	in Russia Valisneria sp. Flowering plants were observed only with female inflorescences (author's observation in 2016) suggesting that reproduction was only vegetative; he most common form of propagation for Vallisneria is through runners. These will grow all over the aquarium and each new plant will quickly start sending out runners of its own. They can very quickly take over the entire tank this way. https://www.sciencedirect.com/science/article/pii/S030437702100 0802?casa_token=hhN6- 6tALIAAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm q0xhr00z609gvYRKlq6w0ASqKq6x8YFlowering plants were https://www.sciencedirect.com/science/article/pii/S030437702100 0802?casa_token=hhN6- 6tALIAAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm q0xhr00z609gvYRKlq6w0ASqKq6x8YFlowering plants were	High

				··· // · · · · · · · · · · · · · · · ·	
32	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features)	No	https://www.sciencedirect.com/science/article/pii/S030437702100 0802?casa token=hhN6-	Very high
		to complete its life cycle?		0802?casa_token=nnN6- 6tALIAAAAAA:gkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm	
		to complete its me cycle:		a0xhr0Oz609qvYRKla6w0ASqKq6x8Y#bib0090	
3	6.06	Is the taxon known (or likely) to produce a	Yes	he pistillate flowers, attached to submerged plants by long,	Medium
-		large number of propagules or offspring		flexuous peduncles, orient their opening at the water surface and	
		within a short time span (e.g. < 1 year)?		pollination occurs when anthers of the floating staminate flowers	
				contact the stigmas of the pistillate flowers. After fertilization the	
				peduncle coils into a spiral, thus drawing the developing fruit	
				underwater where it matures; he most common form of	
				propagation for Vallisneria is through runners. These will grow all	
				over the aquarium and each new plant will quickly start sending	
				out runners of its own. They can very quickly take over the entire	
4	6.07	How many time units (days, months, years)	1	he pistillate flowers, attached to submerged plants by long,	High
		does the taxon require to reach the age-at-		flexuous peduncles, orient their opening at the water surface and	
		first-reproduction?		pollination occurs when anthers of the floating staminate flowers	
				contact the stigmas of the pistillate flowers. After fertilization the	
				peduncle coils into a spiral, thus drawing the developing fruit	
. E	ispers	al mechanisms		underwater where it matures	
	7.01	How many potential internal	One	release from aquaria	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	not yet present	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	based on reproduction, no	High
		attaching itself to hard substrata (e.g. ship			
		hulls, pilings, buoys) such that it enhances			
0	7.04	the likelihood of dispersal?	Yes	by plant remainer All known populations probably results of form	High
o	7.04	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules	105	by plant remains; All known populations probably resulted from plant remains released in drainage water from aquariums.	High
		(for plants: seeds, spores) in the RA area?		https://www.sciencedirect.com/science/article/pii/S030437702100	
		(ior plants, secus, spores) in the KA area?		0802?casa_token=hhN6-	
				6tALIAAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm	
				a0xhr0Oz609avYRKlg6w0ASaKg6x8Y#bib0090	
9	7.05	Is natural dispersal of the taxon likely to	Yes	V. spiralis spreads asexually by means of runners,	Low
-		occur as larvae/juveniles (for animals) or as		https://www.sciencedirect.com/science/article/pii/S030437702100	-
		fragments/seedlings (for plants) in the RA		0802?casa_token=hhN6-	
		area?		6tALIAAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGlJTZTEKUZUhdm	
				q0xhr0Oz609gvYRKlq6w0ASqKq6x8Y#bib0090	
0	7.06	Are older life stages of the taxon likely to	Not applicable	n.a.	Very high
		migrate in the RA area for reproduction?			
1	7.07	Are propagules or eggs of the taxon likely to	No	not known for V.australis	Medium
1	7.00	be dispersed in the RA area by other animals?			N/ 1 · 1
2	7.08	Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous	No	distributed locally elsewhere, Adriatic area with disconnected waterbodies	Very high
		seven questions (35–41; i.e. both		waterbodies	
		unintentional or intentional) likely to be			
3	7.09	Is dispersal of the taxon density dependent?	No	he most common form of propagation for Vallisneria is through	Very high
		. , .		runners. These will grow all over the aquarium and each new	, 5
				plant will quickly start sending out runners of its own. They can	
				very quickly take over the entire tank this way.	
		ce attributes	Ne		1
4	8.01	Is the taxon able to withstand being out of	No	yes in other valisneria	Low
		water for extended periods (e.g. minimum of			
		one or more hours) at some stage of its life			
5	8.02	cvcle? Is the taxon tolerant of a wide range of	Yes	All populations were detected in artificial or strongly modified	High
-		water quality conditions relevant to that		water bodies; no plants were found so far in unregulated water	
		taxon? [In the Justification field, indicate the		systems. As these plants have been observed across multiple	
		relevant water quality variable(s) being		growing seasons, these can be considered as self-sustaining	
		considered.]		populations. However, the survival of these plants in all known	
		_		populations, pointing at. While, at least at present, continental	
				cold winters are posing a barrier for the "giant" alien Vallisneria	
				species, these may become invasive species in western Europe in	
			No	In New Zealand, the species is considered virtually impossible to	High
6	8.03	Can the taxon be controlled or eradicated in		eliminate once established, but small infestations can be	
6	8.03	the wild with chemical, biological, or other			
6	8.03			controlled by divers hand-pulling plants (Auckland Regional	
		the wild with chemical, biological, or other agents/means?	Vac	Council, 2010a). Also generalist herbivoreous fishes can maybe	High
	8.03	the wild with chemical, biological, or other agents/means? Is the taxon likely to tolerate or benefit from	Yes	Council, 2010a). Also generalist herbivoreous fishes can maybe All populations were detected in artificial or strongly modified	High
		the wild with chemical, biological, or other agents/means?	Yes	Council, 2010a). Also generalist herbivoreous fishes can maybe All populations were detected in artificial or strongly modified water bodies; no plants were found so far in unregulated water	High
		the wild with chemical, biological, or other agents/means? Is the taxon likely to tolerate or benefit from	Yes	Council, 2010a). Also generalist herbivoreous fishes can maybe All populations were detected in artificial or strongly modified water bodies; no plants were found so far in unregulated water systems. As these plants have been observed across multiple	High
		the wild with chemical, biological, or other agents/means? Is the taxon likely to tolerate or benefit from	Yes	Council, 2010a). Also generalist herbivoreous fishes can maybe All populations were detected in artificial or strongly modified water bodies; no plants were found so far in unregulated water systems. As these plants have been observed across multiple growing seasons, these can be considered as self-sustaining	High
		the wild with chemical, biological, or other agents/means? Is the taxon likely to tolerate or benefit from	Yes	Council, 2010a). Also generalist herbivoreous fishes can maybe All populations were detected in artificial or strongly modified water bodies; no plants were found so far in unregulated water systems. As these plants have been observed across multiple growing seasons, these can be considered as self-sustaining populations. However, the survival of these plants in all known	High
		the wild with chemical, biological, or other agents/means? Is the taxon likely to tolerate or benefit from	Yes	Council, 2010a). Also generalist herbivoreous fishes can maybe All populations were detected in artificial or strongly modified water bodies; no plants were found so far in unregulated water systems. As these plants have been observed across multiple growing seasons, these can be considered as self-sustaining populations. However, the survival of these plants in all known populations, pointing at. While, at least at present, continental	High
		the wild with chemical, biological, or other agents/means? Is the taxon likely to tolerate or benefit from	Yes	Council, 2010a). Also generalist herbivoreous fishes can maybe All populations were detected in artificial or strongly modified water bodies; no plants were found so far in unregulated water systems. As these plants have been observed across multiple growing seasons, these can be considered as self-sustaining populations. However, the survival of these plants in all known populations, pointing at. While, at least at present, continental cold winters are posing a barrier for the "giant" alien Vallisneria	High
7		the wild with chemical, biological, or other agents/means? Is the taxon likely to tolerate or benefit from environmental/human disturbance?	Yes	Council, 2010a). Also generalist herbivoreous fishes can maybe All populations were detected in artificial or strongly modified water bodies; no plants were found so far in unregulated water systems. As these plants have been observed across multiple growing seasons, these can be considered as self-sustaining populations. However, the survival of these plants in all known populations, pointing at. While, at least at present, continental cold winters are posing a barrier for the "giant" alien Vallisneria species, these may become invasive species in western Europe in	High
7	8.04	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		Council, 2010a). Also generalist herbivoreous fishes can maybe All populations were detected in artificial or strongly modified water bodies; no plants were found so far in unregulated water systems. As these plants have been observed across multiple growing seasons, these can be considered as self-sustaining populations. However, the survival of these plants in all known populations, pointing at. While, at least at present, continental cold winters are posing a barrier for the "giant" alien Vallisneria	
7	8.04	the wild with chemical, biological, or other agents/means? Is the taxon likely to tolerate or benefit from environmental/human disturbance?		Council, 2010a). Also generalist herbivoreous fishes can maybe All populations were detected in artificial or strongly modified water bodies; no plants were found so far in unregulated water systems. As these plants have been observed across multiple growing seasons, these can be considered as self-sustaining populations. However, the survival of these plants in all known populations, pointing at. While, at least at present, continental cold winters are posing a barrier for the "giant" alien Vallisneria species, these may become invasive species in western Europe in	
3	8.04	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		Council, 2010a). Also generalist herbivoreous fishes can maybe All populations were detected in artificial or strongly modified water bodies; no plants were found so far in unregulated water systems. As these plants have been observed across multiple growing seasons, these can be considered as self-sustaining populations. However, the survival of these plants in all known populations, pointing at. While, at least at present, continental cold winters are posing a barrier for the "giant" alien Vallisneria species, these may become invasive species in western Europe in	
3	8.04 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?	No	Council, 2010a). Also generalist herbivoreous fishes can maybe All populations were detected in artificial or strongly modified water bodies; no plants were found so far in unregulated water systems. As these plants have been observed across multiple growing seasons, these can be considered as self-sustaining populations. However, the survival of these plants in all known populations, pointing at. While, at least at present, continental cold winters are posing a barrier for the "giant" alien Vallisneria species. these may become invasive species in western Europe in V. spiralis known to tolerate low salinity.	Low

50	9.01	Under the predicted future climatic	Increase	Our study confirms that V. australis has become established in	High
50	5.01	conditions, are the risks of entry into the RA	increase	some parts of Europe. Firstly, this species naturalised in Hungary	ingii
		area posed by the taxon likely to increase,		although in this country it only occurs in thermally heated canals.	
		decrease or not change?		Later, this species was also recorded from Italy, Belgium and	
		decrease of not change.		Germany where it occurs in strongly modified water bodies (rice	
				fields, canals, gravel pits), but these are not thermally heated.	
				This means that this species can adapt to the Atlantic climate and	
				potentially may become an invasive species in the near future.	
51	9.02	Under the predicted future climatic	Increase	Our study confirms that V. australis has become established in	High
		conditions, are the risks of establishment		some parts of Europe. Firstly, this species naturalised in Hungary	5
		posed by the taxon likely to increase,		although in this country it only occurs in thermally heated canals.	
		decrease or not change?		Later, this species was also recorded from Italy, Belgium and	
		g		Germany where it occurs in strongly modified water bodies (rice	
	1			fields, canals, gravel pits), but these are not thermally heated.	
	1			This means that this species can adapt to the Atlantic climate and	
				potentially may become an invasive species in the near future.	
52	9.03	Under the predicted future climatic	No change	because of not connected waterbodies	High
		conditions, are the risks of dispersal within			-
		the RA area posed by the taxon likely to			
		increase, decrease or not change?			
53	9.04	Under the predicted future climatic	Higher	Our study confirms that V. australis has become established in	Medium
		conditions, what is the likely magnitude of		some parts of Europe. Firstly, this species naturalised in Hungary	
		future potential impacts on biodiversity		although in this country it only occurs in thermally heated canals.	
		and/or ecological integrity/status?		Later, this species was also recorded from Italy, Belgium and	
				Germany where it occurs in strongly modified water bodies (rice	
				fields, canals, gravel pits), but these are not thermally heated.	
				This means that this species can adapt to the Atlantic climate and	
				potentially may become an invasive species in the near future.	
54	9.05	Under the predicted future climatic	Higher	Our study confirms that V. australis has become established in	High
		conditions, what is the likely magnitude of		some parts of Europe. Firstly, this species naturalised in Hungary	
	1	future potential impacts on ecosystem		although in this country it only occurs in thermally heated canals.	
	1	structure and/or function?		Later, this species was also recorded from Italy, Belgium and	
	1			Germany where it occurs in strongly modified water bodies (rice	
				fields, canals, gravel pits), but these are not thermally heated.	
	1			This means that this species can adapt to the Atlantic climate and	
				potentially may become an invasive species in the near future.	
55	9.06	Under the predicted future climatic	Higher	Our study confirms that V. australis has become established in	Medium
	1	conditions, what is the likely magnitude of		some parts of Europe. Firstly, this species naturalised in Hungary	
	1	future potential impacts on ecosystem		although in this country it only occurs in thermally heated canals.	
	1	services/socio-economic factors?		Later, this species was also recorded from Italy, Belgium and	
	1			Germany where it occurs in strongly modified water bodies (rice	
	1			fields, canals, gravel pits), but these are not thermally heated.	
	1			This means that this species can adapt to the Atlantic climate and	
	1			potentially may become an invasive species in the near future.	

Statistics	
Scores	
BRA	21.5
BRA Outcome	Medium
BRA+CCA	31.5
BRA+CCA Outcome	High
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	15.0
4. Undesirable (or persistence) traits	4.0
5. Resource exploitation	2.0
6. Reproduction	6.0
7. Dispersal mechanisms	-1.0
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 5
3. Invasive elsewhere	5
B. Biology/Ecology	<b>36</b> 12
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2 7 9 6
6. Reproduction	7
7. Dispersal mechanisms	9
8. Tolerance attributes	6
C. Climate change	6
9. Climate change	6
Sectors affected	
Commercial	6
Environmental	5
Species or population nuisance traits	22
Thresholds	
BRA	24.75
BRA+CCA	24.75
Confidence	211/0
BDA+CCA	0.60

BRA+CCA BRA CCA 0.60 0.59 0.67

Date and Time 23/11/2021 17:03:25

Faxon and Assessor details					
Category	Plantae (freshwater)				
Taxon name	Azolla cristata				
Common name	-				
Assessor	Mihaela Britvec				
Risk screening context					
Reason and socio-economic benefits					
Risk assessment area	Pannonian region				
Taxonomy					
Native range					
Introduced range					
URL					

			Response	Justification (references and/or other information)	Confidence
		ography/Historical			
1.		cation/Cultivation			LU ala
T	1.01	Has the taxon been the subject of	Yes	Azolla cristata is of commercial importance in cultivation in	High
		domestication (or cultivation) for at least 20		southern and eastern Asia as a bio-fertilizer, valued for its	
		generations?		nitrogen-fixing ability, which benefits crops such as rice when the	
				fern is grown under it and reduces the need for artificial fertilizer	
				addition. The thick mat of fronds also suppresses weed growth.	
				Harvested fronds are also used as a food for fish and poultry. It is	
				also often used as a floating plant in both coldwater and tropical	
~	1.00			aquaria, as well as in outdoor ponds, doi:	
2	1.02	Is the taxon harvested in the wild and likely	Yes	Harvested fronds are also used as a food for fish and poultry. It is	High
		to be sold or used in its live form?		also often used as a floating plant in both coldwater and tropical	
_	1.00			aquaria, as well as in outdoor ponds.	
3	1.03	Does the taxon have invasive races,	Yes	It is closely related to Azolla filiculoides.	Very high
2	Climata	varieties, sub-taxa or congeners?			
∠. ⊿		How similar are the climatic conditions of the	High	doi: 10.1111/j.1365-3180.2012.00926.x	High
<b>–</b>	2.01	Risk Assessment (RA) area and the taxon's	riigii	doi: 10.1111/J.1505-5180.2012.00920.x	ngn
		native range?			
5	2.02	What is the quality of the climate matching	High	doi: 10.1111/j.1365-3180.2012.00926.x	High
5	2.02		riigii	uoi. 10.1111/J.1303-3180.2012.00920.x	nign
c	2.02	data?	N	H-1: 10 1111/- 12CE 2100 2012 0002C	L l'ala
6	2.03	Is the taxon already present outside of	Yes	doi: 10.1111/j.1365-3180.2012.00926.x	High
-	2.04	captivity in the RA area?	<u></u>	coil cond and annual	lliab
<b>′</b>	2.04	How many potential vectors could the taxon	>1	soil, sand and gravel	High
_	2.05	use to enter in the RA area?	Nation 11 11		LU: - h
8	2.05	Is the taxon currently found in close	Not applicable	doi: 10.1111/j.1365-3180.2012.00926.x	High
	1	proximity to, and likely to enter into, the RA			
		area in the near future (e.g. unintentional			
2	Investi	and intentional introductions)?	I		
		e elsewhere	No.	A substate is active to the America, but has been used at as an	LU-h
9	3.01	Has the taxon become naturalised	Yes	A. cristata is native to the America, but has been recorded as an	High
10	2.02	(established viable populations) outside its	N	invasive species in Kashmir, India, and South Africa.	1
10	3.02	In the taxon's introduced range, are there	Yes	Azolla species have negatively impacts animal health	Low
		known adverse impacts to wild stocks or		(https://www.cabi.org/isc/datasheet/8119#toriskAndImpactFactors	
4 -	2.02	commercial taxa?	¥		Madia
11	3.03	In the taxon's introduced range, are there	Yes	A. cristata reduce the light and oxygen levels in water bodies.	Medium
1 ~	2.04	known adverse impacts to aquaculture?			Madium
12	3.04	In the taxon's introduced range, are there	Yes	Azolla species are known to be able to damaged ecosystem	Medium
	2.65	known adverse impacts to ecosystem		services and leaded to ecosystem change/ habitat alteration.	N. 11
13	3.05	In the taxon's introduced range, are there	Yes	Social impacts of Azolla species have centred around the reduction	Medium
		known adverse socio-economic impacts?		of useful water surface area for recreation (fishing, swimming and	]
	Piolog	y/Ecology	L	water skiing) and water transport.	
		able (or persistence) traits			
		Is it likely that the taxon will be poisonous or	No	No physical threats to humans were found.	Low
1-4	7.01	pose other risks to human health?		https://www.fws.gov/fisheries/ANS/erss/highrisk/ERSS-Azolla-	2000
1				cristata-FINAL-July2021.pdf	
15	4.02	Is it likely that the taxon will smother one or	Yes	Multiple peer-reviewed reports document competing with other	Medium
10	4.02	more native taxa (that are not threatened or	103	plants. https://www.fws.gov/fisheries/ANS/erss/highrisk/ERSS-	neulum
		protected)?			
16	4.03	Are there any threatened or protected taxa	No	Azolla-cristata-FINAL-July2021.pdf no reference	Low
10	4.05		NU UNI		Low
		that the non-native taxon would parasitise in			
17	4.04	the RA area? Is the taxon adaptable in terms of climatic	Yes	https://www.fws.gov/fisheries/ANS/erss/highrisk/ERSS-Azolla-	High
Ľ′	4.04		105		ingii
		and other environmental conditions, thus		cristata-FINAL-July2021.pdf	
		enhancing its potential persistence if it has			
10	4.05	invaded or could invade the RA area?	Vac	A aviatata form thick mate	Law
18	4.05	Is the taxon likely to disrupt food-web	Yes	A. cristata form thick mats.	Low
		structure/function in aquatic ecosystems if it			
10	4.00	has invaded or is likely to invade the RA	Vec	Multiple peak reviewed reports do war at a setting impact of	Madium
19	4.06	Is the taxon likely to exert adverse impacts	Yes	Multiple peer-reviewed reports document negative impacts of	Medium
		on ecosystem services in the RA area?		introduction including forming thick mats, competing with other	
				plants, blocking navigation, and increasing difficulty and costs to	
	1			commercial fishing.	
				https://www.fws.gov/fisheries/ANS/erss/highrisk/ERSS-Azolla-	
	1.07			cristata-FINAL-July2021.pdf	
20	4.07	Is it likely that the taxon will host, and/or	No	no reference	Low
	1	act as a vector for, recognised pests and			
_	1	infectious agents that are endemic in the RA		-	
01	4.08	Is it likely that the taxon will host, and/or	No	no reference	Low
21		act as a vector for, recognised pests and	1		
21		, , ,			
21		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 reference	Low
23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g.	No	This species inhabits in still or slow moving water of lakes, ponds, and streams.	Medium
		versatile in habitat use)?		https://www.fws.gov/fisheries/ANS/erss/highrisk/ERSS-Azolla-	
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	Multiple peer-reviewed reports document negative impacts of introduction including forming thick mats and competing with other plants.	High
		native taxa?		https://www.fws.gov/fisheries/ANS/erss/highrisk/ERSS-Azolla-	
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 reference	Low
5 6	Pesouro	e exploitation			
		Is the taxon likely to consume threatened or protected native taxa in the RA area?	Not applicable	A. cristata is not carnivore.	Medium
	5.02	Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?	Yes	competing with other plants: https://www.fws.gov/fisheries/ANS/erss/highrisk/ERSS-Azolla- cristata-FINAL-July2021.pdf	Medium
	Reprodu		1		T
28	6.01	Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?	Not applicable	no evedence	High
29	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	No	no reference	Low
30	6.03	Is the taxon likely to hybridise naturally with native taxa?	No	no reference	Low
	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	No	no reference	Low
32	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	Yes	This fern is a nitrogen fixer.	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	Has high reproductive potential.	Medium
34	6.07	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	2	2 days: The plants most usually reproduce asexually by fragmentation of the fronds as frequently as every two days. https://www.fws.gov/fisheries/ANS/erss/highrisk/ERSS-Azolla- cristata-FINAL-July2021.pdf	Medium
7. L	Dispersa	al mechanisms	1		
35	7.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable habitats nearby)?	>1	Although waterfowl dispersal was regarded as a possible vector, the urban location of these occurrences [in Ottawa, Ontario and Gatineau, Quebec] suggested to those investigators that the 2003 occurrence most likely resulted from the dumping of home aquaria (Darbyshire and Thomson 2004) https://www.fws.gov/fisheries/ANS/erss/highrisk/ERSS-Azolla- cristata-FINAL-Julv2021.odf	Medium
36	7.02	Will any of these vectors/pathways bring the taxon in close proximity to one or more	Yes	through water flow between the organism's locations, cleaning of home aquaria	Medium
37	7.03	protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances	No	no reference of actively attaching	Medium
		the likelihood of dispersal?			
38	7.04	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?	Yes	In winter, Azolla survives as either sporocarps, which fall to the bottom of water bodies, or as sporophytes that float. https://www.fws.gov/fisheries/ANS/erss/highrisk/ERSS-Azolla- cristata-FINAL-July2021.pdf	Medium
39	7.05	Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as	Yes	A. cristata - FINAL-JULY2021.pdf A. cristata is able to undergo rapid vegetative reproduction by the elongation and fragmentation of the small fronds.	High
		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?	Not applicable	has not active dispersal mechanisms	High
11	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	Yes	fragments can be dispersed by animals between water bodies	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	A. cristata is able to undergo rapid vegetative reproduction throughout the year by the elongation and fragmentation.	Medium
43	7.09	unintentional or intentional) likely to be Is dispersal of the taxon density dependent?	No	no reference	Medium
		ce attributes			
		Is the taxon able to withstand being out of	No	no reference	Low
		water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle?			
45	8.02	<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	No	Still or slow moving water of lakes, ponds, and streams.	Medium
46	8.03	Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	Yes	data for taxonomically-related species A. fiiliculoides: https://www.cabi.org/isc/datasheet/8119#topreventionAndControl	Low
47	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	Yes	Seasonal flooding can also result in the spread of the organism locally. Still another possibility involves common use of Azolla as a freshwater aquarium plant; when aquarium water is released it may be transported into sewers and waterways (Whitley et al. 1999). https://www.fws.gov/fisheries/ANS/erss/highrisk/ERSS- Azolla-cristata-FINAL-July2021.pdf	High

48	8.05	Is the taxon able to tolerate salinity levels	No	no evidence	Low
		that are higher or lower than those found in			
		its usual environment?			
49	8.06	Are there effective natural enemies	No	no evidence	Low
		(predators) of the taxon present in the RA			
С. (	Climat	e change			
		change			
50	9.01	Under the predicted future climatic	Increase	https://www.fws.gov/fisheries/ANS/erss/highrisk/ERSS-Azolla-	High
		conditions, are the risks of entry into the RA		cristata-FINAL-July2021.pdf	5
		area posed by the taxon likely to increase,			
		decrease or not change?			
51	9.02	Under the predicted future climatic	Increase	professional judgement	High
		conditions, are the risks of establishment			-
		posed by the taxon likely to increase,			
		decrease or not change?			
52	9.03	Under the predicted future climatic	Increase	professional judgement	Medium
		conditions, are the risks of dispersal within			
		the RA area posed by the taxon likely to			
		increase, decrease or not change?			
53	9.04	Under the predicted future climatic	Higher	professional judgement	High
		conditions, what is the likely magnitude of			
		future potential impacts on biodiversity			
		and/or ecological integrity/status?			
54	9.05	Under the predicted future climatic	Higher	professional judgement	High
		conditions, what is the likely magnitude of			
		future potential impacts on ecosystem			
		structure and/or function?			
55	9.06	Under the predicted future climatic	Higher	professional judgement	Medium
		conditions, what is the likely magnitude of			
		future potential impacts on ecosystem			
		services/socio-economic factors?			

Statistics	
Scores	
BRA	33.0
BRA Outcome	High
BRA+CCA	45.0
BRA+CCA Outcome	High
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	9.0
4. Undesirable (or persistence) traits	5.0
5. Resource exploitation	2.0
6. Reproduction	-2.0
7. Dispersal mechanisms	4.0
8. Tolerance attributes	0.0
C. Climate change	12.0
9. Climate change	12.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	<u>3</u> 5 5
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	5
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2
6. Reproduction	7
7. Dispersal mechanisms	9
8. Tolerance attributes	6
C. Climate change	6
9. Climate change	6
Sectors affected	
Commercial	21
Environmental	12
Species or population nuisance traits	17
Thresholds	
BRA	22.75
BRA+CCA	22.75

-	22170
BRA+	CCA 22.75
Confidence	
BRA+	CCA 0.53
E	BRA 0.51
	CCA 0.67
Date and Time	
10/1	2/2021 12:05:27

Taxon and Assessor details					
Category	Plantae (freshwater)				
Taxon name	Azolla filiculoides				
Common name	Pacific mosquitofern				
Assessor	Mihaela Britvec				
Risk screening context					
Reason and socio-economic benefits					
Risk assessment area	Pannonian region				
Taxonomy					
Native range					
Introduced range					
URL					

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
		ication/Cultivation	N		
	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	Members of the genus Azolla are utilized throughout the world for a wide variety of purposes besides its widespread uses as an ornamental in fish ponds and tanks (Lumpkin and Plucknett, 1980; 1982). A. filiculoides is used as a green manure in rice paddies, mainly in Asia, as an inhibitor of weed growth in rice cultivation in China and Vietnam (Kröck and Alkämper, 1991), and as an alternative high protein fodder for cattle, swine, poultry and fish, and possibly as an alternative food source for humans, again, mainly in Asia. It has also been used as a nitrate-rich compost which potentially increases soil organic nitrogen levels and cation exchange capacity. It is used for purification of water, removal of heavy metals (Sanyahumbi et al., 1998) and removal of nitrogen and phoshorous from wastewater (Forni et al., 2001). It has also	High
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	been used variously as an ingredient in soap production, a cure for sore throats and as a control for mosquitoes in southern India as complete mats discut larval develonment (Raiendran and Members of the genus Azolla are utilized throughout the world for a wide variety of purposes besides its widespread uses as an	High
				ornamental in fish ponds and tanks (Lumpkin and Plucknett, 1980; 1982). A. filiculoides is used as a green manure in rice paddies, mainly in Asia, as an inhibitor of weed growth in rice cultivation in China and Vietnam (Kröck and Alkämper, 1991), and as an alternative high protein fodder for cattle, swine, poultry and fish, and possibly as an alternative food source for humans, again, mainly in Asia. It has also been used as a nitrate-rich compost which potentially increases soil organic nitrogen levels and cation exchange capacity. It is used for purification of water, removal of heavy metals (Sanyahumbi et al., 1998) and removal of nitrogen and phoshorous from wastewater (Forni et al., 2001). It has also been used variously as an ingredient in soap production, a cure for sore throats and as a control for mosquitoes in southern India as complete mats disruit layal development (Baiendran and	
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	It is closely related to Azolla cristata and other species within the genus Azolla (https://www.cabi.org/isc/datasheet/8119#tosimilaritiesToOtherSp eciesOrConditions).	High
2. 0	Climate,	, distribution and introduction risk			
	2.01	How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range?	Medium	A. filiculoides is a small fern native to the Americas which has spread widely throughout the world. Climatic requirements include suitably warm months for sporocarp development, adequate radiation and light intensity for vegetative growth, and adequate amounts of rainfall to prevent its aquatic habitat from drying up. This species of tropical origin is thought to have evolved a cold- tolerant strain since its introduction into Britain (Janes, 1998b) and South Africa (McConnachie, 2003). A. filiculoides may be able to survive temperatures as low as -10°C before death occurs.	Medium
5	2.02	What is the quality of the climate matching data?	High	doi: 10.1016/j.limno.2014.05.003	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	doi: 10.3391/ai.2016.11.4.04	High
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	>1	https://www.cabi.org/isc/datasheet/8119#topathwayVectors	High
	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)?	Not applicable	doi: 10.3391/ai.2016.11.4.04	High
		e elsewhere Has the taxon become naturalised	Yes	A. filiculoides is native to the Rocky Mountain states of the	Very high
-		(established viable populations) outside its native range?		western USA and Canada, through Central America and to most of South America. It has been introduced to Europe, North and sub- Saharan Africa, China, Japan, New Zealand, Australia, the Caribbean and Hawaii.	
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or	Yes	Negatively impacts animal health (https://www.cabi.org/isc/datasheet/8119#toriskAndImpactFactors	High
	3.03	commercial taxa? In the taxon's introduced range, are there known adverse impacts to aquaculture?	Yes	). It has commonly been utilised as an ornamental in fishponds and tanks and has spread from these foci, exhibiting a weedy phenology in nutrient enriched reservoirs and roadside canals (T. Center, Senior Researcher, Aquatic Weeds, United States Department of Agriculture, personal communication).	Medium
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	Yes	Damaged ecosystem services, ecosystem change/ habitat alteration	Very high

13	3.05	In the taxon's introduced range, are there	Yes	Primarily, social impacts of A. filiculoides have centred around the	High
10	5.55	known adverse socio-economic impacts?		reduction of useful water surface area for recreation (fishing,	
B. 4	Biology	//Ecology		swimming and water skiing) and water transport.	
		able (or persistence) traits			
14	4.01	Is it likely that the taxon will be poisonous or pose other risks to human health?	Yes	Negatively impacts human health: A. filiculoides, coupled with the lack of light penetration, creates an anaerobic environment which can reduce the quality of drinking water and make survival for other organisms in the water impossible.	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. filiculoides, coupled with the lack of light penetration, creates an anaerobic environment which make survival for other organisms in the water impossible.	Very high
16		Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	no reference	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	Highly adaptable to different environments (https://www.cabi.org/isc/datasheet/8119#toriskAndImpactFactors ).	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	In eutrophic water systems, A. filiculoides grows rapidly, easily outcompeting indigenous vegetation. Decaying root and leaf matter below a mat of A. filiculoides, and the lack of light penetration, creates an anaerobic environment.	High
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes	Primarily, social impacts of A. filiculoides have centred around the reduction of useful water surface area for recreation (fishing, swimming and water skiing) and water transport.	Medium
20	4.07	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA	No	no reference	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 reference	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 reference	Low
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)?	No	A. filiculoides in its native areas (South America and western North America) is a plant of slow flowing streams and rivers, ponds and lakes (Reed, 1962; Lumpkin and Plucknett, 1980;	Low
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 native taxa?	Yes	In eutrophic water systems, A. filiculoides grows rapidly, easily outcompeting indigenous vegetation. Decaying root and leaf matter below a mat of A. filiculoides, coupled with the lack of light penetration, creates an anaerobic environment which can reduce the quality of drinking water and make survival for other	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	oraanisms in the water impossible. Has propagules that can remain viable for more than one year.	High
-		e exploitation Is the taxon likely to consume threatened or	No	Azolla filiculoides is not cornivore.	High
		protected native taxa in the RA area? Is the taxon likely to sequester food	Yes	In eutrophic water systems, A. filiculoides grows rapidly, easily	High
		resources (including nutrients) to the detriment of native taxa in the RA area?		outcompeting indigenous vegetation.	
	Reprodu				
28	6.01	Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?	Not applicable	no evidence	High
		Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	has propangules	High
		Is the taxon likely to hybridise naturally with native taxa?	No	no reference	Medium
		Is the taxon likely to be hermaphroditic or to display asexual reproduction?	No	no evidence	Medium
		Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	Yes	A. filiculoides grows in association with the heterocystous cyanobacterium (blue-green alga) Anabaena azollae (Nostocales: Nostocaceae), within the dorsal leaf lobe cavities (Ashton and Walmsley, 1984). The alga has the ability to fix atmospheric nitrogen and is able to fulfil the nitrogen requirements of the fern making it successful in nitrogen-deficient waters (Ashton, 1982).	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	has high reproductive potential, has propagules	High
34	6.07	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	1	1 months	Medium
		al mechanisms			
35	7.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable	>1	https://www.cabi.org/isc/datasheet/8119#topathwayVectors	High
	7.02	Will any of these vectors/pathways bring the	Yes	through water flow between the organism's locations	High
36		taxon in close proximity to one or more			
	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?	No	no reference of actively attaching	High

39			l		
59	7.05	Is natural dispersal of the taxon likely to	Yes	A. filiculoides is able to undergo rapid vegetative reproduction	High
		occur as larvae/juveniles (for animals) or as		throughout the year by the elongation and fragmentation of the	
		fragments/seedlings (for plants) in the RA		small fronds.	
40	7.00	area?	Net evel(eeble		111 ala
40	7.06	Are older life stages of the taxon likely to	Not applicable	has not active dispersal mechanisms	High
41	7.07	migrate in the RA area for reproduction?	Vec	fragments can be dispersed by animals between water bedies	Medium
41	7.07	Are propagules or eggs of the taxon likely to	Yes	fragments can be dispersed by animals between water bodies	Medium
42	7 00	be dispersed in the RA area by other animals?	Yes	A filiculaidas is able to undergo reprid vegetative reproduction	llich
4Z	7.08	Is dispersal of the taxon along any of the	res	A. filiculoides is able to undergo rapid vegetative reproduction	High
		vectors/pathways mentioned in the previous		throughout the year by the elongation and fragmentation of the	
		seven questions (35–41; i.e. both		small fronds.	
40	7.00	unintentional or intentional) likely to be	NI-		Ma di una
			No	no reference	Medium
	8.01	ce attributes Is the taxon able to withstand being out of	Yes	Tolerates fire.	Madium
+4	0.01	-	res	Tolerales fire.	Medium
		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	No	A. filiculoides is a plant of slow flowing streams and rivers, ponds	High
		water quality conditions relevant to that		and lakes.	
		taxon? [In the Justification field, indicate the			
		relevant water quality variable(s) being			
<del>1</del> 6	8.03	Can the taxon be controlled or eradicated in	Yes	https://www.cabi.org/isc/datasheet/8119#topreventionAndControl	High
		the wild with chemical, biological, or other			
		agents/means?			
17	8.04	Is the taxon likely to tolerate or benefit from	Yes	Seasonal flooding can also result in the spread of the organism	Medium
		environmental/human disturbance?		locally.	
18	8.05	Is the taxon able to tolerate salinity levels	No	no evidence	Medium
		that are higher or lower than those found in			
		its usual environment?			
49	8.06	Are there effective natural enemies	No	Host records from around the globe show that the genus Azolla is	Medium
		(predators) of the taxon present in the RA		attacked by generalist herbivores and that very few specialist	
		area?		insect species have evolved on these plants (Hill, 1997). However,	
				four beetle species, the weevils Stenopelmus rufinasus and S.	
				brunneus and the two flea beetles Pseudolampsis guttata and P.	
				darwinii, appear to have specialized on the genus Azolla	
				(Richerson and Grigarick, 1967; Habeck, 1979; Hill, 1999) and	
				were identified as potential biological control agents for A.	
				filiculoides in South Africa (Hill, 1997). Following host range	
				filiculoides in South Africa (Hill, 1997). Following host range testing, Stenopelmus rufinasus was released in 1997 as a	
<u> </u>	Climate	e change		filiculoides in South Africa (Hill, 1997). Following host range	
		e change		filiculoides in South Africa (Hill, 1997). Following host range testing, Stenopelmus rufinasus was released in 1997 as a	
9. (	Climate	change	Increase	filiculoides in South Africa (Hill, 1997). Following host range testing, Stenopelmus rufinasus was released in 1997 as a biocontrol of A. filiculoides in South Africa (McConnachie et al.	Hiah
Э. С		change Under the predicted future climatic	Increase	filiculoides in South Africa (Hill, 1997). Following host range testing, Stenopelmus rufinasus was released in 1997 as a	High
Э. С	Climate	e change Under the predicted future climatic conditions, are the risks of entry into the RA	Increase	filiculoides in South Africa (Hill, 1997). Following host range testing, Stenopelmus rufinasus was released in 1997 as a biocontrol of A. filiculoides in South Africa (McConnachie et al.	High
Э. С	Climate	change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase,	Increase	filiculoides in South Africa (Hill, 1997). Following host range testing, Stenopelmus rufinasus was released in 1997 as a biocontrol of A. filiculoides in South Africa (McConnachie et al.	High
<u>9. (</u> 50	<u>Climate</u> 9.01	<ul> <li>change</li> <li>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?</li> </ul>		filiculoides in South Africa (Hill, 1997). Following host range testing, Stenopelmus rufinasus was released in 1997 as a biocontrol of A. filiculoides in South Africa (McConnachie et al https://doi.org/10.1016/j.sajb.2015.07.017	
9. C 50	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	Increase	filiculoides in South Africa (Hill, 1997). Following host range testing, Stenopelmus rufinasus was released in 1997 as a biocontrol of A. filiculoides in South Africa (McConnachie et al.	High Medium
<u>9. (</u> 50	<u>Climate</u> 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		filiculoides in South Africa (Hill, 1997). Following host range testing, Stenopelmus rufinasus was released in 1997 as a biocontrol of A. filiculoides in South Africa (McConnachie et al https://doi.org/10.1016/j.sajb.2015.07.017	
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9. ( 50 51 52 53 53	9.01 9.02 9.03 9.04 9.05	<ul> <li>change</li> <li>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?</li> <li>Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?</li> <li>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?</li> <li>Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?</li> <li>Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?</li> <li>Under the predicted future climatic</li> </ul>	Increase Increase Higher Higher	filiculoides in South Africa (Hill, 1997). Following host range testing, Stenopelmus rufinasus was released in 1997 as a biocontrol of A. filiculoides in South Africa (McConnachie et al https://doi.org/10.1016/j.sajb.2015.07.017 professional judgement professional judgement professional judgement	Medium High High Medium
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Statistics	
Scores	
BRA	30.0
BRA Outcome	High
BRA+CCA	42.0
BRA+CCA Outcome	High
Score partition	
A. Biogeography/Historical	15.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	2.0
3. Invasive elsewhere	9.0
B. Biology/Ecology	15.0
4. Undesirable (or persistence) traits	7.0
5. Resource exploitation	2.0
6. Reproduction	0.0
7. Dispersal mechanisms	4.0
8. Tolerance attributes	2.0
C. Climate change	12.0
9. Climate change	12.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3

2 Climate distribution and introduction visit	
<ol><li>Climate, distribution and introduction risk</li></ol>	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	15
Environmental	10
Species or population nuisance traits	22
Thresholds	
BRA	22.75
BRA+CCA	22.75
BRA+CCA Confidence	22.75
	22.75 0.66
Confidence	
Confidence BRA+CCA	0.66
Confidence BRA+CCA BRA	0.66 0.67
Confidence BRA+CCA BRA CCA	0.66 0.67
Confidence BRA+CCA BRA CCA Date and Time	0.66 0.67

Taxon and Assessor details				
Category	Plantae (freshwater)			
Taxon name	Cabomba caroliniana			
Common name	Carolina fanwort			
Assessor	Tena Radočaj			
Risk screening context				
Reason and socio-economic benefits				
Risk assessment area	Pannonian region			
Taxonomy				
Native range				
Introduced range				
URL				

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
		ication/Cultivation	1		1
1		Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	C. caroliniana is a highly adaptable submersed aquatic macrophyte whose attractive flowers and finely dissected leaves have lead to widespread use and trade in the aquatic industry	High
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	C. caroliniana is a highly adaptable submersed aquatic macrophyte whose attractive flowers and finely dissected leaves have lead to widespread use and trade in the aquatic industry; aquarium plant (CABI, 2020)	High
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	No	no data available	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?	Low	The similarity of climatic conditions between native areas and the RA area is low (Climatch)	Medium
5	2.02	What is the quality of the climate matching data?	Medium	I used climatch and distribution map of CABI	Low
6	2.03	Is the taxon already present outside of captivity in the RA area?	No	C. caroliniana 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	Aircraft, Aquaculture stock, Machinery and equipment, Ship structures above the water line (CABI, 2020)	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	C. caroliniana is present in Hungary and Serbia (Király, G., Steták, D., & Bányász, Á. (2007). Spread of invasive macrophytes in Hungary. Neobiota, 7, 123-131.) Vukov, D., Jurca, T., Rućando, M., Igić, R., & Miljanović, B. (2013). Cabomba caroliniana A. Gray 1837: A new, alien and potentially invasive species in Serbia. Archives of Biological Sciences, 65(4), 1515-1520.	Very high
3.1	<i>nvasive</i> 3.01	e elsewhere Has the taxon become naturalised	T		
		(established viable populations) outside its native range?	Yes	It is a popular aquarium plant native to South America (Brazil, Uruguay, Paraguay, and northeastern Argentina) and, according to some authors, to southeastern United States. It was introduced into the rest of the USA, Canada, Australia, Asia (China, Malaysia, India, Japan), and in many regions of its new range it is considered an invasive and noxious aquatic weed. In Europe, it was found in the United Kingdom (introduced to England), Belgium, the Netherlands, and Hungary. Newly recorded populations in Serbia are restricted to the canals in Bačka. Populations are established only on two localities (Mali Stapar and Odžaci). (Vukov, D., Jurca, T., Rućando, M., Igić, R., & Miljanović, B. (2013). Cabomba caroliniana A. Gray 1837: A new, alien and notentially invasive species in Serbia. Archives of Biological	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	It has a different ecological niche than most other aquatic plants, thus impacting native species (Zhang et al., 2003). C. caroliniana populations are often associated with areas with decreased species diversity (Cao et al., 2006). Hogsden et al. (2007) showed that while native macrophytes could be found in C. caroliniana beds, their abundance was both low and uneven (CABI, 2020)	High
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	no data available	Low
	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem services?	Yes	In Queensland, C. caroliniana have been shown to negatively impact water quality. The winter dieback that occurs in harsher areas of its range can cause substantial nutrient release, especially manganese pulses. This sudden manganese release can impact the manganese cycle and impact water quality. Additionally dense stands can cause water loss through seepage and overflow, thus impacting hydrological regimes (Mackey,	Very high
	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	Yes	In natural systems the plant can cause substantial nuisance to recreational users by impeding navigation, tangling fishing line and wrapping motor propellers. Thick vegetation can also decrease aesthetic value. This species can also reduce swimming access and potentially cause human health safety issues (CABI.	Very high
		y/Ecology			
	4.01	able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health?	No	No (CABI, 2020)	Medium
	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	Smothers and outcompetes native species, and reduces the overall species diversity in aquatic systems (Weibert, C. (2015). Weed Risk Assessment for Cabomba caroliniana A. Gray (Cabombaceae)–Carolina fanwort.)	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 data available	Low

4.04				
7.04	Is the taxon adaptable in terms of climatic	No	The plant prefers warm sub-tropical climates with temperatures	Low
	and other environmental conditions, thus		from 13-27 degrees C (ISSG, 2008), although it can tolerate	
	enhancing its potential persistence if it has		below freezing temperatures. This species is able to adapt to a	
	invaded or could invade the RA area?			1
	Invaded of Could Invade the KA area?		wide variety of climates, and can successfully overwinter in areas	
			that are too cold for continuous growth. (Weibert, C. (2015).	
			Weed Risk Assessment for Cabomba caroliniana A. Gray	
4.05	Is the taxon likely to disrupt food-web	Yes	C. caroliniana is an aggressive plant, and in many instances has	Medium
	structure/function in aquatic ecosystems if it		seriously impacted biodiversity. C. caroliniana has a broader niche	
	has invaded or is likely to invade the RA		than, and may pose a threat to, native species (CABI, 2020)	
4.06	Is the taxon likely to exert adverse impacts	Yes	This species can also reduce swimming access and potentially	Medium
4.07				
4.07		No		Low
	act as a vector for, recognised pests and		Koopman, K. R., Hendriks, A. J., & Leuven, R. S. (2017).	
	infectious agents that are endemic in the RA		Inconsistencies in the risk classification of alien species and	
	area?		implications for risk assessment in the European Union.	
4.08		No		Low
4.00		Vac		Low
4.09		res		Low
	size that will make it more likely to be		Cabomba caroliniana. Downloaded from	
	released from captivity?		http://www.iucngisd.org/gisd/species.php?sc=402	<u> </u>
4.10	Is the taxon capable of sustaining itself in a	No	It grows rooted in the mud of stagnant to slow flowing water	Low
	, , , , , , , , , , , , , , , , , , , ,			
				1
1 1 1	To it likely that the taxage of the first	Vac		Madi
4.11		res		Medium
	(e.g. feeding) will reduce habitat quality for		areas of its range can cause substantial nutrient release,	1
	native taxa?		especially manganese pulses. This sudden manganese release can	
4 1 7	To the tayon likely to prejetain a viable	Vac		Low
4.12		res		Low
			macrophytes in Hungary. Neobiota, 7, 123-131.	
	densities (or persisting in adverse conditions			
	by way of a dormant form)?			
5.01	Is the taxon likely to consume threatened or	Not applicable	Not applicable	Low
	protected native taxa in the RA area?			
5.02	Is the taxon likely to sequester food	No	No data available	Low
	, _ ,			
eprodu			·	
		Not applicable	Not applicable	Very high
0.01				. cr, mgn
6.02		No	Global Invasive Species Database (2021) Species profile:	Low
	, , , , , , , , , , , , , , , , , , , ,			
	or propagules (III the KA area)?			
<u> </u>	To the target Black of the District of the State	Ne		1
o.03		INO	INO GATA AVAIIADIE	Low
6.04			Cabomba can spread locally via vegetative (asexual) or sexual	Low
	Is the taxon likely to be hermaphroditic or to	Yes		LOW
	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	Yes	reproduction (Weibert, C. (2015). Weed Risk Assessment for	2011
	, .	Yes	reproduction (Weibert, C. (2015). Weed Risk Assessment for	2011
	, .	Yes	reproduction (Weibert, C. (2015). Weed Risk Assessment for Cabomba caroliniana A. Gray (Cabombaceae)-Carolina fanwort).	Low
6.05	display asexual reproduction? Is the taxon dependent on the presence of		reproduction (Weibert, C. (2015). Weed Risk Assessment for Cabomba caroliniana A. Gray (Cabombaceae)-Carolina fanwort). Global Invasive Species Database (2021) Species profile:	
	display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features)		reproduction (Weibert, C. (2015). Weed Risk Assessment for Cabomba caroliniana A. Gray (Cabombaceae)–Carolina fanwort). Global Invasive Species Database (2021) Species profile: Cabomba caroliniana. Downloaded from	
6.05	display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	No	reproduction (Weibert, C. (2015). Weed Risk Assessment for Cabomba caroliniana A. Gray (Cabombaceae)–Carolina fanwort). Global Invasive Species Database (2021) Species profile: Cabomba caroliniana. Downloaded from http://www.iucngisd.org/gisd/species.php?sc=402	Low
	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		reproduction (Weibert, C. (2015). Weed Risk Assessment for Cabomba caroliniana A. Gray (Cabombaceae)-Carolina fanwort). Global Invasive Species Database (2021) Species profile: Cabomba caroliniana. Downloaded from http://www.iucngisd.org/gisd/species.php?sc=402 Global Invasive Species Database (2021) Species profile:	
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	No	reproduction (Weibert, C. (2015). Weed Risk Assessment for Cabomba caroliniana A. Gray (Cabombaceae)–Carolina fanwort). Global Invasive Species Database (2021) Species profile: Cabomba caroliniana. Downloaded from http://www.iucngisd.org/gisd/species.php?sc=402	Low
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	No	reproduction (Weibert, C. (2015). Weed Risk Assessment for Cabomba caroliniana A. Gray (Cabombaceae)-Carolina fanwort). Global Invasive Species Database (2021) Species profile: Cabomba caroliniana. Downloaded from http://www.iucngisd.org/gisd/species.php?sc=402 Global Invasive Species Database (2021) Species profile:	Low
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	No	reproduction (Weibert, C. (2015). Weed Risk Assessment for Cabomba caroliniana A. Gray (Cabombaceae)-Carolina fanwort). Global Invasive Species Database (2021) Species profile: Cabomba caroliniana. Downloaded from http://www.iucngisd.org/gisd/species.php?sc=402 Global Invasive Species Database (2021) Species profile:	Low
6.05 6.06	display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)?	No Yes	reproduction (Weibert, C. (2015). Weed Risk Assessment for Cabomba caroliniana A. Gray (Cabombaceae)–Carolina fanwort). Global Invasive Species Database (2021) Species profile: Cabomba caroliniana. Downloaded from http://www.iucngisd.org/gisd/species.php?sc=402 Global Invasive Species Database (2021) Species profile: Cabomba caroliniana	Low
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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?	No Yes	reproduction (Weibert, C. (2015). Weed Risk Assessment for Cabomba caroliniana A. Gray (Cabombaceae)–Carolina fanwort). Global Invasive Species Database (2021) Species profile: Cabomba caroliniana. Downloaded from http://www.iucngisd.org/gisd/species.php?sc=402 Global Invasive Species Database (2021) Species profile: Cabomba caroliniana Global Invasive Species Database (2021) Species profile:	Low
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6.05 6.06 6.07 <i>ispersa</i>	display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to	No Yes 1	reproduction (Weibert, C. (2015). Weed Risk Assessment for Cabomba caroliniana A. Gray (Cabombaceae)-Carolina fanwort). Global Invasive Species Database (2021) Species profile: Cabomba caroliniana. Downloaded from http://www.iucngisd.org/gisd/species.php?sc=402 Global Invasive Species Database (2021) Species profile: Cabomba caroliniana Global Invasive Species Database (2021) Species profile: Cabomba caroliniana Global Invasive Species Database (2021) Species profile: Cabomba caroliniana. Downloaded from http://www.iucngisd.org/gisd/species.php?sc=402 Interconnected waterways, Humans are the main vectors of dispersal, probably introducing the plant by either intentional	Low Low Low
6.05 6.06 6.07 <i>ispersa</i>	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	No Yes 1	reproduction (Weibert, C. (2015). Weed Risk Assessment for Cabomba caroliniana A. Gray (Cabombaceae)-Carolina fanwort). Global Invasive Species Database (2021) Species profile: Cabomba caroliniana. Downloaded from http://www.iucngisd.org/gisd/species.php?sc=402 Global Invasive Species Database (2021) Species profile: Cabomba caroliniana Global Invasive Species Database (2021) Species profile: Cabomba caroliniana Global Invasive Species Database (2021) Species profile: Cabomba caroliniana. Downloaded from http://www.iucngisd.org/gisd/species.php?sc=402 Interconnected waterways, Humans are the main vectors of dispersal, probably introducing the plant by either intentional water garden plantings or through inappropriate disposal.	Low Low Low
6.05 6.06 6.07 <i>ispersa</i>	display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to	No Yes 1	reproduction (Weibert, C. (2015). Weed Risk Assessment for <u>Cabomba caroliniana A. Gray (Cabombaceae)-Carolina fanwort).</u> Global Invasive Species Database (2021) Species profile: Cabomba caroliniana. Downloaded from http://www.iucngisd.org/gisd/species.php?sc=402 Global Invasive Species Database (2021) Species profile: Cabomba caroliniana Global Invasive Species Database (2021) Species profile: Cabomba caroliniana Global Invasive Species Database (2021) Species profile: Cabomba caroliniana. Downloaded from http://www.iucngisd.org/gisd/species.php?sc=402 Interconnected waterways, Humans are the main vectors of dispersal, probably introducing the plant by either intentional water garden plantings or through inappropriate disposal. Additionally, since the plant reproduces via fragmentation, boating	Low Low Low
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6.05 6.06 6.07 <i>ispersa</i> 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 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)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? 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 Yes 1 Yes Yes No	reproduction (Weibert, C. (2015). Weed Risk Assessment for Cabomba caroliniana A. Gray (Cabombaceae)-Carolina fanwort). Global Invasive Species Database (2021) Species profile: Cabomba caroliniana. Downloaded from http://www.iucngisd.org/gisd/species.php?sc=402 Global Invasive Species Database (2021) Species profile: Cabomba caroliniana Global Invasive Species Database (2021) Species profile: Cabomba caroliniana Global Invasive Species Database (2021) Species profile: Cabomba caroliniana. Downloaded from http://www.iucngisd.org/gisd/species.php?sc=402 Interconnected waterways, Humans are the main vectors of dispersal, probably introducing the plant by either intentional water garden plantings or through inappropriate disposal. Additionally, since the plant reproduces via fragmentation, boating activity facilitates the spread of the plant; fragments are frequently observed in lakes with heavy motorboat activit (CABI, Interconnected waterways (CABI, 2020) The spread of the plant increases with boating activity; it has long, trailing stems that become wrapped around boat propellers and consequently is transported within and among water bodies (CABI, 2020) Global Invasive Species Database (2021) Species profile: Cabomba caroliniana. Downloaded from http://www.iucngisd.org/gisd/species.php?sc=402 Global Invasive Species Database (2021) Species profile: Cabomba caroliniana. Downloaded from http://www.iucngisd.org/gisd/species.php?sc=402 Global Invasive Species Database (2021) Species profile: Cabomba caroliniana. Downloaded from	Low Low Low High Low Medium
6.05 6.06 6.07 <i>ispersa</i> 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 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)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA 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 1 Yes Yes No Yes	reproduction (Weibert, C. (2015). Weed Risk Assessment for Cabomba caroliniana A. Gray (Cabombaceae)-Carolina fanwort). Global Invasive Species Database (2021) Species profile: Cabomba caroliniana. Downloaded from http://www.iucngisd.org/gisd/species.php?sc=402 Global Invasive Species Database (2021) Species profile: Cabomba caroliniana Global Invasive Species Database (2021) Species profile: Cabomba caroliniana Global Invasive Species Database (2021) Species profile: Cabomba caroliniana. Downloaded from http://www.iucngisd.org/gisd/species.php?sc=402 Interconnected waterways, Humans are the main vectors of dispersal, probably introducing the plant by either intentional water garden plantings or through inappropriate disposal. Additionally, since the plant reproduces via fragmentation, boating activity facilitates the spread of the plant; fragments are frequently observed in lakes with heavy motorboat activit (CABI, Interconnected waterways (CABI, 2020) The spread of the plant increases with boating activity; it has long, trailing stems that become wrapped around boat propellers and consequently is transported within and among water bodies (CABI, 2020) Global Invasive Species Database (2021) Species profile: Cabomba caroliniana. Downloaded from http://www.iucngisd.org/gisd/species.php?sc=402 Global Invasive Species Database (2021) Species profile: Cabomba caroliniana. Downloaded from http://www.iucngisd.org/gisd/species.php?sc=402 Global Invasive Species Database (2021) Species profile: Cabomba caroliniana. Downloaded from	Low Low Low High Low Medium
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	4.06 4.07 4.08 4.09 4.10 4.11 4.11 4.12 <u>esourc</u> 5.01 5.02	<ul> <li>structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA</li> <li>4.06 Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?</li> <li>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?</li> <li>4.08 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?</li> <li>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?</li> <li>4.09 Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity?</li> <li>4.10 Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)?</li> <li>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?</li> <li>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)?</li> <li>esource exploitation</li> <li>5.01 Is the taxon likely to consume threatened or protected native taxa in the RA area?</li> <li>5.02 Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?</li> <li>6.01 Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?</li> <li>6.02 Is the taxon likely to produce viable gametes or propagules (in the RA area)?</li> </ul>	structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA         4.06       Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?       Yes         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?       No         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         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         4.10       Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)?       No         4.11       Is it likely that the taxon's mode of existence (e.g. feeding) will reduce habitat quality for native taxa?       Yes         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         5.01       Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?       No         5.01       Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?       No tapplicable         6.01       Is the taxon likely to produce viable gametes or propagules (in the RA area)?       No	structure/function in aquatic acosystems if it has invaded or is likely to invade the RA         seriously impacted biodiversity. C. caroliniana has a broader niche than, and may pose a threat to, native species (CABI, 2020)           4.06         Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?         Yes         This species can also reduce swimming access and potentially cause human health safety issues. In natural systems the plant can cause substantial nuisance to recreational users by impeding navigation, tangling fishing line and wrapping motor propellers           4.07         Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are adsent from (novel to) the RA area?         No         Matthews, J., van der Velde, G., Collas, F. P., de Hoop, L., Koopman, K. R., Hendriks, A. J., & Leuven, R. S. (2017).           4.08         Is ti likely that the taxon will achieve a body size that will make it more likely to be released from captivity?         No         Matthews, J., van der Velde, G., Collas, F. P., de Hoop, L., Koopman, K. R., Hendriks, A. J., & Leuven, R. S. (2017).           4.10         Is ti likely that the taxon will achieve a body size that will make it more likely to be released from captivity?         No         Matthews, J., van der Velde, G., Collas, P. J., & Leuven, R. S. (2017).           4.11         Is ti 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 grows roded in the mud of stagnant on therease, especial (Managanese cycle and impact water guality. Additionally dense stands can ca

42	7 09	Is dispersal of the taxon along any of the	Yes	beating activity facilitates the spread of the plant (sphilip 2020)	Low
42	7.08	vectors/pathways mentioned in the previous	res	boating activity facilitates the spread of the plant (cabi, 2020)	Low
		seven questions (35–41; i.e. both			
		unintentional or intentional) likely to be			
43	7.09	Is dispersal of the taxon density dependent?	Yes	Global Invasive Species Database (2021) Species profile:	Low
				Cabomba caroliniana. Downloaded from	
				http://www.iucngisd.org/gisd/species.php?sc=402	
		ice attributes	I		I
44	8.01	Is the taxon able to withstand being out of	No	No evidence	Low
		water for extended periods (e.g. minimum of			
		one or more hours) at some stage of its life			
15	8.02	cycle? Is the taxon tolerant of a wide range of	Yes	It can grow in water with pH from 5.7-9.2, is highly tolerant of	Very high
40	0.02	water quality conditions relevant to that	Tes	anaerobic conditions and can survive in high alkalinity water	very nigh
		taxon? [In the Justification field, indicate the		(USDA-NRCS, 2008) and/or water with high turbidity. Growth is	
		relevant water quality variable(s) being		highest at medium turbidities, but the plant still thrives in high-	
		considered.]		turbidity water, and moderate-to-high turbidity water facilitates	
		consider cu.j		the production of adventitious roots (Mackey, 1996). The plant	
				prefers warm sub-tropical climates with temperatures from 13-27	
				degrees C (ISSG, 2008), although it can tolerate below freezing	
				temperatures (CABL 2020)	
46	8.03	Can the taxon be controlled or eradicated in	Yes	In the north American region herbicide treatments have been used	Medium
		the wild with chemical, biological, or other		for cabomba control. Endothall provides excellent control but it is	
		agents/means?		a contact herbicide only (Global Invasive Species Database (2021)	
				Species profile: Cabomba caroliniana. Downloaded from	
				http://www.iucngisd.org/gisd/species.php?sc=402)	-
47	8.04	Is the taxon likely to tolerate or benefit from	Yes	Flooding and other natural disasters (CABI, 2020)	Low
10	8.05	environmental/human disturbance? Is the taxon able to tolerate salinity levels	No	No evidence	Low
40	0.05	that are higher or lower than those found in	NO	No evidence	LOW
		its usual environment?			
49	8.06	Are there effective natural enemies	Yes	C. caroliniana does serve as a source of food for wildlife. (CABI,	Medium
		(predators) of the taxon present in the RA		2020)	
С. (	Climate	e change			
		e change			r
50	9.01	Under the predicted future climatic	No change	The risks of entry into the RA area by the taxon are likely to no	Medium
		conditions, are the risks of entry into the RA		change. (Matthews, J., Beringen, R., Lamers, L. P. M., Odé, B.,	
		area posed by the taxon likely to increase,		Pot, R., Velde, G., & Leuven, R. S. (2013). Risk analysis of the	
E 1	9.02	decrease or not change? Under the predicted future climatic	No change	non-native Fanwort (Cabomba caroliniana) in the Netherlands.)	Medium
21	9.02	conditions, are the risks of establishment	No change	Potential future changes as a result of e.g. a rise in water temperature due to climate change, may i no change the	Medium
		posed by the taxon likely to increase,		suitability and area of C. caroliniana habitat and establishment	
		decrease or not change?		(Matthews, J., Beringen, R., Lamers, L. P. M., Odé, B., Pot, R.,	
		acciede of not energe:		Velde, G., & Leuven, R. S. (2013). Risk analysis of the non-	
				native Fanwort (Cabomba caroliniana) in the Netherlands.)	
52	9.03	Under the predicted future climatic	No change	Potential future changes as a result of e.g. a rise in water	Medium
		conditions, are the risks of dispersal within	-	temperature due to climate change, may no change the suitability	
		the RA area posed by the taxon likely to		and area of C. caroliniana habitat and establishment (Matthews,	
		increase, decrease or not change?		J., Beringen, R., Lamers, L. P. M., Odé, B., Pot, R., Velde, G., &	
				Leuven, R. S. (2013). Risk analysis of the non-native Fanwort	
				(Cabomba caroliniana) in the Netherlands.)	
= -	a c ·			Matthews, J., Beringen, R., Lamers, L. P. M., Odé, B., Pot, R.,	Medium
53	9.04	Under the predicted future climatic	No change		
53	9.04	conditions, what is the likely magnitude of	No change	Velde, G., & Leuven, R. S. (2013). Risk analysis of the non-	
53	9.04	conditions, what is the likely magnitude of future potential impacts on biodiversity	no change		
		conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?		Velde, G., & Leuven, R. S. (2013). Risk analysis of the non- native Fanwort (Cabomba caroliniana) in the Netherlands.	
	9.04 9.05	conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic	No change	<ul> <li>Velde, G., &amp; Leuven, R. S. (2013). Risk analysis of the non- native Fanwort (Cabomba caroliniana) in the Netherlands.</li> <li>Matthews, J., Beringen, R., Lamers, L. P. M., Odé, B., Pot, R.,</li> </ul>	Medium
		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		Velde, G., & Leuven, R. S. (2013). Risk analysis of the non- native Fanwort (Cabomba caroliniana) in the Netherlands. Matthews, J., Beringen, R., Lamers, L. P. M., Odé, B., Pot, R., Velde, G., & Leuven, R. S. (2013). Risk analysis of the non-	
		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		<ul> <li>Velde, G., &amp; Leuven, R. S. (2013). Risk analysis of the non- native Fanwort (Cabomba caroliniana) in the Netherlands.</li> <li>Matthews, J., Beringen, R., Lamers, L. P. M., Odé, B., Pot, R.,</li> </ul>	
54	9.05	conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	No change	<ul> <li>Velde, G., &amp; Leuven, R. S. (2013). Risk analysis of the non- native Fanwort (Cabomba caroliniana) in the Netherlands.</li> <li>Matthews, J., Beringen, R., Lamers, L. P. M., Odé, B., Pot, R., Velde, G., &amp; Leuven, R. S. (2013). Risk analysis of the non- native Fanwort (Cabomba caroliniana) in the Netherlands.</li> </ul>	Medium
54		conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? Under the predicted future climatic		<ul> <li>Velde, G., &amp; Leuven, R. S. (2013). Risk analysis of the non- native Fanwort (Cabomba caroliniana) in the Netherlands.</li> <li>Matthews, J., Beringen, R., Lamers, L. P. M., Odé, B., Pot, R., Velde, G., &amp; Leuven, R. S. (2013). Risk analysis of the non- native Fanwort (Cabomba caroliniana) in the Netherlands.</li> <li>Matthews, J., Beringen, R., Lamers, L. P. M., Odé, B., Pot, R.,</li> </ul>	
54	9.05	conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	No change	<ul> <li>Velde, G., &amp; Leuven, R. S. (2013). Risk analysis of the non- native Fanwort (Cabomba caroliniana) in the Netherlands.</li> <li>Matthews, J., Beringen, R., Lamers, L. P. M., Odé, B., Pot, R., Velde, G., &amp; Leuven, R. S. (2013). Risk analysis of the non- native Fanwort (Cabomba caroliniana) in the Netherlands.</li> </ul>	Medium

Statistics	
Scores	
BRA	23.0
BRA Outcome	High
BRA+CCA	23.0
BRA+CCA Outcome	High
Score partition	
A. Biogeography/Historical	10.0
1. Domestication/Cultivation	2.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	7.0
B. Biology/Ecology	13.0
4. Undesirable (or persistence) traits	5.0
5. Resource exploitation	0.0
6. Reproduction	3.0
7. Dispersal mechanisms	5.0
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	<u>3</u> 5
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	5
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12

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Date and Time 06/12/2021 20:31:08

Taxon and Assessor details				
Category	Plantae (freshwater)			
Taxon name	Egeria densa			
Common name	Brazilian waterweed			
Assessor	Mihaela Britvec			
Risk screening context				
Reason and socio-economic benefits				
Risk assessment area	Pannonian region			
Taxonomy				
Native range				
Introduced range				
URL				

		even by (Historian)	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	It is a well known and popular plant for use in aquaria and small ponds, not only for its attractiveness and resilience, but also for its oxygenating capacity which benefits the fish contained therein.	High
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	https://fau.digital.flvc.org/islandora/object/fau%3A33564/datastre am/OBJ/view/Culture_of_the_Aquatic_Plant_Egeria_densa_in_a_Cl osed_SystemFinal_Report_for_Contract_No021065Submitte d_to_the_Division_of_AquacultureFlorida_Department_of_Agricu lture_and_Consumer_Services.pdf	
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	It is closely related to Elodea species.	High
2. (	Climate,	, distribution and introduction risk	•		ł
1	2.01	How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range?	High	https://doi.org/10.1016/j.limno.2005.01.001	Medium
5	2.02	What is the quality of the climate matching data?	High	https://doi.org/10.1016/j.limno.2005.01.001	Medium
5	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	doi: 10.23855/preslia.2018.425	High
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	>1	https://www.cabi.org/isc/datasheet/20491#topathwayVectors	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	doi: 10.1111/j.1365-3180.2012.00926.x	High
3. I	nvasive	e elsewhere			
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	E. densa is native to parts of Argentina, Brazil and Uruguay. Being one of the most common plants for aquaria, it has been widely distributed around the world. In many regions it has escaped and has become an invasive aquatic weed. Most reports come from Central and North America, Europe and Australasia.	High
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	No	E. densa is an environmental weed not affecting cultivated crops to any extent, though may impact on agriculture by the blockage of irrigation channels.	Medium
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	Yes	Although there are positive economic impacts resulting in the trade in aquarium plants including E. densa, this is strongly countered by the costs of control as exercised in many areas where it has become a serious problem. Removal of E. densa from lakes and reservoirs in the USA costs some states several million	High
2	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem services?	Yes	damaged ecosystem services, ecosystem change/ habitat alteration (https://www.cabi.org/isc/datasheet/20491#toriskAndImpactFacto	Medium
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	Yes	Dense mats of E. densa will deleteriously affect recreational activities such as fishing, swimming or boating.	Medium
B. I	Biology	//Ecology	1	activities such as itsning, swimming of boating.	
1. 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	no data	Low
15	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	E. densa can out-compete and displace native vegetation (https://www.cabi.org/isc/datasheet/20491#toimpactBiodiversity).	High
.6	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	no reference	Medium
.7	4.04	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?	Yes	E. densa is native to parts of Argentina, Brazil and Uruguay. Being one of the most common plants for aquaria, it has been widely distributed around the world.	High
.8	4.05	Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA area?	Yes	When dense mats of E. densa have formed, native species are displaced, oxygen may be depleted and the character of stream and lakes may be changed. The effects on the environment may be substantial, affecting the hydrology also.	High
9	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes	negatively impacts tourism, reduced amenity values, reduced recreative options	Medium
20	4.07	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA	No	no reference	Medium
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	No	no reference	Medium
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	E. densa formed dense mats.	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	Still water is prefered, or slow-running water, mild or warm. Cannot tolerate shaded water.	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	Yes	When dense mats of E. densa have formed, native species are displaced, oxygen may be depleted and the character of stream and lakes may be changed. The effects on the environment may	High
		native taxa?		be substantial, affecting the hydrology also.	
25	4.12	Is the taxon likely to maintain a viable population even when present in low	No	no reference	Medium
		densities (or persisting in adverse conditions			
		by way of a dormant form)?			
		e exploitation Is the taxon likely to consume threatened or	No	Egeria densa is not carnovore species.	High
20	5.01	protected native taxa in the RA area?			ingn
27	5.02	Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?	Yes	E. densa is a plant with a great capacity of photosynthesizing when illuminated and releases great quantities of oxygen. When dense mats of E. densa have formed, oxygen may be depleted	High
6. R	eprodu	iction		and the character of stream and lakes may be changed.	
		Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response	Not applicable	no reference	High
29	6.02	, , , , , , , , , , , , , , , , , , , ,	No	no reference	Low
30	6.03	or propagules (in the RA area)? Is the taxon likely to hybridise naturally with	No	no reference	Medium
31	6.04	native taxa? Is the taxon likely to be hermaphroditic or to	No	no reference	Medium
		display asexual reproduction?			
32	6.05	Is the taxon dependent on the presence of	Yes	specific habitat: E. densa cannot tolerate shaded water.	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	Has high reproductive potential.	High
		large number of propagules or offspring within a short time span ( $a_1 < 1$ year)?			
34	6.07	within a short time span (e.g. < 1 year)? How many time units (days, months, years)	3	3 months	Medium
		does the taxon require to reach the age-at-			
7Γ	licnerca	first-reproduction? al mechanisms			
		How many potential internal	>1	https://www.cabi.org/isc/datasheet/20491#toriskAndImpactFactor	High
		vectors/pathways could the taxon use to		S	-
36	7.02	disperse within the RA area (with suitable Will any of these vectors/pathways bring the	Yes	through water flow between the organism's locations	Medium
50		taxon in close proximity to one or more		anough match now between the organism 5 locations	. iculum
27	7.02	protected areas (e.g. MCZ, MPA, SSSI)?	No	no reference of activaly attaching	Hich
5/	7.03	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship	No	no reference of actively attaching	High
		hulls, pilings, buoys) such that it enhances			
20	7.04	the likelihood of dispersal? Is natural dispersal of the taxon likely to	Yes	Plants can reproduce by seeds.	Medium
50	7.04	occur as eggs (for animals) or as propagules	103		neululli
20	7.05	(for plants: seeds, spores) in the RA area?	¥		18.55
39	7.05	Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as	Yes	The principal means of reproduction is vegetative, by fragmentation of stems.	High
		fragments/seedlings (for plants) in the RA			
40	7.06	area? Are older life stages of the taxon likely to	Not applicable	Egeria densa has not active dispersal mechanisms.	High
τU	/.00	migrate in the RA area for reproduction?	not applicable		
41	7.07	Are propagules or eggs of the taxon likely to	Yes	Seeds and fragments can be dispersed by animals between water	Medium
42	7.08	be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the	Yes	bodies. Has high reproductive potential, Highly mobile locally	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 reference	Medium
8. T	olerand	ce attributes			
44	8.01	Is the taxon able to withstand being out of water for extended periods (e.g. minimum of	No	no reference	Low
		one or more hours) at some stage of its life			
15	0 0 2	cycle?	Vac	connet telerate chaded water	Modium
45	8.02	Is the taxon tolerant of a wide range of water quality conditions relevant to that	Yes	cannot tolerate shaded water	Medium
		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	Mechanical removal such as cutting, hand pulling or netting is	Medium
τU	5.05	the wild with chemical, biological, or other	103	feasible for small infestations, though the ability to propagate	
		agents/means?		from small stem fragments means that repeat clearing will be	
				required, or even that infestations may spread if removal is not adequate. Use of the herbicide diquat has been recommended,	
				although using chemicals in water bodies leads to evident	
				environmental risks. The stocking with certain fish such as grass	
				carp has been suggested, as E. densa is highly palatable, but there are no reports as to the effectiveness of this method.	
47	8.04	Is the taxon likely to tolerate or benefit from	Yes	Seasonal flooding can also result in the spread of the organism	Low
	8.05	environmental/human disturbance? Is the taxon able to tolerate salinity levels	Yes	locally. doi: 10.3391/bir.2018.7.4.05	Medium
48	5.05	that are higher or lower than those found in	103	uoi. 10.3331/01.2010./.4.03	
48			1		1
	0.01	its usual environment?		6	
	8.06	Are there effective natural enemies	No	no reference	Low
49 <b>C. C</b>	limate		No	no reference	Low

50	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase,	Increase	professional judgement	Medium
		decrease or not change?			
51	9.02	Under the predicted future climatic	Increase	professional judgement	Medium
		conditions, are the risks of establishment			
		posed by the taxon likely to increase,			
		decrease or not change?			
52	9.03	Under the predicted future climatic	Increase	professional judgement	Medium
		conditions, are the risks of dispersal within			
		the RA area posed by the taxon likely to			
		increase, decrease or not change?			
53	9.04	Under the predicted future climatic	Higher	professional judgement (E. densa can out-compete and displace	High
		conditions, what is the likely magnitude of		native vegetation)	
		future potential impacts on biodiversity			
		and/or ecological integrity/status?			
54	9.05	Under the predicted future climatic	Higher	professional judgement	Medium
		conditions, what is the likely magnitude of			
		future potential impacts on ecosystem			
		structure and/or function?			
55	9.06	Under the predicted future climatic	Higher	professional judgement	Low
		conditions, what is the likely magnitude of			
		future potential impacts on ecosystem			
		services/socio-economic factors?			

Statistics

Scores	
BRA	36.0
BRA Outcome	High
BRA+CCA	48.0
BRA+CCA Outcome	High
Score partition	
A. Biogeography/Historical	20.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	2.0
3. Invasive elsewhere	14.0
B. Biology/Ecology	16.0
4. Undesirable (or persistence) traits	7.0
5. Resource exploitation	2.0
6. Reproduction	-2.0
7. Dispersal mechanisms	4.0
8. Tolerance attributes	5.0
C. Climate change	12.0
9. Climate change	12.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	5 5 <b>36</b> 12
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2 7
6. Reproduction	/
7. Dispersal mechanisms	9 6
8. Tolerance attributes	
C. Climate change	<b>6</b>
9. Climate change	6
Sectors affected	47
Commercial	17
Environmental Species or population nuisance traits	12 24
species or population nuisance traits	24
Thresholds	
BRA	22.75
BRA+CCA	22.75
Confidence	0.55
BRA+CCA	0.57

BRA+CCA	0.57
BRA	0.58
CCA	0.50
Date and Time	
08/12/2	021 11:21:46

axon and Assessor details				
Category	Plantae (freshwater)			
Taxon name	Elodea canadensis			
Common name	Canadian waterweed			
Assessor	Mihaela Britvec			
Risk screening context				
Reason and socio-economic benefits				
Risk assessment area	Pannonian region			
Taxonomy				
Native range				
Introduced range				
URL				

			Response	Justification (references and/or other information)	Confidence
A. I	Biogeo	graphy/Historical			
1. E	Domest	ication/Cultivation			
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	https://www.cabi.org/isc/datasheet/20759#touses	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/20759#touses	High
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	It is closely related to Elodea nuttallii.	Very high
2 (	Climate,				
4	2.01		High	https://www.cabi.org/isc/datasheet/20759#toclimate	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	https://www.cabi.org/isc/datasheet/20759#toclimate	High
6 7 8	2.03 2.04 2.05	Is the taxon already present outside of captivity in the RA area? How many potential vectors could the taxon use to enter in the RA area? Is the taxon currently found in close	Yes >1 Not applicable	Elodea canadensis originates from North America, concentrated around the St Lawrence Valley and the Great Lakes regions and the Pacific West Coast (Bowmer et al., 1995), but now occurs throughout the USA. The plant was introduced to the UK in the mid-1800s and has spread eastwards through Western Europe with the apparent exception, so far, of Iberia and northern Scandinavia. It is considered an invasive plant in Europe and has been reported as one of the most widespread invasive species in Russia (Vinogradova et al., 2018). E. canadensis is widespread and abundant in New Zealand (Bowmer et al., 1995) and is ranked as a medium risk with a weed potential score of 46 in New Zealand by the Aquatic Weed Risk Assessment Model (AWRM) (Champion et al., 2007). It has become naturalized in water bodies in the south-eastern parts of Australia, particularly in areas near major cities. It is most common in southern and eastern New South Wales, Victoria and Tasmania. It is also recorded from south-eastern South Australia and is sparingly naturalized in routh-eastern Ouenenland (EWA 2016). It has been recorded in https://www.cabi.org/isc/datasheet/20759#topathwayVectors Hussner, A. (2012). Alien aquatic plant species in European	High High High
		proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)?		countries. Weed Research, 52 (4), 297-306.	
3. I	nvasive	e elsewhere	•		
9	3.01	Has the taxon become naturalised (established viable populations) outside its	Yes	https://www.cabi.org/isc/datasheet/20759#todistribution	Very high
	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/20759#toimpactEconomic	Medium
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	information is not avaible	Low
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	Yes	https://www.cabi.org/isc/datasheet/20759#toimpactEnvironmental	Medium
	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	Yes	https://www.cabi.org/isc/datasheet/20759#toimpactSocial	Medium
		//Ecology			
		able (or persistence) traits Is it likely that the taxon will be poisonous or	Yes	Species of Elodea are known to accumulate metals from the	Low
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	sediment and release them into the waterbody. https://www.cabi.org/isc/datasheet/20759#toimpactEnvironmental	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 reference	Medium

17	4.04	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?	Yes	Evidence shows that this plant is very adaptable and has can spread under a wide range of conditions and nutrient concentrations ranging from oligotrophic to eutrophic (Cook and Urmi-Kônig 1985; Simpson, 1990). E. canadensis has a wide climatic tolerance (it is present from Alaska to Puerto Rico), though it may be less common at the extremes of its range, being predominant in temperate areas of North America and Europe. In studies of maximum depths at which a number of submerged aquatic plants were found, the maximum recorded for any species was 12-14 m for Elodea (Sheldon and Boylen, 1977; Pip and Simmons, 1986; Wells et al., 1997). Its average height is about 1.2 m, having a maximum height of 2.5 m (Wells et al., 1997). In Europe it can survive in water depths of up to 4 m (McGavigan, 2012) in slow moving water. This species can survive and even grow slowly under ice cover (Bowmer et al., 1995). In North America it has been recorded in neutral to slightly alkaline inland waters and in fresh to slightly brackish coastal waters (Holm et al., 1997). Riis et al. (2012), compared the effects of temperature and light availability on the growth and morphology of E. canadensis, Egeria densa and Lagarosiphon major and suggested that, in general, subject to variations due to timing of introductions, E. densa will dominate warmer, shallower waters, L. major will dominate in colder, clear-water lakes, whilst E. canadensis prefers clean water with a current from 0 to 1 m/s. Optimum water temperatures range from 10 to 20°C, and silty water or water with organic sediment is preferred to a sandy substrate (Bowmer et al., 1995, Barrat-Segretain et al., 2002). The habitat preference of E. canadensis in lakes is towards large and deep lakes located at high altitudes, with long water-retention times and high water quality (Kolada and Kutyła 2016). E. canadensis exhibits positive growth under experimental conditions of high-salt concentrations (Stoler et al., 2018). Consequently,	Very high
10	4.05	In the taxon likely to discuss frost web	Vaa		Madium
		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://doi.org/10.1899/03-097.1	Medium
		Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes	Elodea canadensis can form large and dense stands that interfere with boating, fishing and thereby adversely affect recreation activities (McGavigan, 2017). It makes it difficult for boats to travel through invaded waterways (Bowmer et. al., 1995) reduces recreational opportunities and diminishes aesthetics for the environment (Josefsson and Andersson, 2001).	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	doi: 10.1111/j.1600-0587.2013.00296.x	Medium
21	4.08	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area?	No	doi: 10.1111/j.1600-0587.2013.00296.x	Low
	4.09	to) the NA factor Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity?	Yes	Elodea canadensis is dioecious and male plants are less common than female in its native range. Only female plants are currently found in Europe, and male plants have not been reported since 1903 (Cook and Urmi-König, 1985), so reproduction is only vegetative, involving vegetative fragments and turions (overwintering buds). Very small plant fragments are able to form roots from nodes and start growing (McGavigan, 2017). The main growing season is between mid-April and October. Plants die back in Autumn. Turions or short, densely-leaved resistant stems, develop then break off to float around the water body before they sink to the bottom over winter, where they rest until they re-grow in spring (Millane and Caffrey, 2014). Over-wintering buds and fragments of the brittle branches are easily detached by waves, currents, foraging animals and boat traffic. New roots develop quickly on the nodes of these fragments which are carried downstream to form new stands. This method of propagation gives E. canadensis a considerable advantage over annual species and resulted in its rapid enread throughout Europe following its	High
23	4.10	Is the taxon capable of sustaining itself in a	Yes	Elodea canadensis prefers clean water with a current from 0 to 1	High
24	4 1 1	range of water velocity conditions (e.g. versatile in habitat use)?	Vac	m/s.	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	https://www.cabi.org/isc/datasheet/20759#toriskAndImpactFactor s	n ng n

25		Is the taxon likely to maintain a viable	Yes	Elodea canadensis is dioecious and male plants are less common	Very high
		population even when present in low densities (or persisting in adverse conditions by way of a dormant form)?		than female in its native range. Only female plants are currently found in Europe, and male plants have not been reported since 1903 (Cook and Urmi-König, 1985), so reproduction is only vegetative, involving vegetative fragments and turions (overwintering buds). Very small plant fragments are able to form roots from nodes and start growing (McGavigan, 2017). The main	
				growing season is between mid-April and October. Plants die back in Autumn. Turions or short, densely-leaved resistant stems, develop then break off to float around the water body before they sink to the bottom over winter, where they rest until they re-grow	
				in spring (Millane and Caffrey, 2014). Over-wintering buds and fragments of the brittle branches are easily detached by waves, currents, foraging animals and boat traffic. New roots develop	
				quickly on the nodes of these fragments which are carried downstream to form new stands. This method of propagation gives E. canadensis a considerable advantage over annual species and recuted in its rapid correct throughout Europe following its	
	5.01	e exploitation Is the taxon likely to consume threatened or protected native taxa in the RA area?	Not applicable	E. canadensis is not carnivore species.	Very high
27 !	5.02	Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?	Yes	https://www.cabi.org/isc/datasheet/20759#toriskAndImpactFactor s	High
	<i>eprodu</i> 6.01		Not applicable	no reference	Medium
20 0		Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?	Not applicable	no reference	Medium
	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	https://www.cabi.org/isc/datasheet/20759#toriskAndImpactFactor s	-
		Is the taxon likely to hybridise naturally with native taxa?	No	no reference	Medium
		Is the taxon likely to be hermaphroditic or to display asexual reproduction?	No	no reference	Medium
		Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	No	no reference	Medium
33		Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)?	Yes	Elodea canadensis is dioecious and male plants are less common than female in its native range. Only female plants are currently found in Europe, and male plants have not been reported since 1903 (Cook and Urmi-König, 1985), so reproduction is only vegetative, involving vegetative fragments and turions (overwintering buds). Very small plant fragments are able to form roots from nodes and start growing (McGavigan, 2017). The main growing season is between mid-April and October. Plants die back in Autumn. Turions or short, densely-leaved resistant stems,	Very high
				develop then break off to float around the water body before they sink to the bottom over winter, where they rest until they re-grow in spring (Millane and Caffrey, 2014). Over-wintering buds and fragments of the brittle branches are easily detached by waves, currents, foraging animals and boat traffic. New roots develop quickly on the nodes of these fragments which are carried downstream to form new stands. This method of propagation gives E. canadensis a considerable advantage over annual species and resulted in its rapid enread throughout Europe following its	
34 (		How many time units (days, months, years) does the taxon require to reach the age-at-	3	3 months	Medium
7. D		first-reproduction? al mechanisms			
35		How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable	>1	https://www.cabi.org/isc/datasheet/20759#topathwayVectors	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	reduced native biodiversity, threat to/ loss of endangered species	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 reference of acitively attaching	Medium
		Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?	No	Elodea canadensis is dioecious and male plants are less common than female in its native range. Only female plants are currently found in Europe, and male plants have not been reported since 1903 (Cook and Urmi-König, 1985), so reproduction is only vegetative, involving vegetative fragments and turions	Medium
		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	Elodea canadensis is dioecious and male plants are less common than female in its native range. Only female plants are currently found in Europe, and male plants have not been reported since 1903 (Cook and Urmi-König, 1985), so reproduction is only vegetative, involving vegetative fragments and turions	Very high
		Are older life stages of the taxon likely to migrate in the RA area for reproduction?		E. canadensis has not active dispersal mechanisms.	High
		Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the	Yes Yes	Over-wintering buds and fragments of the brittle branches are easily detached by waves, currents, foraging animals and boat Over-wintering buds and fragments of the brittle branches are	Very high High
TZ .		vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be rapid?	100	easily detached by waves, currents, foraging animals and boat traffic. New roots develop quickly on the nodes of these fragments which are carried downstream to form new stands. This method of propagation gives E. canadensis a considerable advantage over	
				annual species and resulted in its rapid spread.	1

	0.61	<b>T</b> (1) (1) (1) (1) (1) (1) (1) (1) (1) (1)	14		MA II
44	8.01	Is the taxon able to withstand being out of	Yes	This species can survive and even grow slowly under ice cover	Medium
	1	water for extended periods (e.g. minimum of		(Bowmer et al., 1995).	
		one or more hours) at some stage of its life			
		cycle?			
45	8.02	Is the taxon tolerant of a wide range of	Yes	https://www.cabi.org/isc/datasheet/20759#towaterTolerances	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	https://www.cabi.org/isc/datasheet/20759#topreventionAndContro	High
		the wild with chemical, biological, or other			
		agents/means?			
47	8.04	Is the taxon likely to tolerate or benefit from	Yes	Seasonal flooding can also result in the spread of the organism	High
		environmental/human disturbance?		locally (Barrat-Segretain and Elger, 2004).	
48	8.05	Is the taxon able to tolerate salinity levels	Yes	E. canadensis exhibits positive growth under experimental	High
		that are higher or lower than those found in		conditions of high-salt concentrations (Stoler et al., 2018).	
		its usual environment?		Consequently, salt marshes and brackish waters are likely to be	
				invaded by this species if salt concentration is lower than to 3 g/l	
				of salt (Thouvenot and Thiébaut, 2018).	
49	8.06	Are there effective natural enemies	Yes	Control by aquatic herbivores has been investigated in numerous	Medium
	1	(predators) of the taxon present in the RA		countries (National Academy of Sciences, 1976). Species tested	
		area?		include Tilapia melanopleura, T. mossambica and the Chinese	
				grass carp Ctenopharyngodon idella. Since the latter is an exotic	
				species, introduction is only allowed when the species can be	
				confined to a particular waterbody and, therefore, investment in	
				fences is a prerequisite. Nevertheless, several successful	
				examples of control are known from Western Europe and the USA	
				(Stott et al. 1971; Willey et al., 1974; Mitzner, 1978; Fowler,	
				1984) and more recent experiments have found medium	
				efficiency in the use of stocking grass carps (Bonar et al., 2002,	
				Pípalová, 2006). There are some disadvantages in using grass	
				Pípalová, 2006). There are some disadvantages in using grass carp, as these fish are generalist feeders and may also damage	
				Pípalová, 2006). There are some disadvantages in using grass	
		e change		Pípalová, 2006). There are some disadvantages in using grass carp, as these fish are generalist feeders and may also damage	
9. (	Climate	e change	Increase	Pípalová, 2006). There are some disadvantages in using grass carp, as these fish are generalist feeders and may also damage native plant species (see Vernon and Hamilton 2011 for further	High
9. (		e change Under the predicted future climatic	Increase	Pípalová, 2006). There are some disadvantages in using grass carp, as these fish are generalist feeders and may also damage	High
9. (	Climate	e change Under the predicted future climatic conditions, are the risks of entry into the RA	Increase	Pípalová, 2006). There are some disadvantages in using grass carp, as these fish are generalist feeders and may also damage native plant species (see Vernon and Hamilton 2011 for further	High
9. (	Climate	e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase,	Increase	Pípalová, 2006). There are some disadvantages in using grass carp, as these fish are generalist feeders and may also damage native plant species (see Vernon and Hamilton 2011 for further	High
<i>9.</i> ( 50	<i>Climate</i> 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?		Pípalová, 2006). There are some disadvantages in using grass carp, as these fish are generalist feeders and may also damage native plant species (see Vernon and Hamilton, 2011 for further doi: 10.3897/neobiota.49.34318	
<i>9.</i> ( 50	Climate	e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic	Increase	Pípalová, 2006). There are some disadvantages in using grass carp, as these fish are generalist feeders and may also damage native plant species (see Vernon and Hamilton 2011 for further	High
<i>9.</i> ( 50	<i>Climate</i> 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		Pípalová, 2006). There are some disadvantages in using grass carp, as these fish are generalist feeders and may also damage native plant species (see Vernon and Hamilton, 2011 for further doi: 10.3897/neobiota.49.34318	
<u>9.</u> 50	<i>Climate</i> 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,		Pípalová, 2006). There are some disadvantages in using grass carp, as these fish are generalist feeders and may also damage native plant species (see Vernon and Hamilton, 2011 for further doi: 10.3897/neobiota.49.34318	
<u>9.</u> 50 51	9.01 9.01 9.02	e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	Increase	Pípalová, 2006). There are some disadvantages in using grass carp, as these fish are generalist feeders and may also damage native plant species (see Vernon and Hamilton, 2011 for further         doi: 10.3897/neobiota.49.34318         doi: 10.3897/neobiota.49.34318	High
<u>9.</u> 50 51	<i>Climate</i> 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, decrease or not change? Under the predicted future climatic		Pípalová, 2006). There are some disadvantages in using grass carp, as these fish are generalist feeders and may also damage native plant species (see Vernon and Hamilton, 2011 for further doi: 10.3897/neobiota.49.34318	
<u>9.</u> 50 51	9.01 9.01 9.02	e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within	Increase	Pípalová, 2006). There are some disadvantages in using grass carp, as these fish are generalist feeders and may also damage native plant species (see Vernon and Hamilton, 2011 for further         doi: 10.3897/neobiota.49.34318         doi: 10.3897/neobiota.49.34318	High
<u>9.</u> 50 51	9.01 9.01 9.02	e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to	Increase	Pípalová, 2006). There are some disadvantages in using grass carp, as these fish are generalist feeders and may also damage native plant species (see Vernon and Hamilton 2011 for further         doi: 10.3897/neobiota.49.34318         doi: 10.3897/neobiota.49.34318	High
<u>9. (</u> 50 51 52	9.01 9.02 9.03	e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change?	Increase Increase	Pípalová, 2006). There are some disadvantages in using grass carp, as these fish are generalist feeders and may also damage native plant species (see Vernon and Hamilton 2011 for further         doi: 10.3897/neobiota.49.34318         doi: 10.3897/neobiota.49.34318         professional judgement	High Medium
<u>9. (</u> 50 51 52	9.01 9.01 9.02	e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic	Increase	Pípalová, 2006). There are some disadvantages in using grass carp, as these fish are generalist feeders and may also damage native plant species (see Vernon and Hamilton 2011 for further         doi: 10.3897/neobiota.49.34318         doi: 10.3897/neobiota.49.34318	High
<u>9. (</u> 50 51 52	9.01 9.02 9.03	e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of	Increase Increase	Pípalová, 2006). There are some disadvantages in using grass carp, as these fish are generalist feeders and may also damage native plant species (see Vernon and Hamilton 2011 for further         doi: 10.3897/neobiota.49.34318         doi: 10.3897/neobiota.49.34318         professional judgement	High Medium
<u>9. (</u> 50 51 52	9.01 9.02 9.03	e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic	Increase Increase	Pípalová, 2006). There are some disadvantages in using grass carp, as these fish are generalist feeders and may also damage native plant species (see Vernon and Hamilton 2011 for further         doi: 10.3897/neobiota.49.34318         doi: 10.3897/neobiota.49.34318         professional judgement	High Medium
9. ( 50 51 52 53	9.01 9.02 9.03 9.04	e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of	Increase Increase	Pípalová, 2006). There are some disadvantages in using grass carp, as these fish are generalist feeders and may also damage native plant species (see Vernon and Hamilton 2011 for further         doi: 10.3897/neobiota.49.34318         doi: 10.3897/neobiota.49.34318         professional judgement         professional judgement	High Medium
9. ( 50 51 52 53	9.01 9.02 9.03	e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity	Increase Increase	Pípalová, 2006). There are some disadvantages in using grass carp, as these fish are generalist feeders and may also damage native plant species (see Vernon and Hamilton 2011 for further         doi: 10.3897/neobiota.49.34318         doi: 10.3897/neobiota.49.34318         professional judgement	High Medium
9. ( 50 51 52 53	9.01 9.02 9.03 9.04	e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	Increase Increase Higher	Pípalová, 2006). There are some disadvantages in using grass carp, as these fish are generalist feeders and may also damage native plant species (see Vernon and Hamilton 2011 for further         doi: 10.3897/neobiota.49.34318         doi: 10.3897/neobiota.49.34318         professional judgement         professional judgement	High Medium High
9. ( 50 51 52 53	9.01 9.02 9.03 9.04	e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of	Increase Increase Higher	Pípalová, 2006). There are some disadvantages in using grass carp, as these fish are generalist feeders and may also damage native plant species (see Vernon and Hamilton 2011 for further         doi: 10.3897/neobiota.49.34318         doi: 10.3897/neobiota.49.34318         professional judgement         professional judgement	High Medium High
9. ( 50 51 52 53	9.01 9.02 9.03 9.04	e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem	Increase Increase Higher	Pípalová, 2006). There are some disadvantages in using grass carp, as these fish are generalist feeders and may also damage native plant species (see Vernon and Hamilton 2011 for further         doi: 10.3897/neobiota.49.34318         doi: 10.3897/neobiota.49.34318         professional judgement         professional judgement	High Medium High
9. ( 50 51 52 53 54	Climate           9.01           9.02           9.03           9.04           9.05	e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Increase Increase Higher Higher	Pípalová, 2006). There are some disadvantages in using grass carp, as these fish are generalist feeders and may also damage native plant species (see Vernon and Hamilton_2011 for further         doi: 10.3897/neobiota.49.34318         doi: 10.3897/neobiota.49.34318         professional judgement         professional judgement         professional judgement	High Medium High Medium
9. ( 50 51 52 53 54	9.01 9.02 9.03 9.04	<ul> <li>change</li> <li>Under the predicted future climatic</li> <li>conditions, are the risks of entry into the RA</li> <li>area posed by the taxon likely to increase,</li> <li>decrease or not change?</li> <li>Under the predicted future climatic</li> <li>conditions, are the risks of establishment</li> <li>posed by the taxon likely to increase,</li> <li>decrease or not change?</li> <li>Under the predicted future climatic</li> <li>conditions, are the risks of establishment</li> <li>posed by the taxon likely to increase,</li> <li>decrease or not change?</li> <li>Under the predicted future climatic</li> <li>conditions, are the risks of dispersal within</li> <li>the RA area posed by the taxon likely to</li> <li>increase, decrease or not change?</li> <li>Under the predicted future climatic</li> <li>conditions, what is the likely magnitude of</li> <li>future potential impacts on biodiversity</li> <li>and/or ecological integrity/status?</li> <li>Under the predicted future climatic</li> <li>conditions, what is the likely magnitude of</li> <li>future potential impacts on ecosystem</li> <li>structure and/or function?</li> <li>Under the predicted future climatic</li> </ul>	Increase Increase Higher	Pípalová, 2006). There are some disadvantages in using grass carp, as these fish are generalist feeders and may also damage native plant species (see Vernon and Hamilton 2011 for further         doi: 10.3897/neobiota.49.34318         doi: 10.3897/neobiota.49.34318         professional judgement         professional judgement	High Medium High
<u>9.</u> 50 51 52 53 54	Climate           9.01           9.02           9.03           9.04           9.05	<ul> <li>change</li> <li>Under the predicted future climatic</li> <li>conditions, are the risks of entry into the RA</li> <li>area posed by the taxon likely to increase,</li> <li>decrease or not change?</li> <li>Under the predicted future climatic</li> <li>conditions, are the risks of establishment</li> <li>posed by the taxon likely to increase,</li> <li>decrease or not change?</li> <li>Under the predicted future climatic</li> <li>conditions, are the risks of dispersal within</li> <li>the RA area posed by the taxon likely to</li> <li>increase, decrease or not change?</li> <li>Under the predicted future climatic</li> <li>conditions, what is the likely magnitude of</li> <li>future potential impacts on biodiversity</li> <li>and/or ecological integrity/status?</li> <li>Under the predicted future climatic</li> <li>conditions, what is the likely magnitude of</li> <li>future potential impacts on ecosystem</li> <li>structure and/or function?</li> <li>Under the predicted future climatic</li> <li>conditions, what is the likely magnitude of</li> <li>future potential impacts on ecosystem</li> <li>structure and/or function?</li> </ul>	Increase Increase Higher Higher	Pípalová, 2006). There are some disadvantages in using grass carp, as these fish are generalist feeders and may also damage native plant species (see Vernon and Hamilton_2011 for further         doi: 10.3897/neobiota.49.34318         doi: 10.3897/neobiota.49.34318         professional judgement         professional judgement         professional judgement	High Medium High Medium
<u>9.</u> 50 51 52 53 54	Climate           9.01           9.02           9.03           9.04           9.05	<ul> <li>change</li> <li>Under the predicted future climatic</li> <li>conditions, are the risks of entry into the RA</li> <li>area posed by the taxon likely to increase,</li> <li>decrease or not change?</li> <li>Under the predicted future climatic</li> <li>conditions, are the risks of establishment</li> <li>posed by the taxon likely to increase,</li> <li>decrease or not change?</li> <li>Under the predicted future climatic</li> <li>conditions, are the risks of establishment</li> <li>posed by the taxon likely to increase,</li> <li>decrease or not change?</li> <li>Under the predicted future climatic</li> <li>conditions, are the risks of dispersal within</li> <li>the RA area posed by the taxon likely to</li> <li>increase, decrease or not change?</li> <li>Under the predicted future climatic</li> <li>conditions, what is the likely magnitude of</li> <li>future potential impacts on biodiversity</li> <li>and/or ecological integrity/status?</li> <li>Under the predicted future climatic</li> <li>conditions, what is the likely magnitude of</li> <li>future potential impacts on ecosystem</li> <li>structure and/or function?</li> <li>Under the predicted future climatic</li> </ul>	Increase Increase Higher Higher	Pípalová, 2006). There are some disadvantages in using grass carp, as these fish are generalist feeders and may also damage native plant species (see Vernon and Hamilton_2011 for further         doi: 10.3897/neobiota.49.34318         doi: 10.3897/neobiota.49.34318         professional judgement         professional judgement         professional judgement	High Medium High Medium

Statistics	
Scores	
BRA	39.0
BRA Outcome	High
BRA+CCA	51.0
BRA+CCA Outcome	High
Score partition	
A. Biogeography/Historical	20.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	2.0
3. Invasive elsewhere	14.0
B. Biology/Ecology	19.0
4. Undesirable (or persistence) traits	9.0
5. Resource exploitation	2.0
6. Reproduction	1.0
7. Dispersal mechanisms	2.0
8. Tolerance attributes	5.0
C. Climate change	12.0
9. Climate change	12.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3 5 5
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	5
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	12 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	17
Environmental	12
Species or population nuisance traits	27
Thresholds	
BRA	22.75
BRA+CCA	22.75
Confidence	
BRA+CCA	0.68
BRA	0.68
CCA	0.63
Date and Time	
08/12/20	21 08:26:31

Taxon and Assessor details					
Category	Plantae (freshwater)				
Taxon name	Elodea nuttallii				
Common name	western waterweed				
Assessor	Mihaela Britvec				
Risk screening context					
Reason and socio-economic benefits					
Risk assessment area	Pannonian region				
Taxonomy					
Native range					
Introduced range					
URL					

			Response	Justification (references and/or other information)	Confidence
_		graphy/Historical			
1. L		ication/Cultivation	N		List
1		Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	E. nuttallii is used in cool water aquariums. Elodea species are often a preferred food for waterfowl or crayfish (Lodge, 1991; van Donk and Otte, 1996), and can also be used as shelter for small fishes and aquatic invertebrates.	High
2		Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	Elodea species are often a preferred food for waterfowl or crayfish (Lodge, 1991; van Donk and Otte, 1996), and can also be used as shelter for small fishes and aquatic invertebrates. E. nuttallii is used in cool water aquariums.	High
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	It is closely related to Elodea canadensis and Egereia densa. https://www.cabi.org/isc/datasheet/20761#tosimilaritiesToOtherS peciesOrConditions	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	https://www.cabi.org/isc/datasheet/20761#toclimate	High
5	2.02	What is the quality of the climate matching data?	Medium	https://www.cabi.org/isc/datasheet/20761#toclimate	Medium
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	Hussner, A. (2012). Alien aquatic plant species in European countries. Weed Research, 52 (4), 297-306.	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	>1	https://www.cabi.org/isc/datasheet/20761#topathwayCauses	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	Hussner, A. (2012). Alien aquatic plant species in European countries. Weed Research, 52 (4), 297-306.	High
3. 1		e elsewhere			
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	E. nuttallii is native to temperate North America common throughout most of the USA and south Canada and has a similar distribution to E. canadensis (eFloras, 2009; USDA-ARS, 2009; USDA-NRCS, 2009). In its non-native distribution, it is found in central and western Europe and Japan (Cook and Urmi-König,	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	No	no reference	Low
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	Yes	negatively impacts aquaculture (https://www.cabi.org/isc/datasheet/20761#toriskAndImpactFacto rs)	Medium
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem services?	Yes	damaged ecosystem services, ecosystem change (https://www.cabi.org/isc/datasheet/20761#toriskAndImpactFacto rs)	Medium
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	Yes	It is a submerged plant, and just like E. canadensis it forms large and dense stands that interfere with boating, fishing and adversely affect recreation activities.	Medium
		//Ecology			
		able (or persistence) traits	Vac	Chaption of Eleden are known to personalists matched from th	Low
14		Is it likely that the taxon will be poisonous or pose other risks to human health?	res	Species of Elodea are known to accumulate metals from the sediment and release them into the waterbody.	Low
	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	It often forms dense, monospecific stands and displaces other aquatic plants from many localities (Simpson, 1984, 1990; Barrat- Segretain, 2005). Threat to/ loss of native species (https://www.cabi.org/isc/datasheet/20761#toriskAndImpactFacto rs).	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 reference	Medium
	4.05	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA area?	Yes Yes	Waterweeds are competitive and well adapted to a broad array of environmental conditions (Cook and Urmi-König, 1985; Simpson, 1990). The spread of E. nuttallii has resulted in displacement of E. canadensis (itself an invasive alien from N. America) from many localities where the latter had previously become well established in Europe (Simpson, 1990; Thiébaut et al., 1997; Barrat-	Very high High
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes	Segretain, 2001; Larson, 2007). E. nuttallii is itself being replaced by Lagarosiphon major. Where it establishes it can form exceptionally dense monocultures, excluding native species E. nuttallii have the potential to develop into dense submerged beds, which prevent the use of water for recreational and professional purposes (Larson, 2003), navigation and port infrastructure (CPS-SKEW, 2008). The plant can also clog and impede drainage waterways.	Very high

et al. a vector for, recognized peaks and start as a vector for, recognized peaks and instructional space that are a vector for, recognized peaks and instructional space that are a vector for, recognized peaks and instructional space that are a vector for, recognized peaks and instructional space that are a vector for, recognized peaks and instructional space that are avector for, recognized peaks and recognized peaks and instructional space that are avector instructional space that are avector for, recognized peaks and recognized peaks and recognized in a vector for and vector peaks are avector for, vector peaks and peaks and instruc- instructional space peaks and instructional space peaks and instruc- instructional space peaks and instructional space peaks are avector for, recognized peaks and in the space instructional space peaks and instructional space peaks and instruc- tional space peaks and instructional space peaks and instructional space peaks and and are avector for, recognized peaks and in the recognized in blocked based peaks and in the space peaks and instructional space peaks and instructional space peaks and and instructional based peaks and in the recognized in blocked based peaks and in the space peaks and instructional based peaks and instructional space peaks and and instructional based peaks and instructional and and instructional and						
21         4.05         Is it likely that the sam will had, and/or at its a factor for, recognize best and one to the factor for, recognize best and the factor for recognize best and the factor factor for recognize as that will make in more likely to be selected in additional the factor factor factor sate that will make in the factor factor sate that will make in the factor factor sate that will make in the factor sate factor factor sate that will make in the factor sate factor factor sate f	20	4.07		No	doi: 10.1111/j.1600-0587.2013.00296.x	Low
Image of a local mean state and a mean state and a local mean base of a local mean state and local mean state	21	4.08	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and	No	doi: 10.1111/j.1600-0587.2013.00296.x	Low
22         4.00         It is it likely that the taxon will acide a body yes         Mith acide is an experimental stresses show the present prevolve predictive is an experimental stresses and the prevent products in additional stresses and the integrate space is an experimental stresses and thexperintegrate space is an experiment			5			
21       4.0       Its intersace applied of sustaining ised in a single service is an entrop in a wide range of water velocity conditions (e.g., versatilis in habitat use)?       Fight wersatilis in habitat use?         22       4.0       Its it likely that the taxon's mode of existence (e.g., excluding in a wide papel wide) (e.g., excluding in a wide) (e.g., excluding in a wide papel wide) (e.g., excluding in a wide) (e.g., excluding in the wide excluding in the set and the production of winer budg in the set in a more papel wide) (e.g., excluding in the excluding in the set in the interve in the interve is an interve is the set interve is the set interve is the set inter	22	4.09	Is it likely that the taxon will achieve a body size that will make it more likely to be	Yes	great phenotypic plasticity variations with increasing water nutrient enrichment and increases in leaf area with decreases in internode length, while the shorter broad-leaved phenotype typically occurs in shallow streams, whereas the longer spacer narrow-leaved phenotype occurs in lakes. Larger leaf width and	High
24     4.1     Is it likely that the taxon's mode of existence     Yes     Modification of nutrient regime (r.e.g. <i>feeding</i> ) will reduce habits quality for rs).     Modification of nutrient regime (rs).     Modification of nutrient regime (	23	4.10	range of water velocity conditions (e.g.	Yes	may enhance plant performance (Simpson, 1988: Vanderpoorten E. nuttallii has been found growing in a wide range of water bodies, in general in quiet water such as shorelines of lakes, reservoirs and ponds, along rivers and streams, and also in wetlands, canals and ditches (Hickman, 1993). In England, it has	High
Institute taxa?         Image: Second leady to maintain a viable of population even when present in low densities (or persisting in advesse conditions in the second leady to the population even when present in low densities (or persisting in advesse conditions of the second leady to the properties of the second leady to the second l	24	4.11		Yes	Modification of nutrient regime	Medium
goulation even when present in low densities (or persisting in adverse conditions by way of a domant form)?         prospation - essentially by fragmentation and division of the stems and the production of white toulds from stem tips (Freston protected native taxe in the RA area?           27         5.02         Is the taxon likely to consume threatened or protected native taxe in the RA area?         Net applicable intracent sequence sepatiation         Very high           27         5.02         Is the taxon likely to consume threatened or protected native taxe in the RA area?         Net applicable intracent sequence sepatiation         Very high           28         6.01         Is the taxon likely to exhibit parental care nady to reduce age-at-maturity in response to environmental conditions?         Net applicable in propagation - essentially by fragmentation and division of the stems and the product value age-at-maturity in response to environmental conditions?         Net applicable in propagation - essentially by fragmentation and division of the stems and the production of winter buds from stem tips (Preston and the production of winter buds from stem tips (Preston and the production of winter buds from stem tips (Preston and the production of winter buds from stem tips (Preston and the production of winter buds from stem tips (Preston and the production of winter buds from stem tips (Preston and the production of winter buds from stem tips (Preston and the production of winter buds from stem tips (Preston and the production of winter buds from stem tips (Preston and the production of winter buds from stem tips (Preston and the production of winter buds from stem tips (Preston and the production of winter buds from stem tips (Preston and the reduction of winter buds from stem tips (Pres					rs).	
26     5.0     Is the taxon likely to consume threatened or protected native taxa in the RA area?     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?     Very high       6.0     Approximation (or propagation)     Not applicable E. nutraliii is not carrivore species.     Very high       70     10     10     the taxon likely to exhibit parental care to environmental conditions?     Not applicable in oreference     Medium       70     0.02     Is the taxon likely to produce viable gametes to environmental conditions?     Yes     Vegetative reproduction seems to be the dominant method of propagation - essentially by fragmentation and division of the area on likely to bybridise naturally with native taxa?     Medium       71     6.04     Is the taxon likely to bybridise naturally with native taxa?     No     no reference     Medium       72     6.05     Is the taxon likely to bybridise naturally with native taxa?     No     no reference     Medium       73     6.04     Is the taxon likely to bybridise naturally with na short time span (e.g. < 1 year)?			population even when present in low densities (or persisting in adverse conditions by way of a dormant form)?	Yes	propagation - essentially by fragmentation and division of the stems and the production of winter buds from stem tips (Preston and Croft, 1997). It has been observed that, when introduced to a new habitat, the establishment of Elodea buds is rapid, since the	Very high
27     5.27     Is the taxon likely to sequester food detriment of native taxa in the RA area?     Yes     Ift can form exceptionally dense monocultures, excluding native species through competition.https://www.cabi.org/isc/datasheet/20751#tosummar     Very high       28     6.01     Is the taxon likely to exhibit parental care and/or to reduce aga-at-matury in response of propagules (in the RA area)?     Not applicable or propagules (in the RA area)?     Not applicable propagution - essentially by fragmentation and division of the and Corth, 1997).     Heigh       29     6.02     Is the taxon likely to hybridise naturally with native taxa?     Not applicable or propagules (in the RA area)?     Not no reference     Medium       30     6.03     Is the taxon likely to hybridise naturally with native taxa?     No     no reference     Medium       31     6.04     Is the taxon neuries of propagules (in the RA area)?     No     no reference     Medium       32     6.05     Is the taxon neuries of propagules or offspring within a short time span (e.g. < 1 year)?				Not applicable	E. nuttallii is not carnivore species.	Very high
resources (including nutrients) to the detriment of native taxa in the RA area?         species through competition.https://www.cabi.org/isc/datasheet/20761#tosummar           28         6.6 Z         Is the taxon likely to exhibit parental care and for breduce age-at-maturity in response to environmental conditions?         Medium           29         6.02         Is the taxon likely to produce viable gametes to environmental conditions?         Medium           30         6.02         Is the taxon likely to produce viable gametes to environmental conditions?         Vegetative reproduction seems to be the dominant method of propagation - essentially by fragmentation and division of the stems and the production         Medium           31         6.04         Is the taxon likely to be hermaphroditic or to mode age asscular propagation - essentially by fragmentation and division of the stems and the production of winter buds from stem tips (Preston and Coft, 1997). It has been observed that, when introduced to a new habits, the establishment of Elodes buds is rapid, since the propagation - essentially by fragmentation and division of the stems and the production of winter buds from stem tips (Preston and Coft, 1997). It has been observed that, when introduced to a new habits, the establishment of Elodes buds is rapid, since the propagation - essentially by fragmentation and division of the stems and the production?           34         6.05         Is the taxon nave (or likely) to produce a large number of propagules or offspring within a stel axon require to reach the age- trict-reproduction?         Medium           35         7.0         How many potential internal vectorsp			protected native taxa in the RA area?			, -
28     6.01     Its the taxon likely to exhibit parental care and dro to reduce age-at-maturity in response to environmental conditions?     Not applicable propagation - essentially by fragmentation and division of the stems and the production of winter buds from stem tips (Preston and Croft, 1997).     Medium       30     6.03     Is the taxon likely to hybridise naturally with native taxa?     Not applicable or propagules (in the RA area)?     Medium       31     6.04     Is the taxon likely to hybridise naturally with native taxa?     No     no reference     Medium       32     6.05     Is the taxon flexiby to hybridise naturally with native taxa?     No     no reference     Medium       33     6.04     Is the taxon flexiby to be hermaphroditic or to another taxon (or specific habitat features)     No     no reference     Medium       33     6.06     Is the taxon flexibita habitat features)     Yes     Vegetative reproduction of winter buds from stem tips (Preston and Croft, 1997). It habitan distribute habitat features)     Very high       34     6.07     How many time units (days, months, years) does the taxon require to reach the age-at- fiftst-reproduction?     3     3     3       35     7.01     How many potential internal vectors/pathways could the taxon use to dispersal mechanisms     >1     https://www.cabi.org/isc/datasheet/20761#topathwayCauses, https://www.cabi.org/isc/datasheet/20761#topathwayCauses, https://www.cabi.org/isc/datasheet/20761#topathwayCauses, https://www.cabi.org/isc/datasheet/20761#topa			resources (including nutrients) to the detriment of native taxa in the RA area?		species through competition.https://www.cabi.org/isc/datasheet/20761#tosummar	
and/or to reduce age-at-maturity in response to environmental conditions?         Vegetative reproduction seems to be the dominant method of propagation - essentially by fragmentation and division of the stems and the production of winter buds from stem tips (Preston and Croft, 1997).           30         6.03         Is the taxon likely to hybridise naturally with native taxa?         No         no reference         Medium           31         6.04         Is the taxon likely to be hemaphroditic or to odi splay asseut erproduction?         No         no reference         Medium           32         6.05         Is the taxon no reflective taxi?         No         no reference         Medium           32         6.06         Is the taxon no relicific hobitat fatures) to complete tail fle cycle?         No         no reference         Medium           33         6.06         Is the taxon nown or likely to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)?	_			Not applicable	no reference	Medium
29     6.02     Is the taxon likely to produce viable gametes or propagules (in the RA area)?     Yes     Vegetative reproduction setup to the the dominant method of propagation - essentially by fragmentation and division of the stems and the production of winter buds from stem tips (Preston and Corft, 1997).     Medium       30     6.03     Is the taxon likely to hybridise naturally with not text to taxon display asscul reproduction?     Medium       31     6.04     Is the taxon likely to be hermaphroditic or to display asscul reproduction?     No     no reference     Medium       32     6.05     Is the taxon no (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)?	20	0.01	and/or to reduce age-at-maturity in response			
30     6.03     Is the taxon likely to hybridise naturally with not reference     No     no reference     Medium       31     6.04     Is the taxon not he presence of complete its life cycle?     No     no reference     Medium       32     6.05     Is the taxon not production?     No     no reference     Medium       33     6.06     Is the taxon not propagation - essentially by fragmentation and division of the arropagation - essentially by fragmentation and division of the stems and the production of winter buds from stem tips (Preston and Croft, 1997). It has been observed that, when introduced to a new habitat, the establishment of Elodea buds is rapid, since the moadules sink into the sediment and arrow rapidly (Barrat- 3 months     Medium       34     6.07     How many time units (days, months, years) dess the taxon nequire to reach the age-at- first-reproduction?     3     3 months     Medium       35     7.01     How many potential internal user or ectors/pathways could the taxon use to disperse within the RA area (with suitable taxon in close proximity to one or more propagation - essentially by ragmentation and division of the taxon in close proximity to one or more propagation - essentially by ragmentation and division of the taxon in close proximity to one or more propagation - essentially by ragmentation and division of the stems and the production or winter buds from stem tips.     High       38     7.02     Kin that it enhances through water flow between the organism's locations     High       39     7.03     Does the taxon have a means of actively toccur	29	6.02	Is the taxon likely to produce viable gametes	Yes	propagation - essentially by fragmentation and division of the stems and the production of winter buds from stem tips (Preston	High
31       6.44       Is the taxon likely to be hermaphroditic or to adely assexul reproduction?       No       no reference       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 reference       Medium         33       6.06       is the taxon known (or likely) to produce a migre number of propagules or offspring within a short time span (e.g. < 1 year)?	30	6.03		No		Medium
32     6.05     Is the taxon dependent on the presence of no complete its life cycle?     No     no reference     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)?	31	6.04	Is the taxon likely to be hermaphroditic or to	No	no reference	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)?	32	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features)	No	no reference	Medium
34       6.07       How many time units (days, months, years) does the taxon require to reach the age-at-first-reproduction?       3       3 months       Medium         7. Dispersal mechanisms	33	6.06	Is the taxon known (or likely) to produce a large number of propagules or offspring	Yes	propagation - essentially by fragmentation and division of the stems and the production of winter buds from stem tips (Preston and Croft, 1997). It has been observed that, when introduced to a new habitat, the establishment of Elodea buds is rapid, since the	Very high
7. Dispersal mechanisms       >1       https://www.cabi.org/isc/datasheet/20761#topathwayCauses, https://www.cabi.org/isc/datasheet/20761#topathwayCauses, https://www.cabi.org/isc/datasheet/20761#topathwayCetors       High         36       7.02       Will any of these vectors/pathways bring the axon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)?       Yes       through water flow between the organism's locations       High         37       7.03       Does the taxon have a means of actively attaching ispersal of the taxon likely to oncur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?       No       no reference of acitively attaching ispersal of the taxon likely to occur as larvae/juveniles (for plants) in the RA area?       Medium         39       7.05       Is natural dispersal of the taxon likely to migrate in the RA area for reproduction?       Yes       Yes         40       7.06       Are older life stages of the taxon likely to migrate in the RA area by other animals?       Not applicable       E. nuttallii has not active dispersal of the taxon likely to be dispersal of the taxon likely to migrate in the RA area by other animals?       Yes       Several traits of the species are typical of successful invaders: Very high area?         41       7.08       Is dispersal of the taxon along any of the yes on ges of the taxon likely to be dispersed in the RA area by other animals?       Yes       Several traits of the species are typical of successful invaders: rapid growth, vegetative reproduction seems to be the dominant method of erapid growth, vegetati	34	6.07	does the taxon require to reach the age-at-	3		Medium
35       7.01       How many potential internal vectors/pathways could the taxon use to disperse within the RA area?       >1       https://www.cabi.org/isc/datasheet/20761#topathwayCauses, https://www.cabi.org/isc/datasheet/20761#topathwayVectors       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       through water flow between the organism's locations       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 reference of actively attaching       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       Vegetative reproduction seems to be the dominant method of propagation - essentially by fragmentation. fragments/seedings (for plants) in the RA area?       Ves         40       7.06       Are propagules or eggs of the taxon likely to be       Not applicable       E. nuttallii has not active dispersal mechanisms.       High         41       7.07       Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?       Yes       Several traits of the species are typical of successful invaders: rapid growth, vegetative reproduction through fragments and easily dispersed by waterfowl .       Yery high         41       7.07				i		
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       through water flow between the organism's locations       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 reference of acitively attaching       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       Vegetative reproduction seems to be the dominant method of propagation - essentially by fragmentation and division of the strang likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?       Yes       Vegetative reproduction of winter buds from stem tips.       Very high         40       7.06       Are older life stages of the taxon likely to migrate in the RA area for reproduction?       Yes       Several traits of the species are typical of successful invaders: raid growth, vegetative reproduction through fragments and easily dispersed by waterfowl .       Very high         41       7.07       Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional) likely to be       Yes       Several traits of the species are typical of successful invaders: raid growth, vegetative reproductive potential, reproduces asexually       High			How many potential internal vectors/pathways could the taxon use to	>1		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 reference of acitively attaching       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       Vegetative reproduction seems to be the dominant method of propagation - essentially by fragmentation and division of the stems and the production of winter buds from stem tips.       Medium         39       7.05       Is natural dispersal of the taxon likely to occur as larvae/juveniles (for rainmals) or as propagules fragments/seedlings (for plants) in the RA area?       Yes       Vegetative reproduction seems to be the dominant method of propagation - essentially by fragmentation.       Very high         40       7.06       Are older life stages of the taxon likely to migrate in the RA area for reproduction?       Not applicable       E. nuttallii has not active dispersal mechanisms.       High         41       7.07       Are propagules or eggs of the taxon likely to be dispersed or the RA area by other animals?       Yes       Several traits of the species are typical of successful invaders: rapid growth, vegetative reproduction through fragments and easily dispersed by waterfowl .       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<	36	7.02	Will any of these vectors/pathways bring the taxon in close proximity to one or more	Yes	through water flow between the organism's locations	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       Vegetative reproduction seems to be the dominant method of propagation - essentially by fragmentation and division of the stems and the production of winter buds from stem tips.       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       Vegetative reproduction seems to be the dominant method of propagation - essentially by fragmentation.       Very high         40       7.06       Are older life stages of the taxon likely to migrate in the RA area for reproduction?       Not applicable       E. nuttallii has not active dispersal mechanisms.       High         41       7.07       Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?       Yes       Several traits of the species are typical of successful invaders: 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       fast growing, has high reproductive potential, reproduces asexually       High	37	7.03	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances	No	no reference of acitively attaching	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       Vegetative reproduction seems to be the dominant method of propagation - essentially by fragmentation.       Very high         40       7.06       Are older life stages of the taxon likely to migrate in the RA area for reproduction?       Not applicable       E. nuttallii has not active dispersal mechanisms.       High         41       7.07       Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?       Yes       Several traits of the species are typical of successful invaders: rapid growth, vegetative reproduction through fragments and easily dispersed by waterfowl .       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       fast growing, has high reproductive potential, reproduces asexually       High	38	7.04	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules	No	propagation - essentially by fragmentation and division of the	Medium
40       7.06       Are older life stages of the taxon likely to migrate in the RA area for reproduction?       Not applicable       E. nuttallii has not active dispersal mechanisms.       High         41       7.07       Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?       Yes       Several traits of the species are typical of successful invaders: rapid growth, vegetative reproduction through fragments and easily dispersed by waterfowl .       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       fast growing, has high reproductive potential, reproduces asexually       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	Vegetative reproduction seems to be the dominant method of	Very high
41       7.07       Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?       Yes       Several traits of the species are typical of successful invaders: rapid growth, vegetative reproduction through fragments and easily dispersed by waterfowl.       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       fast growing, has high reproductive potential, reproduces asexually       High	40	7.06	Are older life stages of the taxon likely to	Not applicable	E. nuttallii has not active dispersal mechanisms.	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	41	7.07	Are propagules or eggs of the taxon likely to		rapid growth, vegetative reproduction through fragments and	Very high
	42	7.08	vectors/pathways mentioned in the previous seven questions (35–41; i.e. both	Yes		High
43 7.09 Is dispersal of the taxon density dependent? No no reference Medium					1	1

44	8.01	Is the taxon able to withstand being out of	Yes	Telerates fire, for example	Low
	0.01	water for extended periods (e.g. minimum of	res	Tolerates fire, for example.	LUW
l		one or more hours) at some stage of its life cycle?			
45	8.02	Is the taxon tolerant of a wide range of	Yes	Waterweeds are competitive and well adapted to a broad array of	Very high
	5.02	water quality conditions relevant to that		environmental conditions (Cook and Urmi-König, 1985; Simpson,	. c. , mgn
		taxon? [In the Justification field, indicate the		1990). E. nuttallii is able to grow in turbid, highly eutrophic	
		relevant water quality variable(s) being		waters (Cook and Urmi-König, 1985; Ozimek et al., 1993;	
		considered.]		Thiébaut and Muller, 1999), as well as in clear oligo-mesotrophic	
		considered.]		waters (Thiébaut et al., 1997; Barrat-Segretain, 2001; Nagasaka,	
				2004) with a certain degree of organic pollution (Best et al.,	
				1996). Growth of E. nuttallii is stimulated by fertilization with	
				nitrogen and benefits from an excess of ammonia (Dendène et al.,	
				1993). It can occur to depths of 3 m (Simpson, 1990) and 5 m	
				(Ikusima, 1984) where it develops into dense pure stands, but it	
				is most frequently found in shallow water. Optimum pH has been found to be between 7 and 0 (Japan et al., 1003). It is talerant of	
				found to be between 7 and 9 (Jones et al., 1993). It is tolerant of	
				disturbance, oil pollution and is typically found in calcareous	
				water, from fresh to slightly brackish coastal water (St John, 1965) up to 14 ppt salinity, and in fine sediment soil, where it is	
46	8.03	Can the taxon be controlled or eradicated in	Yes	https://www.cabi.org/isc/datasheet/20761#topreventionAndContro	High
		the wild with chemical, biological, or other			-
		agents/means?			
47	8.04	Is the taxon likely to tolerate or benefit from	Yes	Seasonal flooding can also result in the spread of the organism	Medium
		environmental/human disturbance?		locally.	
48	8.05	Is the taxon able to tolerate salinity levels	Yes	highly adaptable to different environments, habitat generalist	Medium
		that are higher or lower than those found in			
		its usual environment?			
49	8.06	Are there effective natural enemies	No	no reference	Low
_		(predators) of the taxon present in the RA	<u> </u>		
		e change			
		change			
		change	Increase	professional judgement	Very high
55	9.01	Under the predicted future climatic	Increase	professional judgement	Very high
		Under the predicted future climatic conditions, are the risks of entry into the RA	Increase	professional judgement	Very high
		Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase,	Increase	professional judgement	Very high
	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?			, ,
		Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic	Increase Increase	professional judgement (E. nuttallii is highly adaptable to different	, ,
	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment			, ,
	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic		professional judgement (E. nuttallii is highly adaptable to different	, ,
51	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase,		professional judgement (E. nuttallii is highly adaptable to different	, ,
51	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	Increase	professional judgement (E. nuttallii is highly adaptable to different environments).	Very high
51	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic	Increase	professional judgement (E. nuttallii is highly adaptable to different environments).	Very high
51	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within	Increase	professional judgement (E. nuttallii is highly adaptable to different environments).	Very high
51	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to	Increase	professional judgement (E. nuttallii is highly adaptable to different environments).	Very high
51	9.01 9.02 9.03	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change?	Increase Increase	professional judgement (E. nuttallii is highly adaptable to different environments). professional judgement	Very high Medium
51	9.01 9.02 9.03	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic	Increase Increase	professional judgement (E. nuttallii is highly adaptable to different environments). professional judgement	Very high Medium
51 52 53	9.01 9.02 9.03 9.04	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	Increase Increase Higher	professional judgement (E. nuttallii is highly adaptable to different environments). professional judgement professional judgement	Very high Medium High
51 52 53	9.01 9.02 9.03	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic	Increase Increase	professional judgement (E. nuttallii is highly adaptable to different environments).         professional judgement         professional judgement         professional judgement	Very high Medium
51 52 53	9.01 9.02 9.03 9.04	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of	Increase Increase Higher	professional judgement (E. nuttallii is highly adaptable to different environments). professional judgement professional judgement	Very high Medium High
51 52 53	9.01 9.02 9.03 9.04	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem	Increase Increase Higher	professional judgement (E. nuttallii is highly adaptable to different environments).         professional judgement         professional judgement         professional judgement	Very high Medium High
51 52 53	9.01 9.02 9.03 9.04 9.05	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Increase Increase Higher Higher	professional judgement (E. nuttallii is highly adaptable to different environments).         professional judgement         professional judgement         professional judgement         (https://www.cabi.org/isc/datasheet/20761#toriskAndImpactFactors)	Very high Medium High
51 52 53	9.01 9.02 9.03 9.04	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? Under the predicted future climatic	Increase Increase Higher	professional judgement (E. nuttallii is highly adaptable to different environments).         professional judgement         professional judgement         professional judgement         (https://www.cabi.org/isc/datasheet/20761#toriskAndImpactFactors)         professional judgement (negatively impacts aquaculture/fisheries,	Very high Medium High
51 52 53	9.01 9.02 9.03 9.04 9.05	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Increase Increase Higher Higher	professional judgement (E. nuttallii is highly adaptable to different environments).         professional judgement         professional judgement         professional judgement         (https://www.cabi.org/isc/datasheet/20761#toriskAndImpactFacto rs)         professional judgement (negatively impacts aquaculture/fisheries, negatively impacts tourism, reduced amenity values, reduced	Very high Medium High
51 52 53	9.01 9.02 9.03 9.04 9.05	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? Under the predicted future climatic	Increase Increase Higher Higher	professional judgement (E. nuttallii is highly adaptable to different environments).         professional judgement         professional judgement         professional judgement         (https://www.cabi.org/isc/datasheet/20761#toriskAndImpactFactors)         professional judgement (negatively impacts aquaculture/fisheries,	Very high Medium High

Statistics	
Scores	
BRA	41.0
BRA Outcome	High
BRA+CCA	53.0
BRA+CCA Outcome	High
Score partition	
A. Biogeography/Historical	20.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	2.0
3. Invasive elsewhere	14.0
B. Biology/Ecology	21.0
4. Undesirable (or persistence) traits	9.0
5. Resource exploitation	2.0
6. Reproduction	1.0
7. Dispersal mechanisms	2.0
8. Tolerance attributes	7.0
C. Climate change	12.0
9. Climate change	12.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3 5 5 <b>36</b>
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	12 2 7 9 6
7. Dispersal mechanisms	9
8. Tolerance attributes	6
C. Climate change	6
9. Climate change	6
Sectors affected	

Commercial	17
Environmental	12
Species or population nuisance traits	29
Thresholds	
BRA	22.75
BRA+CCA	22.75
Confidence	
BRA+CCA	0.68
BRA	0.67
CCA	0.75
Date and Time	
08/12/20	21 08:25:45

axon and Assessor details						
Category	Plantae (freshwater)					
Taxon name	Gymnocoronis spilanthoides					
Common name	Senegal tea plant					
Assessor	Marina Piria					
Risk screening context						
Reason and socio-economic benefits						
Risk assessment area	Pannonian region					
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	https://www.cabi.org/isc/datasheet/26246#topathwayCauses	High
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	No	https://www.cabi.org/isc/datasheet/26246#topathwayCauses	Medium
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	No	https://bioone.org/journals/willdenowia/volume-46/issue- 2/wi.46.46208/Gymnocoronis-spilanthoides-Asteraceae- Eupatorieae-anew-naturalized-and-potentially-	Low
2 (				invasive/10.3372/wi.46.46208.full	
Z. (	2.01	, distribution and introduction risk How similar are the climatic conditions of the	High	native to Peru, N Argentina, Bolivia, Paraguay, Uruguay and S	Medium
4	2.01	Risk Assessment (RA) area and the taxon's native range?	Ingn	Brazil. Climatch used and with the most of regions climatic conditions matches	Mediam
5	2.02	What is the quality of the climate matching data?	High	Climatch	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	No	https://bioone.org/journals/willdenowia/volume-46/issue- 2/wi.46.46208/Gymnocoronis-spilanthoides-Asteraceae- Eupatorieae-a-new-naturalized-and-potentially- invasive/10.3372/wi.46.46208.full	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	>1	Escape, flooding, pet trade	Very high
8	2.05	Is the taxon currently found in close	Yes	https://www.cabi.org/isc/datasheet/26246#toidentity Hungary, Italy	Medium
U	2.05	proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)?	103	https://www.cabi.org/isc/datasheet/26246#toidentity	neurum
3.1	nvasive	e elsewhere			
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	In Hungary from 1988; New Zealand from 1980s https://bioone.org/journals/willdenowia/volume-46/issue- 2/wi.46.46208/Gymnocoronis-spilanthoides-Asteraceae- Eupatorieae-a-new-naturalized-and-potentially- invasive/10.3372/wi.46.46208.full	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	No	Gymnocoronis spilanthoides forms large and dense populations but only in habitats modified by human activities, https://bioone.org/journals/willdenowia/volume-46/issue- 2/wi.46.46208/Gymnocoronis-spilanthoides-Asteraceae- Eupatorieae-a-new-naturalized-and-potentially- invasive/10.3372/wi.46.46208.full	Medium
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	https://www.cabi.org/isc/datasheet/26246#toidentity	Low
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	Yes	Recreational activities, irrigation and navigation may also be affected. https://www.cabi.org/isc/datasheet/26246#toidentity	High
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	Yes	https://www.cabi.org/isc/datasheet/26246#toidentity	High
В. І	Biology	//Ecology			
		able (or persistence) traits			
		Is it likely that the taxon will be poisonous or pose other risks to human health?	Yes	https://www.cabi.org/isc/datasheet/26246#toidentity	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/26246#toidentity	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.cabi.org/isc/datasheet/26246#toidentity	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	5.5-8 pH https://www.cabi.org/isc/datasheet/26246#toidentity	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	https://www.cabi.org/isc/datasheet/26246#toidentity	Medium
19	4.06	Is the taxon likely to exert adverse impacts	Yes	https://www.cabi.org/isc/datasheet/26246#toidentity	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	No	https://www.cabi.org/isc/datasheet/26246#toidentity	Low
21	4.08	infectious agents that are endemic in the RA Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area?	No	https://www.cabi.org/isc/datasheet/26246#toidentity	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	grow 15 cm per week up to 1.5m high https://www.cabi.org/isc/datasheet/26246#toidentity	High

C. C		change			
	limate	(predators) of the taxon present in the RA e change			
19	8.06	its usual environment? Are there effective natural enemies (predators) of the taxon present in the RA	No	https://www.cabi.org/isc/datasheet/26246#toidentity	Low
18	8.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in	No	2/wi.40.40200/Gymilocolonis-Spinitolodes-Asteraceae Eupatorieae-a-new-naturalized-and-potentially- invasive/10.3372/wi.46.46208.full cannot tolerate saline or brackish water. https://www.cabi.org/isc/datasheet/26246#toidentity	Very high
17	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	Yes	Gymnocoronis spilanthoides forms large and dense populations but only in habitats modified by human activities. https://bioone.org/journals/willdenowia/volume-46/issue- 2/wi.46.46208/Gymnocoronis-spilanthoides-Asteraceae-	Medium
		the wild with chemical, biological, or other agents/means?		only on the upper parts of the plant, as submerged parts are not killed and can regrow. Following repeated efforts, glyphosate has proven to be ineffective in south Queensland, and it shows some resistance to the most commonly approved aquatic herbicides https://www.cabi.orq/isc/datasheet/26246#toidentity	
6	8.03	water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in	No	https://www.cabi.org/isc/datasheet/26246#toidentity G. spilanthoidesis very hard to kill and herbicides are effective	High
5	8.02	water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of	Yes	Low pH and persistant to chemicals	High
_		Is the taxon able to withstand being out of	No	https://www.cabi.org/isc/datasheet/26246#toidentity	Low
			No	https://www.cabi.org/isc/datasheet/26246#toidentity	Low
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	No	https://www.cabi.org/isc/datasheet/26246#toidentity	Low
1	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	Yes	https://www.cabi.org/isc/datasheet/26246#toidentity	Medium
0	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	Not applicable	https://www.cabi.org/isc/datasheet/26246#toidentity	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	https://www.cabi.org/isc/datasheet/26246#toidentity	High
8	7.04	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?	Yes	https://www.cabi.org/isc/datasheet/26246#toidentity	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	No	https://www.cabi.org/isc/datasheet/26246#toidentity	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	Personal opinion	High
5	7.01	How many potential internal vectors/pathways could the taxon use to	>1	water, flodding,pet trade https://www.cabi.org/isc/datasheet/26246#toidentity	Very high
		first-reproduction?			 
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-	1	https://www.cabi.org/isc/datasheet/26246#toidentity	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.cabi.org/isc/datasheet/26246#toidentity	High
2	6.05	display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features)	No	https://www.cabi.org/isc/datasheet/26246#toidentity https://www.cabi.org/isc/datasheet/26246#toidentity	Very high
1	6.04	native taxa? Is the taxon likely to be hermaphroditic or to	Yes	can reproduce by seeds and vegetatively from stem fragments	Very high
	6.03	or propagules (in the RA area)? Is the taxon likely to hybridise naturally with	No	https://www.cabi.org/isc/datasheet/26246#toidentity	Very high
9	6.02	and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes	Yes	https://www.cabi.org/isc/datasheet/26246#toidentity	Very high
	<i>eprodu</i> 6.01	Is the taxon likely to exhibit parental care	Not applicable	https://www.cabi.org/isc/datasheet/26246#toidentity	High
		resources (including nutrients) to the detriment of native taxa in the RA area?		· · · · · · · · · · · · · · · · · · ·	
	5.02	protected native taxa in the RA area? Is the taxon likely to sequester food	No	https://www.cabi.org/isc/datasheet/26246#toidentity	Medium
	<i>esourc</i> 5.01	e exploitation Is the taxon likely to consume threatened or	Not applicable	https://www.cabi.org/isc/datasheet/26246#toidentity	Very high
		population even when present in low densities (or persisting in adverse conditions by way of a dormant form)?		nicps.//www.coshorg/isc/dotasince(/20240#toldenticy	Low
5	4.12	(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	No	with slower growing native plants and affecting wetland birds and other animals depend upon them. Native species can also be submerged causing death. https://www.cabi.org/isc/datasheet/26246#toidentity	Low
4	4.11	range of water velocity conditions (e.g. versatile in habitat use)? Is it likely that the taxon's mode of existence	Yes	It can invade and degrade natural wetlands, competing strongly	High

50	9.01	Under the predicted future climatic	Increase	https://bioone.org/journals/willdenowia/volume-46/issue-	Very high
		conditions, are the risks of entry into the RA		2/wi.46.46208/Gymnocoronis-spilanthoides-Asteraceae-	
		area posed by the taxon likely to increase,		Eupatorieae-a-new-naturalized-and-potentially-	
		decrease or not change?		invasive/10.3372/wi.46.46208.full	
51	9.02	Under the predicted future climatic	Increase	neotropical species	Very high
		conditions, are the risks of establishment		https://bioone.org/journals/willdenowia/volume-46/issue-	
		posed by the taxon likely to increase,		2/wi.46.46208/Gymnocoronis-spilanthoides-Asteraceae-	
		decrease or not change?		Eupatorieae-a-new-naturalized-and-potentially-	
52	9.03	Under the predicted future climatic	Increase	https://bioone.org/journals/willdenowia/volume-46/issue-	High
		conditions, are the risks of dispersal within		2/wi.46.46208/Gymnocoronis-spilanthoides-Asteraceae-	
		the RA area posed by the taxon likely to		Eupatorieae-a-new-naturalized-and-potentially-	
		increase, decrease or not change?		invasive/10.3372/wi.46.46208.full	
53	9.04	Under the predicted future climatic	Higher	https://bioone.org/journals/willdenowia/volume-46/issue-	High
		conditions, what is the likely magnitude of		2/wi.46.46208/Gymnocoronis-spilanthoides-Asteraceae-	
		future potential impacts on biodiversity		Eupatorieae-a-new-naturalized-and-potentially-	
		and/or ecological integrity/status?		invasive/10.3372/wi.46.46208.full	
54	9.05	Under the predicted future climatic	Higher	https://bioone.org/journals/willdenowia/volume-46/issue-	Very high
		conditions, what is the likely magnitude of		2/wi.46.46208/Gymnocoronis-spilanthoides-Asteraceae-	
		future potential impacts on ecosystem		Eupatorieae-a-new-naturalized-and-potentially-	
		structure and/or function?		invasive/10.3372/wi.46.46208.full	
55	9.06	Under the predicted future climatic	Higher	https://bioone.org/journals/willdenowia/volume-46/issue-	Very high
	]	conditions, what is the likely magnitude of		2/wi.46.46208/Gymnocoronis-spilanthoides-Asteraceae-	
	]	future potential impacts on ecosystem		Eupatorieae-a-new-naturalized-and-potentially-	
		services/socio-economic factors?		invasive/10.3372/wi.46.46208.full	

Statistics

Scores	
BRA	28.0
BRA Outcome	High
BRA+CCA	40.0
BRA+CCA Outcome	High
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	17.0
4. Undesirable (or persistence) traits	6.0
5. Resource exploitation	0.0
6. Reproduction	4.0
7. Dispersal mechanisms	3.0
8. Tolerance attributes	4.0
C. Climate change	12.0
9. Climate change Answered Questions	12.0
Answered Questions Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	-
2. Climate, distribution and introduction risk	<u>3</u> 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	9
8. Tolerance attributes	6
C. Climate change	6
9. Climate change	6
Sectors affected	
Commercial	9
Environmental	11
Species or population nuisance traits	23
Thresholds	
BRA	22.75
BRA+CCA	22.75
Confidence	
BRA+CCA	0.68
BRA	0.65
CCA	0.92

	BRA+CCA	0.68
	BRA	0.65
	CCA	0.92
Date and Time		
	23/11/20	021 17:04:10

axon and Assessor details						
Category	Plantae (freshwater)					
Taxon name	Hygrophila polysperma					
Common name	Indian swampweed					
Assessor	Marina Piria					
Risk screening context						
Reason and socio-economic benefits						
Risk assessment area	Pannonian region					
Taxonomy						
Native range						
Introduced range						
URL						

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
1. L		ication/Cultivation			I
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	Aquarium plant https://www.cabi.org/isc/datasheet/28135	High
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	for aquarium purposes https://www.cabi.org/isc/datasheet/28135	Medium
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	Eleven of the taxa characterised as high risk (Cyperus papyrus, C. sp., Hygrophila difformis, H. balsamica, H. corymbosa, H. sp., Microsorum pteropus, Spathiphyllum sp., Taxiphyllum barbieri, Teucrium scordium and Typha minima) should be restricted from use. If these taxa are not restricted, based on their establishment and dispersal characteristics, they have a high risk of becoming invasive. https://onlinelibrary.wiley.com/doi/full/10.1111/wre.12135?casa_t oken=ZGBeRf6xub0AAAAA%3A2bED9v6G11xd1alX3U38rTvaRIcNOa	
2. (		, distribution and introduction risk			T-
4	2.01	How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range?	Medium	Mediterranean climate matches with India, Bangladesh using climatch	Low
5	2.02	What is the quality of the climate matching data?	Medium	climatch tolerate Cs - Warm temperate climate with dry summer - which is present in Adriatic basin	Medium
6	2.03	Is the taxon already present outside of captivity in the RA area?	No	Not in RA area; H. polysperma has recently been reported in Europe for the first time, where plants were found in North Rhine- Westphalia, Germany and Hungary https://www.cabi.org/isc/datasheet/28135#totaxonomicTree	High
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	>1	biofouling, water, mail, debris https://www.cabi.org/isc/datasheet/28135#totaxonomicTree	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	has recently been reported in Europe for the first time, where plants were found in North Rhine-Westphalia and Hungary	High
3. I	nvasive	e elsewhere			
9	3.01	Has the taxon become naturalised (established viable populations) outside its	Yes	Germany, USA https://www.cabi.org/isc/datasheet/28135#totaxonomicTree	Very high
	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	H. polysperma reduces biodiversity by competing with and displacing native vegetation, and is capable of changing the fauna and flora of an ecosystem. H. polysperma can form dense monocultures which exclude all native plants and do not provide habitat or food for wildlife. H. polysperma is an excellent competitor due to its low light compensation and saturation points, which allow it to start growing in low light conditions before other native plants do. H. polysperma is also able to rapidly change resource acquisition in response to changing environmental conditions, allowing it to outcompete many other species (Spencer and Bowes, 1985). Decomposing mats of H. nolysperma also have the ability to cause fish kills by creating low	Very high
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	Yes	Negatively impacts aquaculture/fisheries, dense populations; H. polysperma has limited water flow in irrigations channels and flood-control systems (UFL-IFAS, 2005). H. polysperma is also reported as being a threat to rice fields (Krombholz, 1996). CABI	Very high
	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem services?	Yes	unsightly mats of vegetation decrease aesthetic values. These declines in recreational and aesthetic values can decrease tourism, which can be a major source of livelihood within the community.	Very high
		In the taxon's introduced range, are there known adverse socio-economic impacts?	Yes	H. polysperma can form dense mats that impede recreational activities such as boating, fishing, swimming, water skiing, canoeing, and kayaking. Herbicides typically used in controlling H. polysperma are estimated at costing between US\$988 to US\$1482 per hectare (US \$400 to US \$600 per acre), and total costs are even higher when labour and equipment are included (Cuda and Sutton, 2000). In an extreme case involving the use of fluridone in flowing water, control was achieved for a period of 20 months at a cost of US \$34.580 per hectare (Sutton, 1996).	Very high
		//Ecology			
		able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health?	No	https://www.cabi.org/isc/datasheet/28135#totaxonomicTree	Very high
	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/28135#totaxonomicTree	Very 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.cabi.org/isc/datasheet/28135#totaxonomicTree	Very high

8 <i>. To</i> 44 8		Is the taxon able to withstand being out of water for extended periods (e.g. minimum of	Yes	Has propagules that can remain viable for more than one year	High
8. To	ieranc				
- /		ce attributes			
43 7	7.09	unintentional or intentional) likely to be Is dispersal of the taxon density dependent?	No	It is not density dependent	High
		vectors/pathways mentioned in the previous seven questions (35-41; i.e. both		viable for more than one year	
12 7	7.08	Is dispersal of the taxon along any of the	Yes	Has high reproductive potential, Has propagules that can remain	High
1 7	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	Yes	H. polysperma can be transported with wildlife and carried to new locations (DCR, 2003).	High
		Are older life stages of the taxon likely to migrate in the RA area for reproduction?		it is not migratory species	Very high
		fragments/seedlings (for plants) in the RA area?			
9 7	7.05	Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as	Yes	https://www.cabi.org/isc/datasheet/109069	High
	7.05	(for plants: seeds, spores) in the RA area?	¥		11:
8 7	7.04	the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules	Yes	https://www.cabi.org/isc/datasheet/109069	Very high
7 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	Yes	https://www.cabi.org/isc/datasheet/28135#tohabitat	Very high
		taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)?			
6 7	7.02	disperse within the RA area (with suitable Will any of these vectors/pathways bring the	No	Not yet present	Low
		How many potential internal vectors/pathways could the taxon use to	>1	water, pet trade, biofouling https://www.cabi.org/isc/datasheet/28135#tohabitat	Very high
Di	spersa	first-reproduction? al mechanisms			
4 6	5.07	How many time units (days, months, years) does the taxon require to reach the age-at-	1	1 year https://www.cabi.org/isc/datasheet/28135#tohabitat	High
		within a short time span (e.g. < 1 year)?		• • •	
3 6	5.06	Is the taxon known (or likely) to produce a large number of propagules or offspring	Yes	inFlorida high spore production https://www.cabi.org/isc/datasheet/28135#tohabitat	Medium
		another taxon (or specific habitat features) to complete its life cycle?			
2 6	5.05	display asexual reproduction? Is the taxon dependent on the presence of	No	https://www.cabi.org/isc/datasheet/28135#tohabitat https://www.cabi.org/isc/datasheet/28135#tohabitat	Very high
. 6	5.04	native taxa? Is the taxon likely to be hermaphroditic or to	Yes	asexual reproduction	Very high
) 6	5.03	or propagules (in the RA area)? Is the taxon likely to hybridise naturally with	No	No data	Low
9 6	5.02	to environmental conditions? Is the taxon likely to produce viable gametes	Yes	https://www.cabi.org/isc/datasheet/28135#tohabitat	High
		and/or to reduce age-at-maturity in response	sppedule		-,
	e <i>produ</i> 5.01		Not applicable	https://www.cabi.org/isc/datasheet/28135#tohabitat	Very high
		resources (including nutrients) to the detriment of native taxa in the RA area?			
7 5	5.02	protected native taxa in the RA area? Is the taxon likely to sequester food	Yes	https://www.cabi.org/isc/datasheet/28135#tohabitat	Medium
		Is the taxon likely to consume threatened or	Not applicable	https://www.cabi.org/isc/datasheet/28135#tohabitat	Very high
Do	Source	by way of a dormant form)? e exploitation			
		population even when present in low densities (or persisting in adverse conditions			
5 4	1.12	native taxa? Is the taxon likely to maintain a viable	Yes	probably yes https://www.cabi.org/isc/datasheet/28135#tohabitat	Medium
		(e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for			
4 4	4.11	Is it likely that the taxon's mode of existence	Yes	altches (FNW Disseminules, 2007). reduces level of oxygen	High
		versatile in habitat use)?		waters, but also found growing in slow-moving systems such as lakes, marshes, canals, rivers, swamps, wetlands, and irrigation ditches (FNW Disseminules, 2007).	
4 ر.	T. TO	range of water velocity conditions (e.g.	100	deep and as an immersed plant along banks, preferring flowing	i ligit
3 1	4.10	released from captivity? Is the taxon capable of sustaining itself in a	Yes	H. polysperma can grow submersed in water up to 3m (10 ft)	High
2 4	1.09	Is it likely that the taxon will achieve a body size that will make it more likely to be	Yes	up to 3 m high https://www.cabi.org/isc/datasheet/28135#totaxonomicTree	High
		infectious agents that are absent from (novel to) the RA area?			
1 4	1.08	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and	No	No information https://www.cabi.org/isc/datasheet/28135#totaxonomicTree	Low
		act as a vector for, recognised pests and infectious agents that are endemic in the RA		https://www.cabi.org/isc/datasheet/28135#totaxonomicTree	
) 4	1.07	on ecosystem services in the RA area? Is it likely that the taxon will host, and/or	No	Not evidences	Low
9 4	1.06	has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts	Yes	https://www.cabi.org/isc/datasheet/28135#totaxonomicTree	Very high
34	1.05	Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it	Yes	https://www.cabi.org/isc/datasheet/28135#totaxonomicTree	High
		invaded or could invade the RA area?			
		enhancing its potential persistence if it has			

	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.] Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	Yes	. polysperma is an excellent competitor due to its low light compensation and saturation points, which allow it to start growing in low light conditions before other native plants do. H. polysperma is also able to rapidly change resource acquisition in response to changing environmental conditions, allowing it to outcompete many other species (Spencer and Bowes, 1985). Decomposing mats of H. polysperma also have the ability to cause fish kills by creating low oxvaen levels in the water (DCR, 2003). Herbicides typically used in controlling H. polysperma are estimated at costing between US\$988 to US\$1482 per hectare (US \$400 to US \$600 per acre), and total costs are even higher when labour and equipment are included (Cuda and Sutton, 2000). In an extreme case involving the use of fluridone in	High
47	0.01			flowing water, control was achieved for a period of 20 months at a cost of US \$34.580 per hectare (Sutton, 1996).	
47	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	No	https://www.cabi.org/isc/datasheet/28135#tohabitat	Low
48	8.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	No	No data, but probably can't	Low
49	8.06	Are there effective natural enemies (predators) of the taxon present in the RA area?	Yes	Introduced grass carp can control it http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.1059.7 979&rep=rep1&type=pdf; https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1095- 8649.1981.tb02&09.x	High
С. С	Climate	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?	Increase	Prefered climate is worm temperate climate and tropical wet and dry, so with increased temp. black sea basin can become more appropriate	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 optimum temperature for H. polysperma is 22-28°C (71-82°F), with a minimum temperature of 4°C (39°F), and maximum temperature of 30°C (	High
52	9.03	Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change?	Increase	https://www.cabi.org/isc/datasheet/28135#tohabitat	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	H. polysperma reduces biodiversity by competing with and displacing native vegetation, and is capable of changing the fauna and flora of an ecosystem. H. polysperma can form dense monocultures which exclude all native plants and do not provide habitat or food for wildlife.:	High
	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Higher	The dense stands and mats of vegetation that are characteristic of this species when introduced outside of its native range can decrease the oxygen levels by limiting water circulation and increased decomposition of dead plants. Damaged 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	САВІ	Medium

ta			

Scores	
BRA	35.5
BRA Outcome	High
BRA+CCA	47.5
BRA+CCA Outcome	High
Score partition	
A. Biogeography/Historical	18.5
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	13.5
B. Biology/Ecology	17.0
4. Undesirable (or persistence) traits	8.0
5. Resource exploitation	2.0
6. Reproduction	4.0
7. Dispersal mechanisms	5.0
8. Tolerance attributes	-2.0
C. Climate change	12.0
9. Climate change	12.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3 5 5
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	
B. Biology/Ecology	36
	12
4. Undesirable (or persistence) traits	
5. Resource exploitation	2
5. Resource exploitation 6. Reproduction	2
5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms	12 2 7 9
5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes	6
5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes <b>C. Climate change</b>	6 <b>6</b>
5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes <b>C. Climate change</b> 9. Climate change	6
5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected	6 6
5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes <b>C. Climate change</b> 9. Climate change <b>Sectors affected</b> <b>Commercial</b>	6 6 6 17
5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes <b>C. Climate change</b> 9. Climate change <b>Sectors affected</b>	6 6 6

Thresholds	
BRA	22.75
BRA+CCA	22.75
Confidence	
BRA+CCA	0.72
BRA	0.73
CCA	0.63
Date and Time	
23/11/20	21 17:04:53

Taxon and Assessor details					
Category	Plantae (freshwater)				
Taxon name	Lemna aequinoctialis				
Common name	lesser duckweed				
Assessor	Marina Piria				
Risk screening context					
Reason and socio-economic benefits					
Risk assessment area	Pannonian region				
Taxonomy					
Native range					
Introduced range					
URL					

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
		ication/Cultivation			Manu bial
		Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	Lemna aequinoctialis has been introduced to temperate areas in Europe, central North America, northern China and Japan through rice cultivation, as fish food and for ornamental purposes (Bengtsson et al., 1999; Ryman and Anderberg, 1999). I	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	Lemna aequinoctialis has been introduced to temperate areas in Europe, central North America, northern China and Japan through rice cultivation, as fish food and for ornamental purposes (Bengtsson et al., 1999; Ryman and Anderberg, 1999). I	Very high
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	Lemna minuta https://www.cabi.org/isc/datasheet/108968	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	Preferred climate Cs - Warm temperate climate with dry summer similar as RA	Low
5	2.02	What is the quality of the climate matching data?	High	Climatch	High
6	2.03	Is the taxon already present outside of captivity in the RA area?	No	https://www.cabi.org/isc/datasheet/121132#tosimilaritiesToOther SpeciesOrConditions	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	>1	Aquaculture, debris, animals, https://www.cabi.org/isc/datasheet/121132#topathwayVectors	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	Hungary aturalized https://www.cabi.org/isc/datasheet/121132#tointroductions	High
		and intentional introductions)?			
<u>3. I</u> 9	1	e elsewhere Has the taxon become naturalised	Yes	Germany, Hungary	Very high
		(established viable populations) outside its native range?		https://www.cabi.org/isc/datasheet/121132#38a70df6-0555-43c1- 9d8d-fd2304676293	, ,
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	L. aequinoctialis is one of the species that restricts the proper functioning of ponds, and contributes to eutrophication (Sengupta et al., 2010). Generally, invasive aquatic plants can affect microinvertebrate communities (Lukács et al., 2016).	Medium
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	Yes	L. aequinoctialis is one of the species that restricts the proper functioning of ponds, and contributes to eutrophication (Sengupta et al., 2010).	Medium
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	Yes	amenities https://www.cabi.org/isc/datasheet/121132#38a70df6- 0555-43c1-9d8d-fd2304676293	High
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	Yes	can impact human activities such as boating, swimming and hydroelectric power plants (Hussner et al., 2010).	Very high
		y/Ecology			
		able (or persistence) traits	T		<b>N 1 1 1</b>
		Is it likely that the taxon will be poisonous or pose other risks to human health?		The species is useful as an indicator of phytotoxic contaminants in irrigation water in urbanized areas (Bengtsson et al., 1999). It is a good food source for humans and livestock due to its high protein content and high digestibility (Leng et al., 1995; Appenroth et al., 2017).	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	Dense aggregations of duckweeds in eutrophic waters can reduce light penetration and pond aeration causing anoxia and fish death (Bengtsson et al., 1999)	Medium
	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	https://www.cabi.org/isc/datasheet/121132#38a70df6-0555-43c1- 9d8d-fd2304676293	
	4.04	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA area?	Yes	It will tolerate temperatures from 6 to 33°C and pH from 3.2 to 9; optimal growth occurs at 20-28°C and pH 6.5-7.5. A minimum water depth of 0.30 m is desirable and levels of 60 mg/l of soluble nitrogen and 1 mg/l of phosphorus are required for normal growth (Gherardi, 2007). It grows abundantly at high phosphorus and chlorophyll a concentrations (Mukhopadhyay and Dewanji, 2005). Cs - Warm temperate climate with dry summer Preferred Warm average temp. > 10°C. Cold average temp. > 0°C. dry summers the submerged vegetation is reduced when L. aequinoctialis cover is higher than 40% (Sengupta et al., 2010). Dense aggregations of duckweeds in eutrophic waters can reduce light penetration and pond aeration causing anoxia and fish death (Bengtsson et al., 1999). Generally, invasive aquatic plants can affect microinvertebrate communities (Lukács et al., 2016).	Medium Medium
19	4.06	Is the taxon likely to exert adverse impacts	Yes	nvasive aquatic plants can impact human activities such as	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	No	boating, swimming and hydroelectric power plants (Hussner et al., Nodata https://www.cabi.org/isc/datasheet/121132#38a70df6- 0555-43c1-9d8d-fd2304676293	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	No	No datahttps://www.cabi.org/isc/datasheet/121132#38a70df6- 0555-43c1-9d8d-fd2304676293	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	No	a tiny free-floating aquatic plan	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	can be found in mesotrophic to eutrophic lentic waters of lakes, pools, ponds, rice fields and ditches and warm-temperate to tropical climates from sea level to 2800 m (Landolt, 1992; Beentje and Lansdown, 2018; Flora of China Editorial Committee, 2017).	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?	Yes	Dense aggregations of duckweeds in eutrophic waters can reduce light penetration and pond aeration causing anoxia and fish death (Bengtsson et al., 1999).	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)?	Yes	the species has a high reproductive capability that is advantageous in eutrophic lentic water (Appenroth et al., 2013).	High
		-	Not applicable	https://www.cabi.org/isc/datasheet/121132#tohabitat	Very high
7	5.02	protected native taxa in the RA area? Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?	No	https://www.cabi.org/isc/datasheet/121132#tohabitat	Low
	<u>Reprodu</u> 6.01		Not applicable	https://www.cabi.org/isc/datasheet/121132#tohabitat	Very high
9	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	https://www.cabi.org/isc/datasheet/121132#tohabitat	Medium
D	6.03	Is the taxon likely to hybridise naturally with native taxa?	Yes	Vegetative reproduction occurs but natural hybridization is likely possible https://link.springer.com/article/10.1007/500425-014-	Low
1	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	Yes	reproduces vegetatively by plant buds	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/121132#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/121132#tobiologyAndEcology	Very high
	6.07	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	1	https://www.cabi.org/isc/datasheet/121132#tobiologyAndEcology	Very high
	7.01	al mechanisms How many potential internal	>1	water, debris, birds and ducks, aquaculture	Very high
	7.02	vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the	No	http://www.coli.org/isc/datasheet/121132#tobiologyAndEcology It is not yet present in captivity of RA	Low
.0	7.02	taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)?			2011
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	it is floating plant	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	may be introduced to new water areas by slow-moving water along interconnected watercourses and by floods (Hicks, 1937).	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	may be introduced to new water areas by slow-moving water along interconnected watercourses and by floods (Hicks, 1937).	High
0	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	Not applicable	it is not migratory species	Very high
	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	Yes	Lemna species can be distributed by birds, fish and mammals over short distances (Hicks, 1937; Flora of North America Editorial Committee, 2017).	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 uniotoptical or interational) likely to be	Yes	Duckweeds may be introduced to new water areas by slow-moving water along interconnected watercourses and by floods (Hicks, 1937).	Very high
3	7.09	unintentional or intentional) likely to be Is dispersal of the taxon density dependent?	No	https://www.cabi.org/isc/datasheet/121132#tomeansOfMovement AndDispersal	Medium
		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	Yes	seeds probably yes	Medium
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	Yes	can be found in mesotrophic to eutrophic lentic waters of lakes, pools, ponds, rice fields and ditches and warm-temperate to tropical climates from sea level to 2800 m	High
6	8.03	Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	Yes	allowed pesticides; Physical/Mechanical Control -Lemna species can be removed mechanically from invaded waterways (Centre for Ecology & Hydrology, 2004).; Biological Control - Lemna species in general can be controlled by herbivorous fish such as grass carp (Centre for Ecology & Hydrology, 2004).Problem in mediterranean	Medium
	8.04	Is the taxon likely to tolerate or benefit from	Yes	are endemic fish, pesticides not recommended and lack of herbivoreous fish. In mediterranean region yes particularly after hydropover plant	High

48	8.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in	No	Can tolerate but not clear if can persist in brackish water https://link.springer.com/article/10.1007/s00425-015-2264-x	Low
49	8.06	its usual environment? Are there effective natural enemies (predators) of the taxon present in the RA	Yes	introduced herbivoreouus are present	High
C	Climat	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?	Increase	Environmental requirements limit its spread into temperate areas (Crawford et al., 2001), but climate change could potentially expand the range of distribution.Vélez-Gavilán J, 2017. Lemna aequinoctialis (lesser duckweed). Invasive Species Compendium. Wallingford, UK: CABI. DOI:10.1079/ISC.121132.20203483098	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	Environmental requirements limit its spread into temperate areas (Crawford et al., 2001), but climate change could potentially expand the range of distribution. Establishment likely will increase in RA	High
52	9.03	Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase. decrease or not change?	Increase	Environmental requirements limit its spread into temperate areas (Crawford et al., 2001), but climate change could potentially expand the range of distribution.	Medium
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?	Higher	Environmental requirements limit its spread into temperate areas (Crawford et al., 2001), but climate change could potentially expand the range of distribution.	Medium
54	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Higher	Environmental requirements limit its spread into temperate areas (Crawford et al., 2001), but climate change could potentially expand the range of distribution.	High
55	9.06	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	Higher	Environmental requirements limit its spread into temperate areas (Crawford et al., 2001), but climate change could potentially expand the range of distribution.Preferred climate is Cs - Warm temperate climate with dry summer which in Danube basin can appear with global warming	High

Statistics	
Scores	
BRA	40.0
BRA Outcome	High
BRA+CCA	52.0
BRA+CCA Outcome	High
Score partition	
A. Biogeography/Historical	23.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	1.0
3. Invasive elsewhere	18.0
B. Biology/Ecology	17.0
4. Undesirable (or persistence) traits	6.0
5. Resource exploitation	0.0
6. Reproduction	6.0
7. Dispersal mechanisms	3.0
8. Tolerance attributes	2.0
C. Climate change	12.0
9. Climate change	12.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	5
3. Invasive elsewhere B. Biology/Ecology	5 5 <b>36</b>
<i>3. Invasive elsewhere</i> <b>B. Biology/Ecology</b> <i>4. Undesirable (or persistence) traits</i>	5 5 <b>36</b> 12
3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation	5 5 36 12 2
3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction	5 5 36 12 2 7
3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms	5 5 36 12 2 7 9
3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes	12 2 7 9 6
3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change	12 2 7 9 6 6
3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change	12 2 7 9 6
3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected	12 2 7 9 6 6 6
3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial	12 2 7 9 6 6 6 6 20
3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change 9. Climate change Commercial Environmental	12 2 7 9 6 6 6 6 6 20 11
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	6 6 20
3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change 9. Climate change Commercial Environmental	12 2 7 9 6 6 6 6 6 20 11

Thresholds	
BRA	22.75
BRA+CCA	22.75
Confidence	
BRA+CCA	0.72
BRA	0.72
CCA	0.71
Date and Time	
23/11/2	021 17:05:45

23/11/2021 17:05:45

AS-15K V2
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Taxon and Assessor details					
Category	Plantae (freshwater)				
Taxon name	Lemna minuta				
Common name	least duckweed				
Assessor	Marina Piria				
Risk screening context					
Reason and socio-economic benefits					
Risk assessment area	Pannonian region				
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	Yes	reared in garden ponds and escaped https://www.cabi.org/isc/datasheet/108968#todescription	Very high
		generations?		https://www.cabi.org/isc/datasneet/100900#todescription	
2	1.02	Is the taxon harvested in the wild and likely	Yes	for garden ponds	High
_	1	to be sold or used in its live form?		https://www.cabi.org/isc/datasheet/108968#todescription	
3	1.03	Does the taxon have invasive races,	Yes	Lemna aequinocitalis, L. turionifera https://www.tandfonline.com/doi/full/10.1080/11263504.2014.98	Very high
		varieties, sub-taxa or congeners?		7846	
2. (	Climate	, distribution and introduction risk	I		
4	2.01	How similar are the climatic conditions of the	High	This is cosmopilitan species native of temperate and subtropical	Medium
		Risk Assessment (RA) area and the taxon's		areas of North and South America. From South America extending	
		native range?		through to Central America and West Indies extended northward	
				along the high mountains to Mexico and California (Flora of North America, 2008; Armstrong, 2009). Very common throughout the	
				southeastern and southwestern United States (USDA-ARS, 2009)	
				with some scarce distribution in the centre of the country (Flora of	
				North America, 2008). Larson and Searcy (2007) reported its	
				presence in Massachussetts recently (2005). The species has been	
				introduced in western Europe and Japan (Landolt, 1986; Reveal,	
				1990) and may well be expected to be discovered elsewhere (Reveal, 1990) because it is almost certainly under-recorded, due	
1				its similarity with L. minor (Preston and Croft, 1997).	
5	2.02	What is the quality of the climate matching	Medium	It occurs in temperate to subtropical regions with relatively mild	Medium
1		data?		winters (Flora of North America, 2008) and prefers a	
6	2.03	Is the taxon already present outside of	Yes	Mediterranean climate (Landolt, 1986) with high water https://www.cabi.org/isc/datasheet/108968#todescription	Very high
		captivity in the RA area?			
7	2.04	How many potential vectors could the taxon	>1	water, wind, pet trade	Very high
_	0.05	use to enter in the RA area?		https://www.cabi.org/isc/datasheet/108968#todescription	
8	2.05	Is the taxon currently found in close	Yes	Hungary - Danube basin, Poland, Germany	Low
		proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional			
		and intentional introductions)?			
	T	elsewhere			
9	3.01	Has the taxon become naturalised	Yes	https://www.cabi.org/isc/datasheet/108968#todescription	Very high
10	3.02	(established viable populations) outside its In the taxon's introduced range, are there	No	https://www.cabi.org/isc/datasheet/108968#todescription	Low
10	5.02	known adverse impacts to wild stocks or	NO	https://www.cabi.org/isc/datasheet/100900#todescription	LOW
		commercial taxa?			
11	3.03	In the taxon's introduced range, are there	No	https://www.cabi.org/isc/datasheet/108968#todescription	Low
12	3.04	known adverse impacts to aquaculture?	Yes	Deduced emerity values	High
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	res	Reduced amenity values https://www.cabi.org/isc/datasheet/108968#todescription	High
13	3.05	In the taxon's introduced range, are there	Yes	Carpets (mats) can occasionally impede activities (navigation,	High
		known adverse socio-economic impacts?		bathing, fishing) and are sometimes perceived by the local	-
				residents as a symbol of contamination of waters;	
R I	Biology	//Ecology		https://www.cabi.org/isc/datasheet/108968#todescription	
		able (or persistence) traits			
		Is it likely that the taxon will be poisonous or	No	https://www.cabi.org/isc/datasheet/108968#todescription	High
	1.0-	pose other risks to human health?			
15	4.02		No	often grows with the other duckweeds (e.g., Spirodela, Landoltia,	Medium
1		more native taxa (that are not threatened or protected)?		Wolffia, Wolffiella) and occupy a similar niche to Azolla filiculoides (Armstrong, 2009).	
16	4.03	Are there any threatened or protected taxa	No	https://www.cabi.org/isc/datasheet/108968#todescription	Very high
1		that the non-native taxon would parasitise in			
4 -	4.6.1	the RA area?			
17	4.04	Is the taxon adaptable in terms of climatic	Yes	Prefer warm climates , Mediterrnean climate tolerale	Low
1		and other environmental conditions, thus 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	A blanketing growth over a large area leads to deoxygenation and	Very high
1		structure/function in aquatic ecosystems if it		fish-kills in hot weather, as well as a decrease in invertebrate	
1		has invaded or is likely to invade the RA		diversity (Bramley et al., 1995). These thick, floating mats of	
1		area?		vegetation could reduce submerged plant diversity by selecting a few tolerant species (Janes et al., 1996).	
19	4.06	Is the taxon likely to exert adverse impacts	Yes	sports on the water, fishing	Very high
		on ecosystem services in the RA area?			
20	4.07	Is it likely that the taxon will host, and/or	No	Not enough data on this topic	Medium
	1	act as a vector for, recognised pests and		https://www.cabi.org/isc/datasheet/108968#todescription	
		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	Not enough data https://www.cabi.org/isc/datasheet/108968#todescription	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	small species	Very high
23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)?	Yes	grows in slow-moving, calm, freshwater ponds and marshes (Armstrong, 2009), and stagnant freshwater habitats such as wetlands like in the Pantanal (Brazil) (Pott and Cervi, 1999). It occurs in temperate to subtropical regions with relatively mild winters (Flora of North America, 2008) and prefers a Mediterranean climate (Landolt, 1986) with high water temperature in summer. L. minuta is found in its introduced areas in sluggishly moving waters of ponds, pools, lakes, swamps, streams. drainade ditches. canals. and sloughs (Preston and Croft.	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	It affects the ecology of its habitat by forming mats on the water surface, reducing sunlight penetration and oxygen exchange. In Poland, it has been found in a nature reserve (Banaszek and Musial, 2009). Mats of free-floating plants such as L. minuta are well known to cause physico-chemical changes in the water beneath them (e.g. Pokorny and Rejmankova, 1983).	Very high
	4.12	Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)?	Yes	Fast growing Has high reproductive potential Has propagules that can remain viable for more than one year Reproduces asexually	Very high
	<i>Resourc</i> 5.01	<i>e exploitation</i> Is the taxon likely to consume threatened or	Not applicable	https://www.cabi.org/isc/datasheet/108968#tohabitat	Very high
		protected native taxa in the RA area?			, -
	5.02	Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?	Yes	Modification of nutrient regime https://www.cabi.org/isc/datasheet/108968#tohabitat	Very high
	Reprodu 6.01	Iction Is the taxon likely to exhibit parental care	Not applicable	https://www.cabi.org/isc/datasheet/108968#tohabitat	Very high
		and/or to reduce age-at-maturity in response to environmental conditions?			
	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	Has propagules that can remain viable for more than one year Maybe possible, but not enough data	Medium
		native taxa?		https://link.springer.com/article/10.1007/s00425-014-2053-y	Low
31	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	Yes	asexual	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	https://www.cabi.org/isc/datasheet/108968#tohabitat	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	Fast growing Has high reproductive potential Has propagules that can remain viable for more than one year Reproduces asexually	Very high
34	6.07	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	1	https://www.cabi.org/isc/datasheet/108968#tohabitat	Very high
		al mechanisms			T
35	7.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable	>1	pet trade, by birds and mammals, fish restocking	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	not yet present	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?	Yes	fragments, seeds	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	Possibility of natural dispersal between basins is low,but could be possible by wind	Low
40	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	Not applicable	not migratory species	Very high
	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	Yes	yes by birds and mammals	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	https://www.cabi.org/isc/datasheet/108968#tohabitat	High
	7.09	Is dispersal of the taxon density dependent?	No	https://www.cabi.org/isc/datasheet/108968#tohabitat	High
		ce attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle?	Yes	seeds	High
45	8.02	Ts 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	Highly adaptable to different environments Is a habitat generalist Tolerates, or benefits from, cultivation, browsing pressure, mutilation, fire etc Pioneering in disturbed areas Tolerant of shadeand, are strongly resistant to pollution	High

46	8.03	Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	Yes	Destroying the duckweed layer with herbicides does not solve the problem of excess nutrients in the water. Because of the exponential growth rate of Lemnaceae, herbicides must be used repeatedly (perhaps several times a year). Ideally, it is best to eliminate the inflow of nutrients, and the repetitive removal of the duckweed layer will greatly reduce the growth of duckweeds (Armstrong, 2009). Biological control using ducks, fish, turtles and crustaceans (water shrimp, crayfish, ostracods, freshwater prawns, daphnia, amphipods, etc.) may also help to control duckweed populations. There are a number of species of freshwater fish that eat duckweeds to supplement their diets, including grass carp (Ctenopharyngodon idella) for example. Duckweeds are also eaten by pacu (Colossoma bidens), a	High
47	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	Yes	freshwater fish native to the Amazon River (Armstrong 2009) Tolerates, or benefits from, cultivation, browsing pressure, mutilation, fire etc Pioneering in disturbed areas Tolerant of shade	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	Highly mobile locally Benefits from human association (i.e. it is a https://link.springer.com/article/10.1007/s00425-015-2264-x	Low
49	8.06	Are there effective natural enemies (predators) of the taxon present in the RA area?	Yes	Biological control using ducks, fish, turtles and crustaceans (water shrimp, crayfish, ostracods, freshwater prawns, daphnia, amphipods, etc.) may also help to control duckweed populations. There are a number of species of freshwater fish that eat duckweeds to supplement their diets, including grass carp (Ctenopharyngodon idella) for example.	High
С. С	Climate	e change			
		change	1		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?	Increase	https://www.cabi.org/isc/datasheet/108968#tohabitat	Medium
51	9.02	Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	Increase	https://www.cabi.org/isc/datasheet/108968#tohabitat	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/108968#tohabitat	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	https://www.cabi.org/isc/datasheet/108968#tohabitat	Medium
54	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Higher	https://www.cabi.org/isc/datasheet/108968#tohabitat	Medium
55	9.06	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem	Higher	https://www.cabi.org/isc/datasheet/108968#tohabitat	Medium

Statistics	
Scores	
BRA	33.0
BRA Outcome	High
BRA+CCA	43.0
BRA+CCA Outcome	High
Score partition	
A. Biogeography/Historical	16.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	2.0
3. Invasive elsewhere	10.0
B. Biology/Ecology	17.0
4. Undesirable (or persistence) traits	6.0
5. Resource exploitation	2.0
6. Reproduction	4.0
7. Dispersal mechanisms	3.0
8. Tolerance attributes	2.0
C. Climate change	10.0
9. Climate change	10.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3 5 5
2. Climate, distribution and introduction risk	5
	5
3. Invasive elsewhere	
B. Biology/Ecology	36
<b>B. Biology/Ecology</b> 4. Undesirable (or persistence) traits	12
<b>B. Biology/Ecology</b> 4. Undesirable (or persistence) traits 5. Resource exploitation	12
B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction	12
B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms	12
B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes	12 2 7 9 6
B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change	12 2 7 9 6 6
B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change	12 2 7 9 6
B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected	12 2 7 9 6 <b>6</b> 6
B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial	12 2 7 9 6 6 6 6 13
B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change 9. Climate change	12 2 7 9 6 <b>6</b> 6

Thresholds	
BRA	22.75
BRA+CCA	22.75
Confidence	
BRA+CCA	0.71
BRA	0.73
CCA	0.50
Date and Time	
23/11/20	21 17:06:48

Taxon and Assessor details	
Category	Plantae (freshwater)
Taxon name	Lemna turionifera
Common name	turion duckweed
Assessor	Marina Piria
Risk screening context	
Reason and socio-economic benefits	
Risk assessment area	Pannonian region
Taxonomy	
Native range	
Introduced range	
URL	

			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	Used in aquaculture, animal feed etc https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1749- 7345.1981.tb00273.x	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://onlinelibrary.wiley.com/doi/abs/10.1111/j.1749- 7345.1981.tb00273.x	Very high
3	1.03	Does the taxon have invasive races,	Yes	Lemna aequinocitalis, L. minuta etc.	Very high
		varieties, sub-taxa or congeners?		https://www.cabi.org/ISC/abstract/19992302892	
2. (		, distribution and introduction risk How similar are the climatic conditions of the	High	native in North America and northern Asia. In North America it	Vorschich
4	2.01	Risk Assessment (RA) area and the taxon's native range?	High	native in North America and northern Asia. In North America it occurs from Mexico north to Alaska and through much of Canada and the United States east to Nova Scotia, it is largely absent from the southeastern United States. In Asia it occurs in a broad band from Turkey, north and east across Russia to Kamchatka and Sakhalin Island (Landolt 1986). In Eurasia, the western limits of its distribution have been obscured by apparently non-native populations (Muller 2004), where it has been recorded from Austria, Belgium (Hoste & Bruinsma 2007; van Landuyt 2007), the Czech Republic, France (Muller 2004), Germany (Landolt 1986, Wolff and Ortschiedt 1993), Poland (Muller 2004), the Netherlands (Wolff & Bruinsma 2005), Sweden and Norwayhtths://citeseerx.ist.ngu.edu/viewdoc/download?doi=10.1.1	Very high
5	2.02	What is the quality of the climate matching data?	High	https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.667.41 94&rep=rep1&type=pdf Climatch confirmed	Very high
6	2.03	Is the taxon already present outside of captivity in the RA area?	No	It is horizon species	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	>1	water, by migrating birds https://www.researchgate.net/profile/Zofija- Sinkeviciene/publication/270506254_FIRST_RECORDS_OF_LEMNA TURIONIFERA IN_LITHUANIA/links/54abcd750cf2bce6aa1dba11/	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	Hungary, B. A. Lukács, A. Mesterházy, R. Vidéki & G. Király (2014): Alien aquatic vascular plants in Hungary (Pannonian ecoregion): Historical aspects, data set and trends, Plant Biosystems - An International Journal Dealing with all Aspects of Plant Biology: Official Journal of the Societa Botanica Italiana, DOI: 10.1080/11263504.2014.987846	High
3. I		elsewhere	n.		
9 10	3.01 3.02	Has the taxon become naturalised (established viable populations) outside its native range? In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	https://www.researchgate.net/profile/Zofija- Sinkeviciene/publication/270506254_FIRST_RECORDS_OF_LEMNA _TURIONIFERA_IN_LITHUANIA/links/54abcd750cf2bce6aa1dba11/ <u>FIRST-RECORDS-OF-LEMNA-TURIONIFERA-IN-LITHUANIA.pdf</u> Probably similar as other Lemnacee	Very high Low
11	3.03	In the taxon's introduced range, are there	No	no data.	Low
		known adverse impacts to aquaculture?		https://www.fao.org/ag/againfo/resources/documents/DW/dw2.ht	
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	No	Impact not recorded https://www.gbif.org/species/2867631	Low
	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	Not recorded https://www.gbif.org/species/2867631	Low
		//Ecology			
	1	able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health?	No	It is not poisonous and not pose risk to humans. Actually represents human food	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 data https://www.gbif.org/species/2867631	Low
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	it is not parasite	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	it is cosmopolitan https://www.researchgate.net/profile/Zofija- Sinkeviciene/publication/270506254_FIRST_RECORDS_OF_LEMNA _TURIONIFERA_IN_LITHUANIA/links/54abcd750cf2bce6aa1dba11/ FIRST-RECORDS-OF-LEMNA-TURIONIFERA-IN-LITHUANIA.pdf	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	No	No evidences	Low
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	No evidences	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 data	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	Not known, usually used to remove pathogens and nutrients from polluted water https://link.springer.com/chapter/10.1007/978-1-4020-6027-4_10	Low
22	4.09	Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity?	No	small bodied species	Very high
23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)?	No	typical for weetlands and tolerate up to 3 m/s	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	For other Lemna is known that reduce habitat quality but no evidence for this species.	Medium
25	4.12	Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)?	Yes	Its species name refers to the fact that it sometimes produces turions, vegetative plantlets that can disperse and go dormant for long periods.	Very high
		e exploitation			
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?	Yes	No predation behaviour Yes would exploit nutrients https://link.springer.com/chapter/10.1007/978-1-4020-6027-4_10	Very high Medium
	R <i>eprodu</i> 6.01		Not applicable		High
-		Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?	Not applicable		High
	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	https://gobotany.nativeplanttrust.org/species/lemna/turionifera/	Very high
30	6.03	Is the taxon likely to hybridise naturally with native taxa?	Yes	with lemna minor https://d-nb.info/1236692624/34	Very high
31	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	Yes	Its species name refers to the fact that it sometimes produces turions, vegetative plantlets that can disperse and go dormant for long periods. https://gobotany.nativeplanttrust.org/species/lemna/turionifera/	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	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	Its species name refers to the fact that it sometimes produces turions, vegetative plantlets that can disperse and go dormant for long periods. https://gobotany.nativeplanttrust.org/species/lemna/turionifera/	Very high
34	6.07	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	1	when appear adequate conditions	Very high
		al mechanisms			L
35	7.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable habitats nearby)?	>1	water, by migrating birds https://www.researchgate.net/profile/Zofija- Sinkeviciene/publication/270506254_FIRST_RECORDS_OF_LEMNA _TURIONIFERA_IN_LITHUANIA/links/54abcd750cf2bce6aa1dba11/	Very high
36	7.02	Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)?	No	It is not yet in RA area	Medium
37	7.03	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship	No	Probably not,not evidences	Medium
38		hulls, pilings, buoys) such that it enhances the likelihood of dispersal?			
	7.04	hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?	Yes	https://www.researchgate.net/profile/Zofija- Sinkeviciene/publication/270506254_FIRST_RECORDS_OF_LEMNA _TURIONIFERA_IN_LITHUANIA/links/54abcd750cf2bce6aa1dba11/ FIRST-RECORDS-OF-LEMNA-TURIONIFERA-IN-LITHUANIA.pdf	High
	7.05	hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?	Yes	Sinkeviciene/publication/270506254_FIRST_RECORDS_OF_LEMNA _TURIONIFERA_IN_LITHUANIA/links/54abcd750cf2bce6aa1dba11/ FIRST-RECORDS-OF-LEMNA-TURIONIFERA-IN-LITHUANIA.pdf Probably with water currents as other Lemna	High
		hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA 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	Sinkeviciene/publication/270506254_FIRST_RECORDS_OF_LEMNA _TURIONIFERA_IN_LITHUANIA/links/54abcd750cf2bce6aa1dba11/ FIRST-RECORDS-OF-LEMNA-TURIONIFERA-IN-LITHUANIA.pdf	
40	7.05	hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to	Yes	Sinkeviciene/publication/270506254_FIRST_RECORDS_OF_LEMNA _TURIONIFERA_IN_LITHUANIA/links/54abcd750cf2bce6aa1dba11/ FIRST-RECORDS-OF-LEMNA-TURIONIFERA-IN-LITHUANIA.pdf Probably with water currents as other Lemna not migratory by migratory birds https://www.researchgate.net/profile/Zofija- Sinkeviciene/publication/270506254_FIRST_RECORDS_OF_LEMNA _TURIONIFERA_IN_LITHUANIA/links/54abcd750cf2bce6aa1dba11/	High
40 41	7.05	hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both	Yes Not applicable	Sinkeviciene/publication/270506254_FIRST_RECORDS_OF_LEMNA _TURIONIFERA_IN_LITHUANIA/links/54abcd750cf2bce6aa1dba11/ FIRST-RECORDS-OF-LEMNA-TURIONIFERA-IN-LITHUANIA.pdf Probably with water currents as other Lemna not migratory by migratory birds https://www.researchgate.net/profile/Zofija- Sinkeviciene/publication/270506254_FIRST_RECORDS_OF_LEMNA _TURIONIFERA_IN_LITHUANIA/links/54abcd750cf2bce6aa1dba11/ FIRST-RECORDS-OF-LEMNA-TURIONIFERA-IN-LITHUANIA.pdf by birds https://www.researchgate.net/profile/Zofija- Sinkeviciene/publication/270506254_FIRST_RECORDS_OF_LEMNA _TURIONIFERA_IN_LITHUANIA/links/54abcd750cf2bce6aa1dba11/ TURIONIFERA_IN_LITHUANIA/links/54abcd750cf2bce6aa1dba11/	High Very high
40 41 42	7.05 7.06 7.07	hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be	Yes Not applicable Yes	Sinkeviciene/publication/270506254_FIRST_RECORDS_OF_LEMNA _TURIONIFERA_IN_LITHUANIA/links/54abcd750cf2bce6aa1dba11/ FIRST-RECORDS-OF-LEMNA-TURIONIFERA-IN-LITHUANIA.pdf Probably with water currents as other Lemna not migratory by migratory birds https://www.researchgate.net/profile/Zofija- Sinkeviciene/publication/270506254_FIRST_RECORDS_OF_LEMNA _TURIONIFERA_IN_LITHUANIA/links/54abcd750cf2bce6aa1dba11/ FIRST-RECORDS-OF-LEMNA-TURIONIFERA-IN-LITHUANIA.pdf by birds https://www.researchgate.net/profile/Zofija- Sinkeviciene/publication/270506254_FIRST_RECORDS_OF_LEMNA	High Very high Very high
40 41 42 43 8.7	7.05 7.06 7.07 7.08 7.09	hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? ce attributes	Yes Not applicable Yes Yes No	Sinkeviciene/publication/270506254_FIRST_RECORDS_OF_LEMNA _TURIONIFERA_IN_LITHUANIA/links/54abcd750cf2bce6aa1dba11/ FIRST-RECORDS-OF-LEMNA-TURIONIFERA-IN-LITHUANIA.pdf Probably with water currents as other Lemna not migratory by migratory birds https://www.researchgate.net/profile/Zofija- Sinkeviciene/publication/270506254_FIRST_RECORDS_OF_LEMNA _TURIONIFERA_IN_LITHUANIA/links/54abcd750cf2bce6aa1dba11/ FIRST-RECORDS-OF-LEMNA-TURIONIFERA-IN-LITHUANIA.pdf by birds https://www.researchgate.net/profile/Zofija- Sinkeviciene/publication/270506254_FIRST_RECORDS_OF_LEMNA _TURIONIFERA_IN_LITHUANIA/links/54abcd750cf2bce6aa1dba11/ FIRST-RECORDS-OF-LEMNA-TURIONIFERA-IN-LITHUANIA.pdf https://en.wikipedia.org/wiki/Lemna_turionifera	High Very high Very high High Very high
40 41 42 43 8.7	7.05 7.06 7.07 7.08 7.09	hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as 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 Not applicable Yes Yes	Sinkeviciene/publication/270506254_FIRST_RECORDS_OF_LEMNA _TURIONIFERA_IN_LITHUANIA/links/54abcd750cf2bce6aa1dba11/ FIRST-RECORDS-OF-LEMNA-TURIONIFERA-IN-LITHUANIA.pdf Probably with water currents as other Lemna by migratory birds https://www.researchgate.net/profile/Zofija- Sinkeviciene/publication/270506254_FIRST_RECORDS_OF_LEMNA _TURIONIFERA_IN_LITHUANIA/links/54abcd750cf2bce6aa1dba11/ FIRST-RECORDS-OF-LEMNA-TURIONIFERA-IN-LITHUANIA.pdf by birds https://www.researchgate.net/profile/Zofija- Sinkeviciene/publication/270506254_FIRST_RECORDS_OF_LEMNA _TURIONIFERA_IN_LITHUANIA/links/54abcd750cf2bce6aa1dba11/ FIRST-RECORDS-OF-LEMNA-TURIONIFERA-IN-LITHUANIA.pdf by birds https://www.researchgate.net/profile/Zofija- Sinkeviciene/publication/270506254_FIRST_RECORDS_OF_LEMNA _TURIONIFERA_IN_LITHUANIA/links/54abcd750cf2bce6aa1dba11/ FIRST-RECORDS-OF-LEMNA-TURIONIFERA-IN-LITHUANIA.pdf	High Very high Very high High
40 41 42 43 <u>8. 7</u> 44	7.05 7.06 7.07 7.08 7.09	hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as 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 Not applicable Yes Yes No	Sinkeviciene/publication/270506254_FIRST_RECORDS_OF_LEMNA _TURIONIFERA_IN_LITHUANIA/links/54abcd750cf2bce6aa1dba11/ FIRST-RECORDS-OF-LEMNA-TURIONIFERA-IN-LITHUANIA.pdf Probably with water currents as other Lemna not migratory by migratory birds https://www.researchgate.net/profile/Zofija- Sinkeviciene/publication/270506254_FIRST_RECORDS_OF_LEMNA _TURIONIFERA_IN_LITHUANIA/links/54abcd750cf2bce6aa1dba11/ FIRST-RECORDS-OF-LEMNA-TURIONIFERA-IN-LITHUANIA.pdf by birds https://www.researchgate.net/profile/Zofija- Sinkeviciene/publication/270506254_FIRST_RECORDS_OF_LEMNA _TURIONIFERA_IN_LITHUANIA/links/54abcd750cf2bce6aa1dba11/ FIRST-RECORDS-OF-LEMNA-TURIONIFERA-IN-LITHUANIA.pdf by birds https://www.researchgate.net/profile/Zofija- Sinkeviciene/publication/270506254_FIRST_RECORDS_OF_LEMNA _TURIONIFERA_IN_LITHUANIA/links/54abcd750cf2bce6aa1dba11/ FIRST-RECORDS-OF-LEMNA-TURIONIFERA-IN-LITHUANIA.pdf https://en.wikipedia.org/wiki/Lemna_turionifera	High Very high Very high High Very high
40 41 42 42 43 8. 7 44	7.05 7.06 7.07 7.08 7.09 7.09 6.01	hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that	Yes Not applicable Yes Yes No Yes	Sinkeviciene/publication/270506254_FIRST_RECORDS_OF_LEMNA _TURIONIFERA_IN_LITHUANIA/links/54abcd750cf2bce6aa1dba11/ FIRST-RECORDS-OF-LEMNA-TURIONIFERA-IN-LITHUANIA.pdf Probably with water currents as other Lemna not migratory by migratory birds https://www.researchgate.net/profile/Zofija- Sinkeviciene/publication/270506254_FIRST_RECORDS_OF_LEMNA _TURIONIFERA_IN_LITHUANIA/links/54abcd750cf2bce6aa1dba11/ FIRST-RECORDS-OF-LEMNA-TURIONIFERA-IN-LITHUANIA.pdf by birds https://www.researchgate.net/profile/Zofija- Sinkeviciene/publication/270506254_FIRST_RECORDS_OF_LEMNA _TURIONIFERA_IN_LITHUANIA/links/54abcd750cf2bce6aa1dba11/ FIRST-RECORDS-OF-LEMNA-TURIONIFERA-IN-LITHUANIA.pdf by birds https://www.researchgate.net/profile/Zofija- Sinkeviciene/publication/270506254_FIRST_RECORDS_OF_LEMNA _TURIONIFERA_IN_LITHUANIA/links/54abcd750cf2bce6aa1dba11/ FIRST-RECORDS-OF-LEMNA-TURIONIFERA-IN-LITHUANIA.pdf https://en.wikipedia.org/wiki/Lemna_turionifera	High Very high Very high Very high

			1		i
48	8.05	Is the taxon able to tolerate salinity levels	Yes		High
		that are higher or lower than those found in		by specific stresses, e.g., salinity	
		its usual environment?		https://www.proquest.com/docview/2174512883?pq-	
				origsite=gscholar&fromopenview=true	
49	8.06	Are there effective natural enemies	Yes		Medium
		(predators) of the taxon present in the RA		take this Laminacce species too	
_		area?		https://www.fao.org/ag/againfo/resources/documents/DW/dw2.ht	
		e change	_		
	9.01	change Under the predicted future climatic	Increase	https://pdf.sciencedirectassets.com/273182/1-s2.0-	Medium
50	9.01	conditions, are the risks of entry into the RA	Increase	S1617138118X00053/1-s2.0-S1617138118300232/main.pdf?X-	neulum
		area posed by the taxon likely to increase,		Amz-Security-	
		decrease or not change?		Token=IQoJb3JpZ2luX2VjEGkaCXVzLWVhc3QtMSJHMEUCIQDc8m2	
		decrease of not change.		PJnnbKZ42LpUSBfBoQegF7CSGzz8ITKI2PwKAqgIgZT7LRnEwkyfoC1	
				pJqm5DnwhYUI1ZBZWnL5qJGNe%2Ftxwq%2BqMIMRAEGqwwNTkw	
				MDM1NDY4NjUiDLCp1Blg4SPIedhM9SrXA5XmAGJcYVIfJYMG9002ui	
				MkSgrk%2BFoSkcpVCnGR24ao%2BhDtLBRANNmV7HpYQAZnrR2wF	
				2Ql2O5TqJ2pr%2B72gP5djuFfbTTGDNTIOrXsU0Dh7w8V2hLQA%2F	
				M4utaQXG3ih%2BGw2n%2FwacOWTME%2FexjUcqMq%2F5pxmyZ	
				zITOjdS0bzxc1J0DhxMrnL11cWi4mzqYxg3PhBFcnLKAyBVY2%2BW0	
				8qYaThKh4HfGKofH2sT4WJfLi7odtm9ZwJkJKzRuXou1s%2FweqAm	
				G7JSBsBAzkd2txyLFAknM7ImVdKgqzf9kOl6QxiymEtpDe0R7Y9aurV	
				qSwlSLsMhL7fQgVTZ0ixSzfgUIsdHQ144pwsacCtBzkg6gS3BLL%2Fe	
				eSXIkkKoSTIDsS2Dfzv7bBWYOvxYw854d2k6WIa4osE6FZMyO%2F4	
				naDzSGmbWx%2FDnQwdAFFcuBwdLba1mbTSTdSJYXxCiSbFwQIh7	
				WlxorP6vhJZLtdJkjYhtO4yi79XOC34%2BnwZOaiTCCS2sQGbBFvOZ	
				UWKUpC10yTxYTyQe%2B%2FSyDjfEXv1jDsW%2BpFoO5hDCLfPpiH	
				IBOzT01IIHmaMWybLu0UGuIK4N%2BBdTCzifiJom0vzkK39yPl6etp0	
				k%2BJdRwIrDDegu%2BMBjqIAUpMAYHFnuj4vujKO5BxGXN3kTs7V4	
				Tz LKFQ h6dwGz x EQKs QZMk02dTO exVSNCIO jwCYV x gfeAaPkyG%2Fi	
				tN6mhrMtPxorL%2FdN9ZihI6dVkFQcQ2YJsCxBPuoNVRZ1Uw2mwttv	
				fKc4HZf%2BqmeVN9UT%2FAHR5DOgC1aoxV9iRAipOSoyqEdWPBV	
				9cW51cOLUtH0AgfHYtWC8AwShL2uND4wQGfM1aPGTw%3D%3D&	
				X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-	
				Date=20211122T162442Z&X-Amz-SignedHeaders=host&X-Amz-	
				Expires=300&X-Amz-	
				Credential=ASIAQ3PHCVTY2SYFFQ6V%2F20211122%2Fus-east-	
				1%2Fs3%2Faws4_request&X-Amz- Signature=3860ad8e3b8989785bcc56eb131bfc4007f3485e12a5c4	
				045371e5a28e9c93c2&hash=31366d759648af0f2181634335b9a79	
				6b84a9338b735c3ad907afd353479342e&host=68042c943591013a	
				c2b2430a89b270f6af2c76d8dfd086a07176afe7c76c2c61&pii=S161	
				7138118300232&tid=spdf-69f51aa4-e438-40bd-bf9b-	
				fa86c1b46cf7&sid=05d25e953a1b1448e48be396c93b5408ff94gxrq	
51	9.02	Under the predicted future climatic	Increase	https://pdf.sciencedirectassets.com/273182/1-s2.0-	Medium
51	5.02	conditions, are the risks of establishment	Increase	S1617138118X00053/1-s2.0-S1617138118300232/main.pdf?X-	nearann
		posed by the taxon likely to increase,		Amz-Security-	
		decrease or not change?		Token=IQoJb3JpZ2luX2VjEGkaCXVzLWVhc3QtMSJHMEUCIQDc8m2	
				PJnnbKZ42LpUSBfBoQegF7CSGzz8ITKl2PwKAqgIgZT7LRnEwkyfoC1	
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	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://pdf.sciencedirectassets.com/273182/1-s2.0- S1617138118X00053/1-s2.0-S1617138118300232/main.pdf?X- Amz-Security- Token=IQ0Jb3JpZ2luX2VjEGkaCXVzLWVhc3QtMSJHMEUCIQDc8m2 PJnnbKZ42LpUSBfBoQegF7CSGzz8ITKI2PwKAqgIgZT7LRneWyfoC1 pJgm5DnwhYUI1ZBZWnL5qJGNe%2Ftxwq%2BgMIMRAEGgwwNTkw MDM1NDY4NjUiDLCp1Blg4SPIedhM9SrXA5XmAGJcYVIfJYMG9002ui MkSgrk%2BFoSkcpVCnGR24ao%2BhDtLBRANNmV7HpYQAZnrR2wF 2Ql205TqJ2pr%2B72gP5djuFfbTTGDNTIOrXsU0Dh7w8V2hLQA%2F M4utq2XG3ih%2BGw2n%2FwacOWTME%2FexjUcqMq%2F5pxmyZ zIT0jdS0bzxc1J0DhXMrnL11CWi4mzqYxg3PhBFcnLKAyBVY2%2BW0 8qYaThKh4Hf6KofH2ST4WJfLi7odtm9ZwJkJKzRuXou1s%2FweqAm G7JSBsBAzkd2txyLFAknM7ImVdKgq2f9k0I6dxijmEtpDe0R7Y9aurV qSwISLSMhL7fQgVT20ixSzfgUISdHQ144pwsacCtBzkg6gS3BLL%2Fe eSX1kkKoSTIDSSDZv7bBWYOvXYw854d2k6WIa4osE6FZMy0%2F4 naDzSGmbWx%2FDnQwdAFFcuBwdLba1mbTSTdSJYXxCiSbFwQIh7 WixorF6vhJZLtdJkjYhtO4yi79XOC34%2BnwZoaiTCCS2sQGbBFvO2 UWKUpC10yTxYTyQe%2B%2FSyDjfEXv1JDsW%2BpFo05hDCLfPpiH IBO2T011IHmaMWybLu0UGLIK4N%2BBdTCzifJ0m0vzkK39yPl6etp0 k%2BJdRwlrDDegu%2BMBjqIAUpMAYHFnuj4vujKO5BxGXN3kTs7V4 TzLKFQh6dwGzxEQKsQZMk02dT0exVSNCIOjwCYVxgfeAaPkyG%2Fi tN6mhrMtPxorL%2FdN9ZihI6dVkFQCQ2YJSCXBPu0NVRZ1JW2mwttv fKc4HZf%2BqmeVN9UT%2FAHRSD0gC1aoxV9iRAipOSoyqEdWPBV 9cw51cOLUtH0AgfHYtWC8AwShL2uND4wQGfM1APGTw%3D%3D& X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz- Date=20211122T162442Z&X-Amz-SignedHeaders=host&X-Amz- Expires=300&X-Amz- Signature=3860ad8a3b8989785bcc56eb131bfc4007f3485e12a5c4 045371e5a28e9C93c2&hash=31366d759648f0f2181634335b9a79 6b84a9338b735c3ad907af353479342e&host=68042c943591013a c2b2430a89b270f6af2c76d8dfd86a07176afe7c76c2c6181µi=S161 7138118300232&tid=spdf-69f51aa4-e438-40bd-bf9b- fa86c1b46cf7&sid=05d25e953a1b1448e48be396c93b5408ff94gxrq	High
53	9.04	Under the predicted future climatic conditions, what is the likely magnitude of	No change	Probably will stay the same	Medium
		future potential impacts on biodiversity and/or ecological integrity/status?			
	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Higher No change	https://pdf.sciencedirectassets.com/273182/1-s2.0- S1617138118X00053/1-s2.0-S1617138118300232/main.pdf?X- Amz-Security- Token=IQoJb3JpZ2luX2VjEGkaCXVzLWVhc3QtMSJHMEUCIQDc8m2 PJnnbKZ42LpUSBfBoQegF7CSGzz8ITKI2PwKAqgIgZT7LRnEwkyfoC1 pJqm5DnwhYUI1ZBZWnL5qJGNe%2Ftxwq%2BgMIMRAEGgwwNTkw MDM1NDY4NjUiDLCp1Blg4SPIedhM9SrXA5XmAGJcYVIfJYMG9002ui MkSgrk%2BFoSkcpVCnGR24ao%2BhDtLBRANNW7HpYQAZnrR2wF 2QI205Tq12pr%2B72gP5djuFfbTTGDNTIOrXsU0Dh7w8V2hLQA%2F M4utaQXG3in%2B6m2n%2Fwac0WTME%2FexjUcqMq%2F5pxmyZ zITOjdS0bzxc1J0DhXHrnL1cWidmzqYxg3PhBFcnLKAyBVY2%2BW0 8qYaThKh4HfGKofH2sT4WJfLi7odtm9ZwJkJKzRuXou1s%2FweqAm G7JSBsBAzkd2txyLFAknM7ImVdKgqzf9k0l6QxiymEtpDe0R7Y9aurV qSwlSLsMhL7fQgVTZ0ixSzfgUIsdHQ144pwsacCtBzkg6gS3BLL%2Fe eSX1kkkoSTIDsS2Dfzv7bBWY0vXYw854d2k6WIa4osE6FZMy0%2F4 naDzSGmbWx%2FDnQwdAFFcuBwdLba1mbTSTdSJYXxCiSbFwQIh7 WlxorP6vhJ2LtdJkJYht04yi79XOC34%2BnwZ0aiTCCS2sQGBBFv0Z UWKUpC10yTxYTyQe%2B%2FSyDjfEXv1jDsW%2BpFo05hDCLfPpiH IB0ZT0111HmaMWybLu0UGuIK4N%2BBdTCzifJom0vzkK39yPl6etp0 k%2BJdRwIrDDegu%2BMBjqIAUpMAYHFnuj4vujK05BsGXN3kTs7V4 TzLKFQh6dwGzxEQKsQZMk02dT0exVSNCI0jwCYVxgfeAaPkyG%2Fi tN6mhrMtPxorL%2FdN9ZihI6dVkFQcQ2YJSCXBPuoNVRZ1Uw2mwttv fKc4HZf%2BqmeVN9UT%2FAHR5D0gC1aoxV9iRAipOSoyqEdWPBV 9cW51cOLUtH0AgfHYtWC8awShL2uND4wQGfM1aPGTw%3D%3D& X-Amz-Algorithm=AWS4-HMAC-SHA256&LAmz- Date=20211122T1624422&X-Amz-SignedHeaders=host&X-Amz- Expires=300&X-Amz- CredentiaI=ASIAQ3PHCVTY2SYFFQ6V%2F20211122%2Fus-east- 1%2Fs3%2Faws4_request&X-Amz- Signature=3860ad&a58989785bcc56eb131bfc4007f3485e12a5c4 045371e5a28e9C93c2&hash=31366d759648af0f2181634335b9a79 6b84a9338b735c3ad907afd353479342e&host=68042c943591013a c2b2430a89b270f6af2c76d8dfd086a07176afe7c76c2c61&pii=S161 7138118300232&tid=spdf-69f51aa4-e438-40bd-bf9b- fa86c1b46cf7&sid=05d25e953a1b1448e48be396c3b5408ff94gxrq Probably no change	High
55	9.00	conditions, what is the likely magnitude of	NO CHANGE		medium
		future potential impacts on ecosystem services/socio-economic factors?			

Statistics	
Scores	
BRA	21.0
BRA Outcome	Medium
BRA+CCA	27.0
BRA+CCA Outcome	High
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	2.0
5. Resource exploitation	2.0
6. Reproduction	6.0
7. Dispersal mechanisms	3.0
8. Tolerance attributes	1.0
C. Climate change	6.0
9. Climate change	6.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	35
2. Climate, distribution and introduction risk	
<i>3. Invasive elsewhere</i>	5
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2
6. Reproduction	2 7 9 6
7. Dispersal mechanisms	9
8. Tolerance attributes	
C. Climate change	<b>6</b> 6
9. Climate change	6
Sectors affected	
Commercial Environmental	6
Species or population nuisance traits	2
Species or population nuisance traits	22
Thresholds	22.75
BRA	22.75
BRA+CCA	22.75
Confidence	0.71
BRA+CCA	0.71
BRA	0.73
CCA	0.58

Date and Time 23/11/2021 17:07:34

axon and Assessor details					
Category	Plantae (freshwater)				
Taxon name	Ludwigia peploides				
Common name	floating primrose-willow				
Assessor	Tena Radočaj				
Risk screening context					
Reason and socio-economic benefits					
Risk assessment area	Pannonian region				
Taxonomy					
Native range					
Introduced range					
URL					

			Response	Justification (references and/or other information)	Confidence
		ography/Historical	_		_
<u>1. l</u>		cation/Cultivation			Link
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	It is most likely that escape from aquaculture explains most of the adventive introductions; this plant is very commonly sold as an ornamental (CABI, 2020)	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 most likely that escape from aquaculture explains most of the adventive introductions; this plant is very commonly sold as an ornamental (CABI, 2020)	Very high
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	No	No evidence	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?	Low	The similarity of climatic conditions between native areas and the RA area is low (Climatch)	Medium
5	2.02	What is the quality of the climate matching data?	Medium	I used climatch and distribution map of CABI	Low
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	Buzjak, S., & Sedlar, Z. (2018). Ludwigia peploides (Kunth.) PH Raven–Floating Water Primrose, a new species in Croatian flora from the list of invasive alien species of Union concern. Natura Croatica: Periodicum Musei Historiae Naturalis Croatici, 27(2),	Very high
7 8	2.04	How many potential vectors could the taxon use to enter in the RA area? Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)?	None	It is present in the RA area Buzjak, S., & Sedlar, Z. (2018). Ludwigia peploides (Kunth.) PH Raven–Floating Water Primrose, a new species in Croatian flora from the list of invasive alien species of Union concern. Natura Croatica: Periodicum Musei Historiae Naturalis Croatici, 27(2), 351-356. It is present in the RA area Buzjak, S., & Sedlar, Z. (2018). Ludwigia peploides (Kunth.) PH Raven–Floating Water Primrose, a new species in Croatian flora from the list of invasive alien species of Union concern. Natura Croatica: Periodicum Musei Historiae	Medium Low
2		!		Naturalis Croatici, 27(2), 351-356.	
<u>3. 1</u> 9	3.01	e elsewhere Has the taxon become naturalised (established viable populations) outside its native range?	Yes	Verloove, F., & Alves, P. (2016). New vascular plant records for the western part of the Iberian Peninsula (Portugal and Spain). Folia Botanica Extremadurensis, (10), 5-23.	High
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	This species causes declines in biodiversity. Due to the species' allelopathic activity, it poses a severe threat to vulnerable native flora (CABI, 2020)	Very 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	This species has an allelopathic effect that impacts water quality throughout the year. Its tendency to grow in thick mats also contributes to physical alteration of the environment, making it unsuitable for sensitive species. (CABI, 2020)	Very high
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	Yes	This plant can grow very densely, impeding navigation and interfering with hunting, fishing and other recreational activities (CEH, 2007). (CABI, 2020)	Very high
		y/Ecology			
		Table (or persistence) traits Is it likely that the taxon will be poisonous or	No	No evidence	Low
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 unstative taxa)	Yes	RUAUX, B. (2008). Invasive plants in river corridors (biological characteristics, the impacts of Ludwigia peploides and L.	Low
16	4.03	protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	grandiflora in the Middle Loire and the implications for 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	Vuković, N., Šegota, V., Rimac, A., Koletić, N., & Alegro, A. (2021). New records of alien plants-Ludwigia peploides (Kunth) PH Raven, Reynoutria sachalinensis (F. Schmidt) Nakai and Nicotiana glauca Graham in Croatia. Natura Croatica: Periodicum Musei Historiae Naturalis Croatici, 30(1), 27-35.	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	For Croatia yet no information, but I think L. peploides will be adverse impact. It is generally considered a threat to biodiversity in its introduced range. (CABI, 2020)	Low
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes	For Croatia yet no information, but I think L. peploides will be adverse impact. This plant can cause substantial nuisance to recreational users by impeding navigation and interfering with hunting, fishing and other recreational activities (CABI, 2020)	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 area?	No	No cases of pathogen pollution are reported for L. peploides (Robert, H., Lafontaine, RM., Beudels-Jamar, R.C., Delsinne, T. (2013). Risk analysis of the Water Primrose Ludwigia peploides (Kunth) P.H. Raven Risk analysis report of non-native organisms in Belgium from the Royal Belgian Institute of Natural Sciences for the Federal Public Service Health, Food chain safety and Environment. 35 p)	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 cases of pathogen pollution are reported for L. peploides (Robert, H., Lafontaine, RM., Beudels-Jamar, R.C., Delsinne, T. (2013). Risk analysis of the Water Primrose Ludwigia peploides (Kunth) P.H. Raven Risk analysis report of non-native organisms in Belgium from the Royal Belgian Institute of Natural Sciences for the Federal Public Service Health, Food chain safety and Environment - Sen)	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	and Environment. 35 p) Vuković, N., Šegota, V., Rimac, A., Koletić, N., & Alegro, A. (2021). New records of alien plants–Ludwigia peploides (Kunth) PH Raven, Reynoutria sachalinensis (F. Schmidt) Nakai and Nicotiana glauca Graham in Croatia. Natura Croatica: Periodicum Musei Historiae Naturalis Croatici, 30(1), 27-35.	Low
23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g.	No	L. peploides can be found in wetlands, on shorelines, in slow-	Low
24	4.11	Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa?	Yes	flowing rivers, ponds, rice fields, marshes and in other freshwater environments (CABI, 2020) This species has an allelopathic effect that impacts water quality throughout the year. Where it is invasive, it often has far reaching and negative effects on multiple trophic levels (CABI, 2020)	Medium
25	4.12	Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)?	Yes	Vuković, N., Šegota, V., Rimac, A., Koletić, N., & Alegro, A. (2021). New records of alien plants–Ludwigia peploides (Kunth) PH Raven, Reynoutria sachalinensis (F. Schmidt) Nakai and Nicotiana glauca Graham in Croatia. Natura Croatica: Periodicum Musei Historiae Naturalis Croatici. 30(1). 27-35.	Low
		e exploitation			
26	5.01	Is the taxon likely to consume threatened or protected native taxa in the RA area?	Not applicable	Not applicable	Very high
	5.02	Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?	No	No data available	Low
	Reprodu		N. 1. 1. 1.1		N/ 111
		Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?	Not applicable		Very high
29	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	Vuković, N., Šegota, V., Rimac, A., Koletić, N., & Alegro, A. (2021). New records of alien plants–Ludwigia peploides (Kunth) PH Raven, Reynoutria sachalinensis (F. Schmidt) Nakai and Nicotiana glauca Graham in Croatia. Natura Croatica: Periodicum Musei Historiae Naturalis Croatici, 30(1), 27-35.	High
30	6.03	Is the taxon likely to hybridise naturally with	No	No evidence	Low
31	6.04	native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction?	Yes	Reproduction in Ludwigia peploides includes both sexual and asexual reproduction (Ramstetter, J., Marlboro, V., & Mott-White,	Medium
	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	No	J. Ludwigia polycarpa Short & Peter. Many-Fruited False- This species can grow in a broad range of habitats due to its high degree of genetic polymorphism and phenotypic plasticity (CABI, 2020)	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	L. peploides is self-compatible and the species has a very high potential seed output (10,000 – 14,000 seeds per square metre) (CABI, 2020)	Low
	6.07	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	1	Robert, H., Lafontaine, RM., Beudels-Jamar, R.C., Delsinne, T. (2013). Risk analysis of the Water Primrose Ludwigia peploides (Kunth) P.H. Raven Risk analysis report of non-native organisms in Belgium from the Royal Belgian Institute of Natural Sciences for the Federal Public Service Health, Food chain safety and Environment. 35 p.	Low
	<i>ispersa</i> 7.01	al mechanisms How many potential internal	>1	Botanical gardens and zoos, Flooding and other natural disasters,	High
	-	vectors/pathways could the taxon use to disperse within the RA area (with suitable		Interconnected waterways (CABI, 2020)	-
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	Flooding, Interconnected waterways (CABI, 2020)	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 evidence	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	No evidence (Robert, H., Lafontaine, RM., Beudels-Jamar, R.C., Delsinne, T. (2013). Risk analysis of the Water Primrose Ludwigia peploides (Kunth) P.H. Raven Risk analysis report of non-native organisms in Belgium from the Royal Belgian Institute of Natural Sciences for the Federal Public Service Health, Food chain safety and Environment. 35 p).	Low
	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	Stem fragments are spread by water currents, animals and humans (Robert, H., Lafontaine, RM., Beudels-Jamar, R.C., Delsinne, T. (2013). Risk analysis of the Water Primrose Ludwigia peploides (Kunth) P.H. Raven Risk analysis report of non-native organisms in Belgium from the Royal Belgian Institute of Natural Sciences for the Federal Public Service Health, Food chain safety and Environment. 35 p).	High
40	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	Not applicable		Very high
41	7.07	Are propagules or eggs of the taxon likely to	Yes	spread by animals, humans (CABI, 2020)	Low
42	7.08	be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the	Yes	Flooding (CABI, 2020)	Low

43	7.09	Is dispersal of the taxon density dependent?	No	Robert, H., Lafontaine, RM., Beudels-Jamar, R.C., Delsinne, T. (2013). Risk analysis of the Water Primrose Ludwigia peploides (Kunth) P.H. Raven Risk analysis report of non-native organisms in Belgium from the Royal Belgian Institute of Natural Sciences for the Federal Public Service Health, Food chain safety and Environment. 35 p.	Low
8. 7	olerand	ce attributes			
44	8.01	Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle?	No	No evidence	Low
45	8.02	Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being	Yes	This species can grow in a broad range of habitats due to its high degree of genetic polymorphism and phenotypic plasticity (CABI, 2020).	Medium
46	8.03	Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	Yes	Several herbicides have been used with reported success, including halosulfuron-methyl, glyphosate and triclopyr (CABI, 2020). Sterile grass carp, Ctenopharyngodon idella, have been used to control L. peploides (CABI, 2020)	Low
47	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	Yes	L. peploides can tolerate from environmental disturbance. It is also tolerant of flooding (CABI, 2020)	Low
		Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	No	No evidence. Freshwater species	Low
		Are there effective natural enemies (predators) of the taxon present in the RA	Yes	Maybe, some insects	Low
		e change			
		change	Net en l'		Norma Inita I
50	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?	Not applicable	It is present in RA area. Vuković, N., Šegota, V., Rimac, A., Koletić, N., & Alegro, A. (2021). New records of alien plants-Ludwigia peploides (Kunth) PH Raven, Reynoutria sachalinensis (F. Schmidt) Nakai and Nicotiana glauca Graham in Croatia. Natura Croatica: Periodicum Musei Historiae Naturalis	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	There is no doubt that the species is able to establish, but prefer Mediterranean climate. (Robert, H., Lafontaine, RM., Beudels- Jamar, R.C., Delsinne, T. (2013). Risk analysis of the Water Primrose Ludwigia peploides (Kunth) P.H. Raven Risk analysis report of non-native organisms in Belgium from the Royal Belgian Institute of Natural Sciences for the Federal Public Service Health, Food chain safety and Environment. 35 p).	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 is no doubt that the species is able to establish, but prefer Mediterranean climate. (Robert, H., Lafontaine, RM., Beudels- Jamar, R.C., Delsinne, T. (2013). Risk analysis of the Water Primrose Ludwigia peploides (Kunth) P.H. Raven Risk analysis report of non-native organisms in Belgium from the Royal Belgian Institute of Natural Sciences for the Federal Public Service Health, Food chain safety and Environment. 35 p).	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 is no doubt that the species is able to establish, but prefer Mediterranean climate. (Robert, H., Lafontaine, RM., Beudels- Jamar, R.C., Delsinne, T. (2013). Risk analysis of the Water Primrose Ludwigia peploides (Kunth) P.H. Raven Risk analysis report of non-native organisms in Belgium from the Royal Belgian Institute of Natural Sciences for the Federal Public Service Health, Food chain safety and Environment. 35 p).	Medium
		Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	No change	There is no doubt that the species is able to establish, but prefer Mediterranean climate. (Robert, H., Lafontaine, RM., Beudels- Jamar, R.C., Delsinne, T. (2013). Risk analysis of the Water Primrose Ludwigia peploides (Kunth) P.H. Raven Risk analysis report of non-native organisms in Belgium from the Royal Belgian Institute of Natural Sciences for the Federal Public Service Health, Food chain safety and Environment. 35 p).	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	There is no doubt that the species is able to establish, but prefer Mediterranean climate. (Robert, H., Lafontaine, RM., Beudels- Jamar, R.C., Delsinne, T. (2013). Risk analysis of the Water Primrose Ludwigia peploides (Kunth) P.H. Raven Risk analysis report of non-native organisms in Belgium from the Royal Belgian Institute of Natural Sciences for the Federal Public Service Health, Food chain safety and Environment. 35 p).	Medium

Statistics	
Scores	
BRA	22.0
BRA Outcome	Medium
BRA+CCA	22.0
BRA+CCA Outcome	Medium
Score partition	
A. Biogeography/Historical	9.0
1. Domestication/Cultivation	2.0
2. Climate, distribution and introduction risk	0.0
3. Invasive elsewhere	7.0
B. Biology/Ecology	13.0
4. Undesirable (or persistence) traits	7.0
5. Resource exploitation	0.0
6. Reproduction	4.0
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
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	10
Throcholdo	

Thresholds	
BRA	22.75
BRA+CCA	22.75
Confidence	
BRA+CCA	0.47
BRA	0.46
CCA	0.58

06/12/2021 20:51:16

Date and Time

axon and Assessor details					
Category	Plantae (freshwater)				
Taxon name	Myriophyllum heterophyllum				
Common name	twoleaf watermilfoil				
Assessor	Tena Radočaj				
Risk screening context					
Reason and socio-economic benefits					
Risk assessment area	Pannonian region				
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	Aquaria and garden ponds (Global Invasive Species Database (2021) Species profile: Myriophyllum heterophyllum).	High
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	M. heterophyllum is a popular plant in the aquarium and water gardening trades and can readily be obtained from any number of aquatic plant vendors under a variety of names. (CABI,2020)	Very high
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	No	No evidence	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?	Low	The similarity of climatic conditions between native areas and the RA area is low (Climatch)	Medium
5	2.02	What is the quality of the climate matching data?	Medium	I used climatch and distribution map of CABI	Low
6	2.03	Is the taxon already present outside of captivity in the RA area?	No	M. heterophyllum is not present in RA area. (Jasprica, N., Lasić, A., Hafner, D., & Bratoš Cetinić, A. (2017). Myriophyllum heterophyllum Michx.(Haloragaceae) u Hrvatskoj. Natura Croatica: Periodicum Musei Historiae Naturalis Croatici, 26(1), 99-103).	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	Pets and aquarium species (CABI, 2020)	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	Myriophyllum heterophyllum is present as an alien species in nine European countries: Hungary (Jasprica, N., Lasić, A., Hafner, D., & Bratoš Cetinić, A. (2017). Myriophyllum heterophyllum Michx.(Haloragaceae) u Hrvatskoj. Natura Croatica: Periodicum Musei Historiae Naturalis Croatici. 26(1), 99-103).	Medium
3. I	1	e elsewhere	1		
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	Myriophyllum heterophyllum is present as an alien species in nine European countries: Austria, Belgium, France, Germany, Hungary, the Netherlands, Spain, Switzerland and the United Kingdom (Jasprica, N., Lasić, A., Hafner, D., & Bratoš Cetinić, A. (2017). Myriophyllum heterophyllum Michx.(Haloragaceae) u Hrvatskoj. Natura Croatica: Periodicum Musei Historiae Naturalis Croatici.	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	Thick mats often out-competing native vegetation (Global Invasive Species Database (2021) Species profile: Myriophyllum heterophyllum.) Dense mono-specific growth of any aquatic plant species can incur impacts on native plant communities and other aquatic organisms such as invertebrates and fish.	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	M. heterophyllum is highly competitive and able to outcompete other aquatic plants. It forms dense mats of submergent vegetative material throughout the water column and at the water surface, which can prevent water flow, reduce sunlight and reduce oxygen availability. The resulting low oxygen conditions can harm or kill aquatic organisms (CABI, 2020)	Very high
13	3.05	In the taxon's introduced range, are there	Yes	M. heterophyllum forms dense stands in water bodies, which have	Very high
P ·	Piolog	known adverse socio-economic impacts?	l	negative effects on boating, swimming and aesthetics. (CABI,	
		y/Ecology able (or persistence) traits			
			No	Global Invasive Species Database (2021) Species profile:	Low
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	Myriophyllum heterophyllum. 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	It can tolerate high summer temperatures as well as cold winter temperatures where it can be covered by ice during the winter months.	Low
	4.05	Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA area?	Yes	M. heterophyllum is highly competitive and able to outcompete other aquatic plants. It forms dense mats of submergent vegetative material throughout the water column and at the water surface, which can prevent water flow, reduce sunlight and reduce oxygen availability. The resulting low oxygen conditions can harm or kill aquatic organisms (CABI, 2020)	Low
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes	M. heterophyllum forms dense stands in water bodies, which have negative effects on boating, swimming and aesthetics. (CABI,	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 area?	No	No evidence (Global Invasive Species Database (2021) Species profile: Myriophyllum heterophyllum.) EPPO (2015) Pest risk analysis for Myriophyllum heterophyllum. EPPO, Paris. Available at http://www.eppo.int/QUARANTINE/Pest_Risk_Analysis/PRA_intro.h t	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 evidence (Global Invasive Species Database (2021) Species profile: Myriophyllum heterophyllum). EPPO (2015) Pest risk analysis for Myriophyllum heterophyllum. EPPO, Paris. Available at http://www.eppo.int/QUARANTINE/Pest_Risk_Analysis/PRA_intro.h t	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	Global Invasive Species Database (2021) Species profile: Myriophyllum heterophyllum. EPPO (2015) Pest risk analysis for Myriophyllum heterophyllum. EPPO, Paris. Available at http://www.eppo.int/QUARANTINE/Pest_Risk_Analysis/PRA_intro.h t	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	Suitable habitats for this species include freshwater ponds, lakes, ditches, standing and slow flowing waters (Global Invasive Species Database (2021) Species profile: Myriophyllum	Low
24	4.11	Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa?	Yes	Dense mats of M. heterophyllum reduce light to other submerged plants and can affect water quality by reducing oxygen levels resulting in fish avoiding the infested area (EPPO (2015) Pest risk analysis for Myriophyllum heterophyllum. EPPO, Paris. Available at http://www.eppo.int/QUARANTINE/Pest_Risk_Analysis/PRA_intro.h t)	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 by way of a dormant form)?	Yes	Jasprica, N., Lasić, A., Hafner, D., & Bratoš Cetinić, A. (2017). Myriophyllum heterophyllum Michx.(Haloragaceae) u Hrvatskoj. Natura Croatica: Periodicum Musei Historiae Naturalis Croatici, 26(1), 99-103.	Low
5. F	Resourc	e exploitation		[20(1), 99-103.	
	5.01	Is the taxon likely to consume threatened or	Not applicable	Not applicable	Very high
27	5.02	protected native taxa in the RA area? Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?	No	No data available	Low
6. F	Reprodu				1
28	6.01	Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?	Not applicable	Not applicable	Very high
29	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	Jasprica, N., Lasić, A., Hafner, D., & Bratoš Cetinić, A. (2017). Myriophyllum heterophyllum Michx.(Haloragaceae) u Hrvatskoj. Natura Croatica: Periodicum Musei Historiae Naturalis Croatici, 26(1), 99-103.	Low
30	6.03	Is the taxon likely to hybridise naturally with native taxa?	Yes	M. heterophyllum x M. laxum (Tavalire, H. F., Bugbee, G. E., LaRue, E. A., & Thum, R. A. (2012). Hybridization, cryptic diversity, and invasiveness in introduced variable-leaf	High
31	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	Yes	watermilfoil. Evolutionary Applications, 5(8), 892-900). Reproduction may occur through asexual vegetative propagation and also sexual reproduction (seed production). Asexual vegetative propagation is thought to be the dominant mode of reproduction in introduced populations (CABI, 2020)	High
32	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	No	EPPO (2015) Pest risk analysis for Myriophyllum heterophyllum. EPPO, Paris. Available at http://www.eppo.int/QUARANTINE/Pest_Risk_Analysis/PRA_intro.h t	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	EPPO (2015) Pest risk analysis for Myriophyllum heterophyllum. EPPO, Paris. Available at http://www.eppo.int/QUARANTINE/Pest_Risk_Analysis/PRA_intro.h tm	Low
34	6.07	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	1	EPPO (2015) Pest risk analysis for Myriophyllum heterophyllum. EPPO, Paris. Available at http://www.eppo.int/QUARANTINE/Pest_Risk_Analysis/PRA_intro.h tm	Low
		al mechanisms			LU: -b
35	7.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable habitats nearby)?	>1	the aquatic plant trade, Ship hull fouling, Floating vegetation and debris (EPPO (2015) Pest risk analysis for Myriophyllum heterophyllum. EPPO, Paris. Available at http://www.eppo.int/QUARANTINE/Pest_Risk_Analysis/PRA_intro.htm)	High
	7.02	Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)?	Yes	Ship hull fouling (EPPO (2015) Pest risk analysis for Myriophyllum heterophyllum. EPPO, Paris. Available at http://www.eppo.int/QUARANTINE/Pest_Risk_Analysis/PRA_intro.h tm)	Low
	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?	Yes	May be commonly transported among water bodies on boats and boat trailers (CABI, 2020)	Medium
38	7.04	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?	Yes	Seeds may also be dispersed by animal vectors. (CABI, 2020)	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	M. heterophyllum is capable of spreading through vegetative fragments (CABI, 2020)	High
40	7.06	Are older life stages of the taxon likely to	Not applicable	Not applicable	Very 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?	Yes	Seeds may also be dispersed by animal vectors. (CABI, 2020)	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	It can be moved around by any number of water and animal vectors and may be commonly transported among water bodies on boats and boat trailers. Seeds may also be dispersed by animal vectors. (CABI, 2020).	High

		Is dispersal of the taxon density dependent?	No	EPPO (2015) Pest risk analysis for Myriophyllum heterophyllum. EPPO, Paris. Available at http://www.eppo.int/QUARANTINE/Pest_Risk_Analysis/PRA_intro.h tm	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 cycle?	No	No evidence	Low
45	8.02	Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being considered.]	Yes	Myriophyllum heterophyllum can grow in a wide range of physical and chemical conditions (EPPO (2015) Pest risk analysis for Myriophyllum heterophyllum. EPPO, Paris. Available at http://www.eppo.int/QUARANTINE/Pest_Risk_Analysis/PRA_intro.h tm)	High
46	8.03	Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	Yes	Triclopyr may be another option. Results from Getsinger et al. (2003) suggest that triclopyr may be efficacious against M. heterophyllum in the field over a wide range of concentrations and exposure times. (Global Invasive Species Database (2021) Species profile: Myriophyllum heterophyllum).	High
	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	No	(EPPO (2015) Pest risk analysis for Myriophyllum heterophyllum. EPPO, Paris. Available at http://www.eppo.int/QUARANTINE/Pest_Risk_Analysis/PRA_intro.h tm)	
		Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	No	No evidence; Freshwater species	Medium
		Are there effective natural enemies (predators) of the taxon present in the RA	Yes	Insects (CABI, 2020)	Low
		e change			
		change Under the predicted future climatic	No change	M. heterophyllum is present in RA area. Only human impact	Very high
50	9.01	conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?	No change	M. neterophyllum is present in KA area. Only numan impact (Jasprica, N., Lasić, A., Hafner, D., & Bratoš Cetinić, A. (2017). Myriophyllum heterophyllum Michx.(Haloragaceae) u Hrvatskoj. Natura Croatica: Periodicum Musei Historiae Naturalis Croatici,	very nign
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 establishment may potentially increase with temperature increases. Those areas which are currently unsuitable for the occurrence of M. heterophyllum may become more suitable with increased number of day degrees. Extreme weather events, flooding etc., may increase the occurrence and potential areas of establishment for the plant. (EPPO (2015) Pest risk analysis for Myriophyllum heterophyllum. EPPO, Paris. Available at http://www.eppo.int/QUARANTINE/Pest_Risk_Analysis/PRA_intro.h tm)	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 spread is likely to increase as established populations build and become more invasive. An increase in extreme natural events, such as increased flooding may act to facilitate movement of the species between isolated populations. M. heterophyllum has been shown to increase in growth and vigour at elevated CO2 levels. (EPPO (2015) Pest risk analysis for Myriophyllum heterophyllum. EPPO, Paris. Available at http://www.eppo.int/QUARANTINE/Pest_Risk_Analysis/PRA_intro.h tm)	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	With increased temperature, C02 levels and nitrogen deposition, the impacts of M. heterophyllum may be more profound within native plant communities. M. heterophyllum has high phenotypic plasticity which will enable the species to persist and outcompete species with restricted habitat requirements. (EPPO (2015) Pest risk analysis for Myriophyllum heterophyllum. EPPO, Paris. Available at http://www.eppo.int/OUARANTINE/Pest Risk Analysis/PRA intro.h	Medium
54		Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Higher	EPPO (2015) Pest risk analysis for Myriophyllum heterophyllum. EPPO, Paris. Available at http://www.eppo.int/QUARANTINE/Pest_Risk_Analysis/PRA_intro.h tm	Medium
55		Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	Higher	EPPO (2015) Pest risk analysis for Myriophyllum heterophyllum. EPPO, Paris. Available at http://www.eppo.int/QUARANTINE/Pest_Risk_Analysis/PRA_intro.h tm	Medium

Statistics	
Scores	
BRA	24.0
BRA Outcome	High
BRA+CCA	34.0
BRA+CCA Outcome	High
Score partition	
A. Biogeography/Historical	9.0
1. Domestication/Cultivation	2.0
2. Climate, distribution and introduction risk	0.0
3. Invasive elsewhere	7.0
B. Biology/Ecology	15.0
4. Undesirable (or persistence) traits	7.0
5. Resource exploitation	0.0
6. Reproduction	6.0
7. Dispersal mechanisms	6.0
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	11
Environmental	10
Species or population nuisance traits	16
Thresholds	
BRA	22.75

BRA	22.75
BRA+CCA	22.75
Confidence	
BRA+CCA	0.53
BRA	0.52
CCA	0.58

Date and Time 06/12/2021 21:08:14

axon and Assessor details					
Category	Plantae (freshwater)				
Taxon name	Najas graminea				
Common name	ricefield waternymph				
Assessor	Tena Radočaj				
Risk screening context					
Reason and socio-economic benefits					
Risk assessment area	Pannonian region				
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	This plant is also commercialized in the aquarium trade. (U.S. Fish & Wildlife Service, August 2020 Revised, January 2021 Web Version, 3/26/2021)	High
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	This plant is also commercialized in the aquarium trade. (U.S. Fish & Wildlife Service, August 2020 Revised, January 2021 Web	High
3	1.03	Does the taxon have invasive races,	No	Version, 3/26/2021) No evidence	Low
2 (	<u> </u>	varieties, sub-taxa or congeners?			
		, distribution and introduction risk	N. 11		M. P.
4	2.01	How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range?	Medium	The similarity of climatic conditions between native areas and the RA area is medium (Climatch)	Medium
5	2.02	What is the quality of the climate matching data?	Medium	I used climatch and distribution map of CABI	Low
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	N. graminea is present in the RA area. (Lansdown, R. V., Anastasiu, P., Barina, Z., Bazos, I., Çakan, H., Caković, D., & Király, G. (2016). Review of alien freshwater vascular plants in South-east Europe. ESENIAS Scientific Reports, 1, 137-154).	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	None	N. gramine is present in the RA area. (Lansdown, R. V., Anastasiu, P., Barina, Z., Bazos, I., Çakan, H., Caković, D., & Király, G. (2016). Review of alien freshwater vascular plants in South-east Europe. ESENIAS Scientific Reports, 1, 137-154).	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)?	No	N. graminea is present in the RA area. (Lansdown, R. V., Anastasiu, P., Barina, Z., Bazos, I., Çakan, H., Caković, D., & Király, G. (2016). Review of alien freshwater vascular plants in South-east Europe. ESENIAS Scientific Reports, 1, 137-154).	Low
3.1	Invasive	e elsewhere			
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	It has become naturalised in Spain, Italy, Bulgaria, the Crimea (U.S. Fish & Wildlife Service, August 2020 Revised, January 2021 Web Version, 3/26/2021)	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or	No	No records of impacts from the introductions were found. With known established populations, but a lack of information on impacts, the history of invasiveness for this species	Low
11	3.03	commercial taxa? In the taxon's introduced range, are there	No	U.S. Fish & Wildlife Service, August 2020 Revised, January 2021	Very high
12	3.04	known adverse impacts to aquaculture? In the taxon's introduced range, are there	No	Web Version, 3/26/2021 No records of impacts from the introductions were found. With	Low
		known adverse impacts to ecosystem services?		known established populations, but a lack of information on impacts, the history of invasiveness for this species	
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	No records of impacts from the introductions were found. With known established populations, but a lack of information on	Low
B. I	Biology	y/Ecology		impacts, the history of invasiveness for this species	
		able (or persistence) traits			
		Is it likely that the taxon will be poisonous or pose other risks to human health?	No	No information on threats to humans was found for Najas graminea. (U.S. Fish & Wildlife Service, August 2020 Revised,	High
15	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or	No	January 2021 Web Version, 3/26/2021) No records of impacts from the introductions were found. With known established populations, but a lack of information on	Low
16	4.03	protected)? Are there any threatened or protected taxa	No	impacts, the history of invasiveness for this species No records of impacts from the introductions were found. With	Low
1		that the non-native taxon would parasitise in the RA area?		known established populations, but a lack of information on impacts, the history of invasiveness for this species	
17	4.04	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?	No	This species is wide-spread in tropical and subtropical regions, in the RA area climate is temperate.	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 records of impacts from the introductions were found. This species is wide-spread in tropical and subtropical regions, in the RA area climate is temperate.	Low
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	No records of impacts from the introductions were found. This species is wide-spread in tropical and subtropical regions, in the RA area climate is temperate.	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 records of diseases were found for Najas graminea. (U.S. Fish & Wildlife Service, August 2020 Revised, January 2021 Web Version. 3/26/2021)	Low
21	4.08	Infectious agents that are endemic in the RA Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area?	No	No records of diseases were found for Najas graminea. (U.S. Fish & Wildlife Service, August 2020 Revised, January 2021 Web Version, 3/26/2021)	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	Stems up to 60 cm high (U.S. Fish & Wildlife Service, August 2020 Revised, January 2021 Web Version, 3/26/2021)	Medium

			r	Γ	
23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)?	No	This aquatic plant grows in ponds, river, streams, lakes and paddy fields, usually in still or slow-moving water. (Zhuang X. 2017. Najas graminea. The IUCN Red List of Threatened Species 2017: e.T164296A67788915. Available:	Low
24	4.11	Is it likely that the taxon's mode of existence	No	https://www.iucnredlist.org/species/164296/67788915) (Zhuang X. 2017. Najas graminea. The IUCN Red List of Threatened Species 2017: e.T164296A67788915. Available:	Low
		(e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa?		https://www.iucnredlist.org/species/164296/67788915)	
25	4.12	Is the taxon likely to maintain a viable population even when present in low	Yes	(Zhuang X. 2017. Najas graminea. The IUCN Red List of Threatened Species 2017: e.T164296A67788915. Available:	Low
		densities (or persisting in adverse conditions by way of a dormant form)?		https://www.iucnredlist.org/species/164296/67788915)	
		e exploitation			
	5.01	Is the taxon likely to consume threatened or protected native taxa in the RA area? Is the taxon likely to sequester food	Not applicable	Not applicable No data available	Very high Low
_/	5.02	resources (including nutrients) to the detriment of native taxa in the RA area?	110		2011
	eprodu	ıction			
28	6.01	Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response	Not applicable	Not applicable	Very high
29	6.02	, , , , , , , , , , , , , , , , , , , ,	No	No evidence	Low
30	6.03	or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa?	No	No evidence (Zhuang X. 2017. Najas graminea. The IUCN Red List of Threatened Species 2017: e.T164296A67788915. Available:	Low
				https://www.iucnredlist.org/species/164296/67788915)	
1	6.04	Is the taxon likely to be hermaphroditic or to	Yes	U.S. Fish & Wildlife Service, August 2020 Revised, January 2021	Low
32	6.05	display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features)	No	Web Version, 3/26/2021 No evidence (U.S. Fish & Wildlife Service, August 2020 Revised, January 2021 Web Version, 3/26/2021)	Low
		to complete its life cycle?			
3	6.06	Is the taxon known (or likely) to produce a large number of propagules or offspring	Yes	(U.S. Fish & Wildlife Service, August 2020 Revised, January 2021 Web Version, 3/26/2021)	Low
34	6.07	within a short time span (e.g. < 1 year)? How many time units (days, months, years)	1	(U.S. Fish & Wildlife Service, August 2020 Revised, January 2021	Low
		does the taxon require to reach the age-at- first-reproduction?		Web Version, 3/26/2021)	
	<i>ispersa</i> 7.01	al mechanisms How many potential internal	One	escape from pond gardens (U.S. Fish & Wildlife Service, August	Medium
55	7.01	vectors/pathways could the taxon use to disperse within the RA area (with suitable	One	2020 Revised, January 2021 Web Version, 3/26/2021)	hearann
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	Interconnected waterways (Personal opinion, no information)	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 evidence (U.S. Fish & Wildlife Service, August 2020 Revised, January 2021 Web Version, 3/26/2021)	Low
88	7.04	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules	No	No evidence (U.S. Fish & Wildlife Service, August 2020 Revised, January 2021 Web Version, 3/26/2021)	Low
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	U.S. Fish & Wildlife Service, August 2020 Revised, January 2021 Web Version, 3/26/2021	Low
10	7.06	Are older life stages of the taxon likely to	Not applicable	Not applicable	Very high
41	7.07	migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to	No	No evidence (U.S. Fish & Wildlife Service, August 2020 Revised,	Low
12	7.08	be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the	Yes	January 2021 Web Version, 3/26/2021) Floods (Personal opinion)	Low
		vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be			
	7.09	Is dispersal of the taxon density dependent?	No	No evidence	Low
		ce attributes			Low
+4	8.01	Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life	No	No evidence	Low
45	8.02	cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that	Yes	Silprasit K, Ngamniyom A, Kerksakul P, Thumajitsakul S. 2016. Using morphology and genomic template stability (GTS) to track	Low
		taxon? [In the Justification field, indicate the relevant water quality variable(s) being		herbicide effect on some submersed aquatic plants. Applied Environmental Research 38:75–85	
16	8.03	Can the taxon be controlled or eradicated in the wild with chemical, biological, or other	No	resistance to aquatic pesticides water (U.S. Fish & Wildlife Service, August 2020 Revised, January 2021 Web Version,	Low
		agents/means? Is the taxon likely to tolerate or benefit from	Yes	3/26/2021) This species resistance to aquatic pesticides; were found to be remained alive in glyphosate-contaminated water (U.S. Fish &	Medium
47	8.04	environmental/human disturbance?		Wildlife Service, August 2020 Revised, January 2021 Web Version, 3/26/2021)	
	8.04	Is the taxon able to tolerate salinity levels that are higher or lower than those found in	Yes	3/26/2021) This species can tolerate high salinity waters (U.S. Fish & Wildlife Service, August 2020 Revised, January 2021 Web Version,	Medium
48		Is the taxon able to tolerate salinity levels	Yes	3/26/2021) This species can tolerate high salinity waters (U.S. Fish & Wildlife	Medium

50	9.01	Under the predicted future climatic	No change	The risks of entry into the RA area by the taxon are likely to no	Medium
		conditions, are the risks of entry into the RA		change, only by human impact	
		area posed by the taxon likely to increase,			
		decrease or not change?			
51	9.02	Under the predicted future climatic	No change	The risks of establishment is no change, in the future	Medium
		conditions, are the risks of establishment		temperatures will not be high enough to achieve a stable	
		posed by the taxon likely to increase,		population (Parmesan, C., & Hanley, M. E. (2015). Plants and	
		decrease or not change?		climate change: complexities and surprises. Annals of botany,	
52	9.03	Under the predicted future climatic	No change	The risks of dispersal is no change, in the future temperatures will	Medium
		conditions, are the risks of dispersal within		not be high enough to achieve a stable population (Parmesan, C.,	
		the RA area posed by the taxon likely to		& Hanley, M. E. (2015). Plants and climate change: complexities	
		increase, decrease or not change?		and surprises. Annals of botany, 116(6), 849-864.)	
53	9.04	Under the predicted future climatic	No change	Parmesan, C., & Hanley, M. E. (2015). Plants and climate change:	Medium
		conditions, what is the likely magnitude of		complexities and surprises. Annals of botany, 116(6), 849-864.	
		future potential impacts on biodiversity			
		and/or ecological integrity/status?			
54	9.05	Under the predicted future climatic	No change	Parmesan, C., & Hanley, M. E. (2015). Plants and climate change:	Medium
		conditions, what is the likely magnitude of		complexities and surprises. Annals of botany, 116(6), 849-864.	
		future potential impacts on ecosystem			
		structure and/or function?			
55	9.06	Under the predicted future climatic	No change	Parmesan, C., & Hanley, M. E. (2015). Plants and climate change:	Medium
	1	conditions, what is the likely magnitude of		complexities and surprises. Annals of botany, 116(6), 849-864.	
		future potential impacts on ecosystem			
		services/socio-economic factors?			

Statistics

	BRA	0.41
	CCA	0.50
Date and Time		
	06/12/20	21 21:33:00

Taxon and Assessor details					
Category	Plantae (freshwater)				
Taxon name	Najas guadalupensis				
Common name	southern waternymph				
Assessor	Mihaela Britvec				
Risk screening context					
Reason and socio-economic benefits					
Risk assessment area	Pannonian region				
Taxonomy					
Native range					
Introduced range					
URL					

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
		ication/Cultivation	N		1
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	No	no reference	Low
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	used in aquaria	High
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	for example Najas graminea, Najas gracillima and Najas orientalis	High
2. (	Climate	, distribution and introduction risk			
4	2.01	How similar are the climatic conditions of the	High	no reference	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	no reference	Low
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	Hussner, A. (2012). Alien aquatic plant species in European countries. Weed Research, 52 (4), 297-306.	High
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	It produces a large amount of seed.	High
8	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA	Not applicable	Hussner, A. (2012). Alien aquatic plant species in European countries. Weed Research, 52 (4), 297-306.	High
		area in the near future (e.g. unintentional and intentional introductions)?			
3. 1	Invasive	e elsewhere	·		·
9	3.01	Has the taxon become naturalised (established viable populations) outside its	Yes	Hussner, A. (2012). Alien aquatic plant species in European countries. Weed Research, 52 (4), 297-306.	High
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	No	no reference	Low
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	no reference	Low
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	No	no reference	Low
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	no reference	Low
<b>B.</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 reference	Low
15	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	sometimes forming mats	Medium
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	no reference	Low
17	4.04	Is the taxon adaptable in terms of climatic and other environmental conditions, thus	Yes	no reference	Low
		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	Yes	Forms dense weed beds in shallow water.	Low
1		has invaded or is likely to invade the RA			
19	4.06	Is the taxon likely to exert adverse impacts	Yes	Forms dense weed beds in shallow water interfering with	Very high
20	4 07	on ecosystem services in the RA area? Is it likely that the taxon will host, and/or	No	recreational activities.	Low
20	4.07	act as a vector for, recognised pests and infectious agents that are endemic in the RA		no reference	LUW
21	4.08	Is it likely that the taxon will host, and/or	No	no reference	Medium
		act as a vector for, recognised pests and infectious agents that are absent from (novel			
22	4.09	to) the RA area? Is it likely that the taxon will achieve a body	Not applicable	no reference	Medium
		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	may be found in springs, fresh and brackish lakes, ponds, and canals	Medium
<u>.</u>		versatile in habitat use)?	N .		
24	4.11	Is it likely that the taxon's mode of existence	Yes	Forms dense weed beds.	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 population even when present in low	Yes	Species has dorminant form - seed.	Low
		densities (or persisting in adverse conditions by way of a dormant form)?			

F D	Docourc	e exploitation			
		Is the taxon likely to consume threatened or	Not applicable	is not carnivore species	High
	0.01	protected native taxa in the RA area?			
27	5.02	Is the taxon likely to sequester food	Yes	The impacts of the plant are not well documented but they are	Low
		resources (including nutrients) to the		theorized to compete with native species by shading.	
6 0	Reprodu	detriment of native taxa in the RA area?			
		Is the taxon likely to exhibit parental care	Not applicable	no reference	Low
		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 reference	Medium
30	6.03	or propagules (in the RA area)? Is the taxon likely to hybridise naturally with	No	no reference	Low
50	0.05	native taxa?			LOW
31	6.04	Is the taxon likely to be hermaphroditic or to	No	no reference	Low
		display asexual reproduction?			
32	6.05	Is the taxon dependent on the presence of	No	no reference	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	Najas guadalupensis is a fast-growing aquatic plant species that	High
		large number of propagules or offspring		produces a large amount of seed.	
2.4	6.07	within a short time span (e.g. < 1 year)?	6		
34	6.07	How many time units (days, months, years) does the taxon require to reach the age-at-	6	6 months	Low
		first-reproduction?			
		al mechanisms			
35	7.01	How many potential internal	One	seeds may be spread by waterfowl	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	no reference	Medium
Ĩ		taxon in close proximity to one or more			
I		protected areas (e.g. MCZ, MPA, SSSI)?			
37	7.03	Does the taxon have a means of actively	No	no reference of acitively attaching	Medium
1		attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances			
1		the likelihood of dispersal?			
38	7.04	Is natural dispersal of the taxon likely to	Yes	seeds may be spread by waterfowl	High
1		occur as eggs (for animals) or as propagules			
30	7.05	(for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to	Yes	as seeds and fragments	Medium
29	7.05	occur as larvae/juveniles (for animals) or as	Tes	as seeds and magnetics	Medium
1		fragments/seedlings (for plants) in the RA			
I		area?			
40	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	Not applicable	has not active dispersal mechanisms	High
41	7.07	Are propagules or eggs of the taxon likely to	Yes	pkants can be dispersed by animals between water bodies	High
		be dispersed in the RA area by other animals?			-
42	7.08	Is dispersal of the taxon along any of the	Yes	Species is a fast growing plant.	High
1		vectors/pathways mentioned in the previous			
1		seven questions (35–41; i.e. both unintentional or intentional) likely to be			
	7.09	Is dispersal of the taxon density dependent?	Yes	when its population density increases - increases the number of	High
		ce attributes			
44	8.01	Is the taxon able to withstand being out of water for extended periods (e.g. minimum of	No	no reference	Medium
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	Species is little tolerant on a few factors: light, temperature, and	Medium
Í		water quality conditions relevant to that		pH.	
		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	https://www.doc.govt.nz/documents/science-and-	Medium
1		the wild with chemical, biological, or other		technical/sfc141.pdf	
A 7	0.04	agents/means?	Voc	Concernal flooding can also requit in the proved of the owner '	Hich
47	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	Yes	Seasonal flooding can also result in the spread of the organism locally.	High
48	8.05	Is the taxon able to tolerate salinity levels	No	no reference	Low
		that are higher or lower than those found in			
4.2	0.07	its usual environment?			
49	8.06	Are there effective natural enemies (predators) of the taxon present in the RA	No	no reference	Low
С. С	Climate	e change			·
9. (	Climate	change			
50	9.01	Under the predicted future climatic	Increase	professional judgement	High
		conditions, are the risks of entry into the RA area posed by the taxon likely to increase,			
		decrease or not change?			
51	9.02	Under the predicted future climatic	Increase	professional judgement	Medium
		conditions, are the risks of establishment			
1		posed by the taxon likely to increase,			
52	9.03	decrease or not change? Under the predicted future climatic	Increase	professional judgement	Medium
22	2.05	conditions, are the risks of dispersal within		processional Jaagement	. icuidiii
		the RA area posed by the taxon likely to			
	0.01	increase, decrease or not change?			
53	9.04	Under the predicted future climatic	Higher	professional judgement	Medium
		conditions, what is the likely magnitude of future potential impacts on biodiversity			
	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?	Higher	professional judgement	Medium
55	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	Higher	professional judgement	Low

Statistics	
Scores	
BRA	17.0
BRA Outcome	Medium
BRA+CCA	29.0
BRA+CCA Outcome	High
Score partition	nigh
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	12.0
4. Undesirable (or persistence) traits	7.0
5. Resource exploitation	2.0
6. Reproduction	-1.0
7. Dispersal mechanisms	4.0
8. Tolerance attributes	0.0
C. Climate change	12.0
9. Climate change	12.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	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	
Sectors affected Commercial	5
Sectors affected Commercial Environmental	5
Sectors affected Commercial	5
Sectors affected Commercial Environmental Species or population nuisance traits	5
Sectors affected Commercial Environmental Species or population nuisance traits Thresholds	5 8 19
Sectors affected Commercial Environmental Species or population nuisance traits Thresholds BRA	5 8 19 22.75
Sectors affected Commercial Environmental Species or population nuisance traits Thresholds BRA BRA+CCA	5 8 19
Sectors affected Commercial Environmental Species or population nuisance traits Thresholds BRA BRA+CCA Confidence	5 8 19 22.75 22.75
Sectors affected Commercial Environmental Species or population nuisance traits Thresholds BRA BRA+CCA Confidence BRA+CCA	5 8 19 22.75 22.75 0.48
Sectors affected Commercial Environmental Species or population nuisance traits Thresholds BRA BRA+CCA Confidence BRA+CCA BRA	5 8 19 22.75 22.75 22.75 0.48 0.48
Sectors affected Commercial Environmental Species or population nuisance traits Thresholds BRA BRA+CCA Confidence BRA+CCA	5 8 19 22.75 22.75 0.48
Sectors affected Commercial Environmental Species or population nuisance traits Thresholds BRA BRA+CCA Confidence BRA+CCA BRA CCA	5 8 19 22.75 22.75 22.75 0.48 0.48
Sectors affected Commercial Environmental Species or population nuisance traits Thresholds BRA+CCA BRA+CCA BRA+CCA BRA+CCA Confidence BRA+CCA BRA CCA	5 8 19 22.75 22.75 22.75 0.48 0.48

Taxon and Assessor details					
Category	Plantae (freshwater)				
Taxon name	Nelumbo nucifera				
Common name	sacred lotus				
Assessor	Mihaela Britvec				
Risk screening context					
Reason and socio-economic benefits					
Risk assessment area	Pannonian region				
Taxonomy					
Native range					
Introduced range					
LIRI					

_			Response	Justification (references and/or other information)	Confidence
		graphy/Historical ication/Cultivation	_		_
<u>1. 1</u> 1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	Nelumbo nucifera has been in cultivation in China for more than 3,000 years, and has been grown not only for its cultural and ornamental value, but also for medicinal uses and for its edible	Very high
				'seeds' and rhizomes. In China, Japan and India, for example, the rhizomes are roasted, pickled, candied or sliced and fried as chips. A paste made from the nutlets is used as a filling in 'mooncakes', traditional Chinese pastries. The young leaves, leaf stalks and flowers are eaten as vegetables in India. https://nowo.science.kew.org/taxon/urn:lsid:ipni.org:names:6054	
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	Although abundant in cultivation, with many different cultivaries to be having been bred over the centuries, local wild populations of sacred lotus in central mainland China have been greatly reduced due to the rapid development of the aquaculture industry. https://powo.science.kew.org/taxon/urn:lsid:ipni.org:names:6054	High
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	Nelumbo lutea, according https://invazivnevrste.haop.hr/katalog	High
2. (	Climate	ate, 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	N. nucifera prefers warm-temperate to tropical climates.	Medium
5	2.02	What is the quality of the climate matching data?	Low	lack of information	Medium
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	doi: 10.1111/j.1365-3180.2012.00926.x	High
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	via human translocations (https://www.fws.gov/fisheries/ANS/erss/uncertainrisk/Nelumbo- nucifera-FINAL-November2020.pdf)	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	Hussner, A. (2012). Alien aquatic plant species in European countries. Weed Research, 52 (4), 297-306.	High
		e elsewhere			
9	3.01	Has the taxon become naturalised (established viable populations) outside its	Yes	Hussner, A. (2012). Alien aquatic plant species in European countries. Weed Research, 52 (4), 297-306.	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	No	No records were found of documented impacts from introductions. https://www.fws.gov/fisheries/ANS/erss/uncertainrisk/Nelumbo- nucifera-FINAL-November2020.pdf	Low
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	No records were found of documented impacts from introductions. https://www.fws.gov/fisheries/ANS/erss/uncertainrisk/Nelumbo- nucifera-FINAL-November2020.pdf	Low
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem services?	No	No records were found of documented impacts from introductions. https://www.fws.gov/fisheries/ANS/erss/uncertainrisk/Nelumbo- nucifera-FINAL-November2020.pdf	Low
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	No records were found of documented impacts from introductions. https://www.fws.gov/fisheries/ANS/erss/uncertainrisk/Nelumbo- nucifera-FINAL-November2020.pdf	Low
		/Ecology			
		able (or persistence) traits			1.
	4.01	Is it likely that the taxon will be poisonous or pose other risks to human health?		No information on threat to humans was found. (https://www.fws.gov/fisheries/ANS/erss/uncertainrisk/Nelumbo- nucifera-FINAL-November2020.pdf)	Low
	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Yes	The impacts of the plant are not well documented but they are theorized to compete with native species by shading. https://www.fws.gov/fisheries/ANS/erss/uncertainrisk/Nelumbo- nucifera-FINAL-November2020.pdf	Medium
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	no reference	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	Nelumbo nucifera is a species native to Japan, India, Australia, India and the surrounding areas. The species has been introduced to areas in Europe, North Africa, North America, and Europe. https://www.fws.gov/fisheries/ANS/erss/uncertainrisk/Nelumbo- nucifera-FINAL-November2020.pdf	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.fws.gov/fisheries/ANS/erss/uncertainrisk/Nelumbo- nucifera-FINAL-November2020.pdf	Low
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes	It is expected that sooner or later the physiognomy of the pond will become monotypic and be represented mainly by the tall and large surface covering plant, Nelumbo. (https://www.fws.gov/fisheries/ANS/erss/uncertainrisk/Nelumbo- nucifera-FINAL-November2020.pdf)	High

20					
	4.07	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and	No	no reference	Low
		infectious agents that are endemic in the RA			
1	4.08	Is it likely that the taxon will host, and/or	No	no reference	Low
		act as a vector for, recognised pests and infectious agents that are absent from (novel			
		to) the RA area?			
2	4.09	Is it likely that the taxon will achieve a body	Not applicable	no reference	Low
		size that will make it more likely to be released from captivity?			
3	4.10	Is the taxon capable of sustaining itself in a	No	N. nucifera are adapted to grow in the flood plains of slow-moving	Medium
		range of water velocity conditions (e.g.		rivers, delta areas, wetland habitats, including flood plains, ponds,	
		versatile in habitat use)?		lakes, pools, lagoons, marshes, swamps and the backwaters of	
4	4.11	Is it likely that the taxon's mode of existence	Yes	reservoirs. Nelumbo, which develops leaves on and above the pond's surface,	Medium
		(e.g. excretion of by-products) or behaviours		has the most advantage in the pond and the shade-intolerant	
		(e.g. feeding) will reduce habitat quality for		species under cover are compelled to be eliminated. It is expected	
		native taxa?		that sooner or later the physiognomy of the pond will become monotypic and be represented mainly by the tall and large surface	
				covering plant, Nelumbo.	
				https://www.fws.gov/fisheries/ANS/erss/uncertainrisk/Nelumbo-	
	4.12	Is the taxon likely to maintain a viable	Yes	nucifera-FINAL-November2020.pdf N. nucifera have remarkable power of dormancy and indeed the	Very high
2.5	4.12	population even when present in low	Tes	proved longevity of its seeds exceeds that of any known species of	very nigh
		densities (or persisting in adverse conditions		flowering plant.	
		by way of a dormant form)?		https://www.fws.gov/fisheries/ANS/erss/uncertainrisk/Nelumbo-	
. /	Resourc	ce exploitation		nucifera-FINAL-November2020.pdf	
		Is the taxon likely to consume threatened or	Not applicable	N. nucifera is not carnivore species.	Very high
7	5.02	protected native taxa in the RA area?	Vec	The impacts of the plant are not well decompared but th	Madiu
./	5.02	Is the taxon likely to sequester food resources (including nutrients) to the	Yes	The impacts of the plant are not well documented but they are theorized to compete with native species by shading.	Medium
		detriment of native taxa in the RA area?		https://www.fws.gov/fisheries/ANS/erss/uncertainrisk/Nelumbo-	
	0			nucifera-FINAL-November2020.pdf	
	Reprodi 6.01		Not applicable	no reference	Medium
		and/or to reduce age-at-maturity in response			
	6.65	to environmental conditions?	N N		
29	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	https://www.sciencedirect.com/science/article/abs/pii/S003194229 6008801	High
30	6.03	Is the taxon likely to hybridise naturally with	No	no reference	Low
		native taxa?			
31	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	No	no reference	Medium
32	6.05	Is the taxon dependent on the presence of	No	no reference	Medium
		another taxon (or specific habitat features)			
22	6.06	to complete its life cycle? Is the taxon known (or likely) to produce a	Yes	Stands of lotus drop hundreds of thousands of seeds every year to	Very high
55	0.00	large number of propagules or offspring	Tes	the bottom of the pond.	very nigh
		within a short time span (e.g. < 1 year)?		https://www.fws.gov/fisheries/ANS/erss/uncertainrisk/Nelumbo-	
			6	nucifera-FINAL-November2020.pdf 6 months	Medium
21	6 07		0		
34	6.07	How many time units (days, months, years) does the taxon require to reach the age-at-			licului
		does the taxon require to reach the age-at- first-reproduction?			
7. <u>[</u>	Dispers	does the taxon require to reach the age-at- first-reproduction? al mechanisms	0.00	lvia human translocations	
7. <u>[</u>	Dispers	does the taxon require to reach the age-at- first-reproduction?	One	via human translocations	High
7 <u>. [</u> 35	Dispers 7.01	does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable			High
7 <u>. [</u> 35	Dispers	does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the	One Yes	via human translocations no reference	
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7. [ 35 36	Dispers 7.01	does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the			High
7. [ 35 36	Dispers 7.01 7.02	does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship	Yes	no reference	High High
7 <u>. [</u> 35 36	Dispers 7.01 7.02	does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances	Yes	no reference	High High
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7. <u>1</u> 35 36 37	Dispers           7.01           7.02           7.03           7.04	does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?	Yes	no reference no reference of acitively attaching This species propagates by seeds and rhizomes.	High High High High
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7. <u>/</u> 35 36 37 38 39 40 41 41	Dispers           7.01           7.02           7.03           7.04           7.05           7.06           7.07           7.08	does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or intentional) likely to be	Yes No Yes Yes Yes Yes	no reference no reference of acitively attaching This species propagates by seeds and rhizomes. This species propagates by seeds and rhizomes. has not active dispersal mechanisms pkants can be dispersed by animals between water bodies https://www.fws.gov/fisheries/ANS/erss/uncertainrisk/Nelumbo- nucifera-FINAL-November2020.pdf	High High High High High High High
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7. 1 35 36 37 38 39 40 41 41 42 43 3. 7	Dispers           7.01           7.02           7.03           7.04           7.05           7.06           7.07           7.08           7.09           Toleran	does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of	Yes No Yes Yes Not applicable Yes Yes	no reference no reference of acitively attaching This species propagates by seeds and rhizomes. This species propagates by seeds and rhizomes. This species propagates by seeds and rhizomes. has not active dispersal mechanisms pkants can be dispersed by animals between water bodies https://www.fws.gov/fisheries/ANS/erss/uncertainrisk/Nelumbo- nucifera-FINAL-November2020.pdf when its population density increases - increases the number of seeds can remain dormant for an extensive period of time as the pond silts in and dries out	High High High High High High High
7. <u>1</u> 35 36 37 38 39 40 41 42 43 3. 7	Dispers           7.01           7.02           7.03           7.04           7.05           7.06           7.07           7.08           7.09           Toleran	does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <b>ree attributes</b> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life	Yes No Yes Yes Not applicable Yes Yes	no reference         no reference of acitively attaching         This species propagates by seeds and rhizomes.         This species propagates by seeds and rhizomes.         This species propagates by seeds and rhizomes.         has not active dispersal mechanisms         pkants can be dispersed by animals between water bodies         https://www.fws.gov/fisheries/ANS/erss/uncertainrisk/Nelumbo- nucifera-FINAL-November2020.pdf         when its population density increases - increases the number of         seeds can remain dormant for an extensive period of time as the pond silts in and dries out         https://www.fws.gov/fisheries/ANS/erss/uncertainrisk/Nelumbo-	High High High High High High High
7. <u>1</u> 35 36 37 38 39 40 41 42 43 3. 7 44	Dispers           7.01           7.02           7.03           7.04           7.05           7.06           7.07           7.08           7.09           Toleran           8.01	does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to be dispersed 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>the attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle?	Yes No Yes Yes Not applicable Yes Yes	no reference no reference no reference of acitively attaching This species propagates by seeds and rhizomes. This species propagates by seeds and rhizomes. This species propagates by seeds and rhizomes. has not active dispersal mechanisms pkants can be dispersed by animals between water bodies https://www.fws.gov/fisheries/ANS/erss/uncertainrisk/Nelumbo- nucifera-FINAL-November2020.pdf Seeds can remain dormant for an extensive period of time as the pond silts in and dries out https://www.fws.gov/fisheries/ANS/erss/uncertainrisk/Nelumbo- nucifera-FINAL-November2020.pdf	High High High High High High High
7. 1 35 36 37 38 39 40 41 41 42 43 3. 7 44	Dispers           7.01           7.02           7.03           7.04           7.05           7.06           7.07           7.08           7.09           Toleran	does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <b>ree attributes</b> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life	Yes No Yes Yes Yes Yes Yes	no reference         no reference of acitively attaching         This species propagates by seeds and rhizomes.         This species propagates by seeds and rhizomes.         This species propagates by seeds and rhizomes.         has not active dispersal mechanisms         pkants can be dispersed by animals between water bodies         https://www.fws.gov/fisheries/ANS/erss/uncertainrisk/Nelumbo- nucifera-FINAL-November2020.pdf         when its population density increases - increases the number of         seeds can remain dormant for an extensive period of time as the pond silts in and dries out         https://www.fws.gov/fisheries/ANS/erss/uncertainrisk/Nelumbo-	High High High High High High High High

46	8.03	Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	Yes	https://www.icid.org/weed_report.pdf	Low
47	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	Yes	Seasonal flooding can also result in the spread of the organism locally.	Medium
48	8.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	No	no reference	Low
		Are there effective natural enemies (predators) of the taxon present in the RA	Yes	https://www.cabi.org/isc/datasheet/68490#tohostPlants	Low
		e change change	_		
		Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?	Increase	professional judgement (https://www.fws.gov/fisheries/ANS/erss/uncertainrisk/Nelumbo- nucifera-FINAL-November2020.pdf)	Low
51	9.02	Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	Increase	professional judgement (https://www.fws.gov/fisheries/ANS/erss/uncertainrisk/Nelumbo- nucifera-FINAL-November2020.pdf)	Low
52	9.03	Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change?	Increase	professional judgement (https://www.fws.gov/fisheries/ANS/erss/uncertainrisk/Nelumbo- nucifera-FINAL-November2020.pdf)	Low
53	9.04	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	Higher	professional judgement	Medium
54	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Higher	professional judgement (https://www.fws.gov/fisheries/ANS/erss/uncertainrisk/Nelumbo- nucifera-FINAL-November2020.pdf)	Low
55	9.06	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	Higher	professional judgement (https://www.fws.gov/fisheries/ANS/erss/uncertainrisk/Nelumbo- nucifera-FINAL-November2020.pdf)	Low

Statistics	
Scores	
BRA	19.0
BRA Outcome	Medium
BRA+CCA	31.0
BRA+CCA Outcome	High
Score partition	7.0
A. Biogeography/Historical	7.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	1.0 2.0
3. Invasive elsewhere	-
B. Biology/Ecology	12.0
4. Undesirable (or persistence) traits	6.0
5. Resource exploitation	2.0
6. Reproduction	0.0
7. Dispersal mechanisms	4.0
8. Tolerance attributes	0.0
C. Climate change	12.0
9. Climate change	12.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3 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	7
Environmental	8
Species or population nuisance traits	19
Thresholds	
BRA	22.75
BRA+CCA	22.75

22.75
22.75
0.54
0.57
0.29

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AS-ISK v2	2
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Taxon and Assessor details				
Category	Plantae (freshwater)			
Taxon name	Nymphaea candida			
Common name	-			
Assessor	Tena Radočaj			
Risk screening context				
Reason and socio-economic benefits				
Risk assessment area	Pannonian region			
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	Yes	ornamental value (Nierbauer, K. U., Kanz, B., & Zizka, G. (2014). The widespread naturalisation of Nymphaea hybrids is masking	Medium
2	1.02	generations? Is the taxon harvested in the wild and likely	Yes	the decline of wild-type Nymphaea alba in Hesse, Germany. Flora- Morphology, Distribution, Functional Ecology of Plants, 209(2), ornamental value (Nierbauer, K. U., Kanz, B., & Zizka, G. (2014).	Medium
		to be sold or used in its live form?		The widespread naturalisation of Nymphaea hybrids is masking the decline of wild-type Nymphaea alba in Hesse, Germany. Flora- Morphology, Distribution, Functional Ecology of Plants, 209(2),	
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	No	No evidence	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 of climatic conditions between native areas and the RA area is medium (Climatch)	Medium
5	2.02	What is the quality of the climate matching data?	Medium	Nowak, A., Nobis, M., Dajdok, Z., Zalewska-Galosz, J., Nowak, S., Nobis, A., & Krawczyk, R. (2010). Revision of Nymphaea candida range-new data on the distribution and habitat preferences of the species in southern Poland. Acta Societatis Botanicorum Poloniae, 79(4).	Low
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	N. candida is present in the RA area. (Boršić I, Kutleša P, Desnica S, Bošnjak D, Slivar S, Wong L J, Pagad S (2021). Global Register of Introduced and Invasive Species- Croatia. Version 2.8. Invasive Species Specialist Group ISSG. Checklist dataset https://doi.org/10.15468/rhmen3 accessed via GBIF.org.)	High
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	None	(Dabrowska, M. A., Rola, K., Volkova, P., Suda, J., & Zalewska- Galosz, J. (2015). Genome size and phenotypic variation of Nymphaea (Nymphaeaceae) species from Eastern Europe and temperate Asia. Acta Societatis Botanicorum Poloniae, 84(2).	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)?	No	Hungary (Nowak, A., Nobis, M., Dajdok, Z., Zalewska-Galosz, J., Nowak, S., Nobis, A., & Krawczyk, R. (2010). Revision of Nymphaea candida range-new data on the distribution and habitat preferences of the species in southern Poland. Acta Societatis Botanicorum Poloniae, 79(4).	Medium
3. I	nvasive	e elsewhere			
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	Czech Republic, Southern regions of Germany, eastern France, Switzerland, south-western Romania, Austria, Hungary (Nowak, A., Nobis, M., Dajdok, Z., Zalewska-Galosz, J., Nowak, S., Nobis, A., & Krawczyk, R. (2010). Revision of Nymphaea candida range-new data on the distribution and habitat preferences of the species in southern Poland. Acta Societatis Botanicorum Poloniae.	High
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	No	No evidence (Bilz, M., Kell, S.P., Maxted, N. and Lansdown, R.V. 2011. European Red List of Vascular Plants. Luxembourg: Publications Office of the European Union)	Low
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	No evidence (Bilz, M., Kell, S.P., Maxted, N. and Lansdown, R.V. 2011. European Red List of Vascular Plants. Luxembourg: Publications Office of the European Union)	Low
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem services?	No	No evidence (Bilz, M., Kell, S.P., Maxted, N. and Lansdown, R.V. 2011. European Red List of Vascular Plants. Luxembourg: Publications Office of the European Union)	Low
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	No evidence (Bilz, M., Kell, S.P., Maxted, N. and Lansdown, R.V. 2011. European Red List of Vascular Plants. Luxembourg: Publications Office of the European Union)	Medium
		y/Ecology			
	Jndesir 4.01	able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health?	No	Harmless (Bilz, M., Kell, S.P., Maxted, N. and Lansdown, R.V. 2011. European Red List of Vascular Plants. Luxembourg: Publications Office of the European Union)	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 information	Low
	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	No information	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?	Yes	Boršić I, Kutleša P, Desnica S, Bošnjak D, Slivar S, Wong L J, Pagad S (2021). Global Register of Introduced and Invasive Species- Croatia. Version 2.8. Invasive Species Specialist Group ISSG. Checklist dataset https://doi.org/10.15468/rhmen3	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	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	NI-	No information	1
	4.07	act as a vector for, recognised pests and	No		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	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	Spread 60cm flower up to size 20 cm.	Low
		size that will make it more likely to be		(https://www.naturescape.co.uk/product/dwarf-white-water-lily-	
~ ~		released from captivity?		bareroot/)	
23	4.10	Is the taxon capable of sustaining itself in a	No	The plant grows only in water, as it is an aquatic plant, mainly in	Medium
		range of water velocity conditions (e.g. versatile in habitat use)?		ponds, lakes, and slow flowing streams (https://inaturalist.ca/taxa/196966-Nymphaea-candida)	
24	4.11	Is it likely that the taxon's mode of existence	No	No evidence (Bilz, M., Kell, S.P., Maxted, N. and Lansdown, R.V.	Low
		(e.g. excretion of by-products) or behaviours		2011. European Red List of Vascular Plants. Luxembourg:	
		(e.g. feeding) will reduce habitat quality for		Publications Office of the European Union)	
25	4.12	native taxa? Is the taxon likely to maintain a viable	No	Nowak, A., Nobis, M., Dajdok, Z., Zalewska-Galosz, J., Nowak, S.,	Low
23		population even when present in low		Nobis, A., & Krawczyk, R. (2010). Revision of Nymphaea	2011
		densities (or persisting in adverse conditions		candida range-new data on the distribution and habitat	
		by way of a dormant form)?		preferences of the species in southern Poland. Acta Societatis	
5 1	Pecouro	ce exploitation		Botanicorum Poloniae, 79(4).	
		Is the taxon likely to consume threatened or	Not applicable	Not applicable	Very high
		protected native taxa in the RA area?			, ,
27	5.02	Is the taxon likely to sequester food	No	No information	Low
		resources (including nutrients) to the detriment of native taxa in the RA area?			
6. F	Reprodu			1 	
-		Is the taxon likely to exhibit parental care	Not applicable	Not applicable	Very high
		and/or to reduce age-at-maturity in response			
20	6.02	to environmental conditions? Is the taxon likely to produce viable gametes	Yes	(Boršić I, Kutleša P, Desnica S, Bošnjak D, Slivar S, Wong L J,	Low
23	0.02	or propagules (in the RA area)?	103	Pagad S (2021). Global Register of Introduced and Invasive	2000
				Species- Croatia. Version 2.8. Invasive Species Specialist Group	
				ISSG. Checklist dataset https://doi.org/10.15468/rhmen3	
30	6.03	Is the taxon likely to hybridise naturally with	Yes	Nymphaea alba – N. candida (Vít, P. (2017). Evolutionary and	High
		native taxa?		conservation consequences of interspecific hybridization in rare plant species.)	
31	6.04	Is the taxon likely to be hermaphroditic or to	Yes	Wiersema, J. H. (1988). Reproductive biology of Nymphaea	Low
		display asexual reproduction?		(Nymphaeaceae). Annals of the Missouri Botanical Garden, 795-	
32	6.05	Is the taxon dependent on the presence of	No	Nowak, A., Nobis, M., Dajdok, Z., Zalewska-Galosz, J., Nowak, S.,	Low
		another taxon (or specific habitat features) to complete its life cycle?		Nobis, A., & Krawczyk, R. (2010). Revision of Nymphaea candida range-new data on the distribution and habitat	
				preferences of the species in southern Poland. Acta Societatis	
				preferences of the species in southern Poland. Acta Societatis Botanicorum Poloniae, 79(4).	
33	6.06	Is the taxon known (or likely) to produce a	Yes	preferences of the species in southern Poland. Acta Societatis Botanicorum Poloniae, 79(4). Wiersema, J. H. (1988). Reproductive biology of Nymphaea	Low
33	6.06	large number of propagules or offspring	Yes	preferences of the species in southern Poland. Acta Societatis Botanicorum Poloniae, 79(4). Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795-	Low
	6.06		Yes	preferences of the species in southern Poland. Acta Societatis Botanicorum Poloniae, 79(4). Wiersema, J. H. (1988). Reproductive biology of Nymphaea	Low
		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-		preferences of the species in southern Poland. Acta Societatis Botanicorum Poloniae, 79(4). Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795- 804. Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795-	
34	6.07	large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?		preferences of the species in southern Poland. Acta Societatis Botanicorum Poloniae, 79(4). Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795- 804. Wiersema, J. H. (1988). Reproductive biology of Nymphaea	
34 <i>7. [</i>	6.07 Dispersa	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-		preferences of the species in southern Poland. Acta Societatis Botanicorum Poloniae, 79(4). Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795- 804. Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795-	
34 <i>7. [</i>	6.07 Dispersa	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	1	preferences of the species in southern Poland. Acta Societatis Botanicorum Poloniae, 79(4). Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795- 804. Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795- 804.	Low
34 <u>7. [</u> 35	6.07 Disperse 7.01	large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable	1 One	preferences of the species in southern Poland. Acta Societatis Botanicorum Poloniae, 79(4). Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795- 804. Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795- 804. the aquatic plant trade	Low
34 <u>7. [</u> 35	6.07 Dispersa	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	1	preferences of the species in southern Poland. Acta Societatis Botanicorum Poloniae, 79(4). Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795- 804. Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795- 804.	Low
34 <u>7. [</u> 35	6.07 Disperse 7.01	large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more	1 One	preferences of the species in southern Poland. Acta Societatis Botanicorum Poloniae, 79(4). Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795- 804. Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795- 804. the aquatic plant trade	Low
34 <u>7. [</u> 35 36	6.07 Disperse 7.01	large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the	1 One	preferences of the species in southern Poland. Acta Societatis Botanicorum Poloniae, 79(4). Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795- 804. Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795- 804. the aquatic plant trade	Low
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34       7. I       35       36       37       38       39       40       41	6.07 <i>Dispers.</i> 7.01 7.02 7.03 7.04 7.05 7.06 7.07	large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, 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? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon likely to be dispersed in the RA area by other animals?	1 One No No Yes No Not applicable No	preferences of the species in southern Poland. Acta Societatis Botanicorum Poloniae, 79(4). Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795- 804. Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795- 804. the aquatic plant trade No information No information Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795- 804. Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795- 804. Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795- 804. Not applicable No evidence (Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795-804).	Low Low Low Low Low Very high Low
34       7. I       35       36       37       38       39       40       41	6.07 <i>Dispers.</i> 7.01 7.02 7.03 7.04 7.05 7.06 7.07	large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both	1 One No No Yes No Not applicable No	preferences of the species in southern Poland. Acta Societatis Botanicorum Poloniae, 79(4). Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795- 804. Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795- 804. the aquatic plant trade No information No information Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795- 804. Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795- 804. Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795- 804. Not applicable No evidence (Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795-804).	Low Low Low Low Low Very high Low
34       7. L       35       36       37       38       39       40       41       42	6.07 <i>Dispers.</i> 7.01 7.02 7.03 7.04 7.05 7.06 7.07	large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, 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? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon likely to be dispersed in the RA area by other animals?	1 One No No Yes No Not applicable No	preferences of the species in southern Poland. Acta Societatis Botanicorum Poloniae, 79(4). Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795- 804. Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795- 804. the aquatic plant trade No information No information Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795- 804. Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795- 804. Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795- 804. Not applicable No evidence (Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795-804).	Low Low Low Low Low Very high Low
34       7. L       35       36       37       38       39       40       41       42       43	6.07 7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08	large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent?	1       One       No       No       Yes       No       Not applicable       No       No	preferences of the species in southern Poland. Acta Societatis Botanicorum Poloniae, 79(4). Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795- 804. Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795- 804. the aquatic plant trade No information No information Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795- 804. Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795- 804. Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795- 804. Not applicable No evidence (Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795-804). No	Low Medium Low Low Low Very high Low Low
34         7. <u>/</u> 35         36         37         38         39         40         41         42         43         38. 7	6.07 <i>Dispers.</i> 7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 <i>Foleran</i>	large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed 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	1 One No No Yes No Not applicable No No	preferences of the species in southern Poland. Acta Societatis Botanicorum Poloniae, 79(4). Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795- 804. Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795- 804. Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795- 804. Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795- 804. Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795- 804. Not applicable No evidence (Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795-804). No	Low Medium Low Low Low Very high Low Low Low
34       7. L       35       36       37       38       39       40       41       42       43       8. 7	6.07 7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08	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 be dispersed or the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of	1       One       No       No       Yes       No       Not applicable       No       No	preferences of the species in southern Poland. Acta Societatis Botanicorum Poloniae, 79(4). Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795- 804. Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795- 804. the aquatic plant trade No information No information Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795- 804. Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795- 804. Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795- 804. Not applicable No evidence (Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795-804). No Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795-804). No	Low Low Low Low Low Very high Low Low
34       7. L       35       36       37       38       39       40       41       42       43       8. 7	6.07 <i>Dispers.</i> 7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 <i>Foleran</i>	large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed 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	1 One No No Yes No Not applicable No No	preferences of the species in southern Poland. Acta Societatis Botanicorum Poloniae, 79(4). Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795- 804. Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795- 804. Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795- 804. Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795- 804. Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795- 804. Not applicable No evidence (Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795-804). No	Low Medium Low Low Low Very high Low Low Low
34       7. []       35       36       37       38       39       40       41       42       43       8. 7	6.07 <i>Dispers.</i> 7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 <i>Foleran</i>	large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed 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	1 One No No Yes No Not applicable No No	preferences of the species in southern Poland. Acta Societatis Botanicorum Poloniae, 79(4). Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795- 804. Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795- 804. the aquatic plant trade No information No information Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795- 804. Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795- 804. Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795- 804. Not applicable No evidence (Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795- 804. Not applicable No evidence (Wiersema, J. H. (1988). Reproductive biology of Nymphaea (Nymphaeaceae). Annals of the Missouri Botanical Garden, 795-804). No	Low Medium Low Low Low Very high Low Low Low

45	8.02	Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being considered.]	No	Nowak, A., Nobis, M., Dajdok, Z., Zalewska-Galosz, J., Nowak, S., Nobis, A., & Krawczyk, R. (2010). Revision of Nymphaea candida range-new data on the distribution and habitat preferences of the species in southern Poland. Acta Societatis Botanicorum Poloniae, 79(4).	Medium
46	8.03	Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	No	No information	Low
47	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	No	SKLIAR, I., SKLIAR, V., KLYMENKO, A., SHERSTIUK, M., & ZUBTSOVA, I. (2020). GROWTH SIGNS OF Nymphaea candida IN VARIOUS ECOLOGICAL AND CENOTIC CONDITIONS OF DESNA BASIN (UKRAINE). AaroLife Scientific Journal. 9(1), 316-323.	Low
48	8.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	No	Freshwater species	Medium
49	8.06	Are there effective natural enemies	No	No evidence	Low
<u> </u>	Climate	(predators) of the taxon present in the RA e change			
		change			
		Under the predicted future climatic	Not applicable	N. candida is present in the RA area. (Boršić I, Kutleša P, Desnica	Very high
50	9.01	conditions, are the risks of entry into the RA	Not applicable	S, Bošnjak D, Slivar S, Wong L J, Pagad S (2021). Global Register	very nigh
		area posed by the taxon likely to increase,		of Introduced and Invasive Species- Croatia. Version 2.8. Invasive	
		decrease or not change?		Species Specialist Group ISSG. Checklist dataset	
		decrease of not change?		https://doi.org/10.15468/rhmen3 accessed via GBIF.org.)	
51	9.02	Under the predicted future climatic	No change	The risks of establishment is no change, in the future	Medium
51	5.02	conditions, are the risks of establishment	no change	temperatures will not be high enough to achieve a stable	riculum
		posed by the taxon likely to increase,		population (Parmesan, C., & Hanley, M. E. (2015). Plants and	
		decrease or not change?		climate change: complexities and surprises. Annals of botany,	
52	9.03	Under the predicted future climatic	No change	The risks of dispersal is no change, in the future temperatures will	Medium
		conditions, are the risks of dispersal within		not be high enough to achieve a stable population (Parmesan, C.,	
		the RA area posed by the taxon likely to		& Hanley, M. E. (2015). Plants and climate change: complexities	
		increase, decrease or not change?		and surprises. Annals of botany, 116(6), 849-864.)	
53	9.04	Under the predicted future climatic	No change	Parmesan, C., & Hanley, M. E. (2015). Plants and climate change:	Medium
		conditions, what is the likely magnitude of	-	complexities and surprises. Annals of botany, 116(6), 849-864.	
		future potential impacts on biodiversity			
		and/or ecological integrity/status?			
54	9.05	Under the predicted future climatic	No change	Parmesan, C., & Hanley, M. E. (2015). Plants and climate change:	Medium
		conditions, what is the likely magnitude of		complexities and surprises. Annals of botany, 116(6), 849-864.	
		future potential impacts on ecosystem			
		structure and/or function?			
55	9.06	Under the predicted future climatic	No change	Parmesan, C., & Hanley, M. E. (2015). Plants and climate change:	Medium
		conditions, what is the likely magnitude of		complexities and surprises. Annals of botany, 116(6), 849-864.	
		future potential impacts on ecosystem			
		services/socio-economic factors?			

Statistics	
Scores	
BRA	5.5
BRA Outcome	Medium
BRA+CCA	5.5
BRA+CCA Outcome	Medium
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	2.0
4. Undesirable (or persistence) traits	1.0
5. Resource exploitation	0.0
6. Reproduction	6.0
7. Dispersal mechanisms	-3.0
8. Tolerance attributes	-2.0
C. Climate change	0.0
9. Climate change	0.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
A. Biogeography/Historical 1. Domestication/Cultivation	<b>13</b> 3
<b>A. Biogeography/Historical</b> 1. Domestication/Cultivation 2. Climate, distribution and introduction risk	<b>13</b> 3
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere	<b>13</b> 3
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
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
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
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected	13 3 5 5 36 12 2 2 7 7 9 6 6 6 6
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial	13 3 5 5 36 12 2 2 7 7 9 6 6 6 6
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 3 0
A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial	13 3 5 5 36 12 2 2 7 7 9 6 6 6 6
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 3 0
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 3 0

Thresholds	
BRA	22.75
BRA+CCA	22.75
Confidence	
BRA+CCA	0.40
BRA	0.38
CCA	0.58

Date and Time 06/12/2021 22:19:04

Faxon and Assessor details				
Category	Plantae (freshwater)			
Taxon name	Nymphaea lotus			
Common name	white Egyptian lotus			
Assessor	Marina Piria			
Risk screening context				
Reason and socio-economic benefits				
Risk assessment area	Pannonian region			
Taxonomy				
Native range				
Introduced range				
URL				

			Response	Justification (references and/or other information)	Confidence	
	A. Biogeography/Historical					
		ication/Cultivation				
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	The leaves, petioles, roots and seeds are all used in medicine in Nigeria (Lim, 2014)	Very high	
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	Pet/aquarium trade https://www.cabi.org/isc/datasheet/115821#touses	High	
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	Nymphaea odorata http://www.columbia.edu/itc/cerc/danoff- burg/invasion_bio/inv_spp_summ/Nymphaea_odorata.html	Medium	
2. (	limate	distribution and introduction risk		burg/invasion_bio/inv_spp_summ/nympilaeu_ouorataintini		
			Medium	N. lotus is widespread in Africa and parts of temperate and	Low	
		Risk Assessment (RA) area and the taxon's native range?		tropical Asia to which it is native (Plant Gene Resources of Canada, 2016) but tolerate Bs climate		
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?	No	Horizon species, found in Hungary	Very high	
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	>1	water, floating vegetation https://www.cabi.org/isc/datasheet/115821#topathwayVectors	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	in Hungary, Hussner et al 2012	Medium	
2 7		and intentional introductions)?				
		e elsewhere Has the taxon become naturalised	Yes	Costarika, Salvador	Very high	
	3.02	(established viable populations) outside its In the taxon's introduced range, are there known adverse impacts to wild stocks or	Yes	https://www.cabi.org/isc/datasheet/115821#todistribution having moderate negative impacts on wildlife or natural communities in Louisiana, but of limited concern and/or extent	Low	
11	3.03	commercial taxa? In the taxon's introduced range, are there	Yes	The plant has also been reported as a weed of fish ponds in	Medium	
12	3.04	known adverse impacts to aquaculture? In the taxon's introduced range, are there	Yes	Nigeria (Adesina et al., 2015). Negatively impacts livelihoods	Low	
13	3.05	known adverse impacts to ecosystem In the taxon's introduced range, are there	No	https://www.cabi.org/isc/datasheet/115821#toimpactSummary	Medium	
P I	Sielea	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?	No	. lotus has many uses as a human food; th	Very high	
	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	No	N. lotus produces a dense mat-like canopy that is heavy enough to break tillers of rice during vegetative growth periods and can reduce crop yield, particularly in direct seeded rice (Mohamed and Serag, 2003). H	Medium	
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	it is not parasite	Very high	
17	4.04	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?	No	https://www.cabi.org/isc/datasheet/115821#toimpactSummary	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	n Louisiana, USA, the plant is listed as a Tier II invasive species, (having moderate negative impacts on wildlife or natural communities in Louisiana, but of limited concern and/or extent),	Medium	
	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes	no evidences but potentially can affect fishery	Medium	
20	4.07	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA	No	no evidence	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	In Ghana, Annang and Addo-Boadu (2012) recorded twenty-eight genera of algae belonging to five phyla in association with N. lotus.	Low	
22	4.09	Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity?	Yes	it is large plant	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	require calm, shallow (<2 m) water, full sunlight and neutral to slightly alkaline $\ensuremath{p}\xspace$	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 native taxa?	No	N. lotus could possibly be used for the removal of heavy metals from polluted water sources (Mohamed and Serag, 2003).	High	

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-	4.12	Is the taxon likely to maintain a viable	No	Species of Nymphaea reproduce sexually though show variability	Very high
		population even when present in low		between species e.g. flower opening times, flower colour and	
		densities (or persisting in adverse conditions by way of a dormant form)?		function of the various flower parts. Agamospermous reproduction is not seen in species of Nymphaea, however several modes are	
				exhibited e.g. detachable tubers and stolon formation.	
. F	Resourc	e exploitation			
6	5.01	Is the taxon likely to consume threatened or	Not applicable	no	Very high
-	F 00	protected native taxa in the RA area?	×		
7	5.02	Is the taxon likely to sequester food	Yes	Probably	Low
		resources (including nutrients) to the detriment of native taxa in the RA area?			
. F	Reprodu				
		Is the taxon likely to exhibit parental care	Not applicable	no.	Very high
		and/or to reduce age-at-maturity in response			
_	6.00	to environmental conditions?			1
9	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	Species of Nymphaea reproduce sexually though show variability between species e.g. flower opening times, flower colour and	Low
		or propagates (in the fortalea).		function of the various flower parts. Agamospermous reproduction	
				is not seen in species of Nymphaea, however several modes are	
_				exhibited e.g. detachable tubers and stolon formation.	
0	6.03	, , , -	No	No evidence but other Nymphea species can hybridize	Low
		native taxa?		https://pbsociety.org.pl/journals/index.php/asbp/article/view/asbp. 2015.016/0	
1	6.04	Is the taxon likely to be hermaphroditic or to	No	Species of Nymphaea reproduce sexually though show variability	Very high
		display asexual reproduction?		between species e.g. flower opening times, flower colour and	, 5
				function of the various flower parts. Agamospermous reproduction	
ļ				is not seen in species of Nymphaea, however several modes are	
2	6.05	Is the taxon dependent on the presence of	Yes	exhibited e.g. detachable tubers and stolon formation. https://www.cabi.org/isc/datasheet/115821#toimpactSummary	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	No	https://www.cabi.org/isc/datasheet/115821#toimpactSummary	Very high
		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)	1	https://www.cabi.org/isc/datasheet/115821#toimpactSummary	Very high
	0.07	does the taxon require to reach the age-at-	-		very night
		first-reproduction?	<u> </u>		
		al mechanisms			
5	7.01	How many potential internal	>1	debris, water, birds	Very high
		vectors/pathways could the taxon use to disperse within the RA area (with suitable			
6	7.02	Will any of these vectors/pathways bring the	Yes	birds	High
	-	taxon in close proximity to one or more		https://www.cabi.org/isc/datasheet/115821#toimpactSummary	5
		protected areas (e.g. MCZ, MPA, SSSI)?			
7	7.03	Does the taxon have a means of actively	No	no data	Medium
		attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances		https://www.cabi.org/isc/datasheet/115821#toimpactSummary	
		the likelihood of dispersal?			
8	7.04	Is natural dispersal of the taxon likely to	No	not yet present	Medium
		occur as eggs (for animals) or as propagules			
0		(for plants: seeds, spores) in the RA area?			
9	7 05		No		Modium
Í.	7.05	Is natural dispersal of the taxon likely to	No	not yet present	Medium
	7.05	Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as	No	not yet present	Medium
		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	not yet present	
0	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? Are older life stages of the taxon likely to	No Not applicable		Medium Very high
	7.06	Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction?	Not applicable	na	Very high
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1	7.06 7.07 7.08	Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as 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	Not applicable Yes No	na https://www.cabi.org/isc/datasheet/115821#toimpactSummary https://www.cabi.org/isc/datasheet/115821#toimpactSummary	Very high Very high Medium
1 2 3	7.06 7.07 7.08 7.09	Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as 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?	Not applicable Yes	na https://www.cabi.org/isc/datasheet/115821#toimpactSummary	Very high Very high
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1 2 3 . <i>T</i> 4	7.06 7.07 7.08 7.09 0leranu 8.01 8.02	Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being	Not applicable Yes No No No	na https://www.cabi.org/isc/datasheet/115821#toimpactSummary https://www.cabi.org/isc/datasheet/115821#toimpactSummary https://www.cabi.org/isc/datasheet/115821#toimpactSummary https://www.cabi.org/isc/datasheet/115821#toimpactSummary	Very high Very high Medium Very high Very high High
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1 2 3 7 4 5 6 7	7.06 7.07 7.08 7.09 0/eran 8.01 8.02 8.03 8.04	Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Is the taxon able to tolerate or benefit from environmental/human disturbance? Is the taxon able to tolerate salinity levels that are higher or lower than those found in	Not applicable Yes No No No Yes	na https://www.cabi.org/isc/datasheet/115821#toimpactSummary https://www.cabi.org/isc/datasheet/115821#toimpactSummary https://www.cabi.org/isc/datasheet/115821#toimpactSummary https://www.cabi.org/isc/datasheet/115821#toimpactSummary https://www.cabi.org/isc/datasheet/115821#toimpactSummary	Very high Very high Medium Very high Very high High Low
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1 2 3 . <u>7</u> 4 5 6 7 8	7.06 7.07 7.08 7.09 0/eran 8.01 8.02 8.03 8.04	Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Is the taxon likely to tolerate or benefit from environmental/human disturbance? 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	Not applicable Yes No No No Yes	na https://www.cabi.org/isc/datasheet/115821#toimpactSummary https://www.cabi.org/isc/datasheet/115821#toimpactSummary https://www.cabi.org/isc/datasheet/115821#toimpactSummary https://www.cabi.org/isc/datasheet/115821#toimpactSummary https://www.cabi.org/isc/datasheet/115821#toimpactSummary	Very high Very high Medium Very high Very high High Low
1 2 3 . <u>7</u> 4 5 6 7 8 9	7.06 7.07 7.08 7.09 0leran 8.01 8.02 8.03 8.04 8.05 8.06	Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Is the taxon nable to lerate 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?	Not applicable Yes No No No Yes No No	na https://www.cabi.org/isc/datasheet/115821#toimpactSummary https://www.cabi.org/isc/datasheet/115821#toimpactSummary https://www.cabi.org/isc/datasheet/115821#toimpactSummary https://www.cabi.org/isc/datasheet/115821#toimpactSummary Herbicides if allowed https://www.cabi.org/isc/datasheet/115821#toimpactSummary https://www.cabi.org/isc/datasheet/115821#toimpactSummary	Very high Very high Medium Very high Very high High Low Medium High
1 2 3 7 4 5 6 7 8 9 • C	7.06 7.07 7.08 7.09 0lerano 8.01 8.02 8.03 8.04 8.05 8.04 8.05 2limate	Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Is the taxon able to lerate 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 <b>e change</b>	Not applicable Yes No No No Yes No No	na https://www.cabi.org/isc/datasheet/115821#toimpactSummary https://www.cabi.org/isc/datasheet/115821#toimpactSummary https://www.cabi.org/isc/datasheet/115821#toimpactSummary https://www.cabi.org/isc/datasheet/115821#toimpactSummary Herbicides if allowed https://www.cabi.org/isc/datasheet/115821#toimpactSummary https://www.cabi.org/isc/datasheet/115821#toimpactSummary	Very high Very high Medium Very high Very high High Low Medium High
1 2 3 7 4 5 6 7 8 9 9 . C	7.06 7.07 7.08 7.09 <i>olerani</i> 8.01 8.02 8.03 8.04 8.05 8.06 <b>Climate</b>	Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Is the taxon likely to tolerate or benefit from environmental/human disturbance? 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 <b>e change</b> Under the predicted future climatic	Not applicable Yes No No No Yes No No	na https://www.cabi.org/isc/datasheet/115821#toimpactSummary https://www.cabi.org/isc/datasheet/115821#toimpactSummary https://www.cabi.org/isc/datasheet/115821#toimpactSummary https://www.cabi.org/isc/datasheet/115821#toimpactSummary Https://www.cabi.org/isc/datasheet/115821#toimpactSummary Https://www.cabi.org/isc/datasheet/115821#toimpactSummary https://www.cabi.org/isc/datasheet/115821#toimpactSummary	Very high Very high Medium Very high Very high High Low Medium High
1 2 3 . 7 4 5 6 7 8 9 . 0	7.06 7.07 7.08 7.09 0lerano 8.01 8.02 8.03 8.04 8.05 8.04 8.05 2limate	Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Is the taxon able to lerate 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 <b>e change</b>	Not applicable Yes No No No Yes No No No	na https://www.cabi.org/isc/datasheet/115821#toimpactSummary https://www.cabi.org/isc/datasheet/115821#toimpactSummary https://www.cabi.org/isc/datasheet/115821#toimpactSummary https://www.cabi.org/isc/datasheet/115821#toimpactSummary https://www.cabi.org/isc/datasheet/115821#toimpactSummary https://www.cabi.org/isc/datasheet/115821#toimpactSummary https://www.cabi.org/isc/datasheet/115821#toimpactSummary https://www.cabi.org/isc/datasheet/115821#toimpactSummary https://www.cabi.org/isc/datasheet/115821#toimpactSummary https://www.cabi.org/isc/datasheet/115821#toimpactSummary https://www.cabi.org/isc/datasheet/115821#toimpactSummary	Very high Very high Medium Very high Very high Low Medium High Very high

51	9.02	Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	Increase	prefer warm temperatures	High
52	9.03	Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change?	Increase	watercourses are connected	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	if introduced with increase temp. have better chance fully establish	Medium
54	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Higher	if there is better chance to establish and distribute than can have higher impact	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	probably will affect fisheries	Medium

## Statistics Scores BRA 14.5 **BRA Outcome** Medium BRA+CCA 26.5 BRA+CCA Outcome High Score partition A. Biogeography/Historical 15.5 1. Domestication/Cultivation 4.0 2. Climate, distribution and introduction risk 1.0 10.5 3. Invasive elsewhere 4. Undesirable (or persistence) traits -1.0 3.0 5. Resource exploitation 2.0 -1.0 6. Reproduction 7. Dispersal mechanisms -1.0 8. Tolerance attributes C. Climate change -4.0 **12.0** 9. Climate change 12.0 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 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 13 Environmental 10 Species or population nuisance traits 7 Thresholds BRA 22.75

BRA+CCA	22.75
Confidence	
BRA+CCA	0.68
BRA	0.69
CCA	0.58
Date and Time	
23/11/2	021 17:07:57

axon and Assessor details				
Category	Plantae (freshwater)			
Taxon name	Pistia stratiotes			
Common name	water lettuce			
Assessor	Tena Radočaj			
Risk screening context				
Reason and socio-economic benefits				
Risk assessment area	Pannonian region			
Taxonomy				
Native range				
Introduced range				
URL				

			Response	Justification (references and/or other information)	Confidence
A. I	Biogeo	graphy/Historical			
		ication/Cultivation			
		Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	P. stratiotes is a popular ornamental plant, used in ponds and aquariums. (Global Invasive Species Database (2021) Species profile: Pistia stratiotes).	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	P. stratiotes is a popular ornamental plant, used in ponds and aquariums. (Global Invasive Species Database (2021) Species profile: Pistia stratiotes).	Very high
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	No	No evidence	Low
2. C	Climate,	, distribution and introduction risk			
4	2.01		Low	The similarity of climatic conditions between native areas and the	Medium
		Risk Assessment (RA) area and the taxon's native range?		RA area is low (Climatch)	
	2.02	What is the quality of the climate matching data?	Medium	I used climatch and distribution map of CABI	Low
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	P. stratiotes is present in RA area (Boršić, I., Rubinić, T., 2018: First record of Pistia stratiotes L. (Araceae) in Croatia, with the consideration of possible introduction pathways. In: Jelaska, S.D. (ed.), Zbornik sažetaka 3. Hrvatskog simpozija o invazivnim vrstama, 96. Hrvatsko ekološko društvo, Zagreb)	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	None	P. stratiotes is present in RA area (Boršić, I., Rubinić, T., 2018: First record of Pistia stratiotes L. (Araceae) in Croatia, with the consideration of possible introduction pathways. In: Jelaska, S.D. (ed.), Zbornik sažetaka 3. Hrvatskog simpozija o invazivnim vrstama, 96. Hrvatsko ekološko društvo, Zagreb)	High
	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)?	No	P. stratiotes is present in RA area (Boršić, I., Rubinić, T., 2018: First record of Pistia stratiotes L. (Araceae) in Croatia, with the consideration of possible introduction pathways. In: Jelaska, S.D. (ed.), Zbornik sažetaka 3. Hrvatskog simpozija o invazivnim vrstama, 96. Hrvatsko ekološko društvo, Zagreb)	High
		e elsewhere			
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	It was introduced into Europe in the 20th century and has since spread to 15 European countries (Živković, M. M., Anđelković, A. A., Cvijanović, D. L., Novković, M. Z., Vukov, D. M., Šipoš, Š. Š., & Radulović, S. B. (2019). The beginnings of Pistia stratiotes L. invasion in the lower Danube delta: the first record for the Province of Vojvodina (Serbia). BioInvasions Record, 8(2))	Medium
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	Its growth habit can make it a weed in waterways, where it can kill native submerged plants and reduce biodiversity. (CABI, 2020)	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	Mats of P. stratiotes can also disrupt natural ecosystems. They can lead to a lower concentration of oxygen in covered waters and sediments by blocking air-water interface and root respiration. (Global Invasive Species Database (2021) Species profile: Pistia stratiotes.)	High
	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	Yes	P. stratiotes can inflict a severe impact on the environment and economy of infested areas. The dense mats created by connected rosettes of the plant lead to the majority of problems encountered with water lettuce. These mats can have a negative economic effect by blocking waterways, thus increasing the difficulty of navigation and hindering flood control efforts. (Global Invasive Species Database (2021) Species profile: Pistia stratiotes.)	High
		y/Ecology			
	4.01	able (or persistence) traits Is it likely that the taxon will be poisonous or pose other ricks to human health?	No	Harmless (Global Invasive Species Database (2021) Species	Low
	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	profile: Pistia stratiotes.) Such rigorous growth often leads to drastic reductions in the diversity of native aquatic plant and animal communities (Živković, M. M., Anđelković, A. A., Cvijanović, D. L., Novković, M. Z., Vukov, D. M., Šipoš, Š. Š., & Radulović, S. B. (2019). The beginnings of Pistia stratiotes L. invasion in the lower Danube delta: the first record for the Province of Voivodina (Serbia).	High
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	No evidence (Global Invasive Species Database (2021) Species profile: Pistia stratiotes.	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	Its temperature tolerance limits are 15°C (59°F) and 35°C (95°F); the optimal growth temperature range for the plant is 22-30°C. In the RA area is temperate climate. Over the years it has been introduced to a number of European countries, e.g. Czech Republic, Spain and Russia but without forming self-replacing populations. (Živković, M. M., Anđelković, A. A., Cvijanović, D. L., Novković, M. Z., Vukov, D. M., Šipoš, Š. S., & Radulović, S. B. (2019). The beginnings of Pistia stratiotes L. invasion in the lower	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	Danube delta: the first record for the Province of Voivodina In the RA area it cannot survive the winter, but it can probably have a adverse impact on the ecosystem in the short period when it is present. Ecological impacts of P. stratiotes and note that they include increased rates of siltation, slowing of water velocities, degradation of fish nesting sites, increased nutrient loading, thermal stratification, increase in alkalinity and fish and meaning the protein (CAPL 2000)	Medium
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes	macroinvertebrate mortality. (CABI, 2020) Consequently, such dense stands of Pistia may have serious negative effects on the multifunctional human use of waterbodies. These harmful effects include impediment of the transport of irrigation and drainage water, interference with hydro-electric schemes from artificial lakes, hindering navigation and fishing and the creation of habitats favourable for the transmittance of water- borne diseases (CABI, 2020)	Medium
20	4.07	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA	No	No evidence (Global Invasive Species Database (2021) Species profile: Pistia stratiotes).	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 evidence (Global Invasive Species Database (2021) Species profile: Pistia stratiotes).	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?	Yes	Živković, M. M., Anđelković, A. A., Cvijanović, D. L., Novković, M. Z., Vukov, D. M., Šipoš, Š. Š., & Radulović, S. B. (2019). The beginnings of Pistia stratiotes L. invasion in the lower Danube delta: the first record for the Province of Vojvodina (Serbia). BioInvasions Record, 8(2).	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	Pistia stratiotes grows in slow-moving rivers and reservoirs, irrigation channels, ponds, lakes, canals and ditches (Živković, M. M., Anđelković, A. A., Cvijanović, D. L., Novković, M. Z., Vukov, D. M., Šipoš, Š. Š., & Radulović, S. B. (2019). The beginnings of Pistia stratiotes L. invasion in the lower Danube delta: the first record for the Province of Vojvodina (Serbia). BioInvasions	Very high
24	4.11	Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa?	Yes	Ecological impacts of P. stratiotes and note that they include increased rates of siltation, slowing of water velocities, degradation of fish nesting sites, increased nutrient loading, thermal stratification, increase in alkalinity and fish and	High
25	4.12	Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)?	Yes	Zivković, M. M., Andelković, A. A., Cvijanović, D. L., Novković, M. Z., Vukov, D. M., Šipoš, Š. Š., & Radulović, S. B. (2019). The beginnings of Pistia stratiotes L. invasion in the lower Danube delta: the first record for the Province of Vojvodina (Serbia). BioInvasions Record, 8(2).)	Low
	Resource 5.01	<i>ce exploitation</i> Is the taxon likely to consume threatened or	Not applicable	Not applicable	Very high
27	5.02	protected native taxa in the RA area? Is the taxon likely to sequester food resources (including nutrients) to the	No	No evidence	Low
6 1	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	Not applicable	Not applicable	Very high
	6.02	to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)?	No	No, due to lower temperatures (Global Invasive Species Database (2021) Species profile: Pistia stratiotes).	Low
	6.03	Is the taxon likely to hybridise naturally with native taxa?	No	No information (CABI, 2020); Global Invasive Species Database (2021) Species profile: Pistia stratiotes.	Low
31	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	Yes	Reproduces asexually (CABI, 2020) ; Global Invasive Species Database (2021) Species profile: Pistia stratiotes.	High
32	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	No	Global Invasive Species Database (2021) Species profile: Pistia stratiotes.	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	Rapid vegetative reproduction allows water lettuce to cover an entire lake, from shore to shore, with a dense mat of connected rosettes in a short period of time. (Global Invasive Species Database (2021) Species profile: Pistia stratiotes).	High
34	6.07	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	1	Global Invasive Species Database (2021) Species profile: Pistia stratiotes.	High
_	Jianara	al mechanisms	. 1		High
		How many potential internal		Escape from confinement or garden escape, Ornamental purposes,	High
35	7.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable	>1	Nursery trade (CABI, 2020)	
35		vectors/pathways could the taxon use to	Yes	Nursery trade (CABI, 2020) Fragments, or whole plants, can be spread via boats or fishing equipment from an infested area to a clean body of water. (Global Invasive Species Database (2021) Species profile: Pistia stratiotes)	Low
35 36	7.01	vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more		Fragments, or whole plants, can be spread via boats or fishing equipment from an infested area to a clean body of water. (Global	Low Medium

39	7.05	Is natural dispersal of the taxon likely to	No	Global Invasive Species Database (2021) Species profile: Pistia	Low
		occur as larvae/juveniles (for animals) or as		stratiotes	
		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?	Not applicable	Not applicable	Very high
41	7.07	Are propagules or eggs of the taxon likely to	No	CABI 2020; Global Invasive Species Database (2021) Species	Medium
12	7.08	be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the	Yes	profile: Pistia stratiotes Ship ballast water; Floating vegetation and debris (CABI, 2020)	Low
72	7.00	vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be	165	Ship banasi water, moating vegetation and debris (CABI, 2020)	LOW
43	7.09	Is dispersal of the taxon density dependent?	No	CABI 2020; Global Invasive Species Database (2021) Species profile: Pistia stratiotes	Low
8. T	olerand	ce attributes	<u>.</u>		
	8.01	Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle?	Yes	It can survive for extended periods on moist soil. (CABI, 2020)	Low
45	8.02	Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being	No	No information (CABI, 2020)	Low
	8.03	Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	Yes	Chemical control methods that have been successful in treating P. stratiotes include the herbicide endothall, which can act quickly and kill all plant cells that it contacts. (Global Invasive Species Database (2021) Species profile: Pistia stratiotes).	Low
47	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	No	Global Invasive Species Database (2021) Species profile: Pistia stratiotes	Low
48	8.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	No	P. stratiotes has a low salinity tolerance; salt concentrations of 1.66% are toxic to the plant (Haller et al., 1974).	Medium
49	8.06	Are there effective natural enemies (predators) of the taxon present in the RA	No	In the RA area no	Low
		e change			
	<i>limate</i> 9.01	change	Net englissible	Net evel-	) (ama biab
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?	No change	The risks of establishment is no change, in the future temperatures will not be high enough to achieve a stable population (Parmesan, C., & Hanley, M. E. (2015). Plants and climate change: complexities and surprises. Annals of botany,	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	We may assume that predicted climate change causing warmer conditions might create new problems: the species might extend its range. (Šajna, N., Haler, M., Škornik, S., & Kaligarič, M. (2007). Survival and expansion of Pistia stratiotes L. in a thermal stream in Slovenia. Aquatic Botany, 87(1), 75-79.)	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?	Higher	Its growth habit can make it a weed in waterways, where it can kill native submerged plants and reduce biodiversity. (CABI, 2020)	Medium
54	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Higher	(Šajna, N., Haler, M., Škornik, S., & Kaligarič, M. (2007). Survival and expansion of Pistia stratiotes L. in a thermal stream in Slovenia. Aquatic Botany, 87(1), 75-79.)	Low
55	9.06	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	Higher	These mats can have a negative economic effect by blocking waterways, thus increasing the difficulty of navigation and hindering flood control efforts. (CABI, 2020)	Medium

Statistics	
Scores	
BRA	15.0
BRA Outcome	Medium
BRA+CCA	23.0
BRA+CCA Outcome	High
Score partition	
A. Biogeography/Historical	9.0
1. Domestication/Cultivation	2.0
2. Climate, distribution and introduction risk	0.0
3. Invasive elsewhere	7.0
B. Biology/Ecology	6.0
4. Undesirable (or persistence) traits	5.0
5. Resource exploitation	0.0
6. Reproduction	3.0
7. Dispersal mechanisms	0.0
8. Tolerance attributes	-2.0
C. Climate change	8.0
9. Climate change	8.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	3 5 5 <b>36</b>
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	12 2 7
6. Reproduction	7

7. Dispersal mechanisms	9
8. Tolerance attributes	6
C. Climate change	6
9. Climate change	6
Sectors affected	
Commercial	11
Environmental	10
Species or population nuisance traits	5
Thresholds	
BRA	22.75
BRA+CCA	22.75
Confidence	
BRA+CCA	0.53
BRA	0.53
CCA	0.54
Date and Time	
06/12/20	21 22:38:50

Taxon and Assessor details					
Category	Plantae (freshwater)				
Taxon name	Rotala macrandra				
Common name					
Assessor	Tena Radočaj				
Risk screening context					
Reason and socio-economic benefits					
Risk assessment area	Pannonian region				
Taxonomy					
Native range					
Introduced range					
URL					

			Response	Justification (references and/or other information)	Confidence
_		graphy/Historical			
		ication/Cultivation	Vac	Details mean design annulay in the stated according to a (1)	Vonchist
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	Rotala macrandra is popular in the global aquarium trade (Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala)	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	Rotala macrandra is popular in the global aquarium trade (Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) –	Very high
3	1.03	Does the taxon have invasive races,	Yes	Giant red Rotala) R. rotundifolia	Low
-		varieties, sub-taxa or congeners?			
2. (		, distribution and introduction risk			<b>1</b> <i>ii</i>
4	2.01	How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range?	LOW	The similarity of climatic conditions between native areas and the RA area is low (Climatch)	Medium
5	2.02	What is the quality of the climate matching data?	Medium	Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala	Low
6	2.03	Is the taxon already present outside of captivity in the RA area?	No	R. macrandra is not present in the RA area.	High
7	2.04	How many potential vectors could the taxon	One	The aquarium trade (Climatch and Weed Risk Assessment for	Medium
8	2.05	use to enter in the RA area? Is the taxon currently found in close	Yes	Rotala macrandra Koehne (Lythraceae) – Giant red Rotala) Hungary (Hussner, A. (2012). Alien aquatic plant species in	High
0	2.05	proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)?	Tes	European countries. Weed Research, 52(4), 297-306).	Ingn
3.1	Invasive	e elsewhere			
9		Has the taxon become naturalised	Yes	It has escaped from cultivation in Hungary, where the plants	High
		(established viable populations) outside its native range?		survive in thermal water bodies. (Hussner, A. (2012). Alien aquatic plant species in European countries. Weed Research,	
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	No	No evidence that R. macrandra has any negative impacts in natural environments, urban and suburban settings, or production systems. (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala)	Low
11	3.03	In the taxon's introduced range, are there	No	No evidence that R. macrandra has any negative impacts in	Low
		known adverse impacts to aquaculture?		natural environments, urban and suburban settings, or production systems. (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala)	
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem services?	No	No evidence that R. macrandra has any negative impacts in natural environments, urban and suburban settings, or production systems. (Climatch and Weed Risk Assessment for Rotala	Low
				macrandra Koehne (Lythraceae) – Giant red Rotala)	
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	No evidence that R. macrandra has any negative impacts in natural environments, urban and suburban settings, or production	Medium
				systems. (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala)	
		//Ecology			
		able (or persistence) traits	No	Harmless (Climatch and Wood Dick Assessment for Datala	High
14	4.01	Is it likely that the taxon will be poisonous or pose other risks to human health?	INO	Harmless (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala)	High
15	4.02	Is it likely that the taxon will smother one or	No	No evidence that R. macrandra has any negative impacts in	Medium
		more native taxa (that are not threatened or protected)?		natural environments, urban and suburban settings, or production systems. (Climatch and Weed Risk Assessment for Rotala	
16	4.03	Are there any threatened or protected taxa	No	macrandra Koehne (Lythraceae) – Giant red Rotala) No evidence	Low
10	4.05	that the non-native taxon would parasitise in the RA area?	UVI		LUW
17	4.04	Is the taxon adaptable in terms of climatic	No	Native area is India, and in Hungary survive in thermal water	Medium
		and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invide the PA prop2		bodies. (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala)	
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 evidence	Low
19	4.06	has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts	No	No evidence	Low
		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	Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala	Low
21	4.08	infectious agents that are endemic in the RA Is it likely that the taxon will host, and/or	No	Climatch and Weed Risk Assessment for Rotala macrandra Koehne	Low
-1	1.00	act as a vector for, recognised pests and infectious agents that are absent from (novel		(Lythraceae) – Giant red Rotala	
		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	The shoots of R. macrandra can grow 60 cm in length (Climatch and Weed Risk Assessment for Rotala macrandra Koehne	Medium

25     4.10     Is the task of automating result in anomal of automating result in anomal of automatic automati	23					
Particular and a second s		4.10		No		Low
24       A.1.1       But Holy that the basels mode of existence (e.g., excelling)       In we weldence that R. manaradar has any sequetive impacts in natural environment, unless and autochron strings, or production protects, (Charachi and Yacaki and Yacaki Protects, Charachi and Yacaki Protects, Protects, Pro						
is de construction of production or behaviours             is de construction of production             is de construction             is de construct	24	4 1 1		No		Low
e.e., Teeding, will reduce habitst quality for expected and the search of the structure of th	2 '			110		2011
54         1.12         Its the tases likely to maintain a visible product on the sparse in low products on the products on the products on the products on the product on the sparse in low products on the product sparse in low product sparse in low productspare in low productspare in low product spare product sp			(e.g. feeding) will reduce habitat quality for		systems. (Climatch and Weed Risk Assessment for Rotala	
Specialities even when presents in low presents on adverse conditions         Magazinerizagine: Commonspecify Biological Invisions in Hungary: Invision PressetsUVAR Alaphytery Klads, Budgest.           Common Pressets In John Harby to consume threatened or protected native same in the RA area?         Mot applicable         Not applicable         Very Infin           25         15         the same interview of a setting and applicable         Not applicable         Not applicable         Very Infin           26         15         the same interview of a setting and applicable         Not applicable         Not applicable         Very Infin           26         15         the same likely to enable applicable         Not applicable         Not applicable         Very Infin           26         16         the same likely to enable applicable         Not applicable         Very Infin           26         16         the tasen likely to enable applicable         Not applicable         Very Infin           27         5.67         the tasen likely to enable applicable         Not applicable         Very Infin           28         16.67         the tasen likely to enable applicable         Not applicable         Nor           29         16.67         the tasen likely to enable applicable         Not applicable         Nor           29         16.67         the tasen likely to enab						
Invisory         Invisory         Particle         Particle         Particle           26         50.1         5 the basin likely to consume threadened or protected relative same in the Rarger?         No	25	4.12		Yes		Low
by case of a domain ferm?         109 gp.           65         150 by the stant live transmitter threatened or for applicable         Not applicab						
6. Resource exception         Not applicable         Not applicable         Not applicable         Wet applicable         Wet applicable           27         5.01         Sin the son likely to comment threatened on the Ba anaal model in the						
protected native toos in the A array         Constraint         Constraint           27 5.02         Ret the const likely to sequester field resources (induction in the A array)         Low         Low           28 6.01         Statuson likely to sequester field and/or to realize sequest annually in response or propagation in the A array)         Not applicable         Very high           28 6.01         Statuson likely to schultr parental care and construction of parents in the A array)         Not applicable         Very high           28 6.01         Statuson likely to schultr parental care are propagation (in the A array)         Not applicable         Very high           30 6.03         Is the toom likely to schultr parental care are propagation (in the A array)         Not applicable         Low         Low           31 6.04         Is the toom likely to produce and display associal reproduction?         Not evidence         Low         Low           32 6.05         Is the toom display display the produce and large number of progenitic high the coler         Ves         Bidond, M, and B-D. Zoltan (eds.). 2004. Biologial Invasion (I humper): Low         Low           33 6.05         Is the toom display the produce and large number of progenitic high the produce and large number of progenitic networks (largenitic high the display associal reproduction?         No         No         Very high No           41 6.07         How many potential internal large number of progenitic a offip	5. R		e exploitation			
27         Stop         Stop         Stop         No         <	26	5.01		Not applicable	Not applicable	Very high
messacres (induiting numbers) to the detimate of native tool in the A area?         Met applicable         Met applicable           6.003         information         Not applicable         Not applicable         Not applicable         Not applicable           6.013         information         Not applicable         Not applicable         Not applicable         Not applicable         Not applicable           6.013         information         Not applicable	27	F 02		No	No. information	1
Identified         Identified         Identified         Identified         Identified           28         6.0.1         15         the factor filedy to schild parental care not provide an early into its parental into an early into the parental care not provide an early into its parental into a parental care not provide an early into its parental into a parental care not provide an early into a parental care not provide care not prov	27	5.02	, ,	NO	No Information	LOW
6. Agencodation         Not applicable         Not ap						
and/or to reduce age-at-muturby in response         No         No         Information         No	6. R	Reprodu	iction			
Interview         Interview         No         No information - 1 think not, because of low temperatures in the RA area.         Low           6.02         Bite beacon likely to phone values and concervations and the concervation of the RA area?         Low         Low           31         6.04         Bite beacon likely to phone         Yes         Botond, M, and B-D. Zoltan (ads.). 2004. Biologial Trustick Mayorrozzgon: Conconvervets (Biological Trustick) is intrustick matcher taxon (respective)         Low           32         6.05         Bite beacon likely to phone         Yes         Botond, M, and B-D. Zoltan (ads.). 2004. Biologial Trustick Mayorrozzgon: Connovervets (Biological Trustick) is the taxon key to phone (ar likely) to produce a targe number of propagatics or offspring within a short time span (e.g. < 1 year)?	28	6.01		Not applicable	Not applicable	Very high
29     6.02     5.12     5.14     textoon likely to produce viable gametes in the seven paratures in the seven parature in the seven paratu						
Image: Construction of propagales (in the RA area).         RA area.         Construction           6.63         Ext textual link to RA information and the RA area (in the RA area).         No	29	6.02		No	No information- I think not because of low temperatures in the	Low
Dis Die Streit Eason likery to hybridies naturally with nature texa?         No         No evidence         Low           21         6.49         is the texaon likery to be hermaphroditic or to display assural ergoduction?         Yes         Botond, M., and BD. Zoltan (ds.). 2004. Biologial Invasion: In Humpyr: Levi Security and Production?         Low           22         6.55         5: the texaon dependent on the presence of another texao (or specific habitat features) to complete the life cycle.         No         No evidence         Low           33         6.66         5: the texaon dependent on the presence of the complete the life cycle.         No         No evidence         Low           34         6.67         How many time units (daw, monthy, year) within a short time span (e.g., < 19 year)?	2,2	0.02		110		2011
31     6.04     Is the taxon inkerly to be hermaphrophic or to Yes     Botond, M., and BD. Zothan (eds.). 2004. Biological Invasions in Humgary: Invasive Plants]. TermászetBUVÁR Alapítvány Kladó, Budapest.     Low       32     6.05     Is the taxon dependent on the prusence of no complete its life cycle?     No     No evidence     Low       33     6.06     Is the taxon information to the taxon interport of the taxon information of the taxon information of the taxon information of the taxon information within a short time span (e.g. + 1 year)?     No     No evidence     Low       34     6.07     How many time units (days, months, years) dispersed taxon require taxon information of the taxon information (days taxon require taxon information)     Yes     Botond, M., and BD. Zothan (eds.). 2004. Biologial Invasions in Humgary: Invasions in Hum	30	6.03		No		Low
Image: sexual reproduction?         Magyarorszápan: Czonnoveyek (Biologial Invasions in Hungary: Invasive Plants). TemészetBUVÁR Alapitvány Kádó, Budapest.           32         6.05         Is the taxon dependent on the presence of another taxon (or specific habitat features).         No         No e vidence         Low           33         6.06         Complete Its life cycle         Yes         Botond, M., and BD. Zoltan (eds.). 2004. Biologial Invaziok Magyarorszagan: Czonnoveyek (Biological Invaziok Magyarorszagan: Czonnovey Magyarorszagan: Czonnovey Magyarorszagan: Czonnovey Magyarorszagan: Czonnovey Magyarorszagan: Czonnovey Magyarorszagan:						
Invasive Paints). TermészetőÚVÁR Alapítvány Kiadó, Budapest.         Invasive Paints). TermészetőÚVÁR Alapítvány Kiadó, Budapest.           32         6.05         Is the taxon dependent on the presence of another taxon (or specific habitat fraturus).         No         No evidence         Low           33         6.06         Is the taxon interpretific habitat fraturus).         No         No         No         No           34         6.07         It taxon interpretific habitat fraturus).         No         No         No         No           34         6.07         How many time units (day, monthrs, years).         It Mayaronzagor. Zonnoveryek (Baolgical Invasions in Hungary: Invasive Plants). Természet80/VAR Alapítvány Kiadó, Budapest.         Low           27. Obsertar InterAnimist         Exception Plants). Természet80/VAR Alapítvány Kiadó, Budapest.         Low           28         7.03         No many potential Internal vector regime taxon in close proximity to one or more taxon in close proximity to one or more taxon in close proximity to ane or more taxon in the taxon inkety to ane or more taxon in close proximity to ane or more provide taxon inkety to ane or more propagues         No evidence         Low           37         7.03         Dest taxon in ket axon inkety to ane or more propagues	31	6.04		Yes		Low
2         6.05         is the taxon dependent on the presence of another taxon (or specific habitst features) to complete its life cycle?         No evidence         Low           3         6.06         is the taxon known (or likely) to produce a large number of programs is or dispring within a short time span (e.g. < 1 year)?			display asexual reproduction?			
32     6.05     Is the taxon drependent on the presence of to complete its life cycle?     No     No evidence     Low       33     6.06     Is the taxon (targe (or likely) to produce a large number of propagules or dipping within a short time spane (e.g. < 1 year)?						
another taxon (or specific habits features) to complete its life cycle?         Ves         Botond, M., and BD. Zoltan (eds.). 2004. Biologial Invaziok large number of progasolues or offspring within a short time span (e.g. < 1 year)?         Low           36         6.06         Is the taxon known (or likely) to produce a large number of progasolues or offspring within a short time span (e.g. < 1 year)?	32	6.05	Is the taxon dependent on the presence of	No		Low
33     6.06     Is the taxon known (or likely) to produce a large produce large			another taxon (or specific habitat features)			
Iarge number of propagules or offspring within a short time span (e.g. < 1 year)?         Magyarorszagon: Ozonoveryek (Biologial Invasions in Hungary: Hungsve Putals), TermészetBUVAR Alapitvány Kladó, Budopest.         Low           24         6.07         How many time units (days, months, years) does the taxon nequire to reach the age-at- first-reproduction?         1         Sotond, M., and BD. Zoltan (eds.). 2004. Biologial Invasiok Magyarorszagon: Ozononoveryek (Biologial Invasiok Magyarorszagon: Ozonoveryek (Biologial Invasiok Ma	22	6.06				1
within a short time span (e.g. < 1 year)?         Invasive Plants]. TermészetbÜVÁR Alapítvány Kladó, Budgpest.         Low           44         6.07         How many time units (days, months, years) do do status (days, months, years) do	33	6.06		res		LOW
40         Control         409 pp.           46         6.07         How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?         50 stord, M, and BD. Zoltan (eds.). 2004. Biologial Invasiok Magyarorszagon: Coronoveryek (Biological Invasiok Magyarorszagon: Coronoveryek (Biological Invasiok Magyarorszagon: Coronoveryek (Biologial Invasiok Magyarotszagon: Coronoveryek (Biologia			5 1 1 5 1 5			
34       6.07       How many time units (days, months, years) of dest the taxon require to reach the age-at- first-reproduction?       Isotond, M., and BD. Zoltan (eds.). 2004. Biological Invaziok Magyacrossagon: Connovery(Biological Invaziok Invasive Plants). Természet8UVAR Alapitvány Kladó, Budapest.       Low         7. Dispersive mechanisms       Escape from garden       Low         8.7       2.01       How many totential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable taxon in close proximity to one or more protested areas (e.g., MCZ, MPA, SSS1)       Ves         37       7.03       atcsinity to one or more protested areas (e.g., MCZ, MPA, SSS1)       No       No evidence       Low         38       7.04       Is natural dispersial of the taxon likely to occur as egas (for animals) or as propagules (for plants; seedings (for plants) in the RA area?       No       No evidence       Low         39       7.03       Atc older life stages of the taxon likely to nigrate in the RA area for reproduction?       No       No evidence       Low         40       7.04       Is natural dispersal of the taxon likely to nigrate in the RA area for reproduction?       No       No evidence       Low         41       7.07       Are older life stages of the taxon likely to nigrate in the RA area for reproduction?       No       Climatch and Weed Risk Assessment for Rotala macrandra koehne (Lythraceae) - Giant red Rotala).       Low         42						
Invasive Plants]. Természet8ÜVÁR Alapítvány Kiadó, Budapest.           Z-Disconst International Internative Construction of State S	34	6.07	How many time units (days, months, years)	1		Low
Cobservation         Conservation           25         7.00         How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable)         One         Escape from garden         Low           26         7.02         Will any of these vectors/pathways bring the protected areas (e.g. (e.g. ship hults, pilings, buoys) such that it enhances the likelihood of dispersal?         No         No evidence         Low           27         7.03         Does the taxon likely to occur as larvad juscesal (e.g. ship hults, pilings, buoys) such that it enhances the likelihood of dispersal?         No         No evidence         Low           27         7.03         Is natural dispersal of the taxon likely to occur as larvad juscesal (ht taxon likely to occur as larvad juscesal (ht taxon likely to migrate in the RA area for reproduction?         No         No evidence         Low           27         7.04         F. area for reproduction?         No         No evidence         Low           27         7.05         Is actural dispersal of the taxon likely to migrate in the RA area for reproduction?         No         No evidence         Low           27         7.05         Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (53-11; i.e. both unintentional or intertional) likely to be         No         (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).         Low <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>						
2. Dispersal mechanisms         Unit Mechanisms           35         7.01         How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable         One         Escape from garden         Low           36         7.02         Will any of these vectors/pathways bring the taxon inclose proximity to one or more protected areas (e.g., MCZ, MPA, SSSI)?         Personal opinion- flood or boat         Low           37         7.03         Does the taxon have a means of actively attaching itself to hard substrate (e.g. ship hulls, plings, buoys) such that it enhances the likelihood of dispersal?         No         No evidence         Low           37         7.04         Is natural dispersal of the taxon likely to occur as larvae/juveniles (for ninmis) or as propagues         No         No evidence         Low           37         7.04         Tantural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedings (for plants) in the RA area?         No         No evidence         Low           37         7.05         Are doler life stages of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedings (for plants) in the RA area?         No         No explence         Low           37         7.04         Tartural dispersal of the taxon likely to negative intervaniles of the taxon likely to ne			first-reproduction?			
35       7.01       How many potential internal vector/pathways could the taxon use to disperse within the RA area (with suitable random constraints) of the vector/pathways constraints (e.g., ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal of the taxon likely to occur as larvacity useds, spores) in the RA area?       No       No evidence       Low         37       7.03       Does the taxon have a means of actively attaching itself to hard substrate (e.g., ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal of the taxon likely to occur as larvacity useds, spores) in the RA area?       No       No evidence       Low         38       7.04       Is natural dispersal of the taxon likely to occur as larvacity used of the taxon likely to occur as larvacity used (for paints) or as prognatures of the taxon likely to migrate in the RA area?       No       No evidence       Low         37       7.05       Is natural dispersal of the taxon likely to migrate in the RA area?       No       No evidence       Low         37       7.04       Zo define fits ages of the taxon likely to migrate in the RA area for reproduction?       No       No evidence       Low         38       7.04       Is dispersal of the taxon likely to migrate in the RA area for reproduction?       No       Climatch and Weed Risk Assessment for Rotala macrandra Low       Low         42       7.08       Is dispersal of the taxon along any of the vector/spathways mentioned in the previous severu goes of the taxon low desity dependefithe w	7Γ	licnerca	al mechanisms		409 pp.	
vectors/pathways could the taxon use to disperse within the NA area (with suitable         Yes           26         7.02         Will any of these vectors/pathways bring the protected areas (e.g. MCZ, MPA, SSSI)?         Yes         Personal opinion- flood or boat         Low           27         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 evidence         Low           28         7.04         Is natural dispersal of the taxon likely to occur as sags (for animals) or as propagules (for plants: seeds, soores) in the RA area?         No         No evidence         Low           29         7.05         Is natural dispersal of the taxon likely to occur as larvad/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?         No         No evidence         Low           40         7.06         Are older life stages of the taxon likely to migrate in the RA area for reproduction?         No         No evidence         Low           41         7.07         Are propagules or grap of the taxon along any of the vectors/pathways mentioned in the previous sever questons (32-41; i.e. bot unintentional or intentional) likely to be         No         (Climatch and Weed Risk Assessment for Rotala macrandra koehne (Lythraceae) - Giant red Rotala).         Low           8.         7.04         Is the taxon able to withstand being out of water for extended periods (e.				One	Escape from garden	Low
56     7.02     Will any of these vectors/pathways bring the protected areas (e.g., MCZ, MPA, SSS1)?     Personal opinion- flood or boat     Low       7     7.03     Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pillings, buoys) such that it enhances the likelihood of dispersal?     No     No evidence     Low       38     7.04     Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants; seeds, soroes) in the RA area?     No     No evidence     Low       39     7.05     Is natural dispersal of the taxon likely to occur as lawae/juveniles (for animals) or as fragments/seedings (for plants) in the RA area?     No     No evidence     Low       40     7.06     Are older life stages of the taxon likely to migrate in the RA area for reproduction?     Not applicable     Not applicable     Very high       41     7.07     Are propagules or eggs of the taxon likely to be dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (32-41, i.e. both unintentional or intentional) likely to be unintentional or intentional) likely to be unintentional or intentional likely to be unintentional or intentional likely to be vectors/pathways mentioned in the previous seven questions (32-41, i.e. both vectors/pathways mentioned or that taxon? In the Justification field, indicate the relevant water quality conditions relevant to that taxon? In the Justification field, indicate the relevant water quality variable(s) being de sevent quality conditions relevant to that taxon? In the Justification relevant to that taxon? In the Justification relevant to th						
taxon in close proximity to one or more protected areas (c. MCZ, MPA, SSS1)?         No         No evidence         Low           37         7.03         Does the taxon have a mean of actively hulls, pilings, buoys) such that it enhances the likelihood of dispersal?         No         No evidence         Low           38         7.04         Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagues         No         No evidence         Low           39         7.05         Is natural dispersal of the taxon likely to occur as larvae/juwelles (for animals) or as fragments/seedings (for plants) in the RA area?         No         No evidence         Low           40         7.06         Are older life stages of the taxon likely to migrate in the RA area for reproduction?         No         No applicable         Not applicable         Not applicable         Very high           41         7.07         Are propagues or eggs of the taxon likely to migrate in the RA area for the production?         Not applicable         Not applicable         Not applicable         Very high           42         7.08         Is dispersal of the taxon along any of the vector/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or intentional) likely to be         Yes         Floads         Low           5.         Toerance attributes         No         (Climatch and Weed Risk Assessment for Rotala macrandra weat ro extended periods						
protected areas (e.g., MCZ, MPA, SSS17         No           37         7.03         Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, plings, buoys) such that it enhances         No         No evidence         Low           38         7.04         Is natural dispersal of the taxon likely to occur as eggs (for plants; seeds, spores) in the RA area?         No         No evidence         Low           39         7.05         Is natural dispersal of the taxon likely to occur as larve/juveniles (for namals) or as fragments/seedings (for plants) in the RA area?         No         No evidence         Low           30         7.05         Is natural dispersal of the taxon likely to occur as larve/juveniles (for animals) or as fragments/seedings (for plants) in the RA area?         No evidence         Low           31         7.07         Is dispersal of the taxon likely to migrate in the RA area by other animals?         Not applicable         Very high           32         7.08         Is dispersal of the taxon disengt ny of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional of intentonal) likely to be dispersed of the taxon density dependent?         No         (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).         Low           32         7.09         Is dispersal of the taxon diverging the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional ) likely to be one or more	36	7.02		Yes	Personal opinion- flood or boat	Low
37     7.03     Does the taxon have a means of actively hulls, pilings, buoys) such that it enhances the likelihood of dispersal?     No     No evidence     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     No evidence     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     No evidence     Low       40     7.06     Are older life stages of the taxon likely to migrate in the RA area for reproduction?     Not applicable     Not applicable     Very high       41     7.07     Are propagules or eggs of the taxon likely to muniterit in the RA area by other animals?     No     (Climatch and Weed Risk Assessment for Rotala macrandra koehne (Lythraceae) – Giant red Rotala).     Low       42     7.08     Is dispersal of the taxon dileg ng or of water question (35-41; i.e. both unintentional or intentional) likely to be ne or more hours) at some stage of its life vectors/pathways mentioned in the previous sever question (35-41; i.e. both unintentional or intentional) likely to be ne or more hours) at some stage of its life vectors/pathways the outbot of water quality conditions relevant to that taxon? (In the Justification field, indicate the relevant water quality variable(s) being environment2/man disturbance?     No     (Climatch and Weed Risk Assessment for Rotala macrandra koehne (Lythraceae) – Giant red Rotala).     Low       47     8.04     Is the						
attaching itself to hard substrate (e.g. ship hulls, pilings, buyos) such that it enhances the likelihood of dispersal ?         No         No evidence         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         No evidence         Low           39         7.05         Is natural dispersal of the taxon likely to occur as larve/juveniles (for animals) or as fragments/seeding (for plants) in the RA area?         No         No evidence         Low           40         7.06         An other likely to occur as larve/juveniles (for animals) or as fragments/seeding (for plants) in the RA area?         Not applicable         Not applicable         Very high           17         7.07         Re dispersal of the taxon likely to migrate in the RA area by other animals?         Not applicable         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         No         (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).         Low           8.70// vectors/pathways mentioned in the previous seven questions (35-41); i.e. both unintentional or intentional) is the taxon ollogent of a wide range of water for extended periods (e.g. minimum of one or more hors) at some stage of its life vector?         No         (Climatch and Weed Risk Assessment for Rotala macran	37	7.03		No	No evidence	Low
the likelihood of dispersal 7         No           38         7.04         Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?         No         No evidence         Low           39         7.05         Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedings (for plants) in the RA area?         No         No evidence         Low           40         7.06         Are order life stages of the taxon likely to migrate in the RA area for reproduction?         Not applicable         Not applicable         Very high           41         7.07         Are propagules or eggs of the taxon likely to dispersed in the RA area for reproduction?         No         (Climatch and Weed Risk Assessment for Rotala macrandra koehne (Lythraceae) - Giant red Rotala).         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 order dist red Rotala).         No         (Climatch and Weed Risk Assessment for Rotala macrandra koehne (Lythraceae) - Giant red Rotala).         Low           8. Tolerance extributes         No         (Climatch and Weed Risk Assessment for Rotala macrandra koehne (Lythraceae) - Giant red Rotala).         Low           45         8.02         Is the taxon tolerant of a wide range of vecto?         No         (Climatch and Weed Risk Assessm				1		1
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 evidence       Low         39       7.05       Is natural dispersal of the taxon likely to occur as larvae/juveniles (for plants) in the RA area?       No       No evidence       Low         40       7.06       Are older life stages of the taxon likely to migrate in the RA area for reproduction?       Not applicable       Not applicable       Very high         41       7.07       Are older life stages of the taxon likely to be dispersed in the RA area by other animals?       Not applicable       Not applicable       Not applicable       Not applicable         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 unintentional or intentional likely to be of more hours) at some stage of its life cycle?       No       (Climatch and Weed Risk Assessment for Rotala macrandra koehne (Lythraceae) – Giant red Rotala).       Low         8.01       Is the taxon along of or wide range of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle?       No       (Climatch and Weed Risk Assessment for Rotala macrandra koehne (Lythraceae) – Giant red Rotala).       Low         46       8.01       Is the taxon tolerant of a wide range of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle			attaching itself to hard substrata (e.g. ship			
ccur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?         No         No evidence         Low           39         7.05         Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedings (for plants) in the RA area?         No         No evidence         Low           40         7.06         7.06         reade of the taxon likely to migrate in the RA area for reproduction?         Not applicable         Not applicable         Very high           41         7.07         Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?         Not applicable         Not applicable         Very high           42         7.08         Is dispersal of the taxon likely to be dispersed in the RA area by other animals?         Not applicable         Not applicable         Not applicable         Low           42         7.09         Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous unintentional or intentional) likely to be         No         (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).         Low           8.         Joil Is the taxon tolerant of a wide range of were quality conditions relevant to that taxon? [In the justification field, indicate the relevant water quality conditions relevant to that taxon? [In the justification field, indicate the relevant water quality conditions relevant to that taxon? [In the wild with chemical, biological, or other agents/mama??			hulls, pilings, buoys) such that it enhances			
Image: International content of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedings (for plants) in the RA area?         No         No evidence         Low           07.05         Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedings (for plants) in the RA area?         No evidence         Very high           07.05         Are older life stages of the taxon likely to object dispersal in the RA area for reproduction?         Not applicable         Very high           11         7.07         Are propagules or eggs of the taxon likely to be dispersed in the 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         (Climatch and Weed Risk Assessment for Rotala macrandra koehne (Lythraceae) - Giant red Rotala).         Low           8.70         Is dispersal of the taxon along or of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or intentional) likely to be         No         (Climatch and Weed Risk Assessment for Rotala macrandra koehne (Lythraceae) - Giant red Rotala).         Low           8.70         Is the taxon along or of the avid range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(5) being and the relevant water quality variable(5) b	20	7.04	hulls, pilings, buoys) such that it enhances the likelihood of dispersal?	No	No ovidance	Low
39       7.05       Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedings (for plants) in the RA area?       No       No evidence       Low         40       7.06       Are older life stages of the taxon likely to migrate in the RA area for reproduction?       No tapplicable       Not applicable       Very high         41       7.07       Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?       No       (Climatch and Weed Risk Assessment for Rotala macrandra Low       Low         42       7.08       Is dispersal of the taxon along any of the very outper animals?       Yes       Floods       Low         43       7.09       Is dispersal of the taxon density dependent?       No       (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) - Giant red Rotala).       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 cycle?       No       (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) - Giant red Rotala).       Low         45       8.02       Is the taxon lolerant of a wide range of more or more hours) at some stage of its life cycle?       No       (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) - Giant red Rotala).       Low         46       8.02       Is the taxon lolerant of a wide range of more	38	7.04	hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to	No	No evidence	Low
40       Image: fragment/seed/ings (for plants) in the RA area?       Not applicable       Not applicable       Very high         40       7.06       Are older life stages of the taxon likely to migrate in the RA area for reproduction?       Not applicable       Not applicable       Very high         41       7.07       Are propagues or eggs of the taxon likely to be dispersed in the RA area by other animals?       Not       (Climatch and Weed Risk Assessment for Rotala macrandra to wow seven questions (35–41; i.e. both unintentional or intentional) likely to be       Low         42       7.09       IS dispersal of the taxon density dependent?       No       (Climatch and Weed Risk Assessment for Rotala macrandra to wow seven questions (35–41; i.e. both unintentional or intentional) likely to be       Low         43       7.09       IS dispersal of the taxon density dependent?       No       (Climatch and Weed Risk Assessment for Rotala macrandra to wow seven questions (35–41; i.e. both unintentional) inkely to be       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 cycle?       No       (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).       Low         45       8.02       IS the taxon lolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(S) bein       No       (Climatch and Wee	38	7.04	hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules	No	No evidence	Low
area?         area?         Very high           40         7.06         Are older life stages of the taxon likely to be dispersed in the RA area for reproduction?         Not applicable         Very high           41         7.07         Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?         No         (Climatch and Weed Risk Assessment for Rotala macrandra vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or intentional) likely to be         Low           42         7.08         Is dispersal of the taxon density dependent?         No         (Climatch and Weed Risk Assessment for Rotala macrandra koehne (Lythraceae) – Giant red Rotala).         Low           43         7.09         Is dispersal of the taxon density dependent?         No         (Climatch and Weed Risk Assessment for Rotala macrandra koehne (Lythraceae) – Giant red Rotala).         Low           44         8.01         Is the taxon able to withstand being out of one or more hours) at some stage of its life cycle?         No         (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).         Low           45         8.02         Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being         No         (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).         Low           47			hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?			
40       7.06       Are older life stages of the taxon likely to migrate in the RA area for reproduction?       Not applicable       Not applicable       Very high         1       7.07       Are propagues or eggs of the taxon likely to be dispersed in the RA area by other animals?       No       (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) - Giant red Rotala).       Low         22       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       (Climatch and Weed Risk Assessment for Rotala macrandra koehne (Lythraceae) - Giant red Rotala).       Low         3       7.09       Is dispersal of the taxon along on of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or intentional) likely to be       No       (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) - Giant red Rotala).       Low         43       7.09       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       (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) - Giant red Rotala).       Low         45       8.02       Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) beinq       No       No evidence       Low         46       8.03 <td></td> <td></td> <td>hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as</td> <td></td> <td></td> <td></td>			hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as			
migrate in the RA area for reproduction?         n			hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA			
41       7.07       Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?       No       (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).       Low         22       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) likely to be       Yes       Floods       Low         43       7.09       Is dispersal of the taxon density dependent?       No       (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).       Low         8.       Tolerance attributes       No       (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).       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 cycle?       No       (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).       Low         45       8.02       Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being agents/means?       No       No evidence       Low         47       8.04       Is the taxon likely to tolerate or benefit from environmental/human disturbance?       No       No evidence       Giant red Rotala).       Low <td< td=""><td>39</td><td>7.05</td><td>hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?</td><td>No</td><td>No evidence</td><td>Low</td></td<>	39	7.05	hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?	No	No evidence	Low
be dispersed in the RA area by other animals?         Koehne (Lythraceae) – Giant red Rotala).         Low           22         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) likely to be         Provectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional) rintentional) likely to be         Low           43         7.09         Is dispersal of the taxon density dependent?         No         (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).         Low           8.70         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 conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality to tolerate or benefit from the wild with chemical, biological, or other and sensor?         No         (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).         Low           47         8.04         Is the taxon ble controlled or eradicated in the wild with chemical, biological, or other and sensor?         No         No evidence         Climatch and Weed Risk Assessment for Rotala macrandra Rotala).         Low           48         8.05         Is the taxon ble to tolerate salinity levels that are higher or lower than those found in the sub evidence         No         No evidence         Low           49         8.06         Roe there effecti	39	7.05	hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to	No	No evidence	Low
wetors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or intentional) likely to be       No       (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).       Low         43       7.09       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       (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).       Low         45       8.02       Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being       No       (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).       Low         46       8.03       Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?       No       No       No evidence       Low         47       8.04       Is the taxon nikely to tolerate or benefit from environmental/human disturbance?       Yes       (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).       Medium         48       8.05       Is the taxon nikely to tolerate salinity levels that are higher or lower than those found in its usual environment?       No       No       No       No         49       8.06       Are there effective natural enemies (predators) of the taxon present in the RA       No	39 40	7.05	hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction?	No Not applicable	No evidence Not applicable	Low Very high
seven questions (35-41; i.e. both unintentional or intentional) likely to be       No       (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).       Low         8.       Toterance attributes       Volume to the taxon density dependent?       No       (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).       Low         8.       Toterance attributes       Volume to 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 vycle?       No       (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).       Low         45       8.02       Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being       No       (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).       Low         47       8.04       Is the taxon likely to tolerate or benefit from environmental/human disturbance?       Yes       (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).       Medium         48       8.05       Is the taxon able to tolerate or benefit from environmental/human disturbance?       Yes       (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).       Low         49       8.05       Is the taxon able to tolerate salinity levels that are h	39 40 41	7.05 7.06 7.07	hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No Not applicable No	No evidence Not applicable (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).	Low Very high Low
unintentional or intentional) likely to be       Image: constraint of the taxon density dependent?       No       Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).       Low         8. Tolerance attributes       Is dispersal of the taxon able to withstand being out of water for extended periods (e.g. minimum of or one or more hours) at some stage of its life cycle?       No       (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).       Low         45       8.02       Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being       No       (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).       Low         46       8.03       Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?       No       (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).       Low         47       8.04       Is the taxon able to tolerate or benefit from environmental/human disturbance?       Yes       (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).       Low         49       8.05       Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?       No       Freshwater species       Low         49       8.05       Is the extoring relevant in the	39 40 41	7.05 7.06 7.07	hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the	No Not applicable No	No evidence Not applicable (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).	Low Very high Low
43       7.09       Is dispersal of the taxon density dependent?       No       (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).       Low         8. Tolerance attributes       8.01       Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cvcle?       No       (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).       Low         45       8.02       Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being       No       (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).       Low         46       8.03       Can the taxon blerontrolled or eradicated in the wild with chemical, biological, or other agents/means?       No       No evidence       Low         47       8.04       Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environmental/human disturbance?       No       Freshwater species       Giant red Rotala).       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       Freshwater species       Low         49       8.06       Are there effective natural enemies (preducts) of the taxon present in the RA       No       No	39 40 41	7.05 7.06 7.07	hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous	No Not applicable No	No evidence Not applicable (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).	Low Very high Low
8. Tolerance 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       (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).       Low         45       8.02       Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being       No       (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).       Low         46       8.03       Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?       No       No evidence       Low         47       8.04       Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?       No       Freshwater species       Low         48       8.05       Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?       No       Freshwater species       Low         49       8.06       Are there effective natural enemies (predators) of the taxon present in the RA       No       No       No       Low	39 40 41	7.05 7.06 7.07	hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both	No Not applicable No	No evidence Not applicable (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).	Low Very high 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 cvcle?       No       (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).       Low         45       8.02       Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being       No       (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).       Low         46       8.03       Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?       No       No evidence       Low         47       8.04       Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?       No       Freshwater species       Medium         48       8.05       Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?       No       No       Freshwater species       Low         49       8.06       Are there effective natural enemies (predators) of the taxon present in the RA       No       No       No       Low	39 40 41 42	7.05 7.06 7.07 7.08	hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be	No Not applicable No Yes	No evidence Not applicable (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala). Floods	Low Very high Low Low
water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle?Koehne (Lythraceae) - Giant red Rotala).Low458.02Is 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) beingNo No(Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) - Giant red Rotala).Low468.03Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?NoNo evidenceLow478.04Is the taxon likely to tolerate or benefit from environmental/human disturbance?Yes(Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) - Giant red Rotala).Medium488.05Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?NoNoFreshwater speciesLow498.06Are there effective natural enemies (predators) of the taxon present in the RANoNoLow	39 40 41 42 43	7.05 7.06 7.07 7.08 7.09	hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as 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 Not applicable No Yes	No evidence Not applicable (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala). Floods (Climatch and Weed Risk Assessment for Rotala macrandra	Low Very high Low Low
and one or more hours) at some stage of its life       Image: cycle?         45       8.02       Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being       No       (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).       Low         46       8.03       Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?       No       No evidence       Low         47       8.04       Is the taxon able to tolerate or benefit from environmental/human disturbance?       Yes       (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).       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       Freshwater species       Low         49       8.06       Are there effective natural enemies (predators) of the taxon present in the RA       No       No       No       Low	39 40 41 42 43 8.7	7.05 7.06 7.07 7.08 7.09	hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as 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>	No Not applicable No Yes	No evidence Not applicable (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala). Floods (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).	Low Very high Low Low
cvcle?       cvcle?       cvcle?       cvcle?         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       (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).       Low         46       8.03       Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?       No       No evidence       Low         47       8.04       Is the taxon able to tolerate or benefit from environmental/human disturbance?       Yes       (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).       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       Freshwater species       Low         49       8.06       Are there effective natural enemies (predators) of the taxon present in the RA       No       No       No       Low	39 40 41 42 43 8.7	7.05 7.06 7.07 7.08 7.09	hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as 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	No Not applicable No Yes	No evidence Not applicable (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala). Floods (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala). (Climatch and Weed Risk Assessment for Rotala macrandra	Low Very high Low Low
45       8.02       Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being       No       (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).       Low         46       8.03       Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?       No       No evidence       Low         47       8.04       Is the taxon able to tolerate or benefit from environmental/human disturbance?       Yes       (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).       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       Freshwater species       Low         49       8.06       Are there effective natural enemies (predators) of the taxon present in the RA       No       No       No       Low	39 40 41 42 43 8.7	7.05 7.06 7.07 7.08 7.09	hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as 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? <b>Ce attributes</b> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of	No Not applicable No Yes	No evidence Not applicable (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala). Floods (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala). (Climatch and Weed Risk Assessment for Rotala macrandra	Low Very high Low Low
taxon? [In the Justification field, indicate the relevant water quality variable(s) beingNoNo evidenceLow468.03Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?NoNo evidenceLow478.04Is the taxon likely to tolerate or benefit from environmental/human disturbance?Yes(Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).Medium488.05Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?NoFreshwater speciesLow498.06Are there effective natural enemies (predators) of the taxon present in the RANoNoLow	39 40 41 42 43 8.7	7.05 7.06 7.07 7.08 7.09	hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as 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? Example 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 applicable No Yes	No evidence Not applicable (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala). Floods (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala). (Climatch and Weed Risk Assessment for Rotala macrandra	Low Very high Low Low
Image: selection of the state selecti	39 40 41 42 43 <u>8. 7</u> 44	7.05 7.06 7.07 7.08 7.09 60lerano 8.01	hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as 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? <b>ce attributes</b> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of	No Not applicable No Yes No	No evidence Not applicable (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala). Floods (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala). (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala). (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).	Low Very high Low Low Low
46       8.03       Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?       No       No evidence       Low         47       8.04       Is the taxon likely to tolerate or benefit from environmental/human disturbance?       Yes       (Climatch and Weed Risk Assessment for Rotala macrandra nevironmental/human disturbance?       Medium         48       8.05       Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?       No       Freshwater species       Low         49       8.06       Are there effective natural enemies (predators) of the taxon present in the RA       No       No       No       Low	39 40 41 42 43 <u>8. 7</u> 44	7.05 7.06 7.07 7.08 7.09 60lerano 8.01	hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as 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	No Not applicable No Yes No	No evidence Not applicable (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala). Floods (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala). (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala). (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).	Low Very high Low Low Low
ke       the wild with chemical, biological, or other agents/means?       he       climatic and Weed Risk Assessment for Rotala macrandra Rotala).       Medium         47       8.04       Is the taxon likely to tolerate or benefit from environmental/human disturbance?       Yes       (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).       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       Freshwater species       Low         49       8.06       Are there effective natural enemies (predators) of the taxon present in the RA       No       No       Low	39 40 41 42 43 <u>8. 7</u> 44	7.05 7.06 7.07 7.08 7.09 60lerano 8.01	hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as 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? Example to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the	No Not applicable No Yes No	No evidence Not applicable (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala). Floods (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala). (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala). (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).	Low Very high Low Low Low
agents/means?       agents/means?       Medium         47       8.04       Is the taxon likely to tolerate or benefit from environmental/human disturbance?       Yes       (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).       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       Freshwater species       Low         49       8.06       Are there effective natural enemies (predators) of the taxon present in the RA       No       No       Low	39 40 41 42 43 44 45	7.05 7.07 7.08 7.09 0lerano 8.01 8.02	hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being	No Not applicable No Yes No No	No evidence Not applicable (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala). Floods (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala). (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala). (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).	Low Very high Low Low Low
47       8.04       Is the taxon likely to tolerate or benefit from environmental/human disturbance?       Yes       (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).       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       Freshwater species       Low         49       8.06       Are there effective natural enemies (predators) of the taxon present in the RA       No       No       Low	39 40 41 42 43 44 45	7.05 7.07 7.08 7.09 0lerano 8.01 8.02	hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as 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? <b>ce</b> attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in	No Not applicable No Yes No No	No evidence Not applicable (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala). Floods (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala). (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala). (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).	Low Very high Low Low Low
48       8.05       Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?       No       Freshwater species       Low         49       8.06       Are there effective natural enemies (predators) of the taxon present in the RA       No       No       No       Low	39 40 41 42 43 44 45	7.05 7.07 7.08 7.09 0lerano 8.01 8.02	hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as 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? <b>ce attributes</b> 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 Not applicable No Yes No No	No evidence Not applicable (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala). Floods (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala). (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala). (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).	Low Very high Low Low Low
that are higher or lower than those found in its usual environment?       that are higher or lower than those found in its usual environment?         49       8.06       Are there effective natural enemies (predators) of the taxon present in the RA       No	<ul> <li>39</li> <li>40</li> <li>41</li> <li>42</li> <li>43</li> <li>8. 7</li> <li>44</li> <li>45</li> <li>46</li> </ul>	7.05 7.07 7.08 7.09 0lerano 8.01 8.02 8.03	hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Is the taxon likely to tolerate or benefit from	No Not applicable No Yes No No No	No evidence         Not applicable         (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).         Floods         (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).         (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).         (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).         (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).         No evidence         (Climatch and Weed Risk Assessment for Rotala macrandra	Low Very high Low Low Low Low
its usual environment?     Image: Second secon	39           40           41           42           43           8. 7           44           45           46           47	7.05 7.07 7.07 7.09 0 <i>lerano</i> 8.01 8.02 8.03 8.04	hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Is the taxon likely to tolerate or benefit from environmental/human disturbance?	No No Yes No No Yes No Yes	No evidence         Not applicable         (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).         Floods         (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).         (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).         (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).         (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).         No evidence         (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).	Low Very high Low Low Low Low Low Low
49 8.06 Are there effective natural enemies No No Low	39           40           41           42           43           8. 7           44           45           46           47	7.05 7.07 7.07 7.09 0 <i>lerano</i> 8.01 8.02 8.03 8.04	hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Is the taxon able to tolerate or benefit from environmental/human disturbance? Is the taxon able to tolerate salinity levels	No No Yes No No Yes No Yes	No evidence         Not applicable         (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).         Floods         (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).         (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).         (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).         (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).         No evidence         (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).	Low Very high Low Low Low Low Low Low
(predators) of the taxon present in the RA	39           40           41           42           43           8. 7           44           45           46           47	7.05 7.07 7.07 7.09 0 <i>lerano</i> 8.01 8.02 8.03 8.04	hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be Is dispersal of the taxon density dependent? Is the taxon able to withstand being out of water for extended periods (e.g. minimum of 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	No No Yes No No Yes No Yes	No evidence         Not applicable         (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).         Floods         (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).         (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).         (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).         (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).         No evidence         (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).	Low Very high Low Low Low Low Low Low
	39         40         41         42         43         8. 7         44         45         46         47         48	7.05 7.07 7.08 7.09 601erano 8.01 8.02 8.03 8.04 8.05	hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the 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 vibrate salinity levels that are higher or lower than those found in its usual environment?	No Not applicable No Yes No No Yes No	No evidence         Not applicable         (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).         Floods         (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).         (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).         (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).         (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).         No evidence         (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).         Freshwater species	Low Very high Low Low Low Low Low Low Low
9. Climate change	39         40         41         42         43         8. 7         44         45         46         47         48	7.05 7.07 7.08 7.09 601erano 8.01 8.02 8.03 8.04 8.05	hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the 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 nikely to tolerate or benefit from environmental/human disturbance? Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment? Are there effective natural enemies	No Not applicable No Yes No No Yes No	No evidence         Not applicable         (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).         Floods         (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).         (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).         (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).         (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).         No evidence         (Climatch and Weed Risk Assessment for Rotala macrandra Koehne (Lythraceae) – Giant red Rotala).         Freshwater species	Low Very high Low Low Low Low Low Low Low

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,	No change	The risks of entry into the RA area by the taxon are likely to no change, only by human impact.	Medium
51	9.02	decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	No change	The risks of establishment is no change, in the future temperatures will not be high enough to achieve a stable population (Parmesan, C., & Hanley, M. E. (2015). Plants and climate change: complexities and surprises. Annals of botany,	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	The risks of dispersal is no change, in the future temperatures will not be high enough to achieve a stable population (Parmesan, C., & Hanley, M. E. (2015). Plants and climate change: complexities and surprises. Annals of botany, 116(6), 849-864.)	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	(Parmesan, C., & Hanley, M. E. (2015). Plants and climate change: complexities and surprises. Annals of botany, 116(6), 849-864.)	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	(Parmesan, C., & Hanley, M. E. (2015). Plants and climate change: complexities and surprises. Annals of botany, 116(6), 849-864.)	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	(Parmesan, C., & Hanley, M. E. (2015). Plants and climate change: complexities and surprises. Annals of botany, 116(6), 849-864.)	Medium

Statistics

Scores	
BRA	8.0
BRA Outcome	Medium
BRA+CCA	8.0
BRA+CCA Outcome	Medium
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	3.0
4. Undesirable (or persistence) traits	1.0
5. Resource exploitation	0.0
6. Reproduction	3.0
7. Dispersal mechanisms	-3.0
8. Tolerance attributes	2.0
C. Climate change	0.0
9. Climate change	0.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3
2. Climate, distribution and introduction risk	5 5
3. Invasive elsewhere	
B. Biology/Ecology	36
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2
6. Reproduction	9
7. Dispersal mechanisms	
8. Tolerance attributes	6
C. Climate change	<b>6</b> 6
9. Climate change	6
Sectors affected	4
Commercial Environmental	4
Environmental Species or population nuisance traits	1
Species or population nuisance traits	5
Thusshalds	
Thresholds	22.75
BRA	22.75
BRA+CCA	22.75
Confidence	0.41
BRA+CCA	0.41

	DRATCCA	0.41
	BRA	0.40
	CCA	0.50
Date and Time		

06/12/2021 13:48:01

Taxon and Assessor details	
Category	Plantae (freshwater)
Taxon name	Rotala rotundifolia
Common name	dwarf rotala
Assessor	Tena Radočaj
Risk screening context	
Reason and socio-economic benefits	
Risk assessment area	Pannonian region
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	It is widely grown as an aquarium plant (Weed Risk Assessment for Rotala rotundifolia (BuchHam. ex Roxb.) Koehne (Lythraceae) – Roundleaf toothcup)	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 widely grown as an aquarium plant (Weed Risk Assessment for Rotala rotundifolia (BuchHam. ex Roxb.) Koehne (Lythraceae) – Roundleaf toothcup)	Very high
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	R.macrandra	Low
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?	Low	Rotala rotundifolia is native to South and Southeast Asia from Japan to India. (Weed Risk Assessment for Rotala rotundifolia (BuchHam. ex Roxb.) Koehne (Lythraceae) – Roundleaf toothcup) The similarity of climatic conditions between native areas and the RA area is low (Climatch)	Medium
5	2.02	What is the quality of the climate matching data?	Medium	Climatch and Weed Risk Assessment for Rotala rotundifolia (Buch Ham. ex Roxb.) Koehne (Lythraceae) – Roundleaf toothcup	Medium
6	2.03	Is the taxon already present outside of	No	R. rotundifolia is not present in the RA area.	Very high
7	2.04	captivity in the RA area? How many potential vectors could the taxon use to enter in the RA area?	One	Pet trade (Weed Risk Assessment for Rotala rotundifolia (Buch Ham. ex Roxb.) Koehne (Lythraceae) – Roundleaf toothcup)	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	Rotala rotundifolia has become naturalized iin thermal water bodies in Hungary (Weed Risk Assessment for Rotala rotundifolia (BuchHam. ex Roxb.) Koehne (Lythraceae) – Roundleaf toothcup)	Medium
3. I	nvasive	e elsewhere			
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	Rotala rotundifolia has become naturalized in Australia in Queensland and New South Wales and in thermal water bodies in Hungary (Weed Risk Assessment for Rotala rotundifolia (Buch Ham. ex Roxb.) Koehne (Lythraceae) – Roundleaf toothcup)	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	that shades out native vegetation (Weed Risk Assessment for Rotala rotundifolia (BuchHam. ex Roxb.) Koehne (Lythraceae) – Roundleaf toothcup)	Medium
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	Rotala rotundifolia is targeted for control in natural systems because this species forms a dense layer on the water surface and restricts water flow. It is prohibited in Western Australia, Tasmania and Honduras. Rotala rotundifolia is also controlled in residential areas because dense populations interfere with drainage, preventing water control canals from working properly. (Weed Risk Assessment for Rotala rotundifolia (BuchHam. ex Roxb.) Koehne (Lythraceae) – Roundleaf toothcup)	High
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	No evidence (Weed Risk Assessment for Rotala rotundifolia (Buch Ham. ex Roxb.) Koehne (Lythraceae) – Roundleaf toothcup)	Low
B. I	Biology	//Ecology			
		able (or persistence) traits	T		1 .
		Is it likely that the taxon will be poisonous or pose other risks to human health?	No	Harmless	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 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	Native area to South and Southeast Asia from Japan to India, and in Hungary survive in thermal water bodies (Weed Risk Assessment for Rotala rotundifolia (BuchHam. ex Roxb.) Koehne (Lythraceae) – Roundleaf toothcup)	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 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	No	(Weed Risk Assessment for Rotala rotundifolia (BuchHam. ex Roxb.) Koehne (Lythraceae) – Roundleaf toothcup)	Low
21	4.08	Infectious agents that are endemic in the KA 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	(Weed Risk Assessment for Rotala rotundifolia (BuchHam. ex Roxb.) Koehne (Lythraceae) – Roundleaf toothcup)	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	Its stems can be creeping or floating and can grow to 70 cm long (Weed Risk Assessment for Rotala rotundifolia (BuchHam. ex Roxb.) Koehne (Lythraceae) – Roundleaf toothcup)	Medium

23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g.	No	R. rotundifolia grows in marshes, swamps, and shallow ponds at high altitudes. (Weed Risk Assessment for Rotala rotundifolia	Low
		versatile in habitat use)?		(BuchHam. ex Roxb.) Koehne (Lythraceae) – Roundleaf toothcup)	
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	changes habitat light regime and slows water flow (Zlatković, B. K., & Bogosavljević, S. S. (2020). Risk analysis of alien plants recorded in thermal waters of Serbia. Weed Research, 60(1), 85-	High
25	4.12	native taxa? Is the taxon likely to maintain a viable	No	95). No evidence	Low
		population even when present in low densities (or persisting in adverse conditions			
		by way of a dormant form)?			
		e exploitation Is the taxon likely to consume threatened or	Not applicable	Not applicable	Very high
		protected native taxa in the RA area?			, -
27	5.02	Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?	No	No information	Low
	eprodu	iction			
28		Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?	Not applicable	Not applicable	Very high
29	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	No	In the RA area is low temperatures	Low
30	6.03	Is the taxon likely to hybridise naturally with native taxa?	No	No information	Low
31		Is the taxon likely to be hermaphroditic or to	Yes	Weed Risk Assessment for Rotala rotundifolia (BuchHam. ex	Medium
32	6.05	display asexual reproduction? Is the taxon dependent on the presence of	No	Roxb.) Koehne (Lythraceae) – Roundleaf toothcup 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 large number of propagules or offspring within a short time span (e.g. < 1 year)?	Yes	(Weed Risk Assessment for Rotala rotundifolia (BuchHam. ex Roxb.) Koehne (Lythraceae) – Roundleaf toothcup)	Low
34		How many time units (days, months, years) does the taxon require to reach the age-at-	1	Weed Risk Assessment for Rotala rotundifolia (BuchHam. ex Roxb.) Koehne (Lythraceae) – Roundleaf toothcup	Low
		first-reproduction?			
		al mechanisms How many potential internal	One	R. rotundifolia is known to disperse by water (Weed Risk	High
		vectors/pathways could the taxon use to disperse within the RA area (with suitable		Assessment for Rotala rotundifolia (BuchHam. ex Roxb.) Koehne (Lythraceae) – Roundleaf toothcup)	
36		Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)?	Yes	By water (Weed Risk Assessment for Rotala rotundifolia (Buch Ham. ex Roxb.) Koehne (Lythraceae) – Roundleaf toothcup)	Medium
37		Does the taxon have a means of actively	No	No information	Low
		attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances			
38		the likelihood of dispersal? Is natural dispersal of the taxon likely to	Yes	reproduce by seed (Weed Risk Assessment for Rotala rotundifolia	High
		occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?		(BuchHam. ex Roxb.) Koehne (Lythraceae) - Roundleaf toothcup)	
39		Is natural dispersal of the taxon likely to	Yes	Fragments also can be dispersed easily in water bodies, providing	High
		occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA		rapid distribution purely by vegetative means. (Ervin, G. N., & White, R. A. Assessing vegetative growth potential of exotic Rotala	
		area?		rotundifolia (Roxb.) Koehne (roundleaf toothcup), in comparison with Alternanthera philoxeroides (Mart.) Griseb.(alligator weed), a	
10	7.06			known successful invader.)	
		Are older life stages of the taxon likely to migrate in the RA area for reproduction?	Not applicable	Not applicable	Very high
41		Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No	Ervin, G. N., & White, R. A. Assessing vegetative growth potential of exotic Rotala rotundifolia (Roxb.) Koehne (roundleaf toothcup), in comparison with Alternanthera philoxeroides (Mart.)	Medium
42	7.08	Is dispersal of the taxon along any of the	Yes	Griseb.(alligator weed), a known successful invader. Water (Weed Risk Assessment for Rotala rotundifolia (BuchHam.	Low
		vectors/pathways mentioned in the previous		ex Roxb.) Koehne (Lythraceae) – Roundleaf toothcup)	
		seven questions (35-41; i.e. both unintentional or intentional) likely to be			
		Is dispersal of the taxon density dependent?	No	No information	Low
	8.01	Is the taxon able to withstand being out of water for extended periods (e.g. minimum of	Yes	Rotala rotundifolia is a water-loving plant that can grow fully submerged, as an emerged aquatic plant, and as a terrestrial plant in dry gravel. (Weed Risk Assessment for Rotala rotundifolia	High
		one or more hours) at some stage of its life cycle?		(BuchHam. ex Roxb.) Koehne (Lythraceae) - Roundleaf toothcup)	
45		Is the taxon tolerant of a wide range of water quality conditions relevant to that	Yes	This species has the potential to grow in a broad range of conditions (Ervin, G. N., & White, R. A. Assessing vegetative	High
		taxon? [In the Justification field, indicate the relevant water quality variable(s) being		growth potential of exotic Rotala rotundifolia (Roxb.) Koehne (roundleaf toothcup), in comparison with Alternanthera	
4.5	0.05	considered.]		philoxeroides (Mart.) Griseb.(alligator weed), a known successful	
46		Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	Yes	the contact herbicide diquat and the sys temic herbicides glyphosate, imazapyr, penoxsulam, and triclopyr are likely to provide effective control (Ervin, G. N. Roundleaf toothcup [Rotala	High
47		Is the taxon likely to tolerate or benefit from environmental/human disturbance?	No	rotundifolia (Roxb.) Koehnel.) No evidence (Weed Risk Assessment for Rotala rotundifolia (Buch Ham. ex Roxb.) Koehne (Lythraceae) – Roundleaf toothcup)	Low
48	8.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in	No	Freshwater species	Low
49		its usual environment? Are there effective natural enemies	No	No evidence	Low
<u> </u>		(predators) of the taxon present in the RA change			
And in case of the local division of the loc					

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 by humans.	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	The risks of establishment is no change, in the future temperatures will not be high enough to achieve a stable population (Parmesan, C., & Hanley, M. E. (2015). Plants and climate change: complexities and surprises. Annals of botany,	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	The risks of dispersal is no change, in the future temperatures will not be high enough to achieve a stable population (Parmesan, C., & Hanley, M. E. (2015). Plants and climate change: complexities and surprises. Annals of botany, 116(6), 849-864.)	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	Parmesan, C., & Hanley, M. E. (2015). Plants and climate change: complexities and surprises. Annals of botany, 116(6), 849-864.	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	Parmesan, C., & Hanley, M. E. (2015). Plants and climate change: complexities and surprises. Annals of botany, 116(6), 849-864.	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	Parmesan, C., & Hanley, M. E. (2015). Plants and climate change: complexities and surprises. Annals of botany, 116(6), 849-864.	Medium

Statistics

Scores	
BRA	14.0
BRA Outcome	Medium
BRA+CCA	14.0
BRA+CCA Outcome	Medium
Score partition	
A. Biogeography/Historical	9.0
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	0.0
3. Invasive elsewhere	5.0
B. Biology/Ecology	5.0
4. Undesirable (or persistence) traits	1.0
5. Resource exploitation	0.0
6. Reproduction	3.0
7. Dispersal mechanisms	1.0
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 <b>36</b>
2. Climate, distribution and introduction risk	5
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	/
8. Tolerance attributes	9
C. Climate change	6
9. Climate change	6
Sectors affected	0
Commercial	6
Environmental	4
Species or population nuisance traits	6
	0
Thresholds	
BRA	22.75
BRA+CCA	22.75
Confidence	/ 5
BRA+CCA	0.50
BRA	0.51

	BRA	0.51
	CCA	0.50
Date and Time		
	06/12/20	21 14:41:05

axon and Assessor details					
Category	Plantae (freshwater)				
Taxon name	Sagittaria subulata				
Common name	awl-leaf arrowhead				
Assessor	Tena Radočaj				
Risk screening context					
Reason and socio-economic benefits					
Risk assessment area	Pannonian region				
Taxonomy					
Native range					
Introduced range					
URL					

			Response	Justification (references and/or other information)	Confidence
		graphy/Historical			
1. l		ication/Cultivation	i -		
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Yes	Garden ponds (http://freshwateraquariumplants.com/plantprofiles/narrowsag.ht ml)	High
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	Garden ponds (http://freshwateraquariumplants.com/plantprofiles/narrowsag.ht	High
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	No	No evidence	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?	Low	The similarity of climatic conditions between native areas and the RA area is low (Climatch)	Low
5	2.02	What is the quality of the climate matching data?	Low	https://tropica.com/en/plants/plantdetails/Sagittariasubulata(079) /4530	Low
6	2.03	Is the taxon already present outside of captivity in the RA area?	No	S. subulata is not present in the RA area.	High
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	One	Pet trade	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	Hungary (Brunel, S. (2009). Pathway analysis: aquatic plants imported in 10 EPPO countries. EPPO bulletin, 39(2), 201-213).	Low
3. 1	Invasiv	e elsewhere			
9		Has the taxon become naturalised (established viable populations) outside its native range?	Yes	Slovakia (Hrivnák, R., Medvecká, J., Baláži, P., Bubíková, K., Oťaheľová, H., & Svitok, M. (2019). Alien aquatic plants in Slovakia over 130 years: historical overview, current distribution and future perspectives. NeoBiota, 49, 37).	High
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	Yes	Low risk (Brunel, S. (2009). Pathway analysis: aquatic plants imported in 10 EPPO countries. EPPO bulletin, 39(2), 201-213.)	Low
	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	Low risk (Brunel, S. (2009). Pathway analysis: aquatic plants imported in 10 EPPO countries. EPPO bulletin, 39(2), 201-213.)	Low
	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	No	Low risk (Brunel, S. (2009). Pathway analysis: aquatic plants imported in 10 EPPO countries. EPPO bulletin, 39(2), 201-213.)	Low
	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	Low risk (Brunel, S. (2009). Pathway analysis: aquatic plants imported in 10 EPPO countries. EPPO bulletin, 39(2), 201-213.)	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	Medium
15	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	No	Low risk (Brunel, S. (2009). Pathway analysis: aquatic plants imported in 10 EPPO countries. EPPO bulletin, 39(2), 201-213.)	Medium
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	South America	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	No	No information	Low
21	4.08	infectious agents that are endemic in the RA Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area?	No	No information	Low
22	4.09	Is it likely that the taxon will achieve a body size that will make it more likely to be	Yes	Place individual plants 2-4 cm apart. This plant may cause problems because in certain conditions it suddenly grows to a bainth of 50 cm when it around place	Medium
	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	height of 50 cm when it grows older The remaining alien plants were recorded in shallow or even very shallow waters (< 0.4 m, Sagittaria subulata). (Hrivnák, R., Medvecká, J., Baláži, P., Bubíková, K., Oťaheľová, H., & Svitok, M. (2019). Alien aquatic plants in Slovakia over 130 years: historical overview, current distribution and future perspectives. NeoBiota,	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	Low risk (Brunel, S. (2009). Pathway analysis: aquatic plants imported in 10 EPPO countries. EPPO bulletin, 39(2), 201-213.)	Low

			1		1
25	4.12	Is the taxon likely to maintain a viable	No	No evidence	Low
		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	Not applicable	Not applicable	Very high
7	5.02	protected native taxa in the RA area?	No	No information	Low
/	5.02	Is the taxon likely to sequester food resources (including nutrients) to the	NO	No information	Low
		detriment of native taxa in the RA area?			
	Reprodu	uction			
8	6.01	Is the taxon likely to exhibit parental care	Not applicable	Not applicable	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	Sutton, D. L. (1990). Growth of Sagittaria subulata and interaction	Low
9	0.02	or propagules (in the RA area)?	NO	with hydrilla. Journal of Aquatic Plant Management, 28, 20-22.	LOW
0	6.03		No	Sutton, D. L. (1990). Growth of Sagittaria subulata and interaction	Low
		native taxa?		with hydrilla. Journal of Aquatic Plant Management, 28, 20-22.	
1	6.04	Is the taxon likely to be hermaphroditic or to	Yes	Sutton, D. L. (1990). Growth of Sagittaria subulata and interaction	Low
2	6.05	display asexual reproduction? Is the taxon dependent on the presence of	No	with hydrilla. Journal of Aquatic Plant Management, 28, 20-22. No evidence	Low
<u> </u>	0.05	another taxon (or specific habitat features)	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			
_	c 07	within a short time span (e.g. < 1 year)?	1		1
t	6.07	How many time units (days, months, years) does the taxon require to reach the age-at-	1	Sutton, D. L. (1990). Growth of Sagittaria subulata and interaction with hydrilla. Journal of Aquatic Plant Management, 28, 20-22.	LOW
		first-reproduction?			
I	Dispers	al mechanisms			
	7.01	How many potential internal	One	Pet trade	Low
		vectors/pathways could the taxon use to			
:	7.02	disperse within the RA area (with suitable Will any of these vectors/pathways bring the	No	No evidence	Low
'	1.02	taxon in close proximity to one or more	NU		LUW
		protected areas (e.g. MCZ, MPA, SSSI)?			
7	7.03	Does the taxon have a means of actively	No	No evidence	Low
		attaching itself to hard substrata (e.g. ship			
		hulls, pilings, buoys) such that it enhances			
2	7.04	the likelihood of dispersal? Is natural dispersal of the taxon likely to	No	No evidence	Low
,	7.04	occur as eggs (for animals) or as propagules	NO	No evidence	LOW
		(for plants: seeds, spores) in the RA area?			
)	7.05	Is natural dispersal of the taxon likely to	No	No evidence	Low
		occur as larvae/juveniles (for animals) or as			
		fragments/seedlings (for plants) in the RA			
n	7.06	area? Are older life stages of the taxon likely to	Not applicable	Not applicable	Very high
	1.00	migrate in the RA area for reproduction?	Not applicable		very night
L	7.07	Are propagules or eggs of the taxon likely to	No	Adair, R. J., Keener, B. R., Kwong, R. M., Sagliocco, J. L., &	Low
		be dispersed in the RA area by other animals?		Flower, G. E. (2012). The Biology of Australian weeds	
				60.'Sagittaria platyphylla'(Engelmann) JG Smith and'Sagittaria	
2	7.08	Is dispersal of the taxon along any of the	No	calycina'Engelmann. Plant Protection Quarterly, 27(2), 47-58. Adair, R. J., Keener, B. R., Kwong, R. M., Sagliocco, J. L., &	Low
	/.00	vectors/pathways mentioned in the previous		Flower, G. E. (2012). The Biology of Australian weeds	2011
		seven questions (35–41; i.e. both		60.'Sagittaria platyphylla'(Engelmann) JG Smith and'Sagittaria	
		unintentional or intentional) likely to be		calycina'Engelmann. Plant Protection Quarterly, 27(2), 47-58.	
3	7.09	Is dispersal of the taxon density dependent?	No	Adair, R. J., Keener, B. R., Kwong, R. M., Sagliocco, J. L., &	Low
				Flower, G. E. (2012). The Biology of Australian weeds	
				60. 'Sagittaria platyphylla' (Engelmann) JG Smith and 'Sagittaria calycina' Engelmann. Plant Protection Quarterly, 27(2), 47-58.	
2	Toleran	ce attributes			
		Is the taxon able to withstand being out of	No	Adair, R. J., Keener, B. R., Kwong, R. M., Sagliocco, J. L., &	Low
		water for extended periods (e.g. minimum of		Flower, G. E. (2012). The Biology of Australian weeds	
		one or more hours) at some stage of its life		60.'Sagittaria platyphylla'(Engelmann) JG Smith and'Sagittaria	
	8.02	cvcle? Is the taxon tolerant of a wide range of	No	calvcina'Engelmann. Plant Protection Quarterly, 27(2), 47-58. Adair, R. J., Keener, B. R., Kwong, R. M., Sagliocco, J. L., &	Low
1	0.02	water quality conditions relevant to that		Flower, G. E. (2012). The Biology of Australian weeds	2011
		taxon? [In the Justification field, indicate the		60.'Sagittaria platyphylla'(Engelmann) JG Smith and'Sagittaria	
		relevant water quality variable(s) being		calycina'Engelmann. Plant Protection Quarterly, 27(2), 47-58.	
5	8.03	Can the taxon be controlled or eradicated in	No	Adair, R. J., Keener, B. R., Kwong, R. M., Sagliocco, J. L., &	Low
		the wild with chemical, biological, or other		Flower, G. E. (2012). The Biology of Australian weeds	
		agents/means?		60.'Sagittaria platyphylla'(Engelmann) JG Smith and'Sagittaria calycina'Engelmann. Plant Protection Quarterly, 27(2), 47-58.	
7	8.04	Is the taxon likely to tolerate or benefit from	No	No evidence	Low
		environmental/human disturbance?			
;	8.05	Is the taxon able to tolerate salinity levels	Yes	Humphreys, A., Gorsky, A. L., Bilkovic, D. M., & Chambers, R. M.	Low
		that are higher or lower than those found in		(2021). Changes in plant communities of low-salinity tidal	
	8.06	its usual environment? Are there effective natural enemies	No	marshes in response to sea-level rise. Ecosphere, 12(7), e03630. No evidence	Low
	0.00	(predators) of the taxon present in the RA			LUW
(	<u>Climat</u>	e change	·		
(	Climate	change			
)	9.01	•	No change	Only by humans	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	No change	(Parmesan, C., & Hanley, M. E. (2015). Plants and climate	Medium
_	9.02				carani
L	9.02	conditions, are the risks of establishment	_	change: complexities and surprises. Annals of botany, 116(6),	
1	9.02		-	change: complexities and surprises. Annals of botany, 116(6), 849-864.)	

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	(Parmesan, C., & Hanley, M. E. (2015). Plants and climate change: complexities and surprises. Annals of botany, 116(6), 849-864.)	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	(Parmesan, C., & Hanley, M. E. (2015). Plants and climate change: complexities and surprises. Annals of botany, 116(6), 849-864.)	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	(Parmesan, C., & Hanley, M. E. (2015). Plants and climate change: complexities and surprises. Annals of botany, 116(6), 849-864.)	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	(Parmesan, C., & Hanley, M. E. (2015). Plants and climate change: complexities and surprises. Annals of botany, 116(6), 849-864.)	Medium

Statistics	
Scores	
BRA	6.0
BRA Outcome	Medium
BRA+CCA	6.0
BRA+CCA Outcome	Medium
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	-2.0
4. Undesirable (or persistence) traits	0.0
5. Resource exploitation	0.0
6. Reproduction	2.0
7. Dispersal mechanisms	-5.0
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	<b>36</b> 12
4. Undesirable (or persistence) traits	12
5. Resource exploitation	2 7 9 6
6. Reproduction	7
7. Dispersal mechanisms	9
8. Tolerance attributes	6
C. Climate change	6
9. Climate change	6
Sectors affected	
Commercial	7
Environmental	
Species or population nuisance traits	-1
Thresholds	
BRA	22.75

	BRA	22.75
BRA	+CCA	22.75
Confidence		
BRA	+CCA	0.37
	BRA	0.36
	CCA	0.50
Date and Time		
07/	12/2021	09.02.34

Taxon and Assessor details	axon and Assessor details						
Category	Plantae (freshwater)						
Taxon name	Utricularia gibba						
Common name	humped bladderwort						
Assessor	Marina Piria						
Risk screening context							
Reason and socio-economic benefits							
Risk assessment area	Pannonian region						
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	U. gibba is commonly cultivated as an ornamental plant (Biosecurity New Zealand, 2008); it may have been introduced originally as an aquarium plant (Webb et al., 1988). I	Very high
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	U. gibba is commonly cultivated as an ornamental plant (Biosecurity New Zealand, 2008); it may have been introduced originally as an aquarium plant (Webb et al., 1988). I	Medium
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Yes	Utricularia aurea	Low
2. (	limate	, distribution and introduction risk			
4		How similar are the climatic conditions of the	Medium	prefer Cs - Warm temperate climate with dry summer	Low
		Risk Assessment (RA) area and the taxon's native range?			
5	2.02	What is the quality of the climate matching data?	Medium	Cs - Warm temperate climate with dry summer; Climatch	Medium
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	https://www.cabi.org/isc/datasheet/117747	Very high
7	2.04	How many potential vectors could the taxon use to enter in the RA area?	>1	machinery, water, pet trade	Very high
8	2.05	Is the taxon currently found in close	Yes	Hungary; Husner 2012	Medium
		proximity to, and likely to enter into, the RA			
		area in the near future (e.g. unintentional			
3 1	nyaciw	and intentional introductions)?	l		
3.1 9	1	Has the taxon become naturalised	Yes	Nwe Zealand	Very high
ĺ	5.51	(established viable populations) outside its			- cr, mgn
10	3.02	In the taxon's introduced range, are there	Yes	Impact on wild native species	Medium
		known adverse impacts to wild stocks or commercial taxa?		https://www.cabi.org/isc/datasheet/117747	
11	3.03	In the taxon's introduced range, are there	Yes	Has high reproductive potential, U. gibba forms mats over the	Medium
		known adverse impacts to aquaculture?		water surface; in New Zealand it has been reported that this could be a problem for irrigation and drainage (Champion and Clayton, 2000; Biosecurity New Zealand, 2008).	
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem	Yes	Damaged ecosystem services	Medium
13	3.05	In the taxon's introduced range, are there	No	. gibba is reported as a weed in botanic gardens throughout the	Low
15	5.05	known adverse socio-economic impacts?	110	Very and the second sec	
		//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	. gibba is reported as a weed in botanic gardens throughout the world; it poses no known harm to human health (Biosecurity New Zealand, 2008).	Very high
15	4.02	Is it likely that the taxon will smother one or	Yes	Competition - monopolizing resources Competition - shading	Very high
		more native taxa (that are not threatened or protected)?		Rapid growth	
16	4.03	Are there any threatened or protected taxa	No	it is not parasitic spec	Very high
		that the non-native taxon would parasitise in			
17	4.04	the RA area? Is the taxon adaptable in terms of climatic	Yes	II. gibba is specially adapted to low putrient environments	Low
1/	4.04	and other environmental conditions, thus	103	U. gibba is specially adapted to low-nutrient environments such as bogs and swamps (Biosecurity New Zeland, 2008), and increases	2000
		enhancing its potential persistence if it has invaded or could invade the RA area?		in abundance when the conditions change from oligotrophic to mesotropic; however, with further change in that direction it	
18	4.05	Is the taxon likely to disrupt food-web	Yes	decreases in abundance (Preston and Croft, 1997)	High
10	+.05	structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA	105	yes	ngn
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes	if introduced, yes	Medium
20	4.07	Is it likely that the taxon will host, and/or	No	no data	Medium
		act as a vector for, recognised pests and			
		infectious agents that are endemic in the RA			
21	4.08	Is it likely that the taxon will host, and/or	No	no data	Medium
		act as a vector for, recognised pests and infectious agents that are absent from (novel			]
		to) the RA area?			
22	4.09	Is it likely that the taxon will achieve a body	Yes	it has high growth potential	Medium
		size that will make it more likely to be			
		released from captivity?			
23	4.10	Is the taxon capable of sustaining itself in a	No	U. gibba prefers slow-moving, warm water and has moderate	Very high
	1	range of water velocity conditions (e.g.		shade tolerance (NZPCN, 2010). These factors best explain the	
		versatile in habitat use)?		occurrence of U. gibba in New Zealand (Compton et al., 2012).	

24	4.11	(e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for	No	no data	Medium
	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 flowers are hermaphrodite and pollinated either by insects or by self-pollination (Salmon, 2001). U. gibba regenerates naturally from seeds (Champion and Clayton, 2000; Compton, et al., 2012). The vegetative reproduction is by re-sprouts from stem fragments or from rhizomes (NZPCN, 2010). U. gibba differs from all these species in that it has no winter buds in its leaf axils, which are the most common propagation method for other species of Utricularia (Zhenvu and Cheek, 2011).	Medium
		te exploitation Is the taxon likely to consume threatened or	No	specialized carnivorous plant	Low
	5.02	protected native taxa in the RA area? Is the taxon likely to sequester food	Yes	Competition - monopolizing resources	High
		resources (including nutrients) to the detriment of native taxa in the RA area?			
	Reprodu	uction Is the taxon likely to exhibit parental care	Not applicable	https://www.cabi.org/isc/datasheet/117747	Very high
.0	0.01	and/or to reduce age-at-maturity in response to environmental conditions?		nitps.//www.cabi.org/isc/uatasineet/11/747	very nigh
9	6.02	Is the taxon likely to produce viable gametes	Yes	yes, similar conditions as part of New Zealand	Medium
80	6.03	or propagules (in the RA area)? Is the taxon likely to hybridise naturally with	No	no evidences	High
31	6.04	native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction?	Yes	The flowers are hermaphrodite and pollinated either by insects or by self-pollination (Salmon, 2001). U. gibba regenerates naturally from seeds (Champion and Clayton, 2000; Compton, et al., 2012). The vegetative reproduction is by re-sprouts from stem fragments or from rhizomes (NZPCN, 2010). U. gibba differs from all these species in that it has no winter buds in its leaf axils, which are the most common propagation method for other species of Utricularia (Zhenvu and Cheek. 2011).	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.	Very high
	6.06	Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)?	Yes	The flowers are hermaphrodite and pollinated either by insects or by self-pollination (Salmon, 2001). U. gibba regenerates naturally from seeds (Champion and Clayton, 2000; Compton, et al., 2012). The vegetative reproduction is by re-sprouts from stem fragments or from rhizomes (NZPCN, 2010). U. gibba differs from all these species in that it has no winter buds in its leaf axils, which are the most common propagation method for other species of Utricularia (Zhenvu and Cheek. 2011).	Very high
34	6.07	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	1	The flowers are hermaphrodite and pollinated either by insects or by self-pollination (Salmon, 2001). U. gibba regenerates naturally from seeds (Champion and Clayton, 2000; Compton, et al., 2012). The vegetative reproduction is by re-sprouts from stem fragments or from rhizomes (NZPCN, 2010). U. gibba differs from all these species in that it has no winter buds in its leaf axils, which are the most common propagation method for other species of Utricularia (Zhenyu and Cheek, 2011).	Very high
		al mechanisms How many potential internal	>1	water erzzierze machinery water	Very high
		vectors/pathways could the taxon use to disperse within the RA area (with suitable	>1	vector organisms, machinery, water	very nigh
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)?	Yes	can be transferred by birds	High
87	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	passive yes, active no	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?	Yes	The flowers are hermaphrodite and pollinated either by insects or by self-pollination (Salmon, 2001). U. gibba regenerates naturally from seeds (Champion and Clayton, 2000; Compton, et al., 2012). The vegetative reproduction is by re-sprouts from stem fragments or from rhizomes (NZPCN, 2010). U. gibba differs from all these species in that it has no winter buds in its leaf axils, which are the most common propagation method for other species of Utricularia (Zhenyu and Cheek, 2011).	Low
	7.05	Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?	Yes	The flowers are hermaphrodite and pollinated either by insects or by self-pollination (Salmon, 2001). U. gibba regenerates naturally from seeds (Champion and Clayton, 2000; Compton, et al., 2012). The vegetative reproduction is by re-sprouts from stem fragments or from rhizomes (NZPCN, 2010). U. gibba differs from all these species in that it has no winter buds in its leaf axils, which are the most common propagation method for other species of Utricularia (Zhenvu and Cheek. 2011).	High
10	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	Not applicable		Very high
1	7.07	Are propagules or eggs of the taxon likely to	Yes	yes	High
12	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	probably not	Medium
		unintentional or intentional) likely to be			

8. 7	olerand	Is dispersal of the taxon density dependent?	No	The flowers are hermaphrodite and pollinated either by insects or by self-pollination (Salmon, 2001). U. gibba regenerates naturally from seeds (Champion and Clayton, 2000; Compton, et al., 2012). The vegetative reproduction is by re-sprouts from stem fragments or from rhizomes (NZPCN, 2010). U. gibba differs from all these species in that it has no winter buds in its leaf axils, which are the most common propagation method for other species of Utricularia (Zhenvu and Cheek. 2011).	Very high
		water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle?	163	has propagules that can remain viable for more than one year	healan
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	mezortophic cinditions, eutrophic cant stand	Medium
46	8.03	Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	No	No information is available on any chemical control methods attempted on this species. Only mechanical removal	Medium
47	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	No	probably not	Low
48	8.05	The taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	No	No data	Medium
49	8.06	Are there effective natural enemies (predators) of the taxon present in the RA	Yes	Rook (2004) reports that in America, U. gibba is occasionally eaten by muskrats, ducks and other waterfowl.	Medium
с. с	Climate	change	1		
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 chance?	Increase	preferred warm climates	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	preferred warm climates	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	connected waterbodies	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	U. gibba has been identified as outcompeting and threatening native, endangered bladderworts including U. dichotoma and U. delicatula, and sundews including Drosera auriculata, D. peltata and the forked sundew D. binate	Medium
54		Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	Higher	probably higher	Medium
55	9.06	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	Higher	on fishing activities	Medium

Statistics	
Scores	
BRA	28.5
BRA Outcome	High
BRA+CCA	40.5
BRA+CCA Outcome	High
Score partition	
A. Biogeography/Historical	16.5
1. Domestication/Cultivation	4.0
2. Climate, distribution and introduction risk	2.0
3. Invasive elsewhere	10.5
B. Biology/Ecology	12.0
4. Undesirable (or persistence) traits	5.0
5. Resource exploitation	2.0
6. Reproduction	4.0
7. Dispersal mechanisms	3.0
8. Tolerance attributes	-2.0
C. Climate change	12.0
9. Climate change	12.0
Answered Questions	
Total	55
A. Biogeography/Historical	13
1. Domestication/Cultivation	3 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	12 2 7 9 6
6. Reproduction	7
7. Dispersal mechanisms	9
8. Tolerance attributes	6
C. Climate change	6
9. Climate change	6
Sectors affected	
Commercial	14
Environmental	10
Species or population nuisance traits	21

Thresholds	
BRA	22.75
BRA+CCA	22.75
Confidence	
BRA+CCA	0.65
BRA	0.66
CCA	0.54
Date and Time	
23/11/20	021 17:08:35

	AS-ISK	v2
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Taxon and Assessor details					
Category	Plantae (freshwater)				
Taxon name	Vallisneria australis				
Common name					
Assessor	Marina Piria				
Risk screening context					
Reason and socio-economic benefits					
Risk assessment area	Pannonian region				
Taxonomy					
Native range					
Introduced range					
URI					

			Response	Justification (references and/or other information)	Confidence
		ography/Historical			
. 1		tication/Cultivation	Te a		
L	1.01	5	Yes	For aquaria	Very high
		domestication (or cultivation) for at least 20		https://www.sciencedirect.com/science/article/pii/S030437702100	
		generations?		0802?casa_token=hhN6-	
				6tALIAAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm	
				q0xhr0Oz609qvYRKlq6w0ASqKq6x8Y	
	1.02	Is the taxon harvested in the wild and likely	Yes	for aquaria	Low
		to be sold or used in its live form?		https://www.sciencedirect.com/science/article/pii/S030437702100	-
				0802?casa_token=hhN6-	
				6tALIAAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm	
	1.02			q0xhr0Oz609gvYRKIq6w0ASqKq6x8Y	N/ 1 · 1
	1.03	Does the taxon have invasive races,	Yes	Valisneria neotropicalis	Very high
		varieties, sub-taxa or congeners?		https://www.sciencedirect.com/science/article/pii/S030437702100	
				0802?casa_token=hhN6-	
				6tALIAAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm	
				q0xhr0Oz609qvYRKlq6w0ASqKq6x8Y	
(	Climate	e, distribution and introduction risk			
	2.01	How similar are the climatic conditions of the	Medium	climatch	Medium
		Risk Assessment (RA) area and the taxon's			1
		native range?			1
-	2.02	What is the quality of the climate matching	Medium	climatch	High
	2.02		inculum	cimaten	ingii
	2 02	data?	Vac		Madium
	2.03	Is the taxon already present outside of	Yes	Hungary, Germany but previously was misidentified as V. nana or	Medium
		captivity in the RA area?		V. americana	1
				https://www.sciencedirect.com/science/article/pii/S030437702100	1
			1	0802?casa_token=hhN6-	
				6tALIAAAAAA:gkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm	
				q0xhr0Oz609qvYRKlq6w0ASqKq6x8Y	
	2.04	How many potential vectors could the taxon	One	accidental, release from aquaria	High
	2.01	use to enter in the RA area?	one	https://www.sciencedirect.com/science/article/pii/S030437702100	ingn
		use to enter in the RA area?			
				0802?casa_token=hhN6-	
				6tALIAAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm	
				q0xhr0Oz609gvYRKlq6w0ASqKq6x8Y	
	2.05	Is the taxon currently found in close	Yes	Hungary	Medium
		proximity to, and likely to enter into, the RA		https://www.sciencedirect.com/science/article/pii/S030437702100	
		area in the near future (e.g. unintentional		0802?casa token=hhN6-	
		and intentional introductions)?		6tALIAAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm	
		and meencional merodactions):		q0xhr0Oz609qvYRKlq6w0ASqKq6x8Y	
1	Invaciu	ve elsewhere	<u></u>	Ιαυχημούζουθαντικτίασωσηθεία το	
1	1		Yes	https://www.sciencedirect.com/science/article/pii/S030437702100	Vory high
	5.01		res		very nigh
				0802?casa_token=hhN6-	
	1	(established viable populations) outside its			
		native range?		6tALIAAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGlJTZTEKUZUhdm	
				6tALIAAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm q0xhr0Oz609qvYRKIq6w0ASqKq6x8Y	
)	3.02		No		Low
)	3.02	native range?	No	q0xhr0Oz609gvYRKlq6w0ASqKq6x8Y	Low
)	3.02	native range? In the taxon's introduced range, are there	No	q0xhr0Oz609gvYRKlq6w0ASqKq6x8Y no data https://www.sciencedirect.com/science/article/pii/S030437702100	Low
)	3.02	native range? In the taxon's introduced range, are there known adverse impacts to wild stocks or	No	q0xhr0Oz609qvYRKlq6w0ASqKq6x8Y no data https://www.sciencedirect.com/science/article/pii/S030437702100 0802?casa_token=hhN6-	Low
)	3.02	native range? In the taxon's introduced range, are there known adverse impacts to wild stocks or	No	q0xhr0Oz609qvYRKlq6w0ASqKq6x8Y no data https://www.sciencedirect.com/science/article/pii/S030437702100 0802?casa_token=hhN6- 6tALIAAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm	Low
		native range? In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?		q0xhr0Oz609qYYRKIq6w0ASqKq6x8Y no data https://www.sciencedirect.com/science/article/pii/S030437702100 0802?casa_token=hhN6- 6tALIAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm q0xhr0Oz609qvYRKIq6w0ASqKq6x8Y	
	3.02	native range? In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? In the taxon's introduced range, are there	No	q0xhr0Oz609qYYRKlq6w0ASqKq6x8Y         no data         https://www.sciencedirect.com/science/article/pii/S030437702100         0802?casa_token=hhN6-         6tALIAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm         q0xhr0Oz609qvYRKlq6w0ASqKq6x8Y         probably displace other species of submerged hydrophytes	Low
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2	3.03	native range?         In the taxon's introduced range, are there         known adverse impacts to wild stocks or         commercial taxa?         In the taxon's introduced range, are there         known adverse impacts to aquaculture?         In the taxon's introduced range, are there         known adverse impacts to ecosystem         In the taxon's introduced range, are there         known adverse impacts to ecosystem         In the taxon's introduced range, are there	No	q0xhr00z609qYYRKlq6w0ASqKq6x8Y         no data         https://www.sciencedirect.com/science/article/pii/S030437702100         0802?casa_token=hhN6-         6tALIAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm         q0xhr00z609qvYRKlq6w0ASqKq6x8Y         probably displace other species of submerged hydrophytes         )similarly as other Valisneria species <https: article="" pii="" s03043770210<="" science="" td="" www.sciencedirect.com="">         00802?casa_token=hhN6-         6tALIAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm         q0xhr00z609qvYRKlq6w0ASqKq6x8Y         probably Damage ecosystem services as other Valisneria sp.         https://www.scbi.org/isc/datasheet/56573#toimpactSummary         V. spiralis can impede water flow in irrigation canals and storage</https:>	Low
2	3.03	native range?         In the taxon's introduced range, are there         known adverse impacts to wild stocks or         commercial taxa?         In the taxon's introduced range, are there         known adverse impacts to aquaculture?         In the taxon's introduced range, are there         known adverse impacts to ecosystem         In the taxon's introduced range, are there         known adverse impacts to ecosystem         In the taxon's introduced range, are there	No	q0xhr00z609qYYRKlq6w0ASqKq6x8Y         no data         https://www.sciencedirect.com/science/article/pii/S030437702100         0802?casa_token=hhN6-         6tALIAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm         q0xhr00z609qvYRKlq6w0ASqKq6x8Y         probably displace other species of submerged hydrophytes         )similarly as other Valisneria species <https: article="" pii="" s03043770210<="" science="" td="" www.sciencedirect.com="">         00802?casa_token=hhN6-         6tALIAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm         q0xhr00z609qvYRKlq6w0ASqKq6x8Y         probably Damage ecosystem services as other Valisneria sp.         https://www.cabi.org/isc/datasheet/56573#toimpactSummary         V. spiralis can impede water flow in irrigation canals and storage         dams, affect drainage, choke hydro turbines, and impact on</https:>	Low
2	3.03 3.04 3.05	native range?         In the taxon's introduced range, are there         known adverse impacts to wild stocks or         commercial taxa?         In the taxon's introduced range, are there         known adverse impacts to aquaculture?         In the taxon's introduced range, are there         known adverse impacts to ecosystem         In the taxon's introduced range, are there         known adverse impacts to ecosystem         In the taxon's introduced range, are there	No	q0xhr00z609qYYRKlq6w0ASqKq6x8Y         no data         https://www.sciencedirect.com/science/article/pii/S030437702100         0802?casa_token=hhN6-         6tALIAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm         q0xhr00z609qvYRKlq6w0ASqKq6x8Y         probably displace other species of submerged hydrophytes         )similarly as other Valisneria species <https: article="" pii="" s03043770210<="" science="" td="" www.sciencedirect.com="">         00802?casa_token=hhN6-         6tALIAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm         q0xhr00z609qvYRKlq6w0ASqKq6x8Y         probably Damage ecosystem services as other Valisneria sp.         https://www.cebi.org/isc/datasheet/56573#toimpactSummary         V. spiralis can impede water flow in irrigation canals and storage         dams, affect drainage, choke hydro turbines, and impact on         navigational, recreational and agricultural use of water bodies.</https:>	Low
1	3.03 3.04 3.05 Biolog	native range?         In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?         In the taxon's introduced range, are there known adverse impacts to aquaculture?         In the taxon's introduced range, are there known adverse impacts to ecosystem         In the taxon's introduced range, are there known adverse impacts to ecosystem         In the taxon's introduced range, are there known adverse socio-economic impacts?	No	q0xhr00z609qYYRKlq6w0ASqKq6x8Y         no data         https://www.sciencedirect.com/science/article/pii/S030437702100         0802?casa_token=hhN6-         6tALIAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm         q0xhr00z609qvYRKlq6w0ASqKq6x8Y         probably displace other species of submerged hydrophytes         )similarly as other Valisneria species <https: article="" pii="" s03043770210<="" science="" td="" www.sciencedirect.com="">         00802?casa_token=hhN6-         6tALIAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm         q0xhr00z609qvYRKlq6w0ASqKq6x8Y         probably Damage ecosystem services as other Valisneria sp.         https://www.cebi.org/isc/datasheet/56573#toimpactSummary         V. spiralis can impede water flow in irrigation canals and storage         dams, affect drainage, choke hydro turbines, and impact on         navigational, recreational and agricultural use of water bodies.</https:>	Low
1 2 3	3.03 3.04 3.05 Biolog	native range?         In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?         In the taxon's introduced range, are there known adverse impacts to aquaculture?         In the taxon's introduced range, are there known adverse impacts to ecosystem         In the taxon's introduced range, are there known adverse impacts to ecosystem         In the taxon's introduced range, are there known adverse socio-economic impacts?         Iv/Ecology         rable (or persistence) traits	No No No	q0xhr00z609qYYRKlq6w0ASqKq6x8Y         no data         https://www.sciencedirect.com/science/article/pii/S030437702100         0802?casa_token=hhN6-         6tALIAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm         q0xhr00z609qvYRKlq6w0ASqKq6x8Y         probably displace other species of submerged hydrophytes         )similarly as other Valisneria species <https: article="" pii="" s03043770210<="" science="" td="" www.sciencedirect.com="">         00802?casa_token=hhN6-         6tALIAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm         q0xhr00z609qvYRKlq6w0ASqKq6x8Y         probably Damage ecosystem services as other Valisneria sp.         https://www.cabi.org/isc/datasheet/56573#toimpactSummary         V. spiralis can impede water flow in irrigation canals and storage         dams, affect drainage, choke hydro turbines, and impact on         navigational, recreational and agricultural use of water bodies.         Probably has similar effect</https:>	Low Low Low
1	3.03 3.04 3.05 Biolog	native range?         In the taxon's introduced range, are there         known adverse impacts to wild stocks or         commercial taxa?         In the taxon's introduced range, are there         known adverse impacts to aquaculture?         In the taxon's introduced range, are there         known adverse impacts to acosystem         In the taxon's introduced range, are there         known adverse socio-economic impacts?         y/Ecology         rable (or persistence) traits         Is it likely that the taxon will be poisonous or	No No No	q0xhr00z609qYYRKlq6w0ASqKq6x8Y         no data         https://www.sciencedirect.com/science/article/pii/S030437702100         0802?casa_token=hhN6-         6tALIAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm         q0xhr00z609qvYRKlq6w0ASqKq6x8Y         probably displace other species of submerged hydrophytes         )similarly as other Valisneria species <https: article="" pii="" s03043770210<="" science="" td="" www.sciencedirect.com="">         00802?casa_token=hhN6-         6tALIAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm         q0xhr00z609qvYRKlq6w0ASqKq6x8Y         probably Damage ecosystem services as other Valisneria sp.         https://www.cabi.org/isc/datasheet/56573#toimpactSummary         V. spiralis can impede water flow in irrigation canals and storage         dams, affect drainage, choke hydro turbines, and impact on         navigational, recreational and agricultural use of water bodies.         Probably has similar effect</https:>	Low Low Low
2	3.03 3.04 3.05 Biolog	native range?         In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?         In the taxon's introduced range, are there known adverse impacts to aquaculture?         In the taxon's introduced range, are there known adverse impacts to ecosystem         In the taxon's introduced range, are there known adverse impacts to ecosystem         In the taxon's introduced range, are there known adverse socio-economic impacts?         Iv/Ecology         rable (or persistence) traits	No No No	q0xhr00z609qYYRKlq6w0ASqKq6x8Y         no data         https://www.sciencedirect.com/science/article/pii/S030437702100         0802?casa_token=hhN6-         6tALIAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm         q0xhr00z609qvYRKlq6w0ASqKq6x8Y         probably displace other species of submerged hydrophytes         )similarly as other Valisneria species <https: article="" pii="" s03043770210<="" science="" td="" www.sciencedirect.com="">         00802?casa_token=hhN6-         6tALIAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm         q0xhr00z609qvYRKlq6w0ASqKq6x8Y         probably Damage ecosystem services as other Valisneria sp.         https://www.cabi.org/isc/datasheet/56573#toimpactSummary         V. spiralis can impede water flow in irrigation canals and storage         dams, affect drainage, choke hydro turbines, and impact on         navigational, recreational and agricultural use of water bodies.         Probably has similar effect         https://www.sciencedirect.com/science/article/pii/S030437702100         0802?casa_token=hhN6-</https:>	Low Low Low
3	3.03 3.04 3.05 Biolog	native range?         In the taxon's introduced range, are there         known adverse impacts to wild stocks or         commercial taxa?         In the taxon's introduced range, are there         known adverse impacts to aquaculture?         In the taxon's introduced range, are there         known adverse impacts to acosystem         In the taxon's introduced range, are there         known adverse socio-economic impacts?         y/Ecology         rable (or persistence) traits         Is it likely that the taxon will be poisonous or	No No No	q0xhr00z609qYYRKlq6w0ASqKq6x8Y         no data         https://www.sciencedirect.com/science/article/pii/S030437702100         0802?casa_token=hhN6-         6tALIAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm         q0xhr00z609qvYRKlq6w0ASqKq6x8Y         probably displace other species of submerged hydrophytes         )similarly as other Valisneria species <https: article="" pii="" s03043770210<="" science="" td="" www.sciencedirect.com="">         00802?casa_token=hhN6-         6tALIAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm         q0xhr00z609qvYRKlq6w0ASqKq6x8Y         probably Damage ecosystem services as other Valisneria sp.         https://www.cabi.org/isc/datasheet/56573#toimpactSummary         V. spiralis can impede water flow in irrigation canals and storage         dams, affect drainage, choke hydro turbines, and impact on         navigational, recreational and agricultural use of water bodies.         Probably has similar effect</https:>	Low Low Low

15	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or understanding)	No	No data https://www.sciencedirect.com/science/article/pii/S030437702100	Low
		protected)?		0802?casa_token=hhN6- 6tALIAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm q0xhr0Oz609gvYRKIq6w0ASqKq6x8Y; According to our experience in Hungarian populations, this species is a very strong competitor and can replace other submerged invasive species (Hydrilla verticillata (L.f.) Royle, Cabomba caroliniana A. Gray) in thermal	
16	4.03	Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	water canals. it is not parasitic https://www.sciencedirect.com/science/article/pii/S030437702100 0802?casa_token=hhN6- 6tALIAAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm a0xhr00z609gvYRKlg6w0ASgKg6x8Y#bib0090	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	even tropical species, found survived populations on -15 C https://www.sciencedirect.com/science/article/pii/S030437702100 0802?casa_token=hhN6- 6tALIAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm a0xhr00z609qvYRKIg6w0ASqKa6x8Y#bib0090	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	Other Valisneria spec disrupts - Ecosystem change/ habitat alteration https://www.cabi.org/isc/datasheet/56573#tohabitat ; According to our experience in Hungarian populations, this species is a very strong competitor and can replace other submerged invasive species (Hydrilla verticillata (L.f.) Royle, Cabomba caroliniana A. Gray) in thermal water canals.	Medium
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	Yes	Other valisneria - Damaged ecosystem services https://www.cabi.org/isc/datasheet/56573#tohabitat	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 area?	No	no data https://www.sciencedirect.com/science/article/pii/S030437702100 0802?casa_token=hhN6- 6tALIAAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm q0xhr00z609gvYRKIq6w0ASqKq6x8Y#bib0090	Medium
21	4.08	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area?	No	no data https://www.sciencedirect.com/science/article/pii/S030437702100 0802?casa_token=hhN6- 6tALIAAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm q0xhr00z609qvYRKIq6w0ASqKq6x8Y#bib0090	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	https://www.sciencedirect.com/science/article/pii/S030437702100 0802?casa_token=hhN6- 6tALIAAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm q0xhr0Oz609gvYRKIq6w0ASqKq6x8Y#bib0090	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	V. spiralis was found in stagnant, slow and fast running (up to 0.8 m/s) water to depths of 1 m, and on muddy, sandy or gravelly sediment (Hussner and Lösch, 2005). Probably is for V americana similar.	Low
24	4.11	Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa?	No	probably yes but no data for this species https://www.sciencedirect.com/science/article/pii/S030437702100 0802?casa_token=hhN6- 6tALIAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm q0xhr02609qvYRKIq6w0ASqKq6x8Y#bib0090	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	Probably yes because of releseas from aquaria usually occur in low densities https://www.sciencedirect.com/science/article/pii/S030437702100 0802?casa_token=hhN6- 6tALIAAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm	Low
5. 1	Resourc	ce exploitation		a0xhr0Oz609avYRKIa6w0ASaKa6x8Y#bib0090	
	5.01	Is the taxon likely to consume threatened or protected native taxa in the RA area?	Not applicable	https://www.sciencedirect.com/science/article/pii/S030437702100 0802?casa_token=hhN6- 6tALIAAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm a0xhr0Oz609qvYRKlq6w0ASqKq6x8Y#bib0090	Very high
		Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?	Yes	probably yes as other Valisneria	Low
	Reprodu 6.01	Is the taxon likely to exhibit parental care	Not applicable	https://www.sciencedirect.com/science/article/pii/S030437702100	Very high
		and/or to reduce age-at-maturity in response to environmental conditions?		0802?casa_token=hhN6- 6tALIAAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm q0xhr0Oz609gvYRKIq6w0ASqKq6x8Y#bib0090	
	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	https://www.sciencedirect.com/science/article/pii/S030437702100 0802?casa_token=hhN6- 6tALIAAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm a0xhr0Oz609qvYRKIq6w0ASqKq6x8Y#bib0090	nign
30	6.03	Is the taxon likely to hybridise naturally with native taxa?	Yes	found in Japan https://www.sciencedirect.com/science/article/abs/pii/S030437701 5300176	High
31	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	Yes	in Russia Valisneria sp. Flowering plants were observed only with female inflorescences (author's observation in 2016) suggesting that reproduction was only vegetative; he most common form of propagation for Vallisneria is through runners. These will grow all over the aquarium and each new plant will quickly start sending out runners of its own. They can very quickly take over the entire tank this way. https://www.sciencedirect.com/science/article/pii/S030437702100 0802?casa_token=hhN6- 6tALIAAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm q0xhr00z609gvYRKIq6w0ASqKq6x8YFlowering plants were https://www.sciencedirect.com/science/article/pii/S030437702100 0802?casa_token=hhN6-	High

32	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	No	https://www.sciencedirect.com/science/article/pii/S030437702100 0802?casa_token=hhN6- 6tALIAAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm q0xhr00z609qvYRKIq6w0ASqKq6x8Y#bib0090	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	he pistillate flowers, attached to submerged plants by long, flexuous peduncles, orient their opening at the water surface and pollination occurs when anthers of the floating staminate flowers contact the stigmas of the pistillate flowers. After fertilization the peduncle coils into a spiral, thus drawing the developing fruit underwater where it matures; he most common form of propagation for Vallisneria is through runners. These will grow all over the aquarium and each new plant will quickly start sending out runners of its own. They can very quickly take over the entire	Medium
34	6.07	How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction?	1	he pistillate flowers, attached to submerged plants by long, flexuous peduncles, orient their opening at the water surface and pollination occurs when anthers of the floating staminate flowers contact the stigmas of the pistillate flowers. After fertilization the peduncle coils into a spiral, thus drawing the developing fruit underwater where it matures	High
7. D	ispersa	al mechanisms			
35	7.01	How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable	One	release from aquaria	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	not yet present	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	based on reproduction, no	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? Is natural dispersal of the taxon likely to	Yes Yes	by plant remains; All known populations probably resulted from plant remains released in drainage water from aquariums. https://www.sciencedirect.com/science/article/pii/S030437702100 0802?casa_token=hhN6- 6tALIAAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm q0xhr00z609qvYRKIq6w0ASqKq6x8Y#bib0090 V. spiralis spreads asexually by means of runners,	High Medium
		occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area?		https://www.sciencedirect.com/science/article/pii/S030437702100 0802?casa_token=hhN6- 6tALIAAAAAA:qkJRMIOnYOEWxWhnFhFnVb4HaZxGIJTZTEKUZUhdm q0xhr0Oz609qvYRKIq6w0ASqKq6x8Y#bib0090	
	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	Not applicable		Very high
11	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No	not known for V.australis	Medium
12	7.08	Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. both unintentional or intentional) likely to be	No	distributed locally elsewhere, Adriatic area with disconnected waterbodies	Very high
	7.09	Is dispersal of the taxon density dependent?	No	he most common form of propagation for Vallisneria is through runners. These will grow all over the aquarium and each new plant will quickly start sending out runners of its own. They can very quickly take over the entire tank this way.	Very high
		<i>ce attributes</i> Is the taxon able to withstand being out of	No	yes in other valisneria	Low
		water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle?			2011
	8.02	Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being considered.]	Yes	All populations were detected in artificial or strongly modified water bodies; no plants were found so far in unregulated water systems. As these plants have been observed across multiple growing seasons, these can be considered as self-sustaining populations. However, the survival of these plants in all known populations, pointing at. While, at least at present, continental cold winters are posing a barrier for the "giant" alien Vallisneria species. these may become invasive species in western Europe in	High
16	8.03	Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	No	In New Zealand, the species is considered virtually impossible to eliminate once established, but small infestations can be controlled by divers hand-pulling plants (Auckland Regional Council, 2010a). Also generalist herbivoreous fishes can maybe	High
	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	Yes	All populations were detected in artificial or strongly modified water bodies; no plants were found so far in unregulated water systems. As these plants have been observed across multiple growing seasons, these can be considered as self-sustaining populations. However, the survival of these plants in all known populations, pointing at. While, at least at present, continental cold winters are posing a barrier for the "giant" alien Vallisneria species. these may become invasive species in western Europe in	High
18	8.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	No	V. spiralis known to tolerate low salinity.	Low
	8.06	Are there effective natural enemies	No	locally grass carp	High

50	9.01	Under the predicted future climatic	Increase	Our study confirms that V. australis has become established in	High
50	5.01	conditions, are the risks of entry into the RA	increase	some parts of Europe. Firstly, this species naturalised in Hungary	ingii
		area posed by the taxon likely to increase,		although in this country it only occurs in thermally heated canals.	
		decrease or not change?		Later, this species was also recorded from Italy, Belgium and	
		decrease of not change.		Germany where it occurs in strongly modified water bodies (rice	
				fields, canals, gravel pits), but these are not thermally heated.	
				This means that this species can adapt to the Atlantic climate and	
				potentially may become an invasive species in the near future.	
51	9.02	Under the predicted future climatic	Increase	Our study confirms that V. australis has become established in	High
		conditions, are the risks of establishment		some parts of Europe. Firstly, this species naturalised in Hungary	-
		posed by the taxon likely to increase,		although in this country it only occurs in thermally heated canals.	
		decrease or not change?		Later, this species was also recorded from Italy, Belgium and	
				Germany where it occurs in strongly modified water bodies (rice	
				fields, canals, gravel pits), but these are not thermally heated.	
				This means that this species can adapt to the Atlantic climate and	
				potentially may become an invasive species in the near future.	
52	9.03	Under the predicted future climatic	Increase	connected waterbodies	Medium
		conditions, are the risks of dispersal within			
		the RA area posed by the taxon likely to			
		increase, decrease or not change?			
53	9.04	Under the predicted future climatic	Higher	Our study confirms that V. australis has become established in	Medium
		conditions, what is the likely magnitude of		some parts of Europe. Firstly, this species naturalised in Hungary	
		future potential impacts on biodiversity		although in this country it only occurs in thermally heated canals.	
		and/or ecological integrity/status?		Later, this species was also recorded from Italy, Belgium and	
				Germany where it occurs in strongly modified water bodies (rice	
				fields, canals, gravel pits), but these are not thermally heated.	
				This means that this species can adapt to the Atlantic climate and	
				potentially may become an invasive species in the near future.	
54	9.05	Under the predicted future climatic	Higher	Our study confirms that V. australis has become established in	High
		conditions, what is the likely magnitude of		some parts of Europe. Firstly, this species naturalised in Hungary	
		future potential impacts on ecosystem		although in this country it only occurs in thermally heated canals.	
		structure and/or function?		Later, this species was also recorded from Italy, Belgium and	
				Germany where it occurs in strongly modified water bodies (rice	
				fields, canals, gravel pits), but these are not thermally heated.	
				This means that this species can adapt to the Atlantic climate and	
				potentially may become an invasive species in the near future.	
55	9.06	Under the predicted future climatic	Higher	Our study confirms that V. australis has become established in	Medium
		conditions, what is the likely magnitude of		some parts of Europe. Firstly, this species naturalised in Hungary	
		future potential impacts on ecosystem		although in this country it only occurs in thermally heated canals.	
		services/socio-economic factors?		Later, this species was also recorded from Italy, Belgium and	
				Germany where it occurs in strongly modified water bodies (rice	
				fields, canals, gravel pits), but these are not thermally heated.	
				This means that this species can adapt to the Atlantic climate and	
	1			potentially may become an invasive species in the near future.	1

Statistics	
Scores	
BRA	22.5
BRA Outcome	Medium
BRA+CCA	34.5
BRA+CCA Outcome	High
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	16.0
4. Undesirable (or persistence) traits	5.0
5. Resource exploitation	2.0
6. Reproduction	6.0
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 <b>36</b>
2. Climate, distribution and introduction risk	5
3. Invasive elsewhere	5
B. Biology/Ecology	30
4. Undesirable (or persistence) traits	12 2 7 9 6 <b>6</b> 6
5. Resource exploitation	2
6. Reproduction 7. Dispersal mechanisms	/
8. Tolerance attributes	9
C. Climate change	6
9. Climate change	6
Sectors affected	0
Commercial	6
Environmental	6
Species or population nuisance traits	24
	27
Thresholds	
BRA	22.75
BRA+CCA	22.75
Confidence	
BDA+CCA	0.61

BRA+CCA BRA CCA 0.61 0.61 0.63

Date and Time 23/11/2021 17:08:58