Supplementary Material S3

Assessment #1

Taxon and Assessor details	
Category	Fishes and Lampreys (marine)
Taxon name	Chilomycterus reticulatus
Common name	Spotfin burrfish
Assessor	Joao Monteiro
Risk screening context	
Reason and socio-economic benefits	The Spotfin burrfish has a circumglobal distribution in tropical, subtropical and warm temperate areas of the Pacific, Indian and Atlantic Oceans. It has been sighted in the Mediterranean, Azores and Madeira
Risk assessment area	Madeira
Taxonomy	Animalia (Kingdom) Chordata (Phylum) Vertebrata (Subphylum) Gnathostomata (Superclass) Pisces (Superclass) Actinopterygii (Class) Tetraodontiformes (Order) Diodontidae (Family) Chilomycterus (Genus) Chilomycterus reticulatus (Species)
Native range	Gulf of Mexico, Atlantic, Indian and Pacific Oceans
Introduced range	Mediterranean Sea and maybe Azores and Madeira
URL	

			Response	Justification (references and/or other information)	Confidence
A. Biogeography/Historical					
1. Domestication/Cultivation					
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	No	No information is available on C. reticulatus domestication.	High
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	In African countries it is often captured, dried and sold as ornaments	Medium
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	No	There are no records or evidence of invasive traits in the taxon of closely related taxa	Medium
2. Climate, distribution and introduction risk					
4	2.01	How similar are the climatic conditions of the RA area and the taxon's native range?	Medium	Climatch score ranges between 3 and 8 when compared to the canary islands.	High

5	2.02	What is the quality of the climate matching data?	Medium	There are not a lot of stations in climatch are limited and with wide range of scores	Medium
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	There are multiple records of Chilomycterus reticulatus in Madeira.	Very high
7	2.04	How many potential pathways could the taxon use to enter in the RA area?	>1	C. reticulatus may enter in Madeira rafting under surface debris or sargassum, and in larval or post-larval phase transported by ballast water (Afonso et al. 2013)	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	Chilomycterus reticulatus is present in the Canary islands and there are multiple records deposited in the Museu Municipal do Funchal and in the Natural History Museum of London (Wirtz et al. 2008)	High
3. Invasive elsewhere					
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	Chilomycterus reticulatus became naturalised outside its native range, e.g. in the Island of el Hierro (Canary Islands) the species established viable populations and it is really common since at least the late 1980s (Brito and Falcón 1990).	Medium
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	No	No information is available on the impact of this species on wild stock or commercial taxa in its introduced range.	Medium
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	Yes	The taxon hosts a parasite that is known to have had adverse impacts on aquaculture stocks	Low
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem services?	No	No information is available on the adverse impact of C. reticulatus to ecosystem services in its introduced range.	Medium
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	No information is available on adverse socio-economic impacts by C. reticulatus in its introduced range.	Medium
B. Biology/Ecology					
4. Undesirable (or persistence) traits					
14	4.01	Is it likely that the taxon will be poisonous, or pose other risks to human health?	Yes	Chilomycterus reticulatus has an inflatable body covered by numerous spines that may, theoretically, cause injury to humans.	Low
15	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	n.a.	Taxa is not a plat, algae or other sessile organism that can overgrow and smother native taxa	Very high
16	4.03	Are there threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	There are no known threatened or protected taxa that could be affected	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	Chilomycterus reticulatus has a circumglobal distribution in tropical, subtropical and warm temperate areas of the Pacific, Indian and Atlantic oceans (Leis et al. 2015), which suggests that it is constrained to reasonably warm waters. There is no other evidence that the taxa can adapt to new conditions	Medium
18	4.05	Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems it has or is likely to invade in the RA area?	No	No information is available on the negative impact of C. reticulatus on food-web structure and/or function.	Medium
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	There is no evidence to support that C. reticulatus could promote adverse impacts on ecosystem services in Madeira.	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?	Yes	There are records of ciguatera being present in the RA. Chilomycterus spp. have been implicated in ciguatera poisoning and, as such, the taxa could serve as vector to ciguatera	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	Chilomycterus reticulatus is know to host several parasites, including four opistholebetines (Martin et al. 2018), a cymothoid isopod (Nagasawa and Doi 2012; Nagasawa and Uyeno, 2012) and a copepod (Uyeno and Nagasawa 2009) from Japan (all) and Senegal (the copepod Hatschekia legouli; Jones, 1985).	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	Chilomycterus reticulatus is not generally subject to home aquarium captivity. Local public aquaria, sometimes host the taxa, however these do not grow to sizes that would warrant their release.	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	The taxa has limited motility and typically dwell in sheltered areas and close to the bottom. There is no evidence that they can persist in flowing waters with 0.7 m per second velocities.	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	No information is available on habitat quality reduction by C. reticulatus for native taxa.	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	In Canary Islands, such as other localities where C. reticulatus is native, the species is likely to maintain viable population even if present in low densities (e.g. Brito and Falcón 1990; Espino et al. 2019)	High
5. Resource exploitation					
26	5.01	Is the taxon likely to consume threatened or protected native taxa in RA area?	No	Chilomycterus reticulatus feeds on hard-shelled invertebrates, but none of the stomach contents analysed by Brito and Falcón (1990) belong to threatened or protected native taxa of Madeira. Also,	Medium
27	5.02	Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?	No	There is no evidence that the taxa can consume prey at the expense of native species	Medium
6. Reproduction					
28	6.01	Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?	No	Chilomycterus reticulatus doesn't exhibit parental care (Almada et al. 1999), while no information is available on age at maturity reduction in response to environmental conditions.	High
29	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	Madeira has a subtropical climate that matches conditions within the range in which the taxa is established (e.g. canary islands)	Medium
30	6.03	Is the taxon likely to hybridize naturally with native taxa?	No	No information is available on C. reticularis, however there are no other close taxa in RA, with which it could hybridise	High
31	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	No	No information is available on asexual reproduction or hermafroditism of C. reticulatus.	Medium
32	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	No	No information is available on the needed of other taxon to complete the life cycle of C. reticulatus, and the preferential spawning ground is unknown (De Andrade et al. 2016),	Medium

				however there are no evidence that would suggest it would require other taxa 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 information is available on the reproduction of C. reticulatus.	Low
34	6.07	How many time units (days, months, years) does the taxon require to reach the age-at-first-reproduction? [In the Justification field, indicate the relevant time unit being used.]	n.a.	There is no information on the age at first reproduction of C. reticulatus.	High
7. Dispersal mechanisms					
35	7.01	How many potential internal pathways could the taxon use to disperse within the RA area (with suitable habitats nearby)?	>1	Chilomycterus reticulatus could disperse whitin of Madeira area through ballast water (larvae or post-larvae) and rafting on floating objects or Sargassum sp. (juvenile/adult) (Afonso et al. 2013).	High
36	7.02	Will any of these pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)?	Yes	In Madeira there are some MPAs, and a couple of them (Cabo Girão and Garajau) are close to Funchal, the capital of the Island, characterized by the highest shipping traffic.	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 information is available on it.	High
38	7.04	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?	Yes	Eggs of C. reticulatus are pelagic and drift in surface oceanic water (Luiz et al. 2012).	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	Larvae of C. reticularis are pelagic and mostly disperse through rafting (Afonso et al. 2013) and commonly juveniles are associated with floating weeds (Kuiter and Tonozuka 2001). Additionally, records in Madeira suggests that it often manages to cross open ocean environment and reach Madeira	Very high
40	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	No	No evidence is available on that.	Low
41	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No	No information is available, but the larvae of C. reticulatus are pelagic, so probably the dispersal does not involve other animals.	Medium
42	7.08	Is dispersal of the taxon along any of the pathways mentioned in the previous seven questions (7.01–7.07; i.e. both unintentional or intentional) likely to be rapid?	Yes	Since eggs or larvae of C. reticulatus can arrive in Madeira through ballast water, this vector can be considered rapid (< 1 year).	Low
43	7.09	Is dispersal of the taxon density dependent?	No	No information is available on that.	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	No information is available on that.	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	Occurrences and distribution do not provide evidence to support or suggest that taxon to be particularly tolerant	Low

46	8.03	Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	No	There is no evidence of successful control or eradication	Low
47	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	No	There is no evidence to suggest it	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	Chilomycterus reticulatus is classified as marine stenohaline in González-Acosta et al. (2018). In De Andrade et al. (2016) is classified as Euryhaline Marine, but the reference (Vilar et al. 2011) is about another species of the same genus, C. spinosus spinosus, that rarely was found in the estuary of Baía da Babitonga.	Medium
49	8.06	Are there effective natural enemies (predators) of the taxon present in the RA area?	No	No predators or natural enemies of C. reticulatus seem to be present in Madeira.	Medium
C. Climate change					
9. Climate change					
50	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?	Increase	In recent decades, several marine organisms expanded their distribution ranges due to ocean warming, as happened for C. reticulatus in Canary Islands (Espino et al. 2019). Range expansion facilitated by climate change and warming conditions is likely to increase risks for the RA	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	In Gran Canaria (Canary Islands) the increase in the presence of C. reticulatus in recent decades, seem to be related to the increase of SST registered in the area, facilitating the range expansion and the establishment of the species (Espino et al. 2019).	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	In Gran Canaria (Canary Islands) the increase in the presence of C. reticulatus in recent decades, seem to be related to the increase of SST registered in the area, facilitating the dispersal of the species within the Island of Gran Canaria (Espino et al. 2019). Additionally, increasing frequency and severity of storms is likely to facilitate larval and individuals dispersal	High
53	9.04	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	Higher	Chilomycterus reticulatus could impact the biodiversity and ecological status of the coast, eating the key herbivore species of sea urchin of Madeira (Diadema africanum) and thus reducing the urchin barren favoring the recover of macroalgae. Urchin's disease outbreaks also seem to be linked with warn conditions. The compounding effect of both, enhanced by higher SSTs can promote phase shifts from urchin barrens to algae biotopes, which is likely to increase biodiversity	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	Chilomycterus reticulatus could impact the biodiversity and ecological status of the coast, eating the key herbivore species of sea urchin of Madeira (Diadema africanum) and thus reducing the urchin barren favoring the recover of macroalgae. Urchin's disease outbreaks also seem to be linked with warn conditions. The compounding effect of both, enhanced by higher SSTs can promote phase shifts from urchin barrens to algae biotopes - changing local benthic communities	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	Climate change could cause an increase of abundance of C. reticulatus, thus consequently it should impact the population of the key herbivore species of sea urchin Diadema africanum, reducing it. A reduction of D. africanum, would permit to reduce the barren state highly present in Madeira, favoring the repopulation of macro algae and consequently of the associated biodiversity, promoting new and enhanced ecosystem services. As such, it is likely to positively impact ecosystem services in coastal habitats	Low

Statistics	
Scores	
BRA Score	**9,5**
BRA Outcome	**Medium**
BRA+CCA Score	**21,5**
BRA+CCA Outcome	**Medium**
Score partition	
A. Biogeography/Historical	**6,5**
1. Domestication/Cultivation	0
2. Climate, distribution and introduction risk	2
3. Invasive elsewhere	4,5
B. Biology/Ecology	**3**
4. Undesirable (or persistence) traits	3
5. Resource exploitation	0
6. Reproduction	0
7. Dispersal mechanisms	2
8. Tolerance attributes	-2
C. Climate change	**12**
9. Climate change	12
Answered Questions	
Total	**55**

Thresholds	
BRA	**12,5**
BRA+CCA	**23.4**
Confidence	
BRA+CCA	**0.54**
BRA	**0.54**
CCA	**0.58**

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

Assessment #2

Taxon and Assessor details	
Category	Fishes and Lampreys (marine)
Taxon name	Chilomycterus reticulatus
Common name	Spotfin burrfish
Assessor	Francesca Gizzi
Risk screening context	
Reason and socio-economic benefits	The Spotfin burrfish has a circumglobal distribution in tropical, subtropical and warm temperate areas of the Pacific, Indian and Atlantic Oceans. It reached the neighbouring Canary Island and with really low frequency also the Azores. Despite the species being widely distributed, it is not common. It arrived in Madeira in 1941, but few information is available on the status of this species.
Risk assessment area	Madeira
Taxonomy	Animalia (Kingdom) Chordata (Phylum) Vertebrata (Subphylum) Gnathostomata (Superclass) Pisces (Superclass) Actinopterygii (Class) Tetraodontiformes (Order) Diodontidae (Family) Chilomycterus (Genus) Chilomycterus reticulatus (Species)
Native range	Gulf of Mexico, Atlantic, Indian and Pacific Oceans
Introduced range	Mediterranean Sea, Canary Islands, Azores, (maybe) Madeira
URL	

			Response	Justification (references and/or other information)	Confidence
A. Biogeography/Historical					
1. Domestication/Cultivation					
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	No	No information is available on C. reticulatus domestication.	High
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	No	There are no records on this.	High
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	No	There are no records on invasive species taxonomically close to C. reticulatus.	High
2. Climate, distribution and introduction risk					
4	2.01	How similar are the climatic conditions of the RA area and the taxon's native range?	High	Considering the climate classification system of Köppen-Geiger for the native range of C. reticulatus and the classification of Cropper (2013) for Madeira, and keeping in mind that C. reticulatus has a circumglobal distribution, from warm temperate to tropical waters (including the Eastern Atlantic from Capo Blanco to Angola), Madeira fits in the native range of C. reticulatus.	High

5	2.02	What is the quality of the climate matching data?	Medium	The climatic data was established by the classification system of Köppen-Geiger (native range) and the classification of Cropper 2013 (Madeira).	Medium
6	2.03	Is the taxon already present outside of captivity in the RA area?	n.a.	Chilomycterus reticulatus is not present in captivity in Madeira.	Very high
7	2.04	How many potential pathways could the taxon use to enter in the RA area?	>1	C. reticulatus may enter Madeira rafting under surface debris or sargassum, and larval or post-larval phase transported by ballast water (Afonso et al. 2013).	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	Some records of Chilomycterus reticulatus were collected in Madeira over the years. Some individuals are deposited in the Museu Municipal do Funchal and in the Natural History Museum of London (Wirtz et al. 2008).	Very high
3. Invasive elsewhere					
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	Chilomycterus reticulatus became naturalised outside its native range, e.g. in El Hierro (Canary Islands), the species established viable populations. It has been widespread since at least the late 1980s (Brito and Falcón 1990).	Very high
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	No	No information is available on the impact of this species on wild stock or commercial taxa in its introduced range.	Medium
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	No records are available on the adverse impact of C. reticulatus on aquaculture in its introduced range.	High
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem services?	No	No information is available on the adverse impact of C. reticulatus on ecosystem services in its introduced range.	Medium
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	No information is available on adverse socio-economic impacts by C. reticulatus in its introduced range.	Medium
B. Biology/Ecology					
4. Undesirable (or persistence) traits					
14	4.01	Is it likely that the taxon will be poisonous, or pose other risks to human health?	Yes	Chilomycterus reticulatus has an inflatable body covered by numerous spines that may cause pain to humans.	High
15	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	No	No information is available.	High
16	4.03	Are there threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	No information is available on that.	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	Chilomycterus reticulatus has a circumglobal distribution in tropical, subtropical, and warm temperate areas of the Pacific, Indian and Atlantic oceans (Leis et al. 2015). That means that the species is adaptable to different environmental conditions, and the subtropical climate of Madeira makes the Island adequate for C. reticulatus persistence in the area.	High
18	4.05	Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems it has or is likely to invade in the RA area?	No	No information is available on the negative impact of C. reticulatus on food-web structure and/or function.	Medium

19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	No information is available on the negative impact of C. reticulatus on ecosystem services in Madeira.	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 information is available on C. reticulatus as a vector for pests or infectious agents endemic in Madeira.	Low
21	4.08	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area?	Yes	Chilomycterus reticulatus is known to host several parasites, including four opistholebetines (Martin et al. 2018), a cymothoid isopod (Nagasawa and Doi 2012; Nagasawa and Uyeno, 2012), and a copepod (Uyeno and Nagasawa 2009) from Japan (all) and Senegal (the copepod Hatschekia legouli; Jones, 1985).	High
22	4.09	Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity?	n.a.	Chilomycterus reticulatus is not subject to captivity.	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	Juveniles of C. reticulatus are pelagic in ocean surface waters (Lieske and Myers 2002), so I suppose that they can sustain themselves in a range of water velocity conditions, at least when young.	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	No information is available on habitat quality reduction by C. reticulatus for native taxa.	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	The species is likely to maintain viable population even if present in low densities (e.g. Brito and Falcón 1990; Espino et al. 2019)	Very high
5. Resource exploitation					
26	5.01	Is the taxon likely to consume threatened or protected native taxa in RA area?	No	Chilomycterus reticulatus feeds on hard-shelled invertebrates, but none of the stomach contents analysed by Brito and Falcón (1990) belong to threatened or protected native taxa of Madeira.	Low
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 is available on sequestering food resources by C. reticulatus.	Medium
6. Reproduction					
28	6.01	Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?	No	Chilomycterus reticulatus doesn't exhibit parental care (Almada et al. 1999), while no information is available on age at maturity reduction in response to environmental conditions.	High
29	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	Madeira has a subtropical climate that falls in the environmental conditions of the native range of C. reticulatus.	High
30	6.03	Is the taxon likely to hybridize naturally with native taxa?	No	No information is available on C. reticulatus. Other Chilomycterus species were hybridized between them, but only in captivity (Doi et al. 2015).	High
31	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	No	No information is available on asexual reproduction or hermaphroditism of C. reticulatus.	Medium
32	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	No	No information is available on the need for other taxa to complete the life cycle of C. reticulatus, and the preferential spawning ground is unknown (De Andrade et al. 2016).	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	No information is available on the reproduction of C. reticulatus. However, a study conducted on another species belonging to the same family (Diodon holocanthus) showed that this species could reproduce more than once per year (Lucano-Ramírez et al. 2011).	Low
34	6.07	How many time units (days, months, years) does the taxon require to reach the age-at-first-reproduction? [In the Justification field, indicate the relevant time unit being used.]	n.a.	There is no information on the age at the first reproduction of C. reticulatus.	High
7. Dispersal mechanisms					
35	7.01	How many potential internal pathways could the taxon use to disperse within the RA area (with suitable habitats nearby)?	>1	Chilomycterus reticulatus could disperse within the Madeira area through ballast water (larvae or post-larvae) and rafting on floating objects or Sargassum sp. (juvenile/adult) (Afonso et al. 2013).	High
36	7.02	Will any of these pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)?	Yes	In Madeira, there are some MPAs, and a couple (Cabo Girão and Garajau) are close to Funchal, the island's capital, characterized by the highest shipping traffic.	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 information is available on it.	High
38	7.04	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?	Yes	Eggs of C. reticulatus are pelagic and drift in surface oceanic water (Luiz et al. 2012).	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	Larvae of C. reticularis are pelagic and mostly disperse through rafting (Afonso et al. 2013), and commonly juveniles are associated with floating weeds (Kuiter and Tonozuka 2001).	Very high
40	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	No	No evidence is available on that.	Low
41	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No	No information is available, but the larvae of C. reticulatus are pelagic, so probably the dispersal does not involve other animals.	Medium
42	7.08	Is dispersal of the taxon along any of the pathways mentioned in the previous seven questions (7.01–7.07; i.e. both unintentional or intentional) likely to be rapid?	Yes	Since eggs or larvae of C. reticulatus can arrive in Madeira through ballast water, this vector can be considered rapid (< 1 year).	Medium
43	7.09	Is dispersal of the taxon density dependent?	No	No information is available on that.	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	No information is available on that.	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.]	n.a.	No information is available on that.	High

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 that.	Medium
47	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	No	No information is available on that.	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	Chilomycterus reticulatus is classified as marine stenohaline in González-Acosta et al. (2018). In De Andrade et al. (2016) is classified as Euryhaline Marine. Still, the reference (Vilar et al. 2011) is about another species of the same genus, C. spinosus spinosus, that rarely was found in the estuary of Baía da Babitonga.	High
49	8.06	Are there effective natural enemies (predators) of the taxon present in the RA area?	No	No predators or natural enemies of C. reticulatus seem to be present in Madeira.	Medium
C. Climate change					
9. Climate change					
50	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?	Increase	Several marine organisms expanded their distribution ranges in recent decades due to ocean warming, as happened for C. reticulatus in the Canary Islands (Espino et al. 2019).	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	In Gran Canaria (Canary Islands), the increase in C. reticulatus in recent decades seems to be related to the rise in SST registered in the area, facilitating the range expansion and the establishment of the species (Espino et al. 2019).	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	In Gran Canaria (Canary Islands), the increase in C. reticulatus in recent decades seems to be related to the increase of SST registered in the area, facilitating the dispersal of the species within the Island of Gran Canaria (Espino et al. 2019).	High
53	9.04	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	No change	Chilomycterus reticulatus could impact the biodiversity and ecological status of the coast, eating the key herbivore species of sea urchin of Madeira (Diadema africanum) and thus reducing the urchin barren favoring the recovery of macroalgae. However, this should not increase or decrease due to climate changes.	High
54	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	No change	Climate change should not increase or decrease the low impact of C. reticulatus on ecosystem structure or function.	Medium
55	9.06	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	Lower	Climate change could cause an increase in the abundance of C. reticulatus. Thus consequently, it should impact the population of the key herbivore species of sea urchin Diadema africanum, reducing it. A reduction of D. africanum would reduce the barren state highly present in Madeira, favoring the repopulation of macro algae and consequently the associated biodiversity.	Medium

Statistics

Scores	
BRA Score	7.0
BRA Outcome	Medium
BRA+CCA Score	11.0
BRA+CCA Outcome	Medium
Score partition	
A. Biogeography/Historical	**1**
1. Domestication/Cultivation	-2
2. Climate, distribution and introduction risk	1
3. Invasive elsewhere	2
B. Biology/Ecology	**6**
4. Undesirable (or persistence) traits	5
5. Resource exploitation	0
6. Reproduction	1
7. Dispersal mechanisms	2
8. Tolerance attributes	-2
C. Climate change	**4**
9. Climate change	4
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

Thresholds	
BRA	12.5
BRA+CCA	23.4
Confidence	
BRA+CCA	0.63
BRA	0.62
CCA	0.67

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7. Dispersal mechanisms	9
8. Tolerance attributes	6
C. Climate change	**6**
9. Climate change	6
Sectors affected	
Commercial	**0**
Environmental	**1**
Species or population nuisance traits	**14**

Assessment #3

Taxon and Assessor details	
Category	Fishes and Lampreys (marine)
Taxon name	Chilomycterus reticulatus
Common name	Spotfin burrfish
Assessor	Nuno Castro
Risk screening context	
Reason and socio-economic benefits	Chilomycterus reticulatus has colonized the neighbouring archipelago of Canary Islands, sporadic sightings of the species have occurred in the RA (Madeira). The main prey item for C. reticulatus is hard shell bivalves, so it is important to verify the risk of establishment to prevent impact on important resources in the RA (i.e. Limpets)
Risk assessment area	Madeira
Taxonomy	Biota Animalia (Kingdom) Chordata (Phylum) Vertebrata (Subphylum) Gnathostomata (Superclass) Pisces (Superclass) Actinopterygii (Class) Tetraodontiformes (Order) Diodontidae (Family)
Native range	Circumglobal (Tropical) : Gulf of Mexico, Atlantic, Indian and Pacific oceans.
Introduced range	Mediterraean; Canary Islands; Madeira?
URL	http://www.marinespecies.org/aphia.php?p=taxdetails&id=219964

			Response	Justification (references and/or other information)	Confidence
A. Biogeography/Historical					
1. Domestication/Cultivation					
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	No	No record of that	High
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	In Brazil, I've witnessed that this fish is often sold dried	High
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	No	No record of that	High
2. Climate, distribution and introduction risk					
4	2.01	How similar are the climatic conditions of the RA area and the taxon's native range?	Medium	According to Climatch the similarity is 6.76/10	Medium

5	2.02	What is the quality of the climate matching data?	Medium	The quality was based on the online model, the number of source stations selected was high, but the target region had only 3 points available.	Medium
6	2.03	Is the taxon already present outside of captivity in the RA area?	n.a.	There is some evidence of the presence of the species (Wirtz et al., 2008)	High
7	2.04	How many potential pathways could the taxon use to enter in the RA area?	>1	Ballast water and association with floating marine litter (Sommer et al 1996; Espino et al., 2015.	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	There is documentation of geographical range expansion of the organism in question: Espino et al., 2019.	Very high
3. Invasive elsewhere					
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	There is evidence that the species established viable populations outside its native range: Espino et al., 2019.	High
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	No	No known adverse impacts to wild stock or commercial taxa	Medium
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	Yes	The fish can host a parasite that could cause adverse impacts on aquaculture	High
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem services?	No	No documented adverse impacts on ecosystem services	Medium
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	No documented socio-economic impacts	Medium
B. Biology/Ecology					
4. Undesirable (or persistence) traits					
14	4.01	Is it likely that the taxon will be poisonous, or pose other risks to human health?	Yes	The species possess spines that can be harmful to humans	High
15	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	No	No record of that	High
16	4.03	Are there threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	No record of that	High
17	4.04	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?	Yes	Since the native distribution of the taxa is similar to the RA, there is a potential for the species to invade the RA area	Medium
18	4.05	Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems it has or is likely to invade in the RA area?	No	No record of that	Medium
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	No record of that	Medium

20	4.07	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA area?	Yes	Tetrodotoxin is present in the liver of C. reticulatus. Nagashima et al., 2018	Medium
21	4.08	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area?	Yes	The taxon is known to host an isopod parasite, Nagasawa and Doi, 2012.	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	No record of that	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	My reply is based on the capacity of the fish to endure oceanic surface waters (Sommer el al.,1996 but regarding the taxa swimming performance my inclination is to no response, so the confidence is low (Blake, 2004).	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	No record of that	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	Evidence of that was found in other regions (Espino et l., 2019)	High
5. Resource exploitation					
26	5.01	Is the taxon likely to consume threatened or protected native taxa in RA area?	No	The taxa feed on hardshell invertebrates(Follesa et al. 2009) but Brito et al. (1990) analyzing stomach contents of the species did not find any threatened or protected native taxa to the RA area.	High
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 record of that	Medium
6. Reproduction					
28	6.01	Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?	No	No record of that	High
29	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	The RA is similar in conditions to the native range of the taxon	High
30	6.03	Is the taxon likely to hybridize naturally with native taxa?	No	No record of hybridization in natural conditions only in captivity (Doi et al., 2015)	High
31	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	No	No record of that	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 record of that	High
33	6.06	Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. <1 year)?	No	There is not much information available regarding the reproduction of this species	Medium
34	6.07	How many time units (days, months, years) does the taxon require to reach the age-at-first-reproduction? [In the Justification field, indicate the relevant time unit being used.]	n.a.	No record of age of first reproduction	Medium
7. Dispersal mechanisms					

35	7.01	How many potential internal pathways could the taxon use to disperse within the RA area (with suitable habitats nearby)?	>1	Ballast water (eggs) associated with floating marine litter (Luiz et al., 2015)	High
36	7.02	Will any of these pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)?	Yes	There is ship traffic around MPAs in the RA	Very high
37	7.03	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal?	No	No record of that	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	Eggs and juveniles are pelagic, drifting in surface oceanic waters to about 20 cm of standard total (Luiz et al., 2015)	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	Eggs and juveniles are pelagic, drifting in surface oceanic waters to about 20 cm of standard total length. (Sommer et al., 1996)	Very high
40	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	Yes	Since juveniles are pelagic (Sommer et al., 1996), they might migrate (although evidence found of migration behaviour)	Low
41	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No	No evidence of that	Medium
42	7.08	Is dispersal of the taxon along any of the pathways mentioned in the previous seven questions (7.01–7.07; i.e. both unintentional or intentional) likely to be rapid?	No	No evidence of that	Medium
43	7.09	Is dispersal of the taxon density dependent?	No	No evidence of that	Medium
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	I believe that this taxon cannot withstand being out of water for long periods	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.]	No	No record to that	Medium
46	8.03	Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	No	No record of that	Medium
47	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	No	No record of this evidence	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 record to support this statement	Medium
49	8.06	Are there effective natural enemies (predators) of the taxon present in the RA area?	No	I couldn't find natural predators in the RA of the taxon	Low
C. Climate change					
9. Climate change					

50	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?	Increase	There are other similar cases (Espino et al., 2015; Schäfer et al., 2019).	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	Over the years, the taxon has increased their number in a nearby area: doi:10.3390/d11120230; other species in the RA have established self-sustained populations (Alves and Alves, 2002)	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	There is evidence of undergoing climate change in the RA that could increase the risk of dispersal of the taxon: Schäfer et al., 2019).	High
53	9.04	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	Higher	Since the selected prey item of the species is Diadema africanum (Brito et al., 1990), this could cause some decline in the urchin abundance. By doing so, the barren state achieved by this urchin species can be reduced, favoring the recovery of macroalgae (Gizzi et al., 2021)	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	C. reticulatus can impact the ecosystem structure and function, by eating Diadema africanum (Brito et al., 1990), this could cause some decline in the urchin abundance. By doing so, the barren state achieved by this urchin species can be reduced, favoring the recovery of macroalgae (Gizzi et al., 2021) and associated species.	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	C. reticulatus can impact the ecosystem services/socio-economic factors, by eating Diadema africanum (Brito et al., 1990), this could cause some decline in the urchin abundance. By doing so, the barren state achieved by this urchin species can be reduced, favoring the recovery of macroalgae (Gizzi et al., 2021) and providing higher associated biodiversity.	Medium

Statistics	
Scores	
BRA Score	**12.5**
BRA Outcome	**High**
BRA+CCA Score	**24.5**
BRA+CCA Outcome	**High**
Score partition	
A. Biogeography/Historical	**5,5**
1. Domestication/Cultivation	0
2. Climate, distribution and introduction risk	1

Thresholds	
BRA	**12.5**
BRA+CCA	**23.4**
Confidence	
BRA+CCA	**0.62**
BRA	**0.62**
CCA	**0.62**

Date and Time

3. Invasive elsewhere	4,5
B. Biology/Ecology	**7**
4. Undesirable (or persistence) traits	6
5. Resource exploitation	0
6. Reproduction	0
7. Dispersal mechanisms	3
8. Tolerance attributes	-2
C. Climate change	**12**
9. Climate change	12
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	**8**
Environmental	**5**
Species or population nuisance traits	**14,5**

Assessment #4

Taxon and Assessor details	
Category	Fishes and Lampreys (marine)
Taxon name	Chilomycterus reticulatus
Common name	Spotfin burrfish
Assessor	Susanne Schaefer
Risk screening context	
Reason and socio-economic benefits	
Risk assessment area	Madeira Island
Taxonomy	
Native range	Circum tropical: Atlantic, Pacific and Indian Ocean
Introduced range	NE Atlantic - Madeira and Canary Islands
URL	

			Response	Justification (references and/or other information)	Confidence
A. Biogeography/Historical					
1. Domestication/Cultivation					
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	No	There is no information available on domestication or cultivation of the taxon for at least 20 generations. There might be a few cases of individuals held in aquaria around the world (commercial, scientific or private), but no evidence could be found about ongoing breeding efforts.	High
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	No	There is no information on this taxon being harvested or sold. Pinto et al (2013) describe that local fishermen in Brazil show a lack of interest in buying or selling this taxon. There might be rare cases of the taxon being caught and consumed in some parts of the world or caught for display in aquaria, but there is no scientific documentation on these processes.	High
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	No	There are no records of this taxon or close congeners being invasive.	High
2. Climate, distribution and introduction risk					
4	2.01	How similar are the climatic conditions of the RA area and the taxon's native range?	Medium	The taxons preferred range in temperatures is from 21.5-28°C, but can reach from 12.5-32.5°C (min-max) and salinities of 30.5-36 is preferred but can reach from 22.5-39 (based on Aquamaps: predicted range maps for aquatic species: Chilomycterus reticulatus). The	High

				RA area meets both requirements, but the seasonal temperature range in the RA area (16-26°C, average 20.5°C; Schaefer et al., 2019) is at the lower end of the taxon's preferred range.	
5	2.02	What is the quality of the climate matching data?	Medium	The analysis is based on only two parameters (temperature and salinity), but the data for these parameters is complete and of high confidence for the RA area. The dataset used to describe the native range is based on an automated output (therefore medium confidence) and is complete for the two considered parameters.	Medium
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	The taxon has already been recorded in the RA area "in the wild". No records were found of the taxon being held in captivity in the RA area.	Very high
7	2.04	How many potential pathways could the taxon use to enter in the RA area?	>1	Eggs larvae and juveniles are pelagic and could be possibly transported by currents and ballast waters (Doi et al.,2015; Leis et al., 2016). Juveniles are sometimes found associated with floating algae/debris (Afonso et al., 2013).	High
8	2.05	Is the taxon currently found in close proximity to, and likely to enter into, the RA area in the near future (e.g. unintentional and intentional introductions)?	Yes	The taxon has already been recorded in the RA area, and other areas close by (e.g. Canary Islands; Espino et al., 2019).	Very high
3. Invasive elsewhere					
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	The taxon has established persistent populations in the Canary Islands (Triay-Portella et al., 2015; Espino et al., 2019).	High
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	No	The taxon preys on benthic invertebrates (e.g. echinoderms, crustaceans, molluscs), with the sea urchin Diadema being one of his main prey items at the Canary Islands (Brito & Falcon, 1990). Diadema is considered an important ecosystem engineer in the RA area, and its densities have a great influence on local ecosystems (Gizzi et al., 2020 & 2021). There are no reports of the taxon reaching densities in their introduced range which had an influence on wild stocks.	Medium
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	There is no information available on any adverse impacts of the taxon on aquaculture in its introduced range or other locations in general.	High
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem services?	No	The taxon preys on benthic invertebrates (e.g. echinoderms, crustaceans, molluscs), with the urchin Diadema being one of his main prey items at the Canary Islands (Brito & Falcon, 1990). Diadema is considered an important ecosystem engineer in the RA area, and its densities have a great influence on local ecosystems (Gizzi et al., 2020 & 2021). There are no reports of the taxon reaching densities in their introduced range which had an influence on ecosystem services.	Medium
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	There is no information available on any adverse impacts of the taxon on socio-economy in its introduced range	Medium
B. Biology/Ecology					
4. Undesirable (or persistence) traits					

14	4.01	Is it likely that the taxon will be poisonous, or pose other risks to human health?	Yes	The body of the taxon is covered in robust, external spines, which can pose a risk to human health at direct contact.	Medium
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 available suggests that the taxon will smother native taxa.	High
16	4.03	Are there threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	The taxon does not parasitise other species. The taxon preys on benthic invertebrates (e.g. echinoderms, crustaceans, molluscs; Brito & Falcon, 1990). There are no reports on incidents of the taxon consuming a threatened or protected species.	High
17	4.04	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?	No	There is no information available on the adaptability of this taxon to climatic/environmental conditions. The taxon has a circumtropical distribution and therefore shows tolerance to a great range of conditions, but adaptability hasn't been reported or tested.	Low
18	4.05	Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems it has or is likely to invade in the RA area?	No	No information was found that suggests a disruption of the local food web structure. The taxon preys on benthic invertebrates (e.g. echinoderms, crustaceans, molluscs), with the urchin Diadema being one of his main prey items at the Canary Islands (Brito & Falcon, 1990). Diadema is considered an important ecosystem engineer in the RA area, and its densities have a great influence on local ecosystems (Gizzi et al., 2020 & 2021). There are no reports of the taxon reaching densities in their introduced range which had an influence on ecosystem services.	Medium
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	No information was found in the literature that suggests adverse impacts on ecosystem services in the RA area. The taxon preys on benthic invertebrates (e.g. echinoderms, crustaceans, molluscs), with the urchin Diadema being one of his main prey items at the Canary Islands (Brito & Falcon, 1990). Diadema is considered an important ecosystem engineer in the RA area, and its densities have a great influence on local ecosystems (Gizzi et al., 2020 & 2021). There are no reports of the taxon reaching densities in their introduced range which had an influence on ecosystem services.	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 information on recognized pests or infectious agents that are endemic in the RA area which could use the taxon as a host.	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	The taxon is known to carry different parasites (Nagasawa 2012; Martin et al., 2018), including species that haven't been recorded in the RA area yet (example: Cymothoa pulchra; Nagasawa & Uyeno, 2012).	High
22	4.09	Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity?	Yes	The taxon is rarely used as a pet in the aquarium trade. As the taxon can reach great sizes, it requires a certain level of experience and very big aquaria. The possibility of releases due to reaching great body size and exceeding their aquarium can not be excluded but seems rather unlikely.	Low
23	4.10	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)?	Yes	There is no information on the swimming abilities of the taxon. Juveniles are known to drift/raft under floating debris (Afonso et al., 2013). Adults are known as slow swimmers but using crevices and other habitat features as hideouts from currents.	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	No information available that suggests that the taxon will reduce habitat quality for native taxa.	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	Populations in the Canary Islands seem to be persistent over decades, although densities were low (Brito and Falcon, 1990; Espino et al., 2019).	High
5. Resource exploitation					
26	5.01	Is the taxon likely to consume threatened or protected native taxa in RA area?	No	The taxon preys on benthic invertebrates (e.g. echinoderms, crustaceans, molluscs). There is no information available on incidents where the taxon consumed any threatened/protected species.	Medium
27	5.02	Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?	No	There is no information available on the sequestering of resources by the taxon.	Medium
6. Reproduction					
28	6.01	Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?	No	The taxon does not show parental care (Almada et al. 1999), and there is no information on age to maturity for the taxon available.	High
29	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	Although there is no information on spawning areas or conditions (Andrade et al., 2016), a captive specimen of the taxon spawned at 25°C and a salinity of 34-35 (Doi et al., 2015). These are conditions that are reached during summer in the RA area. Therefore reproduction seems possible in the RA area.	Medium
30	6.03	Is the taxon likely to hybridize naturally with native taxa?	No	There are no reports on hybridisation directly in this taxon. However, the closely related species C. antillarum was able to successfully fertilize eggs of C. schoepfii, so hybridisation can not be excluded in the taxon. The only closely related species in the RA area is Diodon hystrix (D. eydouxii; Wirtz et al., 2008), which is very rare in the RA area. Therefore hybridisation is very unlikely.	High
31	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	No	There is no record of hermaphrody in the taxon of closely related species (Kuwamura et al., 2020), and the taxon does not reproduce asexually.	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	The taxon is not dependent on the presence of another species, and there is no information on specific habitat features needed to complete its life cycle.	High
33	6.06	Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. <1 year)?	Yes	The taxon is reported to spawn 100.000 eggs in one event (Doi et al., 2015), but there is no information on the success/survival of the offspring or the time between spawning events in a female.	Medium
34	6.07	How many time units (days, months, years) does the taxon require to reach the age-at-first-reproduction? [In the Justification field, indicate the relevant time unit being used.]	n.a.	There is no information available.	Low
7. Dispersal mechanisms					
35	7.01	How many potential internal pathways could the taxon use to disperse within the RA area (with suitable habitats nearby)?	>1	Eggs, larvae, and juveniles are pelagic and could be possibly transported by natural currents or ballast waters (Doi et al.,2015; Leis et al., 2016). Juveniles are sometimes found associated with floating algae/debris (Afonso et al., 2013).	High

36	7.02	Will any of these pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)?	Yes	There are several MPAs in the RA area.	High
37	7.03	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal?	No	None of the taxons' life stages is recorded to actively attach itself to a hard substrate (epipelagic eggs, larvae, and juveniles). The adult stage does not display any specialized structures to facilitate attachment.	Very high
38	7.04	Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area?	Yes	Natural dispersal in this taxon occurs by epipelagic eggs, larvae, and juveniles (Doi et al., 2015; Leis et al., 2016).	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	Natural dispersal in this taxon occurs by epipelagic eggs, larvae, and juveniles (Doi et al., 2015; Leis et al., 2016).	High
40	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	No	There is no information available on the reproduction areas of the taxon or the necessary conditions for reproduction. Furthermore, there are no records of migration patterns of this species available. However, environmental conditions in the RA area overlap with the taxons' natural range so that reproduction might be possible in the RA area.	Low
41	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No	There is no information available that suggests eggs or juveniles being transported by other animals.	Medium
42	7.08	Is dispersal of the taxon along any of the pathways mentioned in the previous seven questions (7.01–7.07; i.e. both unintentional or intentional) likely to be rapid?	Yes	Eggs, larvae, and juveniles are pelagic and could be possibly transported by currents and ballast waters (Doi et al.,2015; Leis et al., 2016). Therefore the dispersal of the taxon has the potential to be rapid (<1year).	Medium
43	7.09	Is dispersal of the taxon density dependent?	No	There is no information available.	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	There is no information available. There are no indications that the taxon can withstand extended periods out of the water.	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.]	No	There is no information available.	Medium
46	8.03	Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	No	There is no information available for the taxon. However, given the fact that the taxon is a motile fish, local eradication based on chemical/biological agents is most likely difficult due to its spread throughout the RA area. Targeted removal could be used to decrease numbers, but a full eradication or control is questionable (Giakoumi et al., 2019).	Medium
47	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	No	There is no information available.	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	Although the taxon is considered euryhaline in Andrade et al., 2016, there seems to be no information available to support this evaluation. The predicted optimal salinity ranges (by Aquamaps) cover 30.5-36 and minimum-maximum of 22.5 - 39, respectively, placing the species mostly in the marine spectrum. There is no information available on experimental studies performed on this taxon to test its tolerance regarding salinity.	High

49	8.06	Are there effective natural enemies (predators) of the taxon present in the RA area?	Yes	There is no information on predators on the taxon itself available. However, studies on other porcupine fish species list several predators on eggs/larvae/juveniles as well as adults, including tuna, groupers, dolphins, and a variety of shark species (Shepherd et al., 2019). All these groups of potential predators exist in the RA area.	High
C. Climate change					
9. Climate change					
50	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?	No change	The risk of the taxon entering the RA area is likely to stay similar to the current situation. Dispersal of the taxon is most likely during the early life stages (eggs, larvae, juveniles), which depends on currents/rafting or human-mediated transport (e.g. ballast waters). There is no information available that suggests major changes of these factors due to climate change.	Medium
51	9.02	Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	Increase	The optimal temperature of the taxon is higher than current seawater temperatures in the RA area. Therefore the predicted increases of SST in the RA area will make the area more suitable for the taxon.	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	The dispersal of the taxon in the RA area is likely to stay similar to the current situation. Dispersal of the taxon is most likely during the early life stages (eggs, larvae, juveniles), which depends on currents/rafting or human-mediated transport (e.g. ballast waters). There is no information available that suggests major changes of these factors due to climate change.	Medium
53	9.04	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	No change	Under predicted future conditions the establishment and spread of the taxon in the RA area could increase considering the tropical affinity of the taxon. The increase of the taxon could lead to an increased predation on the sea urchin Diadema, a keystone species in the area. Decreases in Diadema can lead to a phase shift from barren to algae dominated habitats (Gizzi et al., 2020 & 2021). However, the impact of future conditions on Diadema as well as macro-algae dominated habitats haven't been studied, making predictions on future biodiversity and ecological status highly speculative.	Low
54	9.05	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	No change	Under predicted future conditions, the establishment and spread of the taxon in the RA area could increase considering the tropical affinity of the taxon. The increase of the taxon could lead to increased predation on the sea urchin Diadema, a keystone species in the area. Decreases in Diadema can lead to a phase shift from barren to algae-dominated habitats (Gizzi et al., 2020 & 2021). However, the impact of future conditions on Diadema as well as macro-algae dominated habitats haven't been studied, making predictions on ecosystem structure/function highly speculative.	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	Under predicted future conditions, the establishment and spread of the taxon in the RA area could increase considering the tropical affinity of the taxon. The increase of the taxon could lead to increased predation on the sea urchin Diadema, a keystone species in the area. Decreases in Diadema can lead to a phase shift from barren to algae-dominated habitats (Gizzi et al., 2020 & 2021). However, the impact of future conditions on Diadema	Low

				as well as macro-algae-dominated habitats hasn't been studied, making predictions on ecosystem services and socio-economy highly speculative.	

Statistics	
Scores	
BRA Score	**4.5**
BRA Outcome	**Medium**
BRA+CCA Score	**6.5**
BRA+CCA Outcome	**Medium**
Score partition	
A. Biogeography/Historical	**1,5**
1. Domestication/Cultivation	-2
2. Climate, distribution and introduction risk	2
3. Invasive elsewhere	1,5
B. Biology/Ecology	**3**
4. Undesirable (or persistence) traits	4
5. Resource exploitation	0
6. Reproduction	1
7. Dispersal mechanisms	2
8. Tolerance attributes	-4
C. Climate change	**2**
9. Climate change	2
Answered Questions	
Total	**55**
A. Biogeography/Historical	**13**
1. Domestication/Cultivation	3
2. Climate, distribution and introduction risk	5

Thresholds	
BRA	**12.5**
BRA+CCA	**23.4**
Confidence	
BRA+CCA	**0.59**
BRA	**0.61**
CCA	**0.42**

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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	**3**
Environmental	**1**
Species or population nuisance traits	**8**

Assessment #5

Taxon and Assessor details	
Category	Fishes and Lampreys (marine)
Taxon name	Chilomycterus reticulatus
Common name	Spotfin burrfish
Assessor	Sahar Chebaane
Risk screening context	
Reason and socio-economic benefits	The Spotfin burrfish has a circumglobal distribution in tropical, subtropical and warm temperate areas of the Pacific, Indian and Atlantic Oceans. It has been sighted in the Mediterranean, Azores and Madeira
Risk assessment area	Madeira
Taxonomy	Animalia (Kingdom) Chordata (Phylum) Vertebrata (Subphylum) Gnathostomata (Superclass) Pisces (Superclass) Actinopterygii (Class) Tetraodontiformes (Order) Diodontidae (Family) Chilomycterus (Genus) Chilomycterus reticulatus (Species)
Native range	Gulf of Mexico, Atlantic, Indian and Pacific Oceans
Introduced range	Mediterranean Sea and maybe Azores and Madeira
URL	

			Response	Justification (references and/or other information)	Confidence
A. Biogeography/Historical					
1. Domestication/Cultivation					
1	1.01	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	No	The biology and ecology of this fish is not yet well known (Leis et al., 2015)	High
2	1.02	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Yes	In African countries it is often captured, dried and sold as ornaments	Medium
3	1.03	Does the taxon have invasive races, varieties, sub-taxa or congeners?	No	Cyclichthys spilostylus was reported in the mediterranean sea but without showing an invasive behaviour (Saad et al., 2018) also in the Canary Islands (Espino et al.,2019).	Medium
2. Climate, distribution and introduction risk					
4	2.01	How similar are the climatic conditions of the RA area and the taxon's native range?	Medium	Climatch score ranges between 3 and 8 when compared to the Canary Islands.	High
5	2.02	What is the quality of the climate matching data?	Medium	There are not a lot of stations in climatch are limited and with wide range of scores	Medium
6	2.03	Is the taxon already present outside of captivity in the RA area?	Yes	There are multiple records of Chilomycterus reticulatus in Madeira.	Very high

7	2.04	How many potential pathways could the taxon use to enter in the RA area?	>1	It may have arrived through maritime traffic, including oil rigs and drilling vessels (Triay-Portella et al., 2015; Pajuelo et al.,2016).	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	Chilomycterus reticulatus is present in the Canary islands (Espino el al., 2019)	High
3. Invasive elsewhere					
9	3.01	Has the taxon become naturalised (established viable populations) outside its native range?	Yes	Chilomycterus reticulatus became naturalised outside its native range, e.g. in the Island of el Hierro (Canary Islands) the species established viable populations and it is really common since at least the late 1980s (Brito el al., 2002; Potter el al., 1988).	Medium
10	3.02	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	No	No information is available on the impact of this species on wild stock or commercial taxa in its introduced range.	Low
11	3.03	In the taxon's introduced range, are there known adverse impacts to aquaculture?	No	No information is available on impact of this species on aquaculture stocks in its introduced range	Low
12	3.04	In the taxon's introduced range, are there known adverse impacts to ecosystem services?	No	No information is available on the adverse impact of C. reticulatus to ecosystem services in its introduced range.	Medium
13	3.05	In the taxon's introduced range, are there known adverse socio-economic impacts?	No	No information is available on adverse socio-economic impacts by C. reticulatus in its introduced range.	Medium
B. Biology/Ecology					
4. Undesirable (or persistence) traits					
14	4.01	Is it likely that the taxon will be poisonous, or pose other risks to human health?	No	It's not a venomous species but it has an inflatable body covered by numerous spines that may, theoretically, cause injury to humans.	Low
15	4.02	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	n.a.	Taxa is not a plat, algae or other sessile organism that can overgrow and smother native taxa	Very high
16	4.03	Are there threatened or protected taxa that the non-native taxon would parasitise in the RA area?	No	No interaction between the taxon and any threatened or protected taxa	High
17	4.04	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?	No	There is no other evidence that the taxa can adapt to new conditions	Low
18	4.05	Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems it has or is likely to invade in the RA area?	No	No information is available on the negative impact of C. reticulatus on food-web structure and/or function.	Low
19	4.06	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	No	There is no evidence to support that C. reticulatus could promote adverse impacts on ecosystem services in Madeira.	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?	Yes	the taxa could serve as vector to ciguatera	Low

21	4.08	Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area?	Yes	This fish is reported as a hoster of a bocal parasite (Cymothoa pulchrum Lanchester, 1902). This parasite (isopod) is not yet registered in the RA area (Nagasawa and Doi 2012).	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	Chilomycterus reticulatus is not generally subject to home aquarium captivity	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	There is no evidence that they can persist in flowing waters with 0.7 m per second velocities.	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	No information is available on habitat quality reduction by C. reticulatus for native taxa.	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	In Canary Islands (Espino et al. 2019)	High
5. Resource exploitation					
26	5.01	Is the taxon likely to consume threatened or protected native taxa in RA area?	No	The taxon doesn’t consume any threatened or protected native taxa.	Medium
27	5.02	Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?	No	There is no evidence that the taxa can consume prey at the expense of native species	Medium
6. Reproduction					
28	6.01	Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?	No	Chilomycterus reticulatus doesn't exhibit parental care (Leis, J. 1978)	High
29	6.02	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Yes	Madeira has a subtropical climate that matches conditions within the range in which the taxa is established (e.g. canary islands)	Medium
30	6.03	Is the taxon likely to hybridize naturally with native taxa?	No	no research papers about a natural hybridization with a native taxa	High
31	6.04	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	No	No information is available on asexual reproduction or hermafroditism of C. reticulatus.	Medium
32	6.05	Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	No	No information is available on the needed of other taxon to complete her life cycle	Medium
33	6.06	Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. <1 year)?	No	No information is available on the reproduction of C. reticulatus.	Low
34	6.07	How many time units (days, months, years) does the taxon require to reach the age-at-first-reproduction? [In the Justification field, indicate the relevant time unit being used.]	n.a.	There is no information on the age at first reproduction of C. reticulatus.	High
7. Dispersal mechanisms					
35	7.01	How many potential internal pathways could the taxon use to disperse within the RA area (with suitable habitats nearby)?	>1	Chilomycterus reticulatus could disperse whitin of Madeira area through ballast and rafting on floating	High

36	7.02	Will any of these pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)?	Yes	In Madeira there are some MPAs, and a couple of them (Cabo Girão and Garajau) are close to Funchal, the capital of the Island, characterized by the highest shipping traffic.	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 information is available on it.	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	The eggs are taken by water currents (Sommer et al. 1996).	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	the larvae are taken by the water currents and juveniles could be associated to floating	High
40	7.06	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	No	No migratory behaviour	Low
41	7.07	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	No	No information is available, but the larvae of C. reticulatus are pelagic, so probably the dispersal does not involve other animals.	Medium
42	7.08	Is dispersal of the taxon along any of the pathways mentioned in the previous seven questions (7.01–7.07; i.e. both unintentional or intentional) likely to be rapid?	Yes	Can arrive to Madeira through ballast water, this vector can be considered rapid (< 1 year).	Low
43	7.09	Is dispersal of the taxon density dependent?	No	No information is available on that.	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	the taxon can't survive outside the water at any stage of it's life cycle	Very high
45	8.02	Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being considered.]	No	no evidence suggest that taxon to be particularly tolerant	Low
46	8.03	Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	Yes	spearfishing (like the Lionfish) Harris et al ., 2019	Low
47	8.04	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	No	There is no evidence	Low
48	8.05	Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	Yes	No documentation for the minimum salinity; but it was classified as Euryhaline marine species In De Andrade et al., 2016	Low
49	8.06	Are there effective natural enemies (predators) of the taxon present in the RA area?	No	No predators or natural enemies of C. reticulatus seem to be present in Madeira.	Low
C. Climate change					
9. Climate change					
50	9.01	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?	Increase	In recent decades, several marine organisms expanded their distribution ranges due to ocean warming, as happened for C. reticulatus in Canary Islands (Espino et al. 2019).	High

				Range expansion facilitated by climate change and warming conditions is likely to increase risks for the RA	
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 case of Canary island (Espino et al. 2019). Range expansion facilitated by climate change and warming conditions is likely to increase risks for the establishment of this specie in the 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	In Gran Canaria (Canary Islands) the increase in the presence of C. reticulatus (Espino et al. 2019) facilitated by climate change and warming conditions is likely to increase risks for the RA	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	With the ongoing modification related to the climatic change, this taxon could act as a host of parasites that could alter the fish stock in the RA. It could also prey on sea urchins, which are a key herbivorous species in the RA. As a result, the status of this taxon could upgrade to invasive or pest species.	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	With the ongoing modification related to the climatic change, this species may become more abundant and can affect a key herbivorous species, the sea urchins, in Madeira by consuming it	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	This taxon could act as a host of parasites that could alter the fish stock in the RA. It could also prey on sea urchins, which are a key herbivorous species in the RA.	Low

Statistics	
Scores	
BRA Score	**6.5**
BRA Outcome	**Medium**
BRA+CCA Score	**18.5**
BRA+CCA Outcome	**Medium**
Score partition	
A. Biogeography/Historical	**3,5**
1. Domestication/Cultivation	0
2. Climate, distribution and introduction risk	2
3. Invasive elsewhere	1,5
B. Biology/Ecology	**3**

Thresholds	
BRA	**12.5**
BRA+CCA	**23.4**
Confidence	
BRA+CCA	**0.52**
BRA	**0.51**
CCA	**0.58**

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

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