| Taxon and Assessor details | |
|------------------------------------|---|
| Category | Fishes and Lampreys (freshwater) |
| Taxon name | Acanthicus adonis |
| Common name | adonis pleco |
| Assessor | Gilles |
| Risk screening context | |
| Reason and socio-economic benefits | Commercial |
| Risk assessment area | Lake Taal |
| Taxonomy | Actinopteri (ray-finned fishes) > Siluriformes (Catfish) > Loricariidae (Armored catfishes) > |
| Native range | South America: Lower Tocantins River basin. |
| Introduced range | No data |
| URL | https://www.fishbase.se/summary/Acanthicus-Hypostominae.html |

| | | | Response | Justification (references and/or other information) | Confidence |
|------|----------|---|----------|--|------------|
| | | graphy/Historical | | | |
| 1. L | Domest | ication/Cultivation | | | |
| 1 | 1.01 | Has the taxon been the subject of domestication (or cultivation) for at least 20 generations? | Yes | The taxon was introduced in 1970-1979 as an ornamental species (Cagauna, 2007) | Very high |
| 2 | 1.02 | Is the taxon harvested in the wild and likely to be sold or used in its live form? | Yes | The taxon has no report that it is being harvested in wild already but their related species that already reported to be a major component of fish catch in the Philippine waters but the fish has very little value as food fish since the flesh tastes bitter. It may be used, however, as a source of fish meal andfor ornamental | High |
| 3 | 1.03 | Does the taxon have invasive races, varieties, sub-taxa or congeners? | Yes | Suliriformes already has the invasive history, since species P. multiradiatus, P. pardalis and P. disjunctivus have been so far recorded as exotic in Mesoamerica – Puerto Rico and Mexico (8, 12); in North America: southern United States – Florida, Texas, Washington and North Carolina, as well as at Hawaii islands (10, 11, 19, 18, 20); in Philippines and south-eastern Asia: peninsular Malaysia, Singapore, Taiwan, Java and Sumatra (22). In all those recipient areas recorded so far, the aquarists were assigned responsible for their releasing into natural ecosystems and subsequent establishment (Simonović Nikolić and Gruijć 2014) | High |
| | | , distribution and introduction risk | Lue 1 | | N/ 1 · 1 |
| 4 | 2.01 | How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range? | High | The taxon's native range (Amazon) falls under the same climatic conditions in the Philippines which is a tropical climate Froese and Pauly (2015) | Very high |
| 5 | 2.02 | What is the quality of the climate matching data? | High | The taxon's native range (Amazon) falls under the same climatic conditions in the Philippines which is a tropical climate Froese and Pauly (2015) | High |
| 6 | 2.03 | Is the taxon already present outside of captivity in the RA area? | No | The taxon has no report that present outside of captivity in the RA area, but other realted species from family of Loricariidae reported. (Cagauana, 2007) | Very high |
| 7 | 2.04 | How many potential vectors could the taxon use to enter in the RA area? | >1 | They were probably introduced through an intentional release and possibly fish farm escapes upstream (near Davao) between the 2002 and 2005 (Hubilla et al, 2007). Moreover, local aquarium dealers have used its local moniker that a janitor fish cleans up - as a selling point, wherein anecdotal reports say that the misconception might have also be a reason for the high incidence of these specimens particularly in the Marikina and Pasia rivers | 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 | Loricariidae species are seen proliferating in the waters of Marikina River, Lake Paitan, Nueva Ecija & Laguna de Bay (Agasen, 2005 & Chavez et al., 2006) Because of the damage to the banks of the Marikina River and fish cages in Laguna de Bay by the catfish, they have escaped into the natural waters (Joshi. | Very high |
| | Invasive | e elsewhere | | | |
| 9 | 3.01 | Has the taxon become naturalised (established viable populations) outside its native range? | Yes | Redescription of Acanthicus hystrix Agassiz, 1829 (Siluriformes: Loricariidae), with comments on the systematics and distribution of the genus | High |
| 10 | 3.02 | In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? | Yes | The rapid increase of this species (Suliriformes) has affected the livelihood and fishing operation of the fisherfolk which led to a decrease in marketable catch of endemic and commercial fish species due to its predominance in gill net and fish corral catch. (Chaves et al., 2006) | Very high |
| 11 | 3.03 | In the taxon's introduced range, are there known adverse impacts to aquaculture? | Yes | Based on the findings of the study, the Suliriformes in the Agusan Marsh are considered threat to freshwater biodiversity. (Hubilla et al., 2006) | Very high |
| | 3.04 | In the taxon's introduced range, are there known adverse impacts to ecosystem | Yes | Their burrowing behavior in river banks may contribute to water turbidity and soil erosion (FishBase 2021) | High |
| | 3.05 | In the taxon's introduced range, are there known adverse socio-economic impacts? //Ecology | Yes | Their burrowing behavior in river banks may contribute to water turbidity and soil erosion (FishBase 2021) | Very high |
| | | able (or persistence) traits | | | |
| 14 | 4.01 | Is it likely that the taxon will be poisonous or pose other risks to human health? | Yes | Bioaccumulation of coliform bacteria and heavy metals, as well as vector of parasites, has been recorded on these species. In which if eaten will lead to potential contamination and infection (Orfinger & Goodding, 2018). | Very high |
| 15 | 4.02 | Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? | Yes | This species shows impacts on displacement of local species through resource competition such as indirect food competition which reduces the food resources like aquatic insects and vegetation and direct habitat competition because of high biomass of their populations (Orfinger & Goodding, 2018). | Very high |

| 16 | 4.03 | Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? | No | This is very unlikely to happen considering the feeding guild and morphology of the taxon (Hubilla et al., 2007; Levin et al., 2008). | 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 | These fish are protected by modified scales and by strong spines on the fins and because they show a high tolerance to low oxygen concentrations or desiccation (up to 20 hours). The latter ability can be attributed to an enlarged and vascularized stomach, which functions as an accessory respiratory organ (Jasso et al., 2013). Also, they are commonly found in shallow freshwater environments, but some members of the Family Loricariidae: Pterygoplichthys which are considered to be strictly freshwater, have already established invasive populations in inland waters with mesohaline conditions, such as in North and Central America, Asia, Caribbean islands, Pacific and Indian oceans and in South- Eastern Mexico due to their high salinity tolerance (Canps et al. | Very high |
| 18 | 4.05 | Is the taxon likely to disrupt food-web | Yes | Their burrowing behavior in river banks may contribute to water | Very high |
| | | structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA area? | | turbidity and soil erosion. High water turbidity alters the amount of light that can pass down through the water column, and thus, slows down photosynthesis ad primary productivity. (Hubilla et | |
| 19 | 4.06 | Is the taxon likely to exert adverse impacts | Yes | Their burrowing behavior in river banks may contribute to water | Very 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 | Not applicable | turbidity and soil erosion (Hubilla et al., 2006) No record found that the species can be a host of infectious disease. | High |
| 21 | 4.08 | infectious agents that are endemic in the RA Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area? | Not applicable | No record found that the species can be a host of infectious disease. | High |
| 22 | 4.09 | Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity? | Yes | From Froese and Pauly (2015): "Max length: 20.6 cm SL male/unsexed; [Fisch-Muller 2003]" | Very high |
| 23 | 4.10 | Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)? | Yes | The taxon was collected from medium-velocity rivers no more than two meters deep near the river banks (Chavez, et al., 2006) | 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 | The foraging activities of different-sized Pterygoplichthys had potentially strong negative effects on the number of catfish eggs and first-feeding fry. Therefore, these invasive alien fish pose a risk to the native aquatic resources [of Thailand] (Chaichana et al., 2013) Pterygoplichthys species are also generally herbivores, and large populations can significantly alter the energy budget of a water body by reducing the amount of energy available to other herbivores, such as aquatic insects and other arthropods (Kottelat et al 1993); Fuller 1998; Nico and Martin 2001). Reductions in the population of the arthropods will lead to reduced populations of other animals that feed on arthropods (Inger and Chin 2002: Page | 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)? | Not applicable | No reports found | High |
| | <i>esourc</i> 5.01 | e exploitation Is the taxon likely to consume threatened or | No | This taxon feeds primarily on benthic algae, detritus, various plant | Very high |
| 20 | 5.01 | protected native taxa in the RA area? | | matter, worms, insect larvae, fish eggs and other bottom-dwellers which do not fall under threatened or protected status in the RA area. (IUCN, 2010) | very nigh |
| 27 | 5.02 | Is the taxon likely to sequester food resources (including nutrients) to the | Yes | Food competition by the said taxa, in which it reduces the food resources such as aquatic insects and vegetation in the area, can | High |
| 6. R | eprodu | detriment of native taxa in the RA area? | l | be detrimental to the native taxa (Orfinger & Goodding, 2018). | |
| 28 | 6.01 | Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? | Yes | This species exhibits parental care through building nests, given that their found habitat lacks predator and exploitation (Jasso et al., 2013). | Very high |
| 29 | 6.02 | Is the taxon likely to produce viable gametes or propagules (in the RA area)? | No | Apparently a cave spawner with the male responsible for guarding and tending the eggs. Has been achieved but little information is | High |
| | 6.03 | Is the taxon likely to by bridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to | No | Apparently a cave spawner with the male responsible for guarding and tending the eggs. Has been achieved but little information is | High |
| ı | 6.04 | Is the taxon likely to be hermaphroditic or to display asexual reproduction? | No | Apparently a cave spawner with the male responsible for guarding and tending the eggs. Has been achieved but little information is | High |
| 32 | 6.05 | Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? | No | Apparently a cave spawner with the male responsible for guarding and tending the eggs. Has been achieved but little information is available. | 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 | breeding guide plecostomus/number of minimum eggs | High |
| 34 | 6.07 | How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? | 1 | janotor fish propagation/plecostomus prpgatoion | High |
| | | al mechanisms | 1 | | |
| | | How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable | >1 | The RA Area has a lot of reported tributarries that can be a way of dispersal (Papa & Mamaril, 2011) | Very high |
| 36 | 7.02 | Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? | Yes | The RA Area has a lot of reported tributarries that can be a way of dispersal (Papa & Mamaril, 2011) | Very 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? | Not applicable | No reports found | 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 | Apparently a cave spawner with the male responsible for guarding and tending the eggs. Has been achieved but little information is available. | 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 | book-paper/after hatching they disperse/after consumiing the egg youl the young swim away/disperse | High |
| 0 | 7.06 | Are older life stages of the taxon likely to migrate in the RA area for reproduction? | No | Apparently a cave spawner with the male responsible for guarding and tending the eggs. Has been achieved but little information is | High |
| 1 | 7.07 | Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? | No | Apparently a cave spawner with the male responsible for guarding and tending the eggs. Has been achieved but little information is | 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. either unintentional or intentional) likely to be | Yes | Base on the previous questions | High |
| 3 | 7.09 | Is dispersal of the taxon density dependent? | Yes | Apparently a cave spawner with the male responsible for guarding and tending the eggs. Has been achieved but little information is | High |
| . Т | oleran | ce attributes | | and tending the eggs. has been achieved but little information is | |
| 4 | 8.01 | Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? | No | life history/density dependent | High |
| | 8.02 | Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being considered.] | Yes | Members of this taxon also have the ability to breathe air and are able to survive up to 30 h out of water (Val and De Almeida-Val, 1995). Pterygoplichthys and many other loricariids are facultative air-breathers, able to persist indefinitely in hypoxic conditions and even able to survive out of water for many hours (Graham, 1997) | Very high |
| 6 | 8.03 | Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? | Yes | The taxon's native range (Amazon) falls under the same climatic conditions in the Philippines which is a tropical climate Froese and Pauly (2015) | Very high |
| | 8.04 | Is the taxon likely to tolerate or benefit from environmental/human disturbance? | Yes | A preliminary study of the potential eradication of P. pardalis by three native Thai piscivorous species yielded interesting results. Demersal species such as H. wyckioides and O. marmorata could more effectively eliminate P. pardalis than other native species such as P. sanitwongsei. In particular, H. wyckioides was the most effective consumer of P. pardalis, as it could efficiently ingest individuals up to 10 cm in length. Pterygoplichthys pardalis longer than 10 cm can stretch out their body fins, preventing H. wyckioides from feeding on them. The potential of native fish to help control certain invasive fish species was also addressed by | Very high |
| 8 | 8.05 | Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment? | Yes | eutrophication/tolrence depite pollution | Medium |
| 9 | 8.06 | Are there effective natural enemies (predators) of the taxon present in the RA | Not applicable | No recorded predators found in the RA Area | Medium |
| | | e change | | | |
| | | change | T | |) (and bigh |
| 0 | 9.01 | Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? | Increase | Yes with the rapid change on water parameters of the RA Area (Papa et al. 2009) | Very high |
| 1 | 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 | Lake Taal is close but completely isolated from Laguna de Bay and other rivers in Luzon Island where Pterygoplichthys spp. were recorded and thus may only require accidental and/or intentional vectors of introduction. As such, climate change (natural introduction) will have very little to no contributions to the introduction of such non-native fish species in Lake Taal. | High |
| | 9.03 | Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? | Increase | Yes with the rapid change on water parameters of the RA Area (Papa & Mamaril, 2011) | Very high |
| 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 | Yes with the rapid change on water parameters of the RA Area (Papa & Mamaril, 2011) | Very high |
| 4 | 9.05 | Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? | Higher | Yes with the rapid change on water parameters of the RA Area (Papa & Mamaril, 2011) | Very high |
| 5 | 9.06 | Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors? | Higher | Yes with the rapid change on water parameters of the RA Area (Papa & Mamaril, 2011) | Very high |

| Statistics | |
|-----------------|------|
| Scores | |
| BRA | 45.0 |
| BRA Outcome | High |
| BRA+CCA | 57.0 |
| BRA+CCA Outcome | High |
| Score partition | |

| A. Biogeography/Historical | 25.0 |
|--|------------------|
| 1. Domestication/Cultivation | 4.0 |
| 2. Climate, distribution and introduction risk | 3.0 |
| 3. Invasive elsewhere | 18.0 |
| B. Biology/Ecology | 20.0 |
| 4. Undesirable (or persistence) traits | 8.0 |
| 5. Resource exploitation | 2.0 |
| 6. Reproduction | 2.0 |
| 7. Dispersal mechanisms | 4.0 |
| 8. Tolerance attributes | 4.0 |
| C. Climate change | 12.0 |
| 9. Climate change | 12.0 |
| Answered Questions | |
| Total | 55 |
| A. Biogeography/Historical | 13 |
| 1. Domestication/Cultivation | 3 |
| 2. Climate, distribution and introduction risk | 5 5 |
| 3. Invasive elsewhere | |
| B. Biology/Ecology | 36 |
| 4. Undesirable (or persistence) traits | 12 |
| 5. Resource exploitation | 2 7 9 6 |
| 6. Reproduction | 7 |
| 7. Dispersal mechanisms | 9 |
| 8. Tolerance attributes | 6 |
| C. Climate change | 6 |
| 9. Climate change | 6 |
| Sectors affected | |
| Commercial | 22 |
| Environmental | 12 |
| Species or population nuisance traits | 29 |
| | |
| Thresholds | |
| BRA | 34.5 |
| BRA+CCA | 34.5 |
| Confidence | |
| BRA+CCA | 0.87 |
| BRA | 0.86 |
| CCA | 0.96 |

Date and Time 06/04/2020 13:27:58

| Taxon and Assessor details | |
|------------------------------------|--|
| Category | Fishes and Lampreys (freshwater) |
| Taxon name | Amphilophus citrinellus |
| Common name | Midas cichlid |
| Assessor | Gilles |
| Risk screening context | |
| Reason and socio-economic benefits | Aquaculture and ornamental |
| Risk assessment area | Lake Taal |
| Taxonomy | Actinopteri > Cichliformes > Cichlidae |
| Native range | Tropical America |
| Introduced range | South east asia includimg Philippines |
| URL | |

| | | | Response | Justification (references and/or other information) | Confidence |
|------|----------|---|----------|--|--|
| | | graphy/Historical | | | |
| | | ication/Cultivation | | | 1 |
| 1 | 1.01 | Has the taxon been the subject of | No | The species is recently reported in Lake Taal and other inland | High |
| | | domestication (or cultivation) for at least 20 | | bodies of water in the Philippines (Poniente et al, 2019; Aquilino | |
| 2 | 1.02 | generations? | | et al, 2011) | l l'ala |
| 2 | 1.02 | Is the taxon harvested in the wild and likely | Yes | Introduced by the aquarium trade industry, the species escaped | High |
| 3 | 1.03 | to be sold or used in its live form? Does the taxon have invasive races, | Yes | into the natural waters(Nico et al. 2007) The "black-chinned tilapia" Sarotherodon melanotheron, a native | Very high |
| 5 | 1.05 | varieties, sub-taxa or congeners? | 165 | species in Africa, was reported to be competing for food and space | very nigh |
| | | | | of cultured stocks in the Laguna de Bay (Aquino et al. 2011) and | |
| | | | | in the brackish fishponds of Bulacan (Ordoñez et al. 2015; Chavez | |
| | | | | 2013; Cervantes 2013). | |
| 2. (| Climate, | , distribution and introduction risk | | | |
| 4 | 2.01 | How similar are the climatic conditions of the | High | The species is native to Tropical America (Poniente 2019) | Very high |
| | | Risk Assessment (RA) area and the taxon's | | | |
| | | native range? | | | |
| 5 | 2.02 | What is the quality of the climate matching | High | The species is native to tropical america that have the same | Very high |
| | | data? | | climatic condition in the Philippines (Poniente et al. 2019) | |
| 6 | 2.03 | Is the taxon already present outside of | Yes | Aside from the RA area the species is already present in other | Very high |
| | | captivity in the RA area? | | inland water in Philippines example is Laguna de bay (poniente et | |
| 7 | 2.04 | How many potential vectors could the taxon | >1 | The species is already present in other nearby lakes (Poniente et | Very high |
| | | use to enter in the RA area? | | al. 2019) Introduced by the aquarium trade industry, the species | |
| _ | 2.65 | | X | escaped into the natural waters (Nico et al. 2007). | |
| 8 | 2.05 | Is the taxon currently found in close | Yes | Introduced by the aquarium trade industry, the species escaped | Very high |
| | | proximity to, and likely to enter into, the RA | | into the natural waters(Nico et al. 2007) and its already present in | |
| | | area in the near future (e.g. unintentional | | Laguna de bay the largest lake in Phillipines (Poniente et al. 2019) | |
| 3 1 | nyaciya | and intentional introductions)? | | | |
| | | Has the taxon become naturalised | Yes | Reports shows the the species already estblished in South east | Very high |
| 2 | 5.01 | (established viable populations) outside its | | asia including Philippines. (Adriyono et al 2021; Poniente et al. | ici, ingli |
| 10 | 3.02 | In the taxon's introduced range, are there | Yes | The "black-chinned tilapia" Sarotherodon melanotheron, a native | Very high |
| | | known adverse impacts to wild stocks or | | species in Africa, was reported to be competing for food and space | -, 5 |
| | | commercial taxa? | | of cultured stocks in the Laguna de Bay (Aquino et al. 2011) and | |
| | | | | in the brackish fishponds of Bulacan (Ordoñez et al. 2015; Chavez | |
| | | | | 2013; Cervantes 2013). | |
| 11 | 3.03 | In the taxon's introduced range, are there | Yes | The "black-chinned tilapia" a native species in Africa, was reported | Very high |
| | | known adverse impacts to aquaculture? | | to be competing for food and space of cultured stocks in the | |
| | | | | Laguna de Bay (Aquino et al. 2011) and in the brackish fishponds | |
| | | | | of Bulacan (Ordoñez et al. 2015; Chavez 2013; Cervantes 2013). | |
| 12 | 3.04 | In the taxon's introduced range, are there | No | No reports | Medium |
| 1 2 | 2.05 | known adverse impacts to ecosystem | ¥ | | 11: |
| 13 | 3.05 | In the taxon's introduced range, are there | Yes | The "black-chinned tilapia", a native species in Africa, was | High |
| | | known adverse socio-economic impacts? | | reported to be competing for food and space of cultured stocks in | |
| | | | | the Laguna de Bay (Aquino et al. 2011) and in the brackish | |
| B | Biology | //Ecology | | fishponds of Bulacan (Ordoñez et al. 2015; Chavez 2013; | |
| | | able (or persistence) traits | | | |
| | | Is it likely that the taxon will be poisonous or | No | No, these fish are not dangerous to humans, but their aggressive | Very high |
| | | pose other risks to human health? | | nature might be harmful to other smaller fish species that are | |
| | | | | residents of the same aquarium. (FishBase) | |
| 15 | 4.02 | Is it likely that the taxon will smother one or | Yes | They are mostly found in lakes, omnivorous, eating mostly snails | High |
| | | more native taxa (that are not threatened or | | and small fishes; also feeds on insect larvae, worms, and other | |
| | | protected)? | | bottom-dwelling organisms (Yamamoto and Tagawa 2000). | |
| 16 | 4.03 | Are there any threatened or protected taxa | Yes | They are mostly found in lakes, omnivorous, eating mostly snails | Very high |
| | | that the non-native taxon would parasitise in | | and small fishes; also feeds on insect larvae, worms, and other | |
| | | the RA area? | | bottom-dwelling organisms (Yamamoto and Tagawa 2000). the RA | |
| 4 - | 4.6.1 | | | area is home of endemic and native species. | |
| 17 | 4.04 | Is the taxon adaptable in terms of climatic | Yes | This cichlid is a native of Central America, particularly in | Very high |
| | | and other environmental conditions, thus | | Nicaragua and Costa Rica Freshwater; benthopelagic. Tropical; | |
| | | enhancing its potential persistence if it has | | 23°C - 33°C (Ref. 7335); 15°N - 8°N | |
| 10 | 4.05 | invaded or could invade the RA area? Is the taxon likely to disrupt food-web | Yes | They are mostly found in lakes, omnivorous, eating mostly snails | Very high |
| 10 | 4.05 | structure/function in aquatic ecosystems if it | 165 | and small fishes; also feeds on insect larvae, worms, and other | very mgn |
| | | has invaded or is likely to invade the RA | | bottom-dwelling organisms (Yamamoto and Tagawa 2000). the RA | |
| | | area? | | area is home of endemic and native species. | |
| 19 | 4.06 | Is the taxon likely to exert adverse impacts | Yes | They are mostly found in lakes, omnivorous, eating mostly snails | Very high |
| 1 | 1.50 | on ecosystem services in the RA area? | | and small fishes; also feeds on insect larvae, worms, and other | - c, , , , , , , , , , , , , , , , , , , |
| | | | | bottom-dwelling organisms (Yamamoto and Tagawa 2000). the RA | |
| | | | | area is home of endemic and native species. | |
| L | I | 1 | 1 | | 1 |

| 20 | 4.07 | Is it likely that the taxon will host, and/or | Not applicable | no record found. | Low |
|----|--------------|---|----------------|---|-------------|
| 20 | 4.07 | act as a vector for, recognised pests and | | | LOW |
| 1 | 4.08 | infectious agents that are endemic in the RA Is it likely that the taxon will host, and/or | No | They are mostly found in lakes, omnivorous, eating mostly snails | High |
| - | 4.00 | act as a vector for, recognised pests and | NO | and small fishes; also feeds on insect larvae, worms, and other | ingn |
| | | infectious agents that are absent from (novel | | bottom-dwelling organisms (Yamamoto and Tagawa 2000). the RA | |
| | | to) the RA area? | | area is home of endemic and native species. | |
| 2 | 4.09 | Is it likely that the taxon will achieve a body | Yes | t al. 2015; Chavez 2013; Cervantes 2013). Midas cichlid, | Very high |
| | | size that will make it more likely to be | | Amphilophus citrinellus, a freshwater and benthopelagic fish, has | , <u>g</u> |
| | | released from captivity? | | been reported to have a maximum length of 24.4 cm. According | |
| 3 | 4.10 | Is the taxon capable of sustaining itself in a | No | Freshwater; benthopelagic. Tropical; 23°C - 33°C (Ref. 7335); | High |
| | | range of water velocity conditions (e.g. | | 15°N - 8°N Fishbase | 5 |
| | | versatile in habitat use)? | | | |
| 4 | 4.11 | Is it likely that the taxon's mode of existence | Yes | They are mostly found in lakes, omnivorous, eating mostly snails | Very high |
| | | (e.g. excretion of by-products) or behaviours | | and small fishes; also feeds on insect larvae, worms, and other | ., 5 |
| | | (e.g. feeding) will reduce habitat quality for | | bottom-dwelling organisms (Yamamoto and Tagawa 2000). the RA | |
| | | native taxa? | | area is home of endemic and native species. | |
| 5 | 4.12 | Is the taxon likely to maintain a viable | Yes | Spawn preferentially on the ceiling of natural caves (Ref. 38966). | Very high |
| | | population even when present in low | | Deposit eggs on hard substrates, such as rocks or logs; both | |
| | | densities (or persisting in adverse conditions | | parents guarding the eggs and the fry for several weeks (Ref. | |
| | | by way of a dormant form)? | | 44091). 300-1000 eggs (Ref. 2060). FishBase | |
| | | ce exploitation | | | |
| 6 | 5.01 | Is the taxon likely to consume threatened or | Yes | They are mostly found in lakes, omnivorous, eating mostly snails | Very high |
| | | protected native taxa in the RA area? | | and small fishes; also feeds on insect larvae, worms, and other | |
| | | | | bottom-dwelling organisms (Yamamoto and Tagawa 2000). the RA | |
| | | | | area is home of endemic and native species. | |
| 7 | 5.02 | Is the taxon likely to sequester food | Yes | They are mostly found in lakes, omnivorous, eating mostly snails | Very high |
| | | resources (including nutrients) to the | | and small fishes; also feeds on insect larvae, worms, and other | |
| | | detriment of native taxa in the RA area? | | bottom-dwelling organisms (Yamamoto and Tagawa 2000). the RA | |
| _ | | | | area is home of endemic and native species. | |
| | Reprodu | | | | h |
| 8 | 6.01 | Is the taxon likely to exhibit parental care | Yes | Spawn preferentially on the ceiling of natural caves (Ref. 38966). | Very high |
| | | and/or to reduce age-at-maturity in response | | Deposit eggs on hard substrates, such as rocks or logs; both | 1 |
| | | to environmental conditions? | | parents guarding the eggs and the fry for several weeks (Ref. | |
| _ | 6.00 | • • • • • • • • • • • • • • • • • • • | 24 | 44091). 300-1000 eggs (Ref. 2060). FishBase | 1.1 |
| 9 | 6.02 | Is the taxon likely to produce viable gametes | Yes | Spawn preferentially on the ceiling of natural caves (Ref. 38966). | Very high |
| | | or propagules (in the RA area)? | | Deposit eggs on hard substrates, such as rocks or logs; both | |
| | | | | parents guarding the eggs and the fry for several weeks (Ref. | 1 |
| 0 | 6.02 | Is the taxon likely to hybridian actionally and | No | 44091). 300-1000 eggs (Ref. 2060). FishBase | Vor hi |
| U | 6.03 | Is the taxon likely to hybridise naturally with | No | Spawn preferentially on the ceiling of natural caves (Ref. 38966). | Very high |
| | | native taxa? | | Deposit eggs on hard substrates, such as rocks or logs; both | |
| | | | | parents guarding the eggs and the fry for several weeks (Ref. | |
| 1 | 6.04 | To the tayon likely to be becaused at the | No | 44091). 300-1000 eggs (Ref. 2060). FishBase | Vondetel |
| 51 | 6.04 | Is the taxon likely to be hermaphroditic or to | No | Spawn preferentially on the ceiling of natural caves (Ref. 38966). | Very high |
| | | display asexual reproduction? | | Deposit eggs on hard substrates, such as rocks or logs; both | |
| | | | | parents guarding the eggs and the fry for several weeks (Ref. | |
| 2 | 6.05 | Is the tayon dependent on the presence of | Yes | 44091). 300-1000 eggs (Ref. 2060). FishBase Spawn preferentially on the ceiling of natural caves (Ref. 38966). | Von bist |
| 2 | 0.05 | Is the taxon dependent on the presence of | 105 | | Very high |
| | | another taxon (or specific habitat features) | | Deposit eggs on hard substrates, such as rocks or logs; both | 1 |
| | | to complete its life cycle? | | parents guarding the eggs and the fry for several weeks (Ref. | |
| 2 | 6.06 | Is the taxon known (or likely) to produce a | Yes | 44091). 300-1000 eggs (Ref. 2060). FishBase Spawn preferentially on the ceiling of natural caves (Ref. 38966). | Vony bigh |
| د | 0.00 | Is the taxon known (or likely) to produce a | 105 | | Very high |
| | | large number of propagules or offspring | | Deposit eggs on hard substrates, such as rocks or logs; both | |
| | | within a short time span (e.g. < 1 year)? | | parents guarding the eggs and the fry for several weeks (Ref. | |
| Λ | 6.07 | How many time units (days months years) | 1 | 44091). 300-1000 eggs (Ref. 2060). FishBase They are sexually mature at 6 to 7". fishbase | High |
| 4 | 0.07 | How many time units (days, months, years) | 4 | They are sexually mature at 0 to 7. IISIDASE | High |
| | | does the taxon require to reach the age-at- | | | 1 |
| | Disperc | first-reproduction? | | | I |
| | | How many potential internal | >1 | The species is already present in other nearby lakes (Poniente et | High |
| J | .01 | vectors/pathways could the taxon use to | - 1 | al. 2019) Introduced by the aquarium trade industry, the species | , iigii |
| | | disperse within the RA area (with suitable | | escaped into the natural waters (Nico et al. 2007). | 1 |
| 6 | 7.02 | Will any of these vectors/pathways bring the | Yes | The species is already present in other nearby lakes (Poniente et | Very high |
| 5 | 1.52 | taxon in close proximity to one or more | | al. 2019) Introduced by the aquarium trade industry, the species | , ci, ingit |
| | | protected areas (e.g. MCZ, MPA, SSSI)? | | escaped into the natural waters (Nico et al. 2007). | |
| 7 | 7.03 | Does the taxon have a means of actively | Yes | Spawn preferentially on the ceiling of natural caves (Ref. 38966). | High |
| ' | , | attaching itself to hard substrata (e.g. ship | | Deposit eggs on hard substrates, such as rocks or logs; both | |
| | | hulls, pilings, buoys) such that it enhances | | parents guarding the eggs and the fry for several weeks (Ref. | |
| | | the likelihood of dispersal? | | 44091), 300-1000 eggs (Ref. 2060), FishBase | |
| 8 | 7.04 | Is natural dispersal of the taxon likely to | Yes | Spawn preferentially on the ceiling of natural caves (Ref. 38966). | Very high |
| 2 | | occur as eggs (for animals) or as propagules | | Deposit eggs on hard substrates, such as rocks or logs; both | . c. , mgn |
| | | (for plants: seeds, spores) in the RA area? | | parents guarding the eggs and the fry for several weeks (Ref. | |
| | | (| | 44091). 300-1000 eggs (Ref. 2060). FishBase | |
| 9 | 7.05 | Is natural dispersal of the taxon likely to | Yes | Spawn preferentially on the ceiling of natural caves (Ref. 38966). | Very high |
| 1 | | occur as larvae/juveniles (for animals) or as | | Deposit eggs on hard substrates, such as rocks or logs; both | . c. , mgn |
| | | fragments/seedlings (for plants) in the RA | | parents guarding the eggs and the fry for several weeks (Ref. | |
| | i. | area? | | 44091). 300-1000 eggs (Ref. 2060). FishBase | |
| | | IN CO. | Net eveloped | | Low |
| 0 | 7.06 | Are older life stages of the taxon likely to | Nor annucanio | | -011 |
| 0 | 7.06 | Are older life stages of the taxon likely to migrate in the BA area for reproduction? | Not applicable | | |
| | | migrate in the RA area for reproduction? | | | Hiah |
| | 7.06 7.07 | migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to | No | Spawn preferentially on the ceiling of natural caves (Ref. 38966). | High |
| | | migrate in the RA area for reproduction? | No | | High |

| 42 | 7.08 | Is dispersal of the taxon along any of the | Yes | Spawn preferentially on the ceiling of natural caves (Ref. 38966). | High |
|----------------|----------|---|----------------|---|-----------|
| | | vectors/pathways mentioned in the previous | | Deposit eggs on hard substrates, such as rocks or logs; both | |
| | | seven questions (35-41; i.e. either | | parents guarding the eggs and the fry for several weeks (Ref. | |
| | | unintentional or intentional) likely to be | | 44091). 300-1000 eggs (Ref. 2060). FishBase | |
| | 7.09 | Is dispersal of the taxon density dependent? | Not applicable | do available literature foe this | Low |
| | | ice attributes | La l | | N/ 1 · 1 |
| 14 | 8.01 | Is the taxon able to withstand being out of | No | Midas cichlid, Amphilophus citrinellus, a freshwater and | Very high |
| | | water for extended periods (e.g. minimum of | | benthopelagic fish, has been reported to have a maximum length | |
| | | one or more hours) at some stage of its life | | of 24.4 cm. According to Conkel (1993), the species coloration is | |
| | | cycle? | | mostly bright orange to orange-red in adults; mature males are | |
| | | | | larger, with longer fins, and with a distinct hump on their heads. | |
| | | | | They are mostly found in lakes, omnivorous, eating mostly snails | |
| | | | | and small fishes; also feeds on insect larvae, worms, and other | |
| | | | | bottom-dwelling organisms (Yamamoto and Tagawa 2000). This | |
| | | | | cichlid is a native of Central America, particularly in Nicaragua and | |
| | | | | Costa Rica. Introduced by the aquarium trade industry, the | |
| | | | | species escaped into the natural waters (Nico et al. 2007). | |
| 15 | 8.02 | Is the taxon tolerant of a wide range of | Yes | Freshwater; benthopelagic. Tropical; 23°C - 33°C (Ref. 7335); | High |
| | | water quality conditions relevant to that | | 15°N - 8°N | |
| | | taxon? [In the Justification field, indicate the | | | |
| | <u> </u> | relevant water quality variable(s) being | | | |
| 16 | 8.03 | Can the taxon be controlled or eradicated in | No | There are no reports the the species are being eradicated in the | Medium |
| | | the wild with chemical, biological, or other | | wilds by any chemicals | |
| | + | agents/means? | | | |
| ، 7 | 8.04 | Is the taxon likely to tolerate or benefit from | Yes | Lives in box-cut canals with rocky vertical sides, crevices used for | High |
| | | environmental/human disturbance? | | spawning and protection of the young (Ref. 5723). Found in lakes; | |
| | 1 | | | uncommon in the rivers but will penetrate the lower river valleys | |
| | | | | where the water is slow flowing or tranquil (Ref. 7335). | |
| | | | | Omnivorous, eating mostly aufwuchs, snails and small fishes (Ref. | |
| | | | | 7335); also feeds on insect larvae, worms and other bottom- | |
| | | | | dwelling organisms (Ref. 44091). Majority of this fish has normal | |
| | | | | cryptic coloration (black, gray or brown), matching the substrate | |
| | | | | for camouflage and survival purposes. About 10 % of this species | |
| | | | | is xanthomorphic, undergoing a color metamorphosis at varying | |
| | | | | stages of growth (Ref. 7335). An experimental fish being used for | |
| 8 | 8.05 | Is the taxon able to tolerate salinity levels | No | Lives in box-cut canals with rocky vertical sides, crevices used for | Very high |
| | | that are higher or lower than those found in | | spawning and protection of the young (Ref. 5723). Found in lakes; | |
| | | its usual environment? | | uncommon in the rivers but will penetrate the lower river valleys | |
| | | | | where the water is slow flowing or tranquil (Ref. 7335). | |
| | | | | Omnivorous, eating mostly aufwuchs, snails and small fishes (Ref. | |
| | | | | 7335); also feeds on insect larvae, worms and other bottom- | |
| | | | | dwelling organisms (Ref. 44091). Majority of this fish has normal | |
| | | | | cryptic coloration (black, gray or brown), matching the substrate | |
| | | | | for camouflage and survival purposes. About 10 % of this species | |
| | | | | is xanthomorphic, undergoing a color metamorphosis at varying | |
| | <u> </u> | | | stages of growth (Ref. 7335). An experimental fish being used for | |
| 9 | 8.06 | Are there effective natural enemies | Yes | The "black-chinned tilapia" Sarotherodon melanotheron, a native | High |
| | | (predators) of the taxon present in the RA | | species in Africa, was reported to be competing for food and space | |
| | | area? | | of cultured stocks in the Laguna de Bay (Aquino et al. 2011) and | |
| | | | | in the brackish fishponds of Bulacan (Ordoñez et al. 2015; Chavez | |
| _ | | | | 2013; Cervantes 2013). | |
| | | e change | | | |
| | | change | In eren | Midaa ajahlid Amphilaphua aityin luur - furshuustay and | Lliab |
| U | 9.01 | Under the predicted future climatic | Increase | Midas cichlid, Amphilophus citrinellus, a freshwater and | High |
| | | conditions, are the risks of entry into the RA | | benthopelagic fish, has been reported to have a maximum length | |
| | | area posed by the taxon likely to increase, | | of 24.4 cm. According to Conkel (1993), the species coloration is | |
| | | decrease or not change? | | mostly bright orange to orange-red in adults; mature males are | |
| | | | | larger, with longer fins, and with a distinct hump on their heads. | |
| | | | | They are mostly found in lakes, omnivorous, eating mostly snails | |
| | 1 | | | and small fishes; also feeds on insect larvae, worms, and other | |
| | | | | bottom-dwelling organisms (Yamamoto and Tagawa 2000). This | |
| | | | | cichlid is a native of Central America, particularly in Nicaragua and | |
| | | | | Costa Rica. Introduced by the aquarium trade industry, the | |
| | | | | species escaped into the natural waters (Nico et al. 2007). | High |
| 1 | 0.02 | Under the predicted future elimetic | Incroace | Lives in box-cut canals with rocky vertical sides, crevices used for | High |
| 51 | 9.02 | Under the predicted future climatic | Increase | annuming and protection of the volume (Def. 5722). Source 11 | |
| 51 | 9.02 | conditions, are the risks of establishment | Increase | spawning and protection of the young (Ref. 5723). Found in lakes; | |
| 51 | 9.02 | conditions, are the risks of establishment posed by the taxon likely to increase, | Increase | uncommon in the rivers but will penetrate the lower river valleys | |
| 51 | 9.02 | conditions, are the risks of establishment | Increase | uncommon in the rivers but will penetrate the lower river valleys where the water is slow flowing or tranquil (Ref. 7335). | |
| 1 | 9.02 | conditions, are the risks of establishment posed by the taxon likely to increase, | Increase | uncommon in the rivers but will penetrate the lower river valleys where the water is slow flowing or tranquil (Ref. 7335). Omnivorous, eating mostly aufwuchs, snails and small fishes (Ref. | |
| 1 | 9.02 | conditions, are the risks of establishment posed by the taxon likely to increase, | Increase | uncommon in the rivers but will penetrate the lower river valleys where the water is slow flowing or tranquil (Ref. 7335). Omnivorous, eating mostly aufwuchs, snails and small fishes (Ref. 7335); also feeds on insect larvae, worms and other bottom- | |
| 1 | 9.02 | conditions, are the risks of establishment posed by the taxon likely to increase, | Increase | uncommon in the rivers but will penetrate the lower river valleys where the water is slow flowing or tranquil (Ref. 7335). Omnivorous, eating mostly aufwuchs, snails and small fishes (Ref. 7335); also feeds on insect larvae, worms and other bottom- dwelling organisms (Ref. 44091). Majority of this fish has normal | |
| 1 | 9.02 | conditions, are the risks of establishment posed by the taxon likely to increase, | Increase | uncommon in the rivers but will penetrate the lower river valleys where the water is slow flowing or tranquil (Ref. 7335). Omnivorous, eating mostly aufwuchs, snails and small fishes (Ref. 7335); also feeds on insect larvae, worms and other bottom- dwelling organisms (Ref. 44091). Majority of this fish has normal cryptic coloration (black, gray or brown), matching the substrate | |
| 1 | 9.02 | conditions, are the risks of establishment posed by the taxon likely to increase, | Increase | uncommon in the rivers but will penetrate the lower river valleys where the water is slow flowing or tranquil (Ref. 7335). Omnivorous, eating mostly aufwuchs, snails and small fishes (Ref. 7335); also feeds on insect larvae, worms and other bottom- dwelling organisms (Ref. 44091). Majority of this fish has normal cryptic coloration (black, gray or brown), matching the substrate for camouflage and survival purposes. About 10 % of this species | |
| 1 | 9.02 | conditions, are the risks of establishment posed by the taxon likely to increase, | Increase | uncommon in the rivers but will penetrate the lower river valleys where the water is slow flowing or tranquil (Ref. 7335). Omnivorous, eating mostly aufwuchs, snails and small fishes (Ref. 7335); also feeds on insect larvae, worms and other bottom- dwelling organisms (Ref. 44091). Majority of this fish has normal cryptic coloration (black, gray or brown), matching the substrate | |

| 52 | 9.03 | Under the predicted future climatic | Increase | Lives in box-cut canals with rocky vertical sides, crevices used for | High |
|-----|------|---|----------|---|--------|
| 52 | 9.03 | conditions, are the risks of dispersal within | Increase | spawning and protection of the young (Ref. 5723). Found in lakes; | riigil |
| | | the RA area posed by the taxon likely to | | uncommon in the rivers but will penetrate the lower river valleys | |
| | | increase, decrease or not change? | | where the water is slow flowing or tranguil (Ref. 7335). | |
| | | increase, decrease of not change? | | 5 1 () | |
| | | | | Omnivorous, eating mostly aufwuchs, snails and small fishes (Ref. | |
| | | | | 7335); also feeds on insect larvae, worms and other bottom- | |
| | | | | dwelling organisms (Ref. 44091). Majority of this fish has normal | |
| | | | | cryptic coloration (black, gray or brown), matching the substrate | |
| | | | | for camouflage and survival purposes. About 10 % of this species | |
| | | | | is xanthomorphic, undergoing a color metamorphosis at varying | |
| 52 | 9.04 | Under the predicted future climatic | Higher | stages of growth (Ref. 7335). An experimental fish being used for Lives in box-cut canals with rocky vertical sides, crevices used for | High |
| 55 | 9.04 | conditions, what is the likely magnitude of | riighei | spawning and protection of the young (Ref. 5723). Found in lakes; | riigii |
| | | | | | |
| | | future potential impacts on biodiversity | | uncommon in the rivers but will penetrate the lower river valleys | |
| | | and/or ecological integrity/status? | | where the water is slow flowing or tranquil (Ref. 7335). | |
| | | | | Omnivorous, eating mostly aufwuchs, snails and small fishes (Ref. | |
| | | | | 7335); also feeds on insect larvae, worms and other bottom- | |
| | | | | dwelling organisms (Ref. 44091). Majority of this fish has normal | |
| | | | | cryptic coloration (black, gray or brown), matching the substrate | |
| | | | | for camouflage and survival purposes. About 10 % of this species | |
| | | | | is xanthomorphic, undergoing a color metamorphosis at varying | |
| E / | 9.05 | Under the predicted future climatic | Higher | stages of growth (Ref. 7335). An experimental fish being used for Lives in box-cut canals with rocky vertical sides, crevices used for | High |
| 54 | 9.05 | conditions, what is the likely magnitude of | riighei | spawning and protection of the young (Ref. 5723). Found in lakes; | riigii |
| | | future potential impacts on ecosystem | | uncommon in the rivers but will penetrate the lower river valleys | |
| | | structure and/or function? | | where the water is slow flowing or tranquil (Ref. 7335). | |
| | | | | Omnivorous, eating mostly aufwuchs, snails and small fishes (Ref. | |
| | | | | | |
| | | | | 7335); also feeds on insect larvae, worms and other bottom- | |
| | | | | dwelling organisms (Ref. 44091). Majority of this fish has normal | |
| | | | | cryptic coloration (black, gray or brown), matching the substrate | |
| | | | | for camouflage and survival purposes. About 10 % of this species | |
| | | | | is xanthomorphic, undergoing a color metamorphosis at varying | |
| 55 | 9.06 | Under the predicted future climatic | Higher | stages of growth (Ref. 7335). An experimental fish being used for Lives in box-cut canals with rocky vertical sides, crevices used for | High |
| 55 | 5.00 | conditions, what is the likely magnitude of | inglici | spawning and protection of the young (Ref. 5723). Found in lakes; | , ngin |
| | | future potential impacts on ecosystem | | uncommon in the rivers but will penetrate the lower river valleys | |
| | | services/socio-economic factors? | | where the water is slow flowing or tranguil (Ref. 7335). | |
| | | | | Omnivorous, eating mostly aufwuchs, snails and small fishes (Ref. | |
| | | | | 7335); also feeds on insect larvae, worms and other bottom- | |
| | | | | dwelling organisms (Ref. 44091). Majority of this fish has normal | |
| | | | | | |
| | | | | cryptic coloration (black, gray or brown), matching the substrate | |
| | | | | for camouflage and survival purposes. About 10 % of this species | |
| | | | | is xanthomorphic, undergoing a color metamorphosis at varying | |
| L | 1 | | | stages of growth (Ref. 7335). An experimental fish being used for | |

| 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 | 2.0 |
| 2. Climate, distribution and introduction risk | 4.0 |
| 3. Invasive elsewhere | 14.0 |
| B. Biology/Ecology | 21.0 |
| 4. Undesirable (or persistence) traits | 8.0 |
| 5. Resource exploitation | 7.0 |
| 6. Reproduction | -1.0 |
| 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 |
| 2. Climate, distribution and introduction risk | <u>3</u> 5 |
| 2. Climate, distribution and introduction risk 3. Invasive elsewhere | 3 5 5 |
| | 36 |
| 3. Invasive elsewhere | 3 5 5 36 12 |
| 3. Invasive elsewhere B. Biology/Ecology | 36 12 |
| 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits | 36 12 |
| 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation | 36 12 |
| 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction | 36 12 |
| 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms | 36 |
| 3. Invasive elsewhere B. Biology / Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes | 36 12 2 7 9 6 |
| 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change | 36 12 2 7 9 6 6 |
| 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change | 36 12 2 7 9 6 6 |
| 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected | 36 12 2 7 9 6 6 6 6 |
| 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change 9. Climate change Commercial | 36 12 2 7 9 6 6 6 6 21 |
| 3. Invasive elsewhere B. Biology / Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change 9. Climate change Commercial Environmental | 36 12 2 7 9 6 6 6 6 6 6 2 1 13 |
| 3. Invasive elsewhere B. Biology / Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change 9. Climate change Commercial Environmental | 36 12 2 7 9 6 6 6 6 6 2 1 3 |
| 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial Environmental Species or population nuisance traits | 36 12 2 7 9 6 6 6 6 6 2 1 3 |

| | BRA+CCA | 34.5 |
|---------------|----------|-------------|
| Confidence | | |
| | BRA+CCA | 0.85 |
| | BRA | 0.86 |
| | CCA | 0.75 |
| | | |
| Date and Time | | |
| | 17/05/20 | 22 15:03:19 |

| Taxon and Assessor details | |
|------------------------------------|--|
| Category | Fishes and Lampreys (freshwater) |
| Taxon name | Austrolebias nigripinnis |
| Common name | blackfin pearlfish |
| Assessor | Gilles |
| Risk screening context | |
| Reason and socio-economic benefits | Aquarium:Commercial |
| Risk assessment area | Lake Taal |
| Taxonomy | Actinopteri (ray-finned fishes) > Cyprinodontiformes (Rivulines, killifishes and live bearers) > |
| Native range | South America: Lower Paraná and Uruguay River basins. |
| Introduced range | USA, Philippines |
| URL | https://www.fishbase.se/summary/Austrolebias-nigripinnis.html |

| | | | Response | Justification (references and/or other information) | Confidence |
|------|------------|--|----------|--|---------------------|
| | | graphy/Historical | | | |
| 1. 1 | Domest | ication/Cultivation | | | |
| 1 | 1.01 | Has the taxon been the subject of | Yes | Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk | Very high |
| | | domestication (or cultivation) for at least 20 | | Screening Summary U.S. Fish and Wildlife Service, April 2011 | |
| | | generations? | | Revised, July 2017 Web Version, 7/5/2018 | |
| 2 | 1.02 | Is the taxon harvested in the wild and likely | Yes | Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk | Very high |
| | | to be sold or used in its live form? | | Screening Summary U.S. Fish and Wildlife Service, April 2011 | |
| | | | | Revised, July 2017 Web Version, 7/5/2018 | |
| 3 | 1.03 | Does the taxon have invasive races, | Yes | Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk | Very high |
| - | | varieties, sub-taxa or congeners? | | Screening Summary U.S. Fish and Wildlife Service, April 2011 | · • · / · · · j · · |
| | | ranecies, sus taxa si congenero: | | Revised, July 2017 Web Version, 7/5/2018 | |
| 2 1 | Climate | , distribution and introduction risk | | | |
| 4 | 2.01 | How similar are the climatic conditions of the | High | Freshwater; benthopelagic; pH range: 6.0 - 7.0; dH range: 5 - 12; | High |
| | 2.01 | Risk Assessment (RA) area and the taxon's | ingn | non-migratory. Subtropical; 18°C - 22°C | ingii |
| | | native range? | | https://www.fishbase.se/summary/Austrolebias-nigripinnis.html | |
| 5 | 2.02 | What is the quality of the climate matching | High | Freshwater; benthopelagic; pH range: 6.0 - 7.0; dH range: 5 - 12; | High |
| Э | 2.02 | | High | | nigii |
| | | data? | | non-migratory. Subtropical; 18°C - 22°C | |
| - | | | | https://www.fishbase.se/summary/Austrolebias-nigripinnis.html | |
| 6 | 2.03 | Is the taxon already present outside of | No | History of the biodiversity and limno-ecological studies on Lake | Very high |
| | | captivity in the RA area? | | Taal with notes on the current state of Philippine limnology Rey | |
| | | | | Donne S. Papa1*and Augustus C. Mamaril Sr. | |
| 7 | 2.04 | How many potential vectors could the taxon | >1 | History of the biodiversity and limno-ecological studies on Lake | Very high |
| | | use to enter in the RA area? | | Taal with notes on the current state of Philippine limnology Rey | , - |
| | | | | Donne S. Papa1*and Augustus C. Mamaril Sr. | |
| 8 | 2.05 | Is the taxon currently found in close | No | History of the biodiversity and limno-ecological studies on Lake | High |
| Ŭ | 2.05 | proximity to, and likely to enter into, the RA | | Taal with notes on the current state of Philippine limnology Rey | ingii |
| | | | | | |
| | | area in the near future (e.g. unintentional | | Donne S. Papa1*and Augustus C. Mamaril Sr. | |
| 2 | . . | and intentional introductions)? | I | | |
| | | e elsewhere | 1.4 | | 1 |
| 9 | 3.01 | Has the taxon become naturalised | Yes | Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk | High |
| | | (established viable populations) outside its | | Screening Summary U.S. Fish and Wildlife Service, April 2011 | |
| | | native range? | | Revised, July 2017 Web Version, 7/5/2018 | |
| 10 | 3.02 | In the taxon's introduced range, are there | Yes | Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk | Very high |
| | | known adverse impacts to wild stocks or | | Screening Summary U.S. Fish and Wildlife Service, April 2011 | |
| | | commercial taxa? | | Revised, July 2017 Web Version, 7/5/2018 | |
| 11 | 3.03 | In the taxon's introduced range, are there | No | Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk | Very high |
| | | known adverse impacts to aquaculture? | - | Screening Summary U.S. Fish and Wildlife Service, April 2011 | -, 5 |
| | | known daverse impacts to aquacature. | | Revised, July 2017 Web Version, 7/5/2018 | |
| 12 | 3.04 | In the taxon's introduced range, are there | Yes | Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk | Very high |
| 12 | 5.04 | known adverse impacts to ecosystem | 103 | Screening Summary U.S. Fish and Wildlife Service, April 2011 | very mgn |
| | | | | | |
| 1 2 | 2.05 | services? | V | Revised, July 2017 Web Version, 7/5/2018 | L C - b |
| 13 | 3.05 | In the taxon's introduced range, are there | Yes | Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk | High |
| | | known adverse socio-economic impacts? | | Screening Summary U.S. Fish and Wildlife Service, April 2011 | |
| | 1 | | | Revised, July 2017 Web Version, 7/5/2018 | |
| | | y/Ecology | | | |
| | | able (or persistence) traits | 1 | | |
| 14 | 4.01 | Is it likely that the taxon will be poisonous or | No | Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk | High |
| | | pose other risks to human health? | | Screening Summary U.S. Fish and Wildlife Service, April 2011 | |
| | | | | Revised, July 2017 Web Version, 7/5/2018 | |
| 15 | 4.02 | Is it likely that the taxon will smother one or | No | Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk | Very high |
| | | more native taxa (that are not threatened or | | Screening Summary U.S. Fish and Wildlife Service, April 2011 | |
| | | protected)? | | Revised, July 2017 Web Version, 7/5/2018 | |
| 16 | 4.03 | Are there any threatened or protected taxa | Yes | Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk | High |
| | | that the non-native taxon would parasitise in | | Screening Summary U.S. Fish and Wildlife Service, April 2011 | |
| | | the RA area? | | Revised, July 2017 Web Version, 7/5/2018 | |
| 17 | 4.04 | Is the taxon adaptable in terms of climatic | Voc | Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk | High |
| т/ | 4.04 | | Yes | | High |
| | | and other environmental conditions, thus | | Screening Summary U.S. Fish and Wildlife Service, April 2011 | |
| | | enhancing its potential persistence if it has | | Revised, July 2017 Web Version, 7/5/2018 | |
| | 1 | invaded or could invade the RA area? | | | |
| 18 | 4.05 | Is the taxon likely to disrupt food-web | Yes | Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk | Very high |
| | | structure/function in aquatic ecosystems if it | | Screening Summary U.S. Fish and Wildlife Service, April 2011 | |
| | | has invaded or is likely to invade the RA | | Revised, July 2017 Web Version, 7/5/2018 | |
| 19 | 4.06 | Is the taxon likely to exert adverse impacts | No | History of the biodiversity and limno-ecological studies on Lake | High |
| | | on ecosystem services in the RA area? | | Taal with notes on the current state of Philippine limnology Rey | |
| | | | | Donne S. Papa1*and Augustus C. Mamaril Sr. | |
| 20 | 4.07 | Is it likely that the taxon will host, and/or | No | History of the biodiversity and limno-ecological studies on Lake | Very high |
| 20 | 4.07 | | 110 | | very night |
| | 1 | act as a vector for, recognised pests and | | Taal with notes on the current state of Philippine limnology Rey Donne S. Papa1*and Augustus C. Mamaril Sr. | |
| | | infectious agents that are endemic in the RA | | | |

| 1 | | | | | |
|---|---|--|--|---|--|
| | 4.08 | Is it likely that the taxon will host, and/or | Yes | Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk | High |
| | | act as a vector for, recognised pests and | | Screening Summary U.S. Fish and Wildlife Service, April 2011 | |
| | | infectious agents that are absent from (novel | | Revised, July 2017 Web Version, 7/5/2018 | |
| | | to) the RA area? | | | |
| 2 | 4.09 | Is it likely that the taxon will achieve a body | Yes | Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk | High |
| | | size that will make it more likely to be | | Screening Summary U.S. Fish and Wildlife Service, April 2011 | |
| | | released from captivity? | | Revised, July 2017 Web Version, 7/5/2018 | |
| 3 | 4.10 | Is the taxon capable of sustaining itself in a | Yes | Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk | Very high |
| | | range of water velocity conditions (e.g. | | Screening Summary U.S. Fish and Wildlife Service, April 2011 | |
| | | versatile in habitat use)? | | Revised, July 2017 Web Version, 7/5/2018 | |
| 4 | 4.11 | Is it likely that the taxon's mode of existence | Yes | Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk | High |
| | | (e.g. excretion of by-products) or behaviours | | Screening Summary U.S. Fish and Wildlife Service, April 2011 | - |
| | | (e.g. feeding) will reduce habitat quality for | | Revised, July 2017 Web Version, 7/5/2018 | |
| | | native taxa? | | | |
| 5 | 4.12 | Is the taxon likely to maintain a viable | Yes | Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk | High |
| | | population even when present in low | | Screening Summary U.S. Fish and Wildlife Service, April 2011 | 5 |
| | | densities (or persisting in adverse conditions | | Revised, July 2017 Web Version, 7/5/2018 | |
| | | by way of a dormant form)? | | | |
| . R | esourd | ce exploitation | | | |
| | 5.01 | Is the taxon likely to consume threatened or | Yes | Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk | High |
| | | protected native taxa in the RA area? | | Screening Summary U.S. Fish and Wildlife Service, April 2011 | 5 |
| | | | | Revised, July 2017 Web Version, 7/5/2018 | |
| 7 | 5.02 | Is the taxon likely to sequester food | Yes | Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk | High |
| 1 | 5.52 | resources (including nutrients) to the | | Screening Summary U.S. Fish and Wildlife Service, April 2011 | |
| | | detriment of native taxa in the RA area? | | Revised, July 2017 Web Version, 7/5/2018 | |
| P | eprodu | | | | 1 |
| | | Is the taxon likely to exhibit parental care | Yes | Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk | High |
| - | 5.01 | and/or to reduce age-at-maturity in response | | Screening Summary U.S. Fish and Wildlife Service, April 2011 | '''g'' |
| | | to environmental conditions? | | Revised, July 2017 Web Version, 7/5/2018 | |
| 0 | 6.02 | Is the taxon likely to produce viable gametes | Yes | Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk | High |
| 1 | 0.02 | or propagules (in the RA area)? | 103 | Screening Summary U.S. Fish and Wildlife Service, April 2011 | i iigii |
| | | or propagules (III the KA dred)? | | Revised, July 2017 Web Version, 7/5/2018 | |
| 0 | 6.03 | Is the taxon likely to hybridise naturally with | No | | High |
| ۲ ا | 0.05 | native taxa? | NU | Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk | i iigii |
| | | native taxa? | | Screening Summary U.S. Fish and Wildlife Service, April 2011 | |
| 1 | 6.04 | Is the taxon likely to be however the different | No | Revised, July 2017 Web Version, 7/5/2018 | High |
| т | 6.04 | , , | No | Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk | High |
| | | display asexual reproduction? | | Screening Summary U.S. Fish and Wildlife Service, April 2011 | |
| - | | | • • | Revised, July 2017 Web Version, 7/5/2018 | |
| 2 | 6.05 | Is the taxon dependent on the presence of | No | Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk | Very high |
| | | another taxon (or specific habitat features) | | Screening Summary U.S. Fish and Wildlife Service, April 2011 | |
| | | to complete its life cycle? | | Revised, July 2017 Web Version, 7/5/2018 | |
| 3 | 6.06 | Is the taxon known (or likely) to produce a | Yes | Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk | Very high |
| | | large number of propagules or offspring | | Screening Summary U.S. Fish and Wildlife Service, April 2011 | |
| | | within a short time span (e.g. < 1 year)? | | Revised, July 2017 Web Version, 7/5/2018 | |
| | | | | | |
| 4 | 6.07 | How many time units (days, months, years) | 3 | https://www.fishbase.se/summary/Austrolebias-nigripinnis.html | High |
| 4 | 6.07 | | 3 | https://www.fishbase.se/summary/Austrolebias-nigripinnis.html | High |
| | | How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? | 3 | https://www.fishbase.se/summary/Austrolebias-nigripinnis.html | High |
| . D | ispers | How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms | | | |
| '. D | | How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? <i>al mechanisms</i> How many potential internal | 3 | History of the biodiversity and limno-ecological studies on Lake | High High |
| '. D | ispers | 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 | | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Rey | |
| <i>'. D</i> 5 | <i>ispers</i> 7.01 | How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable | >1 | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Rey Donne S. Papa1*and Augustus C. Mamaril Sr. | High |
| ' <i>. D</i> 5 | ispers | How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? <i>al mechanisms</i> How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the | | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Rey Donne S. Papa1*and Augustus C. Mamaril Sr. History of the biodiversity and limno-ecological studies on Lake | |
| <i>. D</i> 5 | <i>ispers</i> 7.01 | How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more | >1 | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Rey Donne S. Papa1*and Augustus C. Mamaril Sr. History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Rey | High |
| 7. D | <i>Dispers</i> 7.01 7.02 | How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? | >1 Yes | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Rey Donne S. Papa1*and Augustus C. Mamaril Sr. History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Rey Donne S. Papa1*and Augustus C. Mamaril Sr. | High Very high |
| 7. D | <i>Dispers</i> 7.01 7.02 | How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively | >1 | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Rey Donne S. Papa1*and Augustus C. Mamaril Sr. History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Rey Donne S. Papa1*and Augustus C. Mamaril Sr. Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk | High |
| 7. D | <i>Dispers</i> 7.01 7.02 | How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? | >1 Yes | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Rey Donne S. Papa1*and Augustus C. Mamaril Sr. History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Rey Donne S. Papa1*and Augustus C. Mamaril Sr. | High Very high |
| 7. D | <i>Dispers</i> 7.01 7.02 | How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively | >1 Yes | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Rey Donne S. Papa1*and Augustus C. Mamaril Sr. History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Rey Donne S. Papa1*and Augustus C. Mamaril Sr. Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk | High Very high |
| 7. D 5 6 | 7.01 7.02 7.03 | How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? | >1 Yes | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Rey Donne S. Papa1*and Augustus C. Mamaril Sr. History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Rey Donne S. Papa1*and Augustus C. Mamaril Sr. Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, April 2011 | High Very high |
| 7. D 5 6 | <i>Dispers</i> 7.01 7.02 | How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances | >1 Yes | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Rey Donne S. Papa1*and Augustus C. Mamaril Sr. History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Rey Donne S. Papa1*and Augustus C. Mamaril Sr. Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, April 2011 | High Very high |
| 7. D 5 6 | 7.01 7.02 7.03 | How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? | >1 Yes No | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Rey Donne S. Papa1*and Augustus C. Mamaril Sr. History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Rey Donne S. Papa1*and Augustus C. Mamaril Sr. Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, April 2011 Revised, July 2017 Web Version, 7/5/2018 | High Very high High |
| 7. D 5 6 | 7.01 7.02 7.03 | How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to | >1 Yes No | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Rey Donne S. Papa1*and Augustus C. Mamaril Sr. History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Rey Donne S. Papa1*and Augustus C. Mamaril Sr. Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, April 2011 Revised, July 2017 Web Version, 7/5/2018 Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk | High Very high High |
| 7. D 5 6 7 | 7.01 7.02 7.03 | How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules | >1 Yes No | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Rey Donne S. Papa1*and Augustus C. Mamaril Sr. History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Rey Donne S. Papa1*and Augustus C. Mamaril Sr. Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, April 2011 Revised, July 2017 Web Version, 7/5/2018 Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, April 2011 | High Very high High |
| 7. D 5 6 7 | 7.02 7.03 7.04 | How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? | >1 Yes No Yes | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Rey Donne S. Papa1*and Augustus C. Mamaril Sr. History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Rey Donne S. Papa1*and Augustus C. Mamaril Sr. Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, April 2011 Revised, July 2017 Web Version, 7/5/2018 Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, April 2011 Revised, July 2017 Web Version, 7/5/2018 | High Very high High High |
| 7. D 5 6 7 | 7.02 7.03 7.04 | How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to | >1 Yes No Yes | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Rey Donne S. Papa1*and Augustus C. Mamaril Sr. History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Rey Donne S. Papa1*and Augustus C. Mamaril Sr. Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, April 2011 Revised, July 2017 Web Version, 7/5/2018 Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, April 2011 Revised, July 2017 Web Version, 7/5/2018 Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk | High Very high High High |
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| . D 5 6 7 8 9 0 1 1 2 3 | 7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 | How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? 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. either unintentional or intentional) likely to be Is dispersal of the taxon density dependent? | >1 Yes No Yes No Yes | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Rey Donne S. Papa1*and Augustus C. Mamaril Sr. History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Rey Donne S. Papa1*and Augustus C. Mamaril Sr. Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, April 2011 Revised, July 2017 Web Version, 7/5/2018 Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, April 2011 Revised, July 2017 Web Version, 7/5/2018 Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, April 2011 Revised, July 2017 Web Version, 7/5/2018 Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, April 2011 Revised, July 2017 Web Version, 7/5/2018 Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, April 2011 Revised, July 2017 Web Version, 7/5/2018 Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk Screening Summary U.S. Fish and Wildlif | High Very high High High High Very high High |
| . D 5 6 7 8 9 0 1 2 3 . T | Dispers. 7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 | How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. either unintentional or intentional) likely to be Is dispersal of the taxon density dependent? ce attributes | >1 Yes No Yes No Yes No Yes No | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Rey Donne S. Papa1*and Augustus C. Mamaril Sr. History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Rey Donne S. Papa1*and Augustus C. Mamaril Sr. Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, April 2011 Revised, July 2017 Web Version, 7/5/2018 Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, April 2011 Revised, July 2017 Web Version, 7/5/2018 Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, April 2011 Revised, July 2017 Web Version, 7/5/2018 Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, April 2011 Revised, July 2017 Web Version, 7/5/2018 Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, April 2011 Revised, July 2017 Web Version, 7/5/2018 Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk Screening Summary U.S. Fish and Wildlif | High Very high High High High Very high High High |
| <u>. D</u> 5 6 7 8 9 9 0 1 1 2 . T | 7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 | How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? 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. either unintentional or intentional) likely to be Is dispersal of the taxon density dependent? ce attributes Is the taxon able to withstand being out of | >1 Yes No Yes No Yes | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Rey Donne S. Papa1*and Augustus C. Mamaril Sr. History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Rey Donne S. Papa1*and Augustus C. Mamaril Sr. Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, April 2011 Revised, July 2017 Web Version, 7/5/2018 Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, April 2011 Revised, July 2017 Web Version, 7/5/2018 Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, April 2011 Revised, July 2017 Web Version, 7/5/2018 Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, April 2011 Revised, July 2017 Web Version, 7/5/2018 Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, April 2011 Revised, July 2017 Web Version, 7/5/2018 Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk Screening Summary U.S. Fish and Wildlif | High Very high High High High Very high High |
| <u>. D</u> 5 6 7 8 9 9 0 1 1 2 . T | Dispers. 7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 | How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. either unintentional or intentional) likely to be Is dispersal of the taxon density dependent? ce attributes | >1 Yes No Yes No Yes No Yes No | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Rey Donne S. Papa1*and Augustus C. Mamaril Sr. History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Rey Donne S. Papa1*and Augustus C. Mamaril Sr. Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, April 2011 Revised, July 2017 Web Version, 7/5/2018 Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, April 2011 Revised, July 2017 Web Version, 7/5/2018 Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, April 2011 Revised, July 2017 Web Version, 7/5/2018 Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, April 2011 Revised, July 2017 Web Version, 7/5/2018 Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, April 2011 Revised, July 2017 Web Version, 7/5/2018 Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk Screening Summary U.S. Fish and Wildlif | High Very high High High High Very high High High |

| 45 | 8.02 | Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being | Yes | Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, April 2011 Revised, July 2017 Web Version, 7/5/2018 | Very high |
|----|------|---|----------------|--|-----------|
| 46 | 8.03 | Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? | Not applicable | no data | High |
| 47 | 8.04 | Is the taxon likely to tolerate or benefit from environmental/human disturbance? | Yes | Blackfin Pearlfish (Austrolebias nigripinnis) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, April 2011 Revised, July 2017 Web Version, 7/5/2018 | High |
| 48 | 8.05 | Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment? | Yes | https://www.fishbase.se/summary/Austrolebias-nigripinnis.html | High |
| 49 | 8.06 | Are there effective natural enemies (predators) of the taxon present in the RA | Not applicable | no data | Medium |
| | | e change | | | |
| | | change | T | | 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 | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Rey Donne S. Papa1*and Augustus C. Mamaril Sr. | 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 | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Rey Donne S. Papa1*and Augustus C. Mamaril Sr. | 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 | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Rey Donne S. Papa1*and Augustus C. Mamaril Sr. | 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 | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Rey Donne S. Papa1*and Augustus C. Mamaril Sr. | High |
| 54 | 9.05 | Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? | Higher | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Rey Donne S. Papa1*and Augustus C. Mamaril Sr. | Very high |
| 55 | 9.06 | Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors? | Higher | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Rey Donne S. Papa1*and Augustus C. Mamaril Sr. | High |

| Statistics | |
|--|--------------------------|
| | |
| Scores | 42.0 |
| BRA | 43.0 |
| BRA Outcome | High |
| BRA+CCA BRA+CCA Outcome | 55.0 |
| Score partition | High |
| A. Biogeography/Historical | 19.0 |
| 1. Domestication/Cultivation | 4.0 |
| 2. Climate, distribution and introduction risk | 4.0 |
| , | |
| 3. Invasive elsewhere | 14.0 |
| B. Biology/Ecology | 24.0 |
| 4. Undesirable (or persistence) traits | 8.0 |
| 5. Resource exploitation | 7.0 |
| 6. Reproduction | 2.0 |
| 7. Dispersal mechanisms | 2.0 |
| 8. Tolerance attributes | 5.0 |
| C. Climate change | 12.0 |
| 9. Climate change | 12.0 |
| Answered Questions | |
| Total A. Biogeography/Historical | 55 13 |
| 1. Domestication/Cultivation | |
| 2. Climate, distribution and introduction risk | 3 5 5 36 |
| 3. Invasive elsewhere | 5 |
| B. Biology/Ecology | 36 |
| 4. Undesirable (or persistence) traits | 12 |
| 5. Resource exploitation | 12 |
| 6. Reproduction | 2 |
| 7. Dispersal mechanisms | / |
| 8. Tolerance attributes | 9 6 |
| C. Climate change | 6 |
| 9. Climate change | 6 |
| Sectors affected | 0 |
| Commercial | 16 |
| Environmental | 16 |
| Species or population nuisance traits | 27 |
| | 27 |
| Thresholds | |
| BRA | 34.5 |
| BRA+CCA | 34.5 |
| Confidence | 2 110 |
| | |

F

BRA+CCA 0.83

| BRA | 0.83 |
|-----|------|
| CCA | 0.79 |
| | |

Date and Time 02/04/2020 07:59:16

| Taxon and Assessor details | |
|------------------------------------|--|
| Category | Fishes and Lampreys (freshwater) |
| Taxon name | Balantiocheilos melanopterus |
| Common name | tricolour sharkminnow |
| Assessor | Gilles |
| Risk screening context | |
| Reason and socio-economic benefits | Aquarium trade |
| Risk assessment area | Lake Taal |
| Taxonomy | Actinopteri (ray-finned fishes) > Cypriniformes (Carps) > Cyprinidae (Minnows or carps) > |
| Native range | Mekong and Chao Phraya basins, Malay Peninsula, Sumatra and Borneo. Becoming rare or extinct |
| Introduced range | Canada, Spain, USA, Philippines |
| URI | https://www.fishbase.se/summary/Balantiocheilos-melanopterus.html |

| | | | Response | Justification (references and/or other information) | Confidence |
|------|---------|--|----------|--|------------|
| | | graphy/Historical | | | |
| | | ication/Cultivation | Vec | Tricolor Charleminney (Delentice - 1 | Vonchist |
| 1 | 1.01 | Has the taxon been the subject of domestication (or cultivation) for at least 20 generations? | Yes | Tricolor Sharkminnow (Balantiocheilos melanopterus) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, January 2016 Revised, March 2018 Web Version, 8/29/2018 | Very high |
| 2 | 1.02 | Is the taxon harvested in the wild and likely to be sold or used in its live form? | Yes | Tricolor Sharkminnow (Balantiocheilos, melanopterus) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, January 2016 Revised, March 2018 Web Version, 8/29/2018 | Very high |
| 3 | 1.03 | Does the taxon have invasive races, varieties, sub-taxa or congeners? | Yes | Tricolor Sharkminnow (Balantiocheilos melanopterus) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, January 2016 Revised, March 2018 Web Version, 8/29/2018 | 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 | Freshwater; benthopelagic; pH range: 6.0 - 8.0; dH range: 5 - 12. Tropical; 22°C - 28°C https://www.fishbase.se/summary/Balantiocheilos- | Very high |
| 5 | 2.02 | What is the quality of the climate matching data? | High | Freshwater; benthopelagic; pH range: 6.0 - 8.0; dH range: 5 - 12. Tropical; 22°C - 28°C https://www.fishbase.se/summary/Balantiocheilos- | Very high |
| 6 | 2.03 | Is the taxon already present outside of captivity in the RA area? | No | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Rey Donne S. Papa1*and Augustus C. Mamaril Sr. | Very high |
| 7 | 2.04 | How many potential vectors could the taxon use to enter in the RA area? | >1 | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Rey Donne S. Papa1*and Augustus C. Mamaril Sr. | 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 | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Rey Donne S. Papa1*and Augustus C. Mamaril Sr. | Very high |
| 3. I | | e elsewhere | 1 | | |
| 9 | 3.01 | Has the taxon become naturalised (established viable populations) outside its native range? | Yes | Tricolor Sharkminnow (Balantiocheilos melanopterus) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, January 2016 Revised, March 2018 Web Version, 8/29/2018 | Very high |
| 10 | 3.02 | In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? | No | Tricolor Sharkminnow (Balantiocheilos melanopterus) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, January 2016 Revised, March 2018 Web Version, 8/29/2018 | High |
| 11 | 3.03 | In the taxon's introduced range, are there known adverse impacts to aquaculture? | No | Tricolor Sharkminnow (Balantiocheilos melanopterus) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, January 2016 Revised, March 2018 Web Version, 8/29/2018 | Very high |
| 12 | 3.04 | In the taxon's introduced range, are there known adverse impacts to ecosystem services? | No | Tricolor Sharkminnow (Balantiocheilos melanopterus) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, January 2016 Revised, March 2018 Web Version, 8/29/2018 | Very high |
| 13 | 3.05 | In the taxon's introduced range, are there known adverse socio-economic impacts? | No | Tricolor Sharkminnow (Balantiocheilos melanopterus) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, January | Very high |
| R I | Biology | //Ecology | | 2016 Revised, March 2018 Web Version, 8/29/2018 | |
| | | able (or persistence) traits | | | |
| | | | No | Tricolor Sharkminnow (Balantiocheilos melanopterus) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, January 2016 Revised, March 2018 Web Version, 8/29/2018 | High |
| 15 | 4.02 | Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? | Yes | Tricolor Sharkminnow (Balantiocheilos, or <u>1972</u>) Risk Screening Summary U.S. Fish and Wildlife Service, January 2016 Revised, March 2018 Web Version, 8/29/2018 | Very high |
| | 4.03 | Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? | Yes | Tricolor Sharkminnow (Balantiocheilos melanopterus) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, January 2016 Revised, March 2018 Web Version, 8/29/2018 | 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 | Tricolor Sharkminnow (Balantiocheilos melanopterus) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, January 2016 Revised, March 2018 Web Version, 8/29/2018 | 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 | No | Tricolor Sharkminnow (Balantiocheilos melanopterus) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, January 2016 Revised, March 2018 Web Version, 8/29/2018 | High |
| | 4.06 | Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? | Yes | Tricolor Sharkminnow (Balantiocheilos melanopterus) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, January 2016 Revised, March 2018 Web Version, 8/29/2018 | High |
| 20 | 4.07 | Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA | Yes | Tricolor Sharkminnow (Balantiocheilos melanopterus) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, January 2016 Revised, March 2018 Web Version, 8/29/2018 | High |

| 1 | 4.08 | Is it likely that the taxon will host, and/or | Yes | Tricolor Sharkminnow (Balantiocheilos melanopterus) Ecological | Very high |
|-----------------------------|-------------------------|---|----------------|---|-------------------|
| | | act as a vector for, recognised pests and | | Risk Screening Summary U.S. Fish and Wildlife Service, January | |
| | | infectious agents that are absent from (novel | | 2016 Revised, March 2018 Web Version, 8/29/2018 | |
| | | to) the RA area? | | | |
| 2 | 4.09 | Is it likely that the taxon will achieve a body | No | Max length : 35.0 cm SL male/unsexed | Very high |
| | | size that will make it more likely to be | | | |
| | | released from captivity? | | | |
| 3 | 4.10 | Is the taxon capable of sustaining itself in a | Yes | Freshwater; benthopelagic; pH range: 6.0 - 8.0; dH range: 5 - 12. | Very high |
| | | range of water velocity conditions (e.g. | | Tropical; 22°C - 28°C | |
| | | versatile in habitat use)? | | https://www.fishbase.se/summary/Balantiocheilos- | |
| 4 | 4.11 | Is it likely that the taxon's mode of existence | Not applicable | no data | Medium |
| | | (e.g. excretion of by-products) or behaviours | | | |
| | | (e.g. feeding) will reduce habitat quality for | | | |
| | | native taxa? | | | |
| 25 | 4.12 | Is the taxon likely to maintain a viable | Yes | Tricolor Sharkminnow (Balantiocheilos melanopterus) Ecological | Very high |
| | | population even when present in low | | Risk Screening Summary U.S. Fish and Wildlife Service, January | , 5 |
| | | densities (or persisting in adverse conditions | | 2016 Revised, March 2018 Web Version, 8/29/2018 | |
| | | by way of a dormant form)? | | | |
| 5. 1 | Resourd | ce exploitation | | | |
| | 5.01 | Is the taxon likely to consume threatened or | Yes | Tricolor Sharkminnow (Balantiocheilos melanopterus) Ecological | Very high |
| - | | protected native taxa in the RA area? | | Risk Screening Summary U.S. Fish and Wildlife Service, January | - , |
| | | | | 2016 Revised, March 2018 Web Version, 8/29/2018 | |
| 27 | 5.02 | Is the taxon likely to sequester food | Yes | Tricolor Sharkminnow (Balantiocheilos melanopterus) Ecological | Very high |
| - ' | 5.02 | resources (including nutrients) to the | | Risk Screening Summary U.S. Fish and Wildlife Service, January | , mgm |
| | | detriment of native taxa in the RA area? | | 2016 Revised, March 2018 Web Version, 8/29/2018 | |
| 5 | Reprodu | | 1 | | 1 |
| | | Is the taxon likely to exhibit parental care | Yes | Tricolor Sharkminnow (Balantiocheilos melanopterus) Ecological | Very high |
| _0 | 0.01 | and/or to reduce age-at-maturity in response | | | *cry mgn |
| | | , , , | | Risk Screening Summary U.S. Fish and Wildlife Service, January | |
| 20 | 6.02 | to environmental conditions? | Voc | 2016 Revised, March 2018 Web Version, 8/29/2018 | Vonthist |
| 29 | 6.02 | Is the taxon likely to produce viable gametes | Yes | Tricolor Sharkminnow (Balantiocheilos melanopterus) Ecological | Very high |
| | | or propagules (in the RA area)? | | Risk Screening Summary U.S. Fish and Wildlife Service, January | |
| 20 | 6.03 | Is the taxon likely to hybridize naturally with | No | 2016 Revised, March 2018 Web Version, 8/29/2018 | Vonchich |
| JU | 0.03 | Is the taxon likely to hybridise naturally with | No | Tricolor Sharkminnow (Balantiocheilos melanopterus) Ecological | Very high |
| | | native taxa? | | Risk Screening Summary U.S. Fish and Wildlife Service, January | |
| 21 | 6.04 | To the tayon likely to be how 1, 191 | No | 2016 Revised, March 2018 Web Version, 8/29/2018 | Vomiti |
| 51 | 6.04 | Is the taxon likely to be hermaphroditic or to | No | Tricolor Sharkminnow (Balantiocheilos melanopterus) Ecological | Very high |
| | | display asexual reproduction? | | Risk Screening Summary U.S. Fish and Wildlife Service, January | |
| | c | | | 2016 Revised, March 2018 Web Version, 8/29/2018 | |
| 32 | 6.05 | Is the taxon dependent on the presence of | No | Tricolor Sharkminnow (Balantiocheilos melanopterus) Ecological | Very high |
| | 1 | another taxon (or specific habitat features) | | Risk Screening Summary U.S. Fish and Wildlife Service, January | |
| | | to complete its life cycle? | | 2016 Revised, March 2018 Web Version, 8/29/2018 | |
| 33 | 6.06 | Is the taxon known (or likely) to produce a | Yes | Tricolor Sharkminnow (Balantiocheilos melanopterus) Ecological | Very high |
| | 1 | large number of propagules or offspring | | Risk Screening Summary U.S. Fish and Wildlife Service, January | |
| | | within a short time span (e.g. < 1 year)? | | 2016 Revised, March 2018 Web Version, 8/29/2018 | |
| 34 | 6.07 | How many time units (days, months, years) | 3 | Tricolor Sharkminnow (Balantiocheilos melanopterus) Ecological | Very high |
| | | does the taxon require to reach the age-at- | | Risk Screening Summary U.S. Fish and Wildlife Service, January | |
| | | first-reproduction? | <u> </u> | 2016 Revised, March 2018 Web Version, 8/29/2018 | |
| | | al mechanisms | | | |
| 35 | 7.01 | How many potential internal | >1 | History of the biodiversity and limno-ecological studies on Lake | Very high |
| | | vectors/pathways could the taxon use to | | Taal with notes on the current state of Philippine limnology Rey | |
| | | disperse within the RA area (with suitable | | Donne S. Papa1*and Augustus C. Mamaril Sr. | |
| 36 | 7.02 | Will any of these vectors/pathways bring the | Yes | History of the biodiversity and limno-ecological studies on Lake | Very high |
| | | taxon in close proximity to one or more | | Taal with notes on the current state of Philippine limnology Rey | |
| _ | | protected areas (e.g. MCZ, MPA, SSSI)? | | Donne S. Papa1*and Augustus C. Mamaril Sr. | |
| 37 | 7.03 | Does the taxon have a means of actively | No | Tricolor Sharkminnow (Balantiocheilos melanopterus) Ecological | High |
| | | attaching itself to hard substrata (e.g. ship | | Risk Screening Summary U.S. Fish and Wildlife Service, January | |
| | 1 | hulls, pilings, buoys) such that it enhances | | 2016 Revised, March 2018 Web Version, 8/29/2018 | |
| | | the likelihood of dispersal? | | | |
| 38 | 7.04 | Is natural dispersal of the taxon likely to | Yes | Tricolor Sharkminnow (Balantiocheilos melanopterus) Ecological | High |
| | 1 | occur as eggs (for animals) or as propagules | | Risk Screening Summary U.S. Fish and Wildlife Service, January | - |
| | | (for plants: seeds, spores) in the RA area? | | 2016 Revised, March 2018 Web Version, 8/29/2018 | |
| 39 | 7.05 | Is natural dispersal of the taxon likely to | No | Tricolor Sharkminnow (Balantiocheilos melanopterus) Ecological | Very high |
| - | | occur as larvae/juveniles (for animals) or as | · | Risk Screening Summary U.S. Fish and Wildlife Service, January | · - , |
| | | fragments/seedlings (for plants) in the RA | | 2016 Revised, March 2018 Web Version, 8/29/2018 | |
| | 1 | area? | | | |
| 10 | 7.06 | Are older life stages of the taxon likely to | Yes | Tricolor Sharkminnow (Balantiocheilos melanopterus) Ecological | Very high |
| 5 | /.00 | migrate in the RA area for reproduction? | 103 | Risk Screening Summary U.S. Fish and Wildlife Service, January | very myn |
| | 1 | | | 2016 Revised, March 2018 Web Version, 8/29/2018 | |
| | 1 | 1 | No | | Very high |
| 1 | 707 | Are propagules or eggs of the taxon likely to | INU | Tricolor Sharkminnow (Balantiocheilos melanopterus) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, January | very mgn |
| 1 | 7.07 | Are propagules or eggs of the taxon likely to | | INSK SCREEDING SUMMARY U.S. FISD and Wildlife Service January | |
| 1 | 7.07 | Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? | | | |
| | | be dispersed in the RA area by other animals? | | 2016 Revised, March 2018 Web Version, 8/29/2018 | 14 14 1 |
| | 7.07 | be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the | Yes | 2016 Revised, March 2018 Web Version, 8/29/2018 Tricolor Sharkminnow (Balantiocheilos melanopterus) Ecological | Very high |
| | | 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 | 2016 Revised, March 2018 Web Version, 8/29/2018 Tricolor Sharkminnow (Balantiocheilos melanopterus) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, January | Very high |
| | | be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. either | Yes | 2016 Revised, March 2018 Web Version, 8/29/2018 Tricolor Sharkminnow (Balantiocheilos melanopterus) Ecological | Very 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. either unintentional or intentional) likely to be | Yes | 2016 Revised, March 2018 Web Version, 8/29/2018 Tricolor Sharkminnow (Balantiocheilos melanopterus) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, January 2016 Revised, March 2018 Web Version, 8/29/2018 | |
| 2 | | be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. either | Yes | 2016 Revised, March 2018 Web Version, 8/29/2018 Tricolor Sharkminnow (Balantiocheilos melanopterus) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, January | Very high 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. either unintentional or intentional) likely to be | | 2016 Revised, March 2018 Web Version, 8/29/2018 Tricolor Sharkminnow (Balantiocheilos melanopterus) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, January 2016 Revised, March 2018 Web Version, 8/29/2018 | |
| 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. either unintentional or intentional) likely to be | | 2016 Revised, March 2018 Web Version, 8/29/2018 Tricolor Sharkminnow (Balantiocheilos melanopterus) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, January 2016 Revised, March 2018 Web Version, 8/29/2018 Tricolor Sharkminnow (Balantiocheilos melanopterus) Ecological | |
| 3 | 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. either unintentional or intentional) likely to be | | 2016 Revised, March 2018 Web Version, 8/29/2018 Tricolor Sharkminnow (Balantiocheilos melanopterus) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, January 2016 Revised, March 2018 Web Version, 8/29/2018 Tricolor Sharkminnow (Balantiocheilos melanopterus) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, January | |
| 3 | 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. either unintentional or intentional) likely to be Is dispersal of the taxon density dependent? | | 2016 Revised, March 2018 Web Version, 8/29/2018 Tricolor Sharkminnow (Balantiocheilos melanopterus) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, January 2016 Revised, March 2018 Web Version, 8/29/2018 Tricolor Sharkminnow (Balantiocheilos melanopterus) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, January | |
| 12 | 7.08 7.09 Toleran | be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. either unintentional or intentional) likely to be Is dispersal of the taxon density dependent? ce attributes | No | 2016 Revised, March 2018 Web Version, 8/29/2018 Tricolor Sharkminnow (Balantiocheilos melanopterus) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, January 2016 Revised, March 2018 Web Version, 8/29/2018 Tricolor Sharkminnow (Balantiocheilos melanopterus) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, January 2016 Revised, March 2018 Web Version, 8/29/2018 | High |
| 12 13 3. ⁻ | 7.08 7.09 Toleran | be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. either 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 | 2016 Revised, March 2018 Web Version, 8/29/2018 Tricolor Sharkminnow (Balantiocheilos melanopterus) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, January 2016 Revised, March 2018 Web Version, 8/29/2018 Tricolor Sharkminnow (Balantiocheilos melanopterus) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, January 2016 Revised, March 2018 Web Version, 8/29/2018 Tricolor Sharkminnow (Balantiocheilos melanopterus) Ecological Tricolor Sharkminnow (Balantiocheilos melanopterus) Ecological | High |

| 45 | 8.02 | Is the taxon tolerant of a wide range of | Yes | Tricolor Sharkminnow (Balantiocheilos melanopterus) Ecological | Very high |
|----|------|--|----------------|---|-----------|
| | | water quality conditions relevant to that | | Risk Screening Summary U.S. Fish and Wildlife Service, January | , - |
| | | taxon? [In the Justification field, indicate the | | 2016 Revised, March 2018 Web Version, 8/29/2018 | |
| | | relevant water quality variable(s) being | | | |
| 6 | 8.03 | Can the taxon be controlled or eradicated in | Not applicable | no data | High |
| | | the wild with chemical, biological, or other | | | |
| | | agents/means? | | | |
| 7 | 8.04 | Is the taxon likely to tolerate or benefit from | Yes | Tricolor Sharkminnow (Balantiocheilos melanopterus) Ecological | Very high |
| | | environmental/human disturbance? | | Risk Screening Summary U.S. Fish and Wildlife Service, January | |
| | | | | 2016 Revised, March 2018 Web Version, 8/29/2018 | |
| 8 | 8.05 | Is the taxon able to tolerate salinity levels | Yes | Freshwater; benthopelagic; pH range: 6.0 - 8.0; dH range: 5 - 12. | Very high |
| | | that are higher or lower than those found in | | Tropical; 22°C - 28°C | |
| | | its usual environment? | | https://www.fishbase.se/summary/Balantiocheilos- | |
| .9 | 8.06 | Are there effective natural enemies | No | History of the biodiversity and limno-ecological studies on Lake | Very high |
| | | (predators) of the taxon present in the RA | | Taal with notes on the current state of Philippine limnology Rey | |
| | | area? | | Donne S. Papa1*and Augustus C. Mamaril Sr. | |
| | | e change | | | |
| | | change | 1 | | T |
| 0 | 9.01 | Under the predicted future climatic | Increase | History of the biodiversity and limno-ecological studies on Lake | Very high |
| | | conditions, are the risks of entry into the RA | | Taal with notes on the current state of Philippine limnology Rey | |
| | | area posed by the taxon likely to increase, | | Donne S. Papa1*and Augustus C. Mamaril Sr. | |
| | | decrease or not change? | | | |
| 1 | 9.02 | Under the predicted future climatic | Increase | History of the biodiversity and limno-ecological studies on Lake | High |
| | | conditions, are the risks of establishment | | Taal with notes on the current state of Philippine limnology Rey | |
| | | posed by the taxon likely to increase, | | Donne S. Papa1*and Augustus C. Mamaril Sr. | |
| | | decrease or not change? | | | |
| 2 | 9.03 | Under the predicted future climatic | Increase | History of the biodiversity and limno-ecological studies on Lake | High |
| | | conditions, are the risks of dispersal within | | Taal with notes on the current state of Philippine limnology Rey | |
| | | the RA area posed by the taxon likely to | | Donne S. Papa1*and Augustus C. Mamaril Sr. | |
| _ | | increase, decrease or not change? | | | |
| 3 | 9.04 | Under the predicted future climatic | No change | History of the biodiversity and limno-ecological studies on Lake | High |
| | | conditions, what is the likely magnitude of | | Taal with notes on the current state of Philippine limnology Rey | |
| | | future potential impacts on biodiversity | | Donne S. Papa1*and Augustus C. Mamaril Sr. | |
| | | and/or ecological integrity/status? | | | |
| 4 | 9.05 | Under the predicted future climatic | No change | History of the biodiversity and limno-ecological studies on Lake | High |
| | | conditions, what is the likely magnitude of | | Taal with notes on the current state of Philippine limnology Rey | |
| | | future potential impacts on ecosystem | | Donne S. Papa1*and Augustus C. Mamaril Sr. | |
| | | structure and/or function? | | | |
| 5 | 9.06 | Under the predicted future climatic | Higher | History of the biodiversity and limno-ecological studies on Lake | Very high |
| | | conditions, what is the likely magnitude of | | Taal with notes on the current state of Philippine limnology Rey | |
| | | future potential impacts on ecosystem | | Donne S. Papa1*and Augustus C. Mamaril Sr. | |
| | 1 | services/socio-economic factors? | | | |

| Statistics | |
|--|--------------------------|
| Scores | |
| BRA | 34.0 |
| BRA Outcome | Medium |
| BRA+CCA | 42.0 |
| BRA+CCA Outcome | High |
| Score partition | |
| A. Biogeography/Historical | 9.0 |
| 1. Domestication/Cultivation | 4.0 |
| 2. Climate, distribution and introduction risk | 3.0 |
| 3. Invasive elsewhere | 2.0 |
| B. Biology/Ecology | 25.0 |
| 4. Undesirable (or persistence) traits | 8.0 |
| 5. Resource exploitation | 7.0 |
| 6. Reproduction | 2.0 |
| 7. Dispersal mechanisms | 2.0 |
| 8. Tolerance attributes | 6.0 |
| C. Climate change | 8.0 |
| 9. Climate change | 8.0 |
| Answered Questions | |
| Total | 55 |
| A. Biogeography/Historical | 13 |
| 1. Domestication/Cultivation | 3 5 5 36 |
| 2. Climate, distribution and introduction risk | 5 |
| 3. Invasive elsewhere | 5 |
| B. Biology/Ecology | 36 |
| 4. Undesirable (or persistence) traits | 12 2 7 9 6 |
| 5. Resource exploitation | 2 |
| 6. Reproduction | / |
| 7. Dispersal mechanisms | 9 |
| 8. Tolerance attributes | |
| C. Climate change | 6 |
| 9. Climate change | 6 |
| Sectors affected | |
| Commercial | 10 |
| Environmental | 7 |
| Species or population nuisance traits | 31 |
| | |
| Thresholds | |
| BRA | 34.5 |
| BRA+CCA | 34.5 |
| Confidence | |

| В | BRA+CCA | 0.93 |
|---------------|------------|----------|
| | BRA | 0.94 |
| | CCA | 0.83 |
| | | |
| Date and Time | | |
| | 02/04/2020 | 07:59:30 |

| axon and Assessor details | | | | | | |
|------------------------------------|---|--|--|--|--|--|
| Category | Fishes and Lampreys (freshwater) | | | | | |
| Taxon name | Barbonymus gonionotus | | | | | |
| Common name | silver barb | | | | | |
| Assessor Gilles | | | | | | |
| Risk screening context | | | | | | |
| Reason and socio-economic benefits | Aquaculture | | | | | |
| Risk assessment area | Lake Taal | | | | | |
| Taxonomy | Actinopteri (ray-finned fishes) > Cypriniformes (Carps) > Cyprinidae (Minnows or carps) > | | | | | |
| Native range | Asia: Mekong and Chao Phraya basins, Malay Peninsula, Sumatra and Java | | | | | |
| Introduced range | Philippines, Malaysia, India, Singapore | | | | | |
| URL | https://www.fishbase.se/summary/Barbonymus-gonionotus.html | | | | | |

| | | | Response | Justification (references and/or other information) | Confidence |
|------|----------|--|----------------|--|------------|
| | | graphy/Historical | | | |
| 1. C | | ication/Cultivation | | | |
| 1 | 1.01 | Has the taxon been the subject of domestication (or cultivation) for at least 20 generations? | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/Surehkumar2014.pdf | High |
| 2 | 1.02 | Is the taxon harvested in the wild and likely to be sold or used in its live form? | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/Surehkumar2014.pdf | High |
| 3 | 1.03 | Does the taxon have invasive races, varieties, sub-taxa or congeners? | Yes | https://www.fishbase.de/Introductions/IntroductionsList.php?ID=4 682&GenusName=Gymnocorymbus&SpeciesName=ternetzi&fc=10 2&StockCode=4900 | High |
| 2. C | Climate, | , distribution and introduction risk | | | |
| 4 | 2.01 | How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range? | High | file:///C:/Users/User/Desktop/Thesis%20Ref/kottek2006.pdf | High |
| 5 | 2.02 | What is the quality of the climate matching data? | High | file:///C:/Users/User/Desktop/Thesis%20Ref/kottek2006.pdf | High |
| 6 | 2.03 | Is the taxon already present outside of captivity in the RA area? | Yes | https://www.fishbase.de/Introductions/IntroductionsList.php?ID=4 682&GenusName=Gymnocorymbus&SpeciesName=ternetzi&fc=10 2&StockCode=4900 | High |
| 7 | 2.04 | How many potential vectors could the taxon use to enter in the RA area? | >1 | file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.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)? | Not applicable | no record | High |
| 3. I | nvasive | elsewhere | | | |
| 9 | 3.01 | Has the taxon become naturalised (established viable populations) outside its native range? | Yes | https://www.fishbase.de/Introductions/IntroductionsList.php?ID=4 682&GenusName=Gymnocorymbus&SpeciesName=ternetzi&fc=10 2&StockCode=4900 | High |
| 10 | 3.02 | In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? | Yes | http://sci-hub.tw/https://doi.org/10.1016/j.biocon.2013.04.019 | High |
| 11 | 3.03 | In the taxon's introduced range, are there known adverse impacts to aquaculture? | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/Surehkumar2014.pdf | High |
| 12 | 3.04 | In the taxon's introduced range, are there known adverse impacts to ecosystem | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/Surehkumar2014.pdf | Very high |
| 13 | 3.05 | In the taxon's introduced range, are there known adverse socio-economic impacts? | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/Surehkumar2014.pdf | Very high |
| В. Е | Biology | //Ecology | | | |
| | | able (or persistence) traits | | | |
| | | Is it likely that the taxon will be poisonous or pose other risks to human health? | No | https://www.fishbase.de/summary/Dawkinsia-arulius.html | High |
| 15 | 4.02 | Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? | No | file:///C:/Users/User/Desktop/Thesis%20Ref/atkore2015.pdf | Very high |
| 16 | 4.03 | Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? | No | file:///C:/Users/User/Desktop/Thesis%20Ref/atkore2015.pdf | 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 | file:///C:/Users/User/Desktop/Thesis%20Ref/kottek2006.pdf | Very high |
| | 4.05 | Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA | No | https://www.fishbase.de/summary/Dawkinsia-arulius.html | Very high |
| 19 | 4.06 | Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/atkore2015.pdf | 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 | https://www.fishbase.de/summary/Dawkinsia-arulius.html | High |
| | 4.08 | Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area? | No | https://www.fishbase.de/summary/Dawkinsia-arulius.html | High |
| 22 | 4.09 | Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity? | No | https://www.fishbase.de/summary/Dawkinsia-arulius.html | High |

| 23 | | | r | | 1 |
|--|--|--|---|--|--|
| | 4.10 | Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/atkore2015.pdf | Very high |
| | | versatile in habitat use)? | | | |
| 24 | 4.11 | Is it likely that the taxon's mode of existence | Yes | https://www.fishbase.de/summary/Dawkinsia-arulius.html | High |
| | | (e.g. excretion of by-products) or behaviours | | | |
| | | (e.g. feeding) will reduce habitat quality for | | | |
| 25 | 4.12 | native taxa? Is the taxon likely to maintain a viable | No | file:///C:/Users/User/Desktop/Thesis%20Ref/atkore2015.pdf | Very high |
| 20 | 4.12 | population even when present in low | NO | | very nigh |
| | | densities (or persisting in adverse conditions | | | |
| | | by way of a dormant form)? | | | |
| | | ce exploitation | I | | I |
| 26 | 5.01 | Is the taxon likely to consume threatened or | No | file:///C:/Users/User/Desktop/Thesis%20Ref/atkore2015.pdf | Very high |
| 27 | 5.02 | protected native taxa in the RA area? Is the taxon likely to sequester food | No | https://www.fishbase.de/Reproduction/FishReproSummary.php?ID | High |
| 21 | 5.02 | resources (including nutrients) to the | NO | =11275&GenusName=Dawkinsia&SpeciesName=arulius&fc=122&S | riigii |
| | | detriment of native taxa in the RA area? | | tockCode=11600 | |
| <i>6. I</i> | Reprodu | uction | • | | • • |
| 28 | 6.01 | Is the taxon likely to exhibit parental care | Yes | | Very high |
| | | and/or to reduce age-at-maturity in response | | =11275&GenusName=Dawkinsia&SpeciesName=arulius&fc=122&S | |
| 20 | 6.02 | to environmental conditions? Is the taxon likely to produce viable gametes | No | tockCode=11600 https://www.fishbase.de/Reproduction/FishReproSummary.php?ID | High |
| 29 | 0.02 | or propagules (in the RA area)? | NO | =11275&GenusName=Dawkinsia&SpeciesName=arulius&fc=122&S | riigii |
| | | | | tockCode=11600 | |
| 30 | 6.03 | Is the taxon likely to hybridise naturally with | No | https://www.fishbase.de/Reproduction/FishReproSummary.php?ID | High |
| | | native taxa? | | =11275&GenusName=Dawkinsia&SpeciesName=arulius&fc=122&S | |
| | | | | tockCode=11600 | |
| 31 | 6.04 | Is the taxon likely to be hermaphroditic or to | No | https://www.fishbase.de/Reproduction/FishReproSummary.php?ID | High |
| | | display asexual reproduction? | | =11275&GenusName=Dawkinsia&SpeciesName=arulius&fc=122&S tockCode=11600 | |
| 32 | 6.05 | Is the taxon dependent on the presence of | Yes | https://www.fishbase.de/Reproduction/FishReproSummary.php?ID | High |
| | | another taxon (or specific habitat features) | | =11275&GenusName=Dawkinsia&SpeciesName=arulius&fc=122&S | |
| | | to complete its life cycle? | | tockCode=11600 | |
| 33 | 6.06 | Is the taxon known (or likely) to produce a | Yes | https://www.fishbase.de/Reproduction/FishReproSummary.php?ID | High |
| | | large number of propagules or offspring | | =11275&GenusName=Dawkinsia&SpeciesName=arulius&fc=122&S | |
| 24 | 6.07 | within a short time span (e.g. < 1 year)? How many time units (days, months, years) | 2 | tockCode=11600 https://www.fishbase.de/Reproduction/FishReproSummary.php?ID | High |
| 4 | 0.07 | does the taxon require to reach the age-at- | <u>۲</u> | =11275&GenusName=Dawkinsia&SpeciesName=arulius&fc=122&S | i iigii |
| | | first-reproduction? | | tockCode=11600 | |
| | | al mechanisms | · | | |
| 35 | 7.01 | How many potential internal | >1 | file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf | Very high |
| | | vectors/pathways could the taxon use to | | | |
| 36 | 7.02 | disperse within the RA area (with suitable Will any of these vectors/pathways bring the | Not applicable | No data for this question | Medium |
| .0 | /.02 | taxon in close proximity to one or more | | | . iculum |
| | | protected areas (e.g. MCZ, MPA, SSSI)? | | | |
| 37 | 7.03 | Does the taxon have a means of actively | No | | High |
| | | attaching itself to hard substrata (e.g. ship | | =11275&GenusName=Dawkinsia&SpeciesName=arulius&fc=122&S | |
| | | hulls, pilings, buoys) such that it enhances | | tockCode=11600 | |
| 38 | 7.04 | the likelihood of dispersal? Is natural dispersal of the taxon likely to | No | https://www.fishbase.de/Reproduction/FishReproSummary.php?ID | High |
| | | occur as eggs (for animals) or as propagules | | =11275&GenusName=Dawkinsia&SpeciesName=arulius&fc=122&S | |
| | | (for plants: seeds, spores) in the RA area? | | tockCode=11600 | |
| 39 | 7.05 | Is natural dispersal of the taxon likely to | Yes | | High |
| | | occur as larvae/juveniles (for animals) or as | | =11275&GenusName=Dawkinsia&SpeciesName=arulius&fc=122&S | |
| | | fragments/seedlings (for plants) in the RA | | tockCode=11600 | |
| 40 | 7.06 | area? | | | |
| . 0 | | | Not annlicable | no data for this question | Medium |
| | | Are older life stages of the taxon likely to migrate in the RA area for reproduction? | Not applicable | no data for this question | Medium |
| 41 | 7.07 | Are older life stages of the taxon likely to | Not applicable | no data for this question https://www.fishbase.de/Reproduction/FishReproSummary.php?ID | Medium High |
| 41 | | Are older life stages of the taxon likely to migrate in the RA area for reproduction? | | https://www.fishbase.de/Reproduction/FishReproSummary.php?ID =11275&GenusName=Dawkinsia&SpeciesName=arulius&fc=122&S | |
| | 7.07 | Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? | No | https://www.fishbase.de/Reproduction/FishReproSummary.php?ID =11275&GenusName=Dawkinsia&SpeciesName=arulius&fc=122&S tockCode=11600 | High |
| | | Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the | | https://www.fishbase.de/Reproduction/FishReproSummary.php?ID =11275&GenusName=Dawkinsia&SpeciesName=arulius&fc=122&S tockCode=11600 https://www.fishbase.de/Reproduction/FishReproSummary.php?ID | |
| | 7.07 | Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous | No | https://www.fishbase.de/Reproduction/FishReproSummary.php?ID =11275&GenusName=Dawkinsia&SpeciesName=arulius&fc=122&S tockCode=11600 https://www.fishbase.de/Reproduction/FishReproSummary.php?ID =11275&GenusName=Dawkinsia&SpeciesName=arulius&fc=122&S | High |
| | 7.07 | Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. either | No | https://www.fishbase.de/Reproduction/FishReproSummary.php?ID =11275&GenusName=Dawkinsia&SpeciesName=arulius&fc=122&S tockCode=11600 https://www.fishbase.de/Reproduction/FishReproSummary.php?ID | High |
| 42 | 7.07 7.08 7.09 | Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. either unintentional or intentional) likely to be Is dispersal of the taxon density dependent? | No | https://www.fishbase.de/Reproduction/FishReproSummary.php?ID =11275&GenusName=Dawkinsia&SpeciesName=arulius&fc=122&S tockCode=11600 https://www.fishbase.de/Reproduction/FishReproSummary.php?ID =11275&GenusName=Dawkinsia&SpeciesName=arulius&fc=122&S tockCode=11600 | High |
| 12 | 7.07 7.08 7.09 Toleran | Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. either unintentional or intentional) likely to be Is dispersal of the taxon density dependent? ce attributes | No Yes Not applicable | https://www.fishbase.de/Reproduction/FishReproSummary.php?ID =11275&GenusName=Dawkinsia&SpeciesName=arulius&fc=122&S tockCode=11600 https://www.fishbase.de/Reproduction/FishReproSummary.php?ID =11275&GenusName=Dawkinsia&SpeciesName=arulius&fc=122&S tockCode=11600 no records | High High Medium |
| 12 13 3. | 7.07 7.08 7.09 | Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. either 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 | https://www.fishbase.de/Reproduction/FishReproSummary.php?ID =11275&GenusName=Dawkinsia&SpeciesName=arulius&fc=122&S tockCode=11600 https://www.fishbase.de/Reproduction/FishReproSummary.php?ID =11275&GenusName=Dawkinsia&SpeciesName=arulius&fc=122&S tockCode=11600 | High High |
| 12 13 3. | 7.07 7.08 7.09 Toleran | Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. either unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of | No Yes Not applicable | https://www.fishbase.de/Reproduction/FishReproSummary.php?ID =11275&GenusName=Dawkinsia&SpeciesName=arulius&fc=122&S tockCode=11600 https://www.fishbase.de/Reproduction/FishReproSummary.php?ID =11275&GenusName=Dawkinsia&SpeciesName=arulius&fc=122&S tockCode=11600 no records | High High Medium |
| 42 43 3. | 7.07 7.08 7.09 Toleran | Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. either 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 Not applicable | https://www.fishbase.de/Reproduction/FishReproSummary.php?ID =11275&GenusName=Dawkinsia&SpeciesName=arulius&fc=122&S tockCode=11600 https://www.fishbase.de/Reproduction/FishReproSummary.php?ID =11275&GenusName=Dawkinsia&SpeciesName=arulius&fc=122&S tockCode=11600 no records | High High Medium |
| 42 4 <u>3</u> 3. 1 44 | 7.07 7.08 7.09 Toleran | Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. either unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life | No Yes Not applicable | https://www.fishbase.de/Reproduction/FishReproSummary.php?ID =11275&GenusName=Dawkinsia&SpeciesName=arulius&fc=122&S tockCode=11600 https://www.fishbase.de/Reproduction/FishReproSummary.php?ID =11275&GenusName=Dawkinsia&SpeciesName=arulius&fc=122&S tockCode=11600 no records | High High Medium |
| 12 13 3. 1 14 | 7.07 7.08 7.09 7.09 7.09 | Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. either unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? | No Yes Not applicable Yes | https://www.fishbase.de/Reproduction/FishReproSummary.php?ID =11275&GenusName=Dawkinsia&SpeciesName=arulius&fc=122&S tockCode=11600 https://www.fishbase.de/Reproduction/FishReproSummary.php?ID =11275&GenusName=Dawkinsia&SpeciesName=arulius&fc=122&S tockCode=11600 no records https://www.fishbase.de/summary/Dawkinsia-arulius.html | High High Medium High |
| 42 4 <u>3</u> 3. 1 44 | 7.07 7.08 7.09 7.09 7.09 | Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. either unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the | No Yes Not applicable Yes | https://www.fishbase.de/Reproduction/FishReproSummary.php?ID =11275&GenusName=Dawkinsia&SpeciesName=arulius&fc=122&S tockCode=11600 https://www.fishbase.de/Reproduction/FishReproSummary.php?ID =11275&GenusName=Dawkinsia&SpeciesName=arulius&fc=122&S tockCode=11600 no records https://www.fishbase.de/summary/Dawkinsia-arulius.html | High High Medium High |
| 12 13 14 | 7.07 7.08 7.09 7.09 7.09 8.01 8.01 | Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. either 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 Yes Not applicable Yes Yes | https://www.fishbase.de/Reproduction/FishReproSummary.php?ID =11275&GenusName=Dawkinsia&SpeciesName=arulius&fc=122&S tockCode=11600 https://www.fishbase.de/Reproduction/FishReproSummary.php?ID =11275&GenusName=Dawkinsia&SpeciesName=arulius&fc=122&S tockCode=11600 no records https://www.fishbase.de/summary/Dawkinsia-arulius.html file:///C:/Users/User/Desktop/Thesis%20Ref/atkore2015.pdf | High High Medium High Very high |
| 12 13 14 | 7.07 7.08 7.09 7.09 7.09 | Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. either 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 Not applicable Yes Yes | https://www.fishbase.de/Reproduction/FishReproSummary.php?ID =11275&GenusName=Dawkinsia&SpeciesName=arulius&fc=122&S tockCode=11600 https://www.fishbase.de/Reproduction/FishReproSummary.php?ID =11275&GenusName=Dawkinsia&SpeciesName=arulius&fc=122&S tockCode=11600 no records https://www.fishbase.de/summary/Dawkinsia-arulius.html | High High Medium High |
| 12 13 14 | 7.07 7.08 7.09 7.09 7.09 8.01 8.01 | Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. either 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 Not applicable Yes Yes | https://www.fishbase.de/Reproduction/FishReproSummary.php?ID =11275&GenusName=Dawkinsia&SpeciesName=arulius&fc=122&S tockCode=11600 https://www.fishbase.de/Reproduction/FishReproSummary.php?ID =11275&GenusName=Dawkinsia&SpeciesName=arulius&fc=122&S tockCode=11600 no records https://www.fishbase.de/summary/Dawkinsia-arulius.html file:///C:/Users/User/Desktop/Thesis%20Ref/atkore2015.pdf | High High Medium High Very high |
| 12 13 14 15 | 7.07 7.08 7.09 7.09 7.09 8.01 8.01 8.02 8.02 | Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. either 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 Yes Yes | https://www.fishbase.de/Reproduction/FishReproSummary.php?ID =11275&GenusName=Dawkinsia&SpeciesName=arulius&fc=122&S tockCode=11600 https://www.fishbase.de/Reproduction/FishReproSummary.php?ID =11275&GenusName=Dawkinsia&SpeciesName=arulius&fc=122&S tockCode=11600 no records https://www.fishbase.de/summary/Dawkinsia-arulius.html file:///C:/Users/User/Desktop/Thesis%20Ref/atkore2015.pdf no data foe this question | High High Medium High Very high Medium |
| 12 13 14 15 | 7.07 7.08 7.09 7.09 7.09 8.01 8.01 | Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. either 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 Not applicable Yes Yes | https://www.fishbase.de/Reproduction/FishReproSummary.php?ID =11275&GenusName=Dawkinsia&SpeciesName=arulius&fc=122&S tockCode=11600 https://www.fishbase.de/Reproduction/FishReproSummary.php?ID =11275&GenusName=Dawkinsia&SpeciesName=arulius&fc=122&S tockCode=11600 no records https://www.fishbase.de/summary/Dawkinsia-arulius.html file:///C:/Users/User/Desktop/Thesis%20Ref/atkore2015.pdf | High High Medium High Very high |
| 42 43 3. 44 45 46 47 | 7.07 7.08 7.09 7.09 7.09 8.01 8.01 8.02 8.02 | Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. either 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 Yes Yes | https://www.fishbase.de/Reproduction/FishReproSummary.php?ID =11275&GenusName=Dawkinsia&SpeciesName=arulius&fc=122&S tockCode=11600 https://www.fishbase.de/Reproduction/FishReproSummary.php?ID =11275&GenusName=Dawkinsia&SpeciesName=arulius&fc=122&S tockCode=11600 no records https://www.fishbase.de/summary/Dawkinsia-arulius.html file:///C:/Users/User/Desktop/Thesis%20Ref/atkore2015.pdf no data foe this question | High High Medium High Very high Medium |
| 42 43 8. 44 45 46 47 | 7.07 7.08 7.09 7.09 7.09 7.09 8.01 8.01 8.01 8.02 8.03 8.04 | Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. either 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 Yes Not applicable Yes Not applicable Yes | https://www.fishbase.de/Reproduction/FishReproSummary.php?ID =11275&GenusName=Dawkinsia&SpeciesName=arulius&fc=122&S tockCode=11600 =11275&GenusName=Dawkinsia&SpeciesName=arulius&fc=122&S tockCode=11600 no records https://www.fishbase.de/summary/Dawkinsia-arulius.html file:///C:/Users/User/Desktop/Thesis%20Ref/atkore2015.pdf file:///C:/Users/User/Desktop/Thesis%20Ref/atkore2015.pdf | High High Medium High Very high Medium Very high |

| 49 | 8.06 | Are there effective natural enemies (predators) of the taxon present in the RA | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/Mutia%20et%20al% 202018.pdf | Very high |
|------|---------|---|-----------|---|-----------|
| С. | Climate | e change | | | |
| 9. (| Climate | change | | | |
| | | Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? | Increase | https://www.fishbase.de/summary/Dawkinsia-arulius.html | High |
| 51 | 9.02 | Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? | No change | https://www.fishbase.de/summary/Dawkinsia-arulius.html | 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 | https://www.fishbase.de/summary/Dawkinsia-arulius.html | 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 | https://www.fishbase.de/summary/Dawkinsia-arulius.html | High |
| 54 | 9.05 | Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? | No change | https://www.fishbase.de/summary/Dawkinsia-arulius.html | High |
| 55 | 9.06 | Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors? | No change | https://www.fishbase.de/summary/Dawkinsia-arulius.html | High |

| Statistics | |
|--|-------------|
| Scores | |
| BRA | 30.0 |
| BRA Outcome | Medium |
| BRA+CCA | 34.0 |
| BRA+CCA Outcome | Medium |
| 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 | 6.0 |
| 4. Undesirable (or persistence) traits | 4.0 |
| 5. Resource exploitation | 0.0 |
| 6. Reproduction | -1.0 |
| 7. Dispersal mechanisms | 0.0 |
| 8. Tolerance attributes | 3.0 |
| C. Climate change | 4.0 |
| 9. Climate change | 4.0 |
| Answered Questions | |
| Total | 55 |
| A. Biogeography/Historical | 13 |
| 1. Domestication/Cultivation | 3 |
| 2. Climate, distribution and introduction risk | 3 5 5 |
| 3. Invasive elsewhere | |
| B. Biology/Ecology | 36 |
| 4. Undesirable (or persistence) traits | 12 |
| 5. Resource exploitation | 2 7 9 |
| 6. Reproduction | 7 |
| 7. Dispersal mechanisms | |
| 8. Tolerance attributes | 6 |
| C. Climate change | 6 |
| 9. Climate change | 6 |
| Sectors affected | |
| Commercial | 19 |
| Environmental | 8 |
| Species or population nuisance traits | 11 |
| | |
| Thresholds | |
| BRA | 34.5 |
| BRA+CCA | 34.5 |

| BRA | 34.5 |
|---------------|--------------|
| BRA+CCA | 34.5 |
| Confidence | |
| BRA+CCA | 0.81 |
| BRA | 0.82 |
| CCA | 0.75 |
| | |
| Date and Time | |
| 02/04/2 | 020 07:59:47 |

| Taxon and Assessor details | | | | | | |
|------------------------------------|---|--|--|--|--|--|
| Category | Fishes and Lampreys (freshwater) | | | | | |
| Taxon name | Baryancistrus xanthellus | | | | | |
| Common name | golden nugget pleco | | | | | |
| Assessor | Gilles, Pavia | | | | | |
| Risk screening context | | | | | | |
| Reason and socio-economic benefits | Ornamental | | | | | |
| Risk assessment area | Lake Taal | | | | | |
| Taxonomy | Order - Suliriformes Family - Loricariidae | | | | | |
| Native range | South America | | | | | |
| Introduced range | No Data | | | | | |
| URL | https://www.fishbase.se/summary/Baryancistrus-xanthellus.html | | | | | |

| | | | Response | Justification (references and/or other information) | Confidence |
|------|------|--|----------|---|------------|
| | | graphy/Historical | | | |
| 1.1 | | rication/Cultivation | 1 | | · · · · |
| 1 | 1.01 | Has the taxon been the subject of domestication (or cultivation) for at least 20 | Yes | Yes, based on Py-Daniel et al., (2011) this fishes are popular in the aquarium trade | High |
| 2 | 1.02 | generations? Is the taxon harvested in the wild and likely to be sold or used in its live form? | Yes | The taxon is the major component of fish catch in the Philippine waters but the fish has very little value as food fish since the flesh tastes bitter. It may be used, however, as a source of fish meal | High |
| 3 | 1.03 | Does the taxon have invasive races, varieties, sub-taxa or congeners? | No | and for ornamental industry (Cagauan, 2007). This taxon has no invasive histroty, although species P. multiradiatus, P. pardalis and P. disjunctivus have been so far recorded as exotic in Mesoamerica – Puerto Rico and Mexico (8, 12); in North America: southern United States – Florida, Texas, Washington and North Carolina, as well as at Hawaii islands (10, 11, 19, 18, 20); in Philippines and south-eastern Asia: peninsular Malaysia, Singapore, Taiwan, Java and Sumatra (22). In all those recipient areas recorded so far, the aquarists were assigned responsible for their releasing into natural ecosystems and subsequent establishment (Simonović, Nikolić, and Gruiić, 2014). | High |
| 2. (| | , distribution and introduction risk | 1. | | T |
| 4 | 2.01 | How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range? | LOW | The taxon's native range (Brazuil) has different climatic conditions in the Philippines which is a tropical climate (Peel et al., 2007) | High |
| 5 | 2.02 | What is the quality of the climate matching data? | High | The taxon's native range (Amazon) falls under the same climatic conditions in the Philippines which is a tropical climate (Peel et al., 2007) | High |
| 6 | 2.03 | Is the taxon already present outside of captivity in the RA area? | Yes | The taxon was found and collected from five sites in and around the Laguna de Bay basin: Marikina River in Marikina and Pasig Cities; Pasig River in the City of Manila; Catmon Creek in Bay, Laguna; Banilad Creek in Siniloan, Laguna; and Laguna de Bay in San Pedro, Laguna (Chavez et al., 2006). | High |
| 7 | 2.04 | How many potential vectors could the taxon use to enter in the RA area? | >1 | They were probably introduced through an intentional release and possibly fish farm escapes upstream (near Davao) between the 2002 and 2005 (Hubilla et al, 2007). Moreover, local aquarium dealers have used its local moniker that a janitor fish cleans up - as a selling point, wherein anecdotal reports say that the misconception might have also be a reason for the high incidence of these specimens particularly in the Marikina and Pasig rivers | 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)? e elsewhere | No | There is no current report on the taxon found in close proximity. However, taxon can enter the RA intentionally because of its abundant ornamental use and unintentionally through aquarium escape during natural calamities like flooding which the RA area is prone (Brändlin & Wingard 2013: CABI, 2015) | High |
| 0.1 | | Has the taxon become naturalised | No | No report on the establishedment of the taxon, however related | High |
| 7 | 3.01 | (established viable populations) outside its native range? | | No report on the establishedment of the taxon, however related taxon P. disjunctivus and P. pardalis are also seen in Singapore waterways, with the former also found in Taiwan and the latter found as well in the canals and sewer system of Indonesia and the Red River of Northern Vietnam (Levin et al., 2008). In addition, "they have established populations and displaced indigenous fish and invertebrate communities" in Mexico, Puerto Rico and the United States (Soriano & Valleio, Jr., 2011) | High |
| 10 | 3.02 | In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? | No | No report currently on the umpact of introduction. However, the rapid increase of similar species (Pterygloplchthys) has affected the livelihood and fishing operation of the fisherfolk which led to a decrease in marketable catch of endemic and commercial fish species due to its predominance in gill net and fish corral catch. (Chavez et al., 2006) | High |
| 11 | 3.03 | In the taxon's introduced range, are there known adverse impacts to aquaculture? | No | There are no current adverse impact on aquaculture but related taxon based on the findings of the study, therelated taxon in the Agusan Marsh are considered threat to freshwater biodiversity (Hubilla et al., 2006). Also, there are records that related taxon caused scarcity of nutrient resources, alter food webs, increase turbidity and cause bank erosion due to their nest building activity, and physically inhibit other aquatic organisms specially | High |

| 12 | 3.04 | In the taxon's introduced range, are there known adverse impacts to ecosystem services? | No | There are no current adverse impact on aquaculture but related taxon based on the findings of the study, therelated taxon in the Agusan Marsh are considered threat to freshwater biodiversity (Hubilla et al., 2006). Also, there are records that related taxon caused scarcity of nutrient resources, alter food webs, increase turbidity and cause bank erosion due to their nest building activity, and physically inhibit other aquatic organisms specially | High |
|------|---------|---|-----|---|-----------|
| 13 | 3.05 | In the taxon's introduced range, are there known adverse socio-economic impacts? | No | There are no current adverse impact on aquaculture but related taxon based on the findings of the study, therelated taxon in the Agusan Marsh are considered threat to freshwater biodiversity (Hubilla et al., 2006). Also, there are records that related taxon caused scarcity of nutrient resources, alter food webs, increase turbidity and cause bank erosion due to their nest building | High |
| B. I | Biology | //Ecology | | activity, and physically inhibit other aquatic organisms specially | |
| | | able (or persistence) traits | 1 | | |
| 14 | 4.01 | Is it likely that the taxon will be poisonous or pose other risks to human health? | Νο | There is no current report on B. xanthelulus have impact or threats on human. However some related taxon has Bioaccumulation of coliform bacteria and heavy metals, as well as vector of parasites, has been recorded on related species. In which if eaten will lead to potential contamination and infection | High |
| 15 | 4.02 | Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? | No | Related taxon shows impacts on displacement of local species through resource competition such as indirect food competition which reduces the food resources like aquatic insects and vegetation and direct habitat competition because of high biomass of their populations (Orfinger & Goodding, 2018). But B. | High |
| 16 | 4.03 | Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? | No | xanthellus has no recorded impact that affects native taxa. This is very unlikely to happen considering the feeding guild and morphology of the taxon (Hubilla et al., 2007; Levin et al., 2008). | 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 | Family of these taxon has a protected and modified scales and by strong spines on the fins and because they show a high tolerance to low oxygen concentrations or desiccation (up to 20 hours). The latter ability can be attributed to an enlarged and vascularized stomach, which functions as an accessory respiratory organ (Jasso et al., 2013). Also, they are commonly found in shallow freshwater environments, but some members of the Family Loricariidae: Pterygoplichthys which are considered to be strictly freshwater, have already established invasive populations in inland waters with mesohaline conditions, such as in North and Central America, Asia, Caribbean islands, Pacific and Indian oceans and in South-Fastern Mexico due to their high salinity. | 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 | B. xanthellus has no recorded effect on food we structure however being closely related to other plecos their burrowing behavior in river banks may contribute to water turbidity and soil erosion. High water turbidity alters the amount of light that can pass down through the water column, and thus, slows down photosynthesis and primary productivity. (Hubilla et al., 2006) | High |
| 19 | 4.06 | Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? | No | There are no records that this taxon caused scarcity of nutrient resources, alter food webs, increase turbidity and cause bank erosion due to their nest building activity, and physically inhibit other aquatic organisms specially local fishes (CABI, 2015). | High |
| 20 | 4.07 | Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA area? | No | There are no reports that the taxon may carry pests or infectious agents that are endemic in Lake Taal (Nitta and Nagasawa, 2013; Nitta and Nagasawa, 2016; Rodríguez-Santiago et al., 2016; Cardoso et al., 2017). | 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 | There are no reports that the taxon can be a host for several parasites which are not yet recorded in Lake Taal (Nitta and Nagasawa, 2013; Nitta and Nagasawa, 2016; Rodríguez-Santiago et al., 2016; Cardoso et al., 2017). | High |
| | 4.09 | Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity? | No | The size range for most of the adult species in the Loricariid family is 30–50 cm, but individuals have been observed to reach 70 cm (IUCN, 2010). While the max published weight: 310.00 g (Junawan and Seronay, 2017). Accidental release of Pterygoplichthys spp. has been documented, such as when typhoon Rosing struck the Philippines resulting in escape of the fish from commercial farms. Also, they are very common aquarium fish around the world. Nearly all of their introduced populations are caused by pet release or aquaculture escape | 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 | The taxon was collected from medium-velocity rivers no more than two meters deep near the river banks (Chavez, et al., 2006; Magalhaes et al, 2021) | High |
| 24 | 4.11 | Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa? | No | The only recorded effect is pollution of the water by overfeeding in an aquarium setting, however in the wilr, this is not likely to happened. | 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)? e exploitation | No | The taxon can maintain viable population under low density condition which is reported in the Chacamax River, Chiapas, Mexico (Capps and Flecker, 2015). However, there is no recorded established population from this species based on FishBase. | High |
| | 5.01 | Is the taxon likely to consume threatened or protected native taxa in the RA area? | No | This taxon feeds primarily on benthic algae, detritus, various plant matter, worms, insect larvae, fish eggs and other bottom-dwellers which do not fall under threatened or protected status in the RA area. (IUCN, 2010). | High |

| | 1 | | 1 | | |
|------|----------|--|----------------|--|--------|
| 27 | 5.02 | Is the taxon likely to sequester food | Yes | Food competition by the said taxa, in which it reduces the food | High |
| | | resources (including nutrients) to the | | resources such as aquatic insects and vegetation in the area, can | |
| 6 5 | Reprodu | detriment of native taxa in the RA area? | | be detrimental to the native taxa (Orfinger & Goodding, 2018). | |
| | | Is the taxon likely to exhibit parental care | No | No record shows that this taxa has parental care, however Similar | High |
| | | and/or to reduce age-at-maturity in response | | taxa species exhibits parental care through building nests, given | 5 |
| | | to environmental conditions? | | that their found habitat lacks predator and exploitation (Jasso et | |
| 29 | 6.02 | Is the taxon likely to produce viable gametes | Yes | this taxon can likely produce viable gametes in the RA area (Jasso | High |
| 20 | 6.00 | or propagules (in the RA area)? | | et al., 2013; CABI, 2015) | |
| 30 | 6.03 | Is the taxon likely to hybridise naturally with native taxa? | No | There is no native taxa present in the RA area where the taxon can hybridise (Papa and Mamaril, 2011). | High |
| 31 | 6.04 | Is the taxon likely to be hermaphroditic or to | No | The taxon mates through external fertilization, where the female | High |
| 51 | 0.01 | display asexual reproduction? | 110 | deposits eggs on smooth rocks, depressions or burrows in the | ingn |
| | | | | river bank. The eggs are then fertilized by the male. Afterwards, | |
| | | | | the eggs are guarded by one or both parents. In captivity, the | |
| | | | | most successful breedings have occurred in ponds with steep clay | |
| | | | | or mud banks. The fish dig tunnels close to the water level and | |
| 32 | 6.05 | Is the taxon dependent on the presence of | No | the males quard the eqqs until they hatch. (Jumawan et al. 2014) The taxon does not depend on other taxa and or other means to | High |
| 52 | 0.05 | another taxon (or specific habitat features) | 110 | complete lifecycle (Power, 2003). | riigii |
| | | to complete its life cycle? | | | |
| 33 | 6.06 | Is the taxon known (or likely) to produce a | No | the spawning season which happens from March to September. | High |
| | | large number of propagules or offspring | | Also, they exhibit extended spawning season which extends for | |
| | 6.07 | within a short time span (e.g. < 1 year)? | | more than 5 months during the warm rainy season (CABI, 2015) | |
| 34 | 6.07 | How many time units (days, months, years) | NOT applicable | no record found fot this question. | Medium |
| | | does the taxon require to reach the age-at- first-reproduction? | | | |
| 7. E | Dispersa | al mechanisms | | | |
| | | How many potential internal | >1 | The taxon can enter the RA through natural dispersal and its | High |
| | | vectors/pathways could the taxon use to | | success is increased because of its environmental tolerances. Also, | |
| | | disperse within the RA area (with suitable | | it can be dispersed intentionally because of its abundant | |
| | | habitats nearby)? | | ornamental use and unintentionally through aquarium escape | |
| | | | | during natural calamities like flooding which the RA area is prone (Brändlin & Wingard 2013: CABI, 2015) | |
| 36 | 7.02 | Will any of these vectors/pathways bring the | No | The taxon can enter the RA through natural dispersal and its | High |
| | | taxon in close proximity to one or more | | success is increased because of its environmental tolerances. Also, | 5 |
| | | protected areas (e.g. MCZ, MPA, SSSI)? | | it can be dispersed intentionally because of its abundant | |
| | | | | ornamental use and unintentionally through aquarium escape | |
| | | | | during natural calamities like flooding which the RA area is prone | |
| 37 | 7.03 | Does the taxon have a means of actively | No | (Brändlin & Wingard 2013; CABI, 2015) However related taxa has modified mouth allows the taxon to | High |
| 57 | 7.05 | attaching itself to hard substrata (e.g. ship | NO | feed, breathe, and attach to the substrate through suction | riigii |
| | | hulls, pilings, buoys) such that it enhances | | (CABI,2015). | |
| | | the likelihood of dispersal? | | | |
| 38 | 7.04 | Is natural dispersal of the taxon likely to | No | In the case of an invasive species such as P. pardalis, accidental | High |
| | | occur as eggs (for animals) or as propagules | | release of eggs and juveniles may result in assured higher | |
| 20 | 7.05 | (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to | No | survival rates in the wild (Jumawan et al., 2014). In the case of an invasive species such as P. pardalis, accidental | High |
| 22 | 7.05 | occur as larvae/juveniles (for animals) or as | NO | release of eggs and juveniles may result in assured higher | riigii |
| | | fragments/seedlings (for plants) in the RA | | survival rates in the wild (Jumawan et al., 2014). | |
| | | area? | | | |
| 40 | 7.06 | Are older life stages of the taxon likely to | No | This taxon are generally nocturnal and non-migratory (CABI, | High |
| 4 1 | 7 07 | migrate in the RA area for reproduction? | No | 2015). | Hiab |
| 41 | 7.07 | Are propagules or eggs of the taxon likely to | No | Because this taxon exhibits parental care through building nests, | High |
| | | be dispersed in the RA area by other animals? | | given that their found habitat lacks predator and exploitation (Jasso et al., 2013). | |
| 42 | 7.08 | Is dispersal of the taxon along any of the | No | This taxon can quickly migrate to reach new bodies of water, this | High |
| | | vectors/pathways mentioned in the previous | | is enabled by their ability to hold into solid substrates using their | |
| | | seven questions (35-41; i.e. either | | sucker mouth, beating of pelvic fins, and hooking and bracing | |
| 1- | 7.00 | unintentional or intentional) likely to be | | using their studded spines of the pectoral fins (CABI, 2015) | |
| 43 | 7.09 | Is dispersal of the taxon density dependent? | No | Nest distribution and relationships between nest size and shell | High |
| | | | | content in the sediment suggest that nest site selection and nest size are determined by the shell availability in the sediment. (Ochi | |
| | | | | & Yanagisawa, 2001) | |
| 8. 7 | | ce attributes | | | |
| 44 | 8.01 | Is the taxon able to withstand being out of | No | Members of this taxon also have the ability to breathe air and are | High |
| | | water for extended periods (e.g. minimum of | | able to survive up to 30 h out of water (Val and De Almeida-Val, | |
| | | one or more hours) at some stage of its life | | 1995). Pterygoplichthys and many other loricariids are facultative | |
| | | cycle? | | air-breathers, able to persist indefinitely in hypoxic conditions and even able to survive out of water for many hours (Graham, 1997) | |
| 45 | 8.02 | Is the taxon tolerant of a wide range of | No | no record found for B. xanthellus however related taxa can | High |
| | | water quality conditions relevant to that | - | tolerate water pollution, low oxygen levels, and elevated salinity | |
| | | taxon? [In the Justification field, indicate the | | (Capps et al., 2011; Özgür et al., 2016) | |
| | | relevant water quality variable(s) being | | | |
| 46 | 8.03 | Can the taxon be controlled or eradicated in | No | no record found for B. xanthellus however on related taxa a | High |
| | | the wild with chemical, biological, or other | | successful eradication through human intervention was done in | |
| | | agents/means? | | the Rainbow River, Florida USA (Hill and Sowards, 2015). Also, a preliminary study of the potential eradication of P. pardalis by | |
| | | | | three native Thai piscivorous species yielded interesting results. | |
| | | | | Demersal species such as H. wyckioides and O. marmorata could | |
| | | | | more effectively eliminate P. pardalis than other native species | |
| | | | | such as P. sanitwongsei. In particular, H. wyckioides was the most | |
| | 1 | | | effective consumer of P. pardalis, as it could efficiently ingest | 1 |
| | | | | | |
| | | | | individuals up to 10 cm in length. Pterygoplichthys pardalis longer than 10 cm can stretch out their body fins, preventing H. | |

| 47 | 8.04 | Is the taxon likely to tolerate or benefit from environmental/human disturbance? | No | no record found for B. xanthellus however related taxa can is tolerant of (and likely to benefit from) eutrophication and other forms of aquatic disturbance, as evidenced by their occurrence in | High |
|------|--------|---|-----------|---|------|
| | | | | nutrient-rich Lake Thonotosassa and Lake Maggiore, Florida and Nong Yai Canal, East Thailand (Hoover et al., 2004; Chaichana et | |
| 48 | 8.05 | Is the taxon able to tolerate salinity levels that are higher or lower than those found in | No | No record found for B. xanthllus however related Taxon can tolerate elevated salinity (Capps et al., 2011). | High |
| | | its usual environment? | | tolerate elevated samity (Capps et al., 2011). | |
| 49 | 8.06 | Are there effective natural enemies | No | Based on the list of fish species present in lake Taal (Papa and | High |
| | | (predators) of the taxon present in the RA area? | | Mamaril, 2011), there is none that could possibly prey on the taxon being assessed. | |
| С. С | Climat | e change | | | |
| | | change | | | |
| 50 | 9.01 | Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? | Increase | Lake Taal is close but completely isolated from Laguna de Bay and other rivers in Luzon Island where Pterygoplichthys spp. were recorded and thus may only require accidental and/or intentional vectors of introduction, together with the fact that the RA area is | High |
| | 0.02 | | | prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) the risk of entry through accidental release from aguarium would most likely increase the risk of entry of this | |
| - | 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 | As a fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) the risk of dispersal through accidental release from aquarium together with their fitness to counter act environmental disturbances, this would most likely increase the risk of establishment of this 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 | As a fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) the risk of dispersal through accidental release from aquarium together with their fitness to counter act environmental disturbances, this would most likely increase the dispersal of this taxon. | 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 | Since they can survive the future climatic conditions of the RA area, this taxon can cause increased scarcity of nutrient resources, alter food webs, increase turbidity and cause bank erosion due to their nest building activity which alters the amount of light that can pass down through the water column, and thus, slows down photosynthesis and primary productivity which physically inhibit other aquatic organisms specially the local fishes. | 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 | Since they can survive the future climatic conditions of the RA area, this taxon can cause increased scarcity of nutrient resources, alter food webs, increase turbidity and cause bank erosion due to their nest building activity which alters the amount of light that can pass down through the water column, and thus, slows down photosynthesis and primary productivity which physically inhibit other aquatic organisms specially the local fishes. | 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 | As this taxon can survive the future climatic conditions of the RA area and can establish viable population on it, it can pose a huge impact on the ecosystem services and socio-economic factors of the RA area by competing on the existence of the local species which would eventually replace their existence in the RA area, thus affecting the livelihood services and the genetic diversity of the ecosystem in the area. | High |

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

| Sectors affected | | | |
|---------------------------------------|------|--|--|
| Commercial | 8 | | |
| Environmental | 5 | | |
| Species or population nuisance traits | 2 | | |
| | | | |
| Thresholds | | | |
| BRA | 34.5 | | |
| BRA+CCA | 34.5 | | |
| Confidence | | | |
| BRA+CCA | 0.75 | | |
| BRA | 0.74 | | |
| CCA | 0.75 | | |
| | | | |
| Date and Time | | | |
| 11/02/2023 16:29:0 | | | |

| Taxon and Assessor details | | | | | |
|------------------------------------|---|--|--|--|--|
| Category | Fishes and Lampreys (freshwater) | | | | |
| Taxon name | Carassius auratus | | | | |
| Common name | goldfish | | | | |
| Assessor | Gilles | | | | |
| Risk screening context | | | | | |
| Reason and socio-economic benefits | Aquarium:Commercial | | | | |
| Risk assessment area | Lake Taal | | | | |
| Taxonomy | Actinopteri (ray-finned fishes) > Cypriniformes (Carps) > Cyprinidae (Minnows or carps) > | | | | |
| Native range | central Asia and China | | | | |
| Introduced range | Many parts of Asia including Philippines | | | | |
| URL | https://www.fishbase.se/summary/Carassius-auratus.html | | | | |

| pose other risks to human health?toxins that can contaminate drinking water which can poison humans (IUCNGSID, 2019).154.02Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?YesThis taxon eat snails, small insects, fish eggs and young fish, making this species a competitor with and predator of native fish. Also, they stir up mud and other matter when they feed, which increases the cloudiness of the water and affects the growth of aquatic plants and lastly, it can carry diseases such as koi herpesvirus that can harm local fish populations (Ontario Invading that the non-native taxon would parasitise in the RA area?YesConsidering their feeding habits, wherein this taxon consumes eggs and larvae of other fishes, and the fact that there are already records that it has predated and competed with threatended species (CABI, 2019; Ontario Invading Species AwarenessVery high174.04Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it hasYesThis taxon making them a habitat generalist. Also, they are capable of securing and ingesting a wide range of food and theyVery high | | | | Response | Justification (references and/or other information) | Confidence |
|---|------|----------|--|----------------|---|------------|
| 1 1.0.1 Has the taxon beam the subject of domain of the subject of domain of the subject of domain of the subject of a valid variety of colours and fin shapes. These fish usually revert to olive-branze wild countation and universemental purposes. These fish usually revert to olive-branze wild countation and universemental 2000). 2 1.0.2 Is the taxon harvested in the wild and likely varieties and finance and both America and purposes. Were high to be invosive in carently unposed wild to be invosive in carently unposing is the Carent subject of the countree varieties (CAB). 2.0 Broke, distribution and introduction rak. The taxon is now present in pet stoses for onnamental use, such as in Cartinar Market where importation and sale of this taxon is indexed wrong in the country's native species (CAB). 2.0 Broke, distribution and introduction rak. The taxon is now present in pet stose for onnamental use, such as in Cartinar Market where importation and sale of this taxon is indexide and present in pet stose for onnamental use, such as in Cartinar Market where importation and sale of this taxon is indexident or used with human intervention and aquarium escape. Were high Adap 7 2.0.4 How many potential vectors could the taxon is indexident or used with human intervention and aquarium escape. Were high the taxon is not exception of the taxon is indexident or used with human intervention and aquarium escape. Were high with human intervention and aquarium escape. 7 2.0.4 How many potential vectors could the taxon is indexident or used with human intervention and aquarium escape. Were high dadap | | | | | | |
| domestication (or cultivation) for at least 20 generations? selective breading for a wile variety of coluration and normal in shapes. If reliased from captivity (McGoull, 2000). 2 1.02 is the taxon harvested in the wild and likely varieties, sub-taxo or congeners? Yes The taxon has been harvested in the wild for omamerial purposes (Mercenter taxon) Very high the taxon's harvested reliant conditions of the varieties, sub-taxo or congeners? Yes 2 Commet, distribution and informations of the varieties, sub-taxo or congeners? Yes The fax are and the taxon's information and informations. High the fax area and the taxon's highly absorbed High the fax area and the taxon's highly absorbed High the fax area and the taxon's highly absorbed Yes The taxon is native Call, 2010) Wery high as in Cartinar Minet taxon is attive Call, 2010) Yer high as in Cartinar Minet taxon is attive Call, 2010) Yer high as in Cartinar Minet taxon is attive taxon is highly abundant. Yes The taxon is native Call, 2010) Yer high as in Cartinar Minet taxon is attive taxon is attive taxon is highly abundant. Yes 7 2.04 How many potential vectors sould the taxon is highly abundant. Yes Yes The taxon could be introduced through intertional intraduction highly abundant. High area in the near future (e.g. unintervention and squartum escape. Low 7 2.04 How many potential | 1. E | | | | | |
| generations? These fish usually revert to olive-bronze with (McCowall, 2000). 2 1.02 Is the taxon harwested in the wild and likely to some castivity (McCowall, 2000). Yes 3 1.03 Does the taxon harwested in the wild reduce to reagenes? Yes The taxon has been harvested in the wild room castivity (McCowall, 2000). Yes high taxon has been harvested in the wild room castivity (McCowall, 2000). 2 One concrete example is the Carassias pileton, which is condered Very high taxon has been harvested in the control of the pileton is the control of the pileton is the same part of the continent (Southeast Very high classias pileton in the same part of the continent (Southeast Very high classias pileton in the same part of the continent (Southeast Very high classias pileton is tables (CABL, 2002) 2 What is the quality of the dimate matching if the very high as the taxon is highly abunes the same part of the continent (Southeast Very high classias (CABL, 2002) 2 2.04 Hex hares P Yes The taxon could be introduced through intervalue (Southeast Very high highly abunes the same part of the continent (Southeast Very high highly abunes the same part of the continent (Southeast Very high highly abunes the same part of the continent (Southeast Very high highly abunes the same part of the continent (Southeast Very high highly abunes the same part of the continent (Southeast Very high highly abunes the same part of the continent (Southeast Very high highly abunes the same part of the continent (Southeast Very high highly abunes the same part of the same part of the same part of the same | 1 | 1.01 | Has the taxon been the subject of | Yes | Many different varities of goldfish have been produced, through | Very high |
| Image: Instruction Instruction <t< td=""><td></td><td></td><td>domestication (or cultivation) for at least 20</td><td></td><td></td><td></td></t<> | | | domestication (or cultivation) for at least 20 | | | |
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| 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 Since this species can stimulate algal blooms which can realease toxins that can contaminate drinking water which can poison humans (IUCNGSID, 2019). Very high 15 4.02 Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Yes This taxon eat snails, small insects, fish eggs and young fish, Also, they stir up mud and other matter when they feed, which increases the cloudiness of the water and affects the growth of aquatic plants and lastly, it can carry diseases such as koi herpesvirus that can harm local fish populations (Ontario Invading the RA area? Yes Considering their feeding habits, wherein this taxon consumes eggs and larvae of other fishes, and the fact that there are already records that it has predated and competed with threatended species (CABI, 2019; Ontario Invading Species Awareness Very high 17 4.04 Is the taxon adaptable in terms of climatic enhancing its potential persistence if it has Yes This taxon high adaptability to different environmental conditions, thus enhancing its potential persistence if it has Yes This taxon has a high adaptability to different environmental conditions, thus enhancing its potential persistence if it has Yes This taxon has a high adaptability to different environmental conditions, thus enhancing its potential persistence if it has Yes This taxon has a high adaptability to diffe | | | known adverse socio-economic impacts? | | | |
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| Image: section of the section of th | | | | | | |
| aquatic plants and lastly, it can carry diseases such as koi aquatic plants and lastly, it can carry diseases such as koi herpesvirus that can harm local fish populations (Ontario Invading that the non-native taxon would parasitise in the RA area? very high that the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has | | | protected)? | | | |
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| and other environmental conditions, thus enhancing its potential persistence if it has capable of securing and ingesting a wide range of food and they | | | | | | |
| enhancing its potential persistence if it has capable of securing and ingesting a wide range of food and they | 17 | 4.04 | Is the taxon adaptable in terms of climatic | Yes | This taxon has a high adaptability to different environmental | Very high |
| | | | | | conditions making them a habitat generalist. Also, they are | |
| | | | | | capable of securing and ingesting a wide range of food and they | |
| invaded or could invade the RA area? are long lived (CABI, 2019) | | | invaded or could invade the RA area? | | are long lived (CABI, 2019) | |

| 18 | | | | | |
|-------------------------|---------------------------------|---|----------------|---|--------------------------------|
| 10 | 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 | Considering their feeding habits, wherein this taxon consumes eggs and larvae of other fishes, small fishes, crustaceans and insects and their ability to stimulate algal blooms which can affect other species, as well as in increasing water turbidity which can | High |
| | | | | deplete aquatic vegetation (IUCNGSID, 2019) | |
| 19 | 4.06 | Is the taxon likely to exert adverse impacts | Yes | This taxon can potentially cause major impact to the aquaculture | Very high |
| 20 | 4.07 | on ecosystem services in the RA area? | | services of the RA area due to its physiological characteristics. | |
| 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 | There are no reports that the taxon may carry pests or infectious agents that are endemic in Lake Taal. | High |
| 21 | 4.08 | Is it likely that the taxon will host, and/or | Yes | This taxon can carry diseases such as the koi herpesvirus that can | High |
| | | act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area? | | harm local fish populations (Ontario Invading Species Awareness Program, 2019) | |
| 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 | Ths taxon can reach a large body size, having a maximum length of 48 cm (Fish Base,2019) | 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 | They can only live in rivers, lakes, ponds, lagoons and ditches with stagnant or slow-flowing water (IUCNGSID, 2019) | High |
| 24 | 4.11 | Is it likely that the taxon's mode of existence | Yes | The passage of cyanobacteria through the goldfish intestine | Very high |
| | | (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa? | | stimulates cyanobacterial growth, which may result in algal blooms occurring. The bottom-sucking feeding methods of goldfish can also contribute towards algal blooms by re-suspending nutrients, which makes them available to algae (Morgan & Beatty, 2004). Goldfish have also been known to prey upon the eggs, larvae and adult of native fishes (Morgan & Beatty, 2004), as well as increasing water turbidity and depleting aguatic vegetation | |
| 25 | 4.12 | Is the taxon likely to maintain a viable population even when present in low | Yes | This taxon has a high adaptability to different environmental conditions making them a habitat generalist. Also, they are | High |
| | | densities (or persisting in adverse conditions | | capable of securing and ingesting a wide range of food and they | |
| F 1 | Pocour | by way of a dormant form)? | | are long lived (CABI, 2019) | |
| | 5.01 | te exploitation Is the taxon likely to consume threatened or | Yes | Considering their feeding habits, wherein this taxon consumes | Very high |
| | | protected native taxa in the RA area? | | eggs and larvae of other fishes, and the fact that there are already records that it has predated and competed with threatended species (CABI, 2019; Ontario Invading Species Awareness | · · · · · · · · · · |
| 27 | 5.02 | Is the taxon likely to sequester food | Yes | The bottom-sucking feeding methods of goldfish can cause algal | Very high |
| | | resources (including nutrients) to the | | blooms by re-suspending nutrients, which makes them available | |
| <i>с</i> 1 | | detriment of native taxa in the RA area? | | to algae and is harmful to other fishes (Morgan & Beatty, 2004). | |
| | Reprodu | Is the taxon likely to exhibit parental care | No | The taxon does not exhibit any parental care, they just deposit | Very high |
| | | and/or to reduce age-at-maturity in response to environmental conditions? | | their eggs to vegetations or any surface (Fish Base, 2019) | |
| 29 | 6.02 | Is the taxon likely to produce viable gametes or propagules (in the RA area)? | Yes | The conditions of the RA meets the required conditions for maturation and reproduction of this taxon, which will enable it to produce a viable gametes (Fish Base, 2019) | High |
| 30 | 6.03 | Is the taxon likely to hybridise naturally with native taxa? | Yes | There are already records of different hybrid forms of this taxon (IUCNGSID, 2019) | High |
| 31 | 6.04 | Is the taxon likely to be hermaphroditic or to | No | There are no documented evidence of hermaphroditism/asexual reproduction of this species. | High |
| 32 | 6.05 | display asexual reproduction? | | reproduction of this species. | 5 |
| | 0.05 | display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) | No | This taxon only requires a substrate where they can lay their eggs and mature (Fish Base, 2019) | Very high |
| | | Is the taxon dependent on the presence of | No | This taxon only requires a substrate where they can lay their eggs | Very high |
| 33 | | Is the taxon dependent on the presence of another taxon (or specific habitat features) | No Yes | This taxon only requires a substrate where they can lay their eggs and mature (Fish Base, 2019) Spawning occurs in shallow water amongst weeds, and up to several hundred thousand small eggs (1-2mm diameter) are laid at once (McDowall, 2000). Individual fish can spawn 3-10 lots of eggs at intervals of 8-10 days. Cold water during winter is | - |
| | | 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- | | This taxon only requires a substrate where they can lay their eggs and mature (Fish Base, 2019) Spawning occurs in shallow water amongst weeds, and up to several hundred thousand small eggs (1-2mm diameter) are laid at once (McDowall, 2000). Individual fish can spawn 3-10 lots of | Very high |
| 34 | 6.06 | Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? | Yes | This taxon only requires a substrate where they can lay their eggs and mature (Fish Base, 2019) Spawning occurs in shallow water amongst weeds, and up to several hundred thousand small eggs (1-2mm diameter) are laid at once (McDowall, 2000). Individual fish can spawn 3-10 lots of eggs at intervals of 8-10 days. Cold water during winter is essential for proper ova development (FishBase, 2004). This taxon reaches the age of maturity at 1-2 years old (Fish | Very high Very high |
| 34 <i>7. [</i> | 6.06 | Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms | Yes | This taxon only requires a substrate where they can lay their eggs and mature (Fish Base, 2019) Spawning occurs in shallow water amongst weeds, and up to several hundred thousand small eggs (1-2mm diameter) are laid at once (McDowall, 2000). Individual fish can spawn 3-10 lots of eggs at intervals of 8-10 days. Cold water during winter is essential for proper ova development (FishBase, 2004). This taxon reaches the age of maturity at 1-2 years old (Fish | Very high Very high High |
| 34 <i>7. [</i> | 6.06 6.07 Dispers | Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? | Yes | This taxon only requires a substrate where they can lay their eggs and mature (Fish Base, 2019) Spawning occurs in shallow water amongst weeds, and up to several hundred thousand small eggs (1-2mm diameter) are laid at once (McDowall, 2000). Individual fish can spawn 3-10 lots of eggs at intervals of 8-10 days. Cold water during winter is essential for proper ova development (FishBase, 2004). This taxon reaches the age of maturity at 1-2 years old (Fish Base, 2019) The taxon can enter the RA area through natural dispersal and its succes is increased because of its broad environmental tollerences. Also, it can be dispersed intentionally because of its abundant ornamental use and unintentionally through aquarium escape during natural calamities (flooding) which the RA area is | Very high Very high |
| 34 <u>7. l</u> 35 | 6.06 6.07 Dispers | 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 | Yes | This taxon only requires a substrate where they can lay their eggs and mature (Fish Base, 2019) Spawning occurs in shallow water amongst weeds, and up to several hundred thousand small eggs (1-2mm diameter) are laid at once (McDowall, 2000). Individual fish can spawn 3-10 lots of eggs at intervals of 8-10 days. Cold water during winter is essential for proper ova development (FishBase, 2004). This taxon reaches the age of maturity at 1-2 years old (Fish Base, 2019) The taxon can enter the RA area through natural dispersal and its succes is increased because of its broad environmental tollerences. Also, it can be dispersed intentionally because of its abundant ornamental use and unintentionally through aquarium | Very high Very high High |
| 34 <u>7. l</u> 35 | 6.06 6.07 0ispers 7.01 | 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)? | Yes 1 >1 | This taxon only requires a substrate where they can lay their eggs and mature (Fish Base, 2019) Spawning occurs in shallow water amongst weeds, and up to several hundred thousand small eggs (1-2mm diameter) are laid at once (McDowall, 2000). Individual fish can spawn 3-10 lots of eggs at intervals of 8-10 days. Cold water during winter is essential for proper ova development (FishBase, 2004). This taxon reaches the age of maturity at 1-2 years old (Fish Base, 2019) The taxon can enter the RA area through natural dispersal and its succes is increased because of its broad environmental tollerences. Also, it can be dispersed intentionally because of its abundant ornamental use and unintentionally through aquarium escape during natural calamities (flooding) which the RA area is prone to (CABI, 2019) The taxon can enter the RA area through natural dispersal and its succes is increased because of its broad environmental tollerences. Also, it can be dispersed intentionally because of its abundant ornamental use and unintentionally through aquarium escape during natural calamities (flooding) which the RA area is prone to (CABI, 2019) | Very high Very high High |
| 34 35 36 37 | 6.06 6.07 0ispers 7.01 | 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 | Yes 1 >1 | This taxon only requires a substrate where they can lay their eggs and mature (Fish Base, 2019) Spawning occurs in shallow water amongst weeds, and up to several hundred thousand small eggs (1-2mm diameter) are laid at once (McDowall, 2000). Individual fish can spawn 3-10 lots of eggs at intervals of 8-10 days. Cold water during winter is essential for proper ova development (FishBase, 2004). This taxon reaches the age of maturity at 1-2 years old (Fish Base, 2019) The taxon can enter the RA area through natural dispersal and its succes is increased because of its broad environmental tollerences. Also, it can be dispersed intentionally because of its abundant ornamental use and unintentionally through aquarium escape during natural calamities (flooding) which the RA area is prone to (CABI, 2019) The taxon can enter the RA area through natural dispersal and its succes is increased because of its broad environmental tollerences. Also, it can be dispersed intentionally because of its abundant ornamental use and unintentionally because of its succes is increased because of its broad environmental tollerences. Also, it can be dispersed intentionally because of its abundant ornamental use and unintentionally because of its | Very high Very high High |

| 20 | | | | | |
|------------|---------|---|------------------|---|--------------|
| 39 | 7.05 | Is natural dispersal of the taxon likely to | Yes | Since this taxon attahes their eggs to substares, it is possible for | High |
| | | occur as larvae/juveniles (for animals) or as | | it to be dispersed by water currents (Fish Base, 2019) | |
| | | fragments/seedlings (for plants) in the RA | | | |
| | | area? | •• | | |
| 40 | 7.06 | Are older life stages of the taxon likely to | No | This taxon does not have migratory characteristics (Fish Base, | Very high |
| 11 | 7.07 | migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to | Yes | 2019) Since this taxon does not exhibit parental care and it attaches its | High |
| 41 | 7.07 | be dispersed in the RA area by other animals? | 165 | eggs to substares and after hatching the larvae it is possible for it | riigii |
| | | be dispersed in the for area by other animals. | | to be dispersed by water currents making it available for | |
| | | | | preadation and dispersion of other animals (Fish Base, 2019) | |
| 42 | 7.08 | Is dispersal of the taxon along any of the | Yes | This taxon which is readily available in the market for aquaculture | High |
| | | vectors/pathways mentioned in the previous | | and as pets together with the fact that the RA area are prone to | - |
| | | seven questions (35-41; i.e. either | | natural calamities such as typhoons (Brändlin & Wingard, 2013) | |
| | | unintentional or intentional) likely to be | | and its high adaptability to different environmental conditions | |
| | | rapid? | | making them a habitat generalist makes their dispersal rapid | |
| 43 | 7.09 | Is dispersal of the taxon density dependent? | Not applicable | There are no records of that this taxon is density dependent in | High |
| 0 7 | Toloran | ce attributes | | terms of dispersal. | |
| | 8.01 | Is the taxon able to withstand being out of | Yes | This taxon can survive out of water for more than 3 hours (Caring | High |
| | 0.01 | water for extended periods (e.g. minimum of | 103 | Pets, 2019) | Ingn |
| | | one or more hours) at some stage of its life | | , , | |
| | | cycle? | | | |
| 45 | 8.02 | Is the taxon tolerant of a wide range of | Yes | Water pH: 6.5-8.5, Temperature: 0°C - 41°C, Ammonia | Very high |
| | | water quality conditions relevant to that | | [unionised] (mg/l): <0.1, Dissolved oxygen (mg/l) >5.0, | |
| | | taxon? [In the Justification field, indicate the | | Hydrogen sulphide (mg/l) <0.002, Nitrate (mg/l) <3.0 and | |
| 4.5 | 0.07 | relevant water quality variable(s) being | × | Salinity: >15 | |
| 46 | 8.03 | Can the taxon be controlled or eradicated in | Yes | In Crystal Lake, California, the state fish and game commission | Very high |
| | | the wild with chemical, biological, or other | | used a chemical that temporary paralyzes the gills all finshes | |
| | | agents/means? | | which enabled them to separate the taxon from other species when they float in the waters. Also, in the Vasse River in Western | |
| | | | | Australia, they performed an intensive capture effort prior to | |
| | | | | spawning and also the use of gill and seine nets, and | |
| 47 | 8.04 | Is the taxon likely to tolerate or benefit from | Yes | Due to their ability to survive in a wide range of environmental | High |
| | | environmental/human disturbance? | | conditions and their capability to stay out of water for long periods | |
| | | | | of time, it is mostlikely, that they will benefit from environmental | |
| | | | | disturbances specially flooding which is prone in the RA area | |
| | | | | (CABI, 2019) | |
| 48 | 8.05 | Is the taxon able to tolerate salinity levels | No | The maximum recorded salinity that this taxon can survive is 17 | High |
| | | that are higher or lower than those found in its usual environment? | | ppt (Ref. 39171), but above 15 ppt is already harmful to them (Fish Base, 2019; CABI, 2019) | |
| 49 | 8.06 | Are there effective natural enemies | No | Based on fish species present in the RA area (Papa & Mamaril, | Very high |
| 15 | 0.00 | (predators) of the taxon present in the RA | | 2011) there is no predator that can preadate the taxon in the RA | very night |
| С. С | Climat | e change | | | |
| | | change | | | |
| 50 | 9.01 | Under the predicted future climatic | Increase | Together with the fact that the RA area is prone to natural | High |
| | | conditions, are the risks of entry into the RA | | calamities such as typhoons and floods (Brändlin & Wingard, | |
| | | area posed by the taxon likely to increase, | | 2013) the risk of entry through accidental release from aquarium | |
| F 1 | 9.02 | decrease or not change? Under the predicted future climatic | Increase | would most likely increase the entry of this taxon. Based on their different morphological characteristics, together | Very high |
| 51 | 9.02 | conditions, are the risks of establishment | Increase | with the fact that they can survive a wide range of environmental | very nigh |
| | | posed by the taxon likely to increase, | | conditions and their fitness to counter act environmental | |
| | | decrease or not change? | | tolerances, the risk of establishment of the taxon increases. | |
| | 0.00 | | Increase | As a fact that the RA area is prone to natural calamities such as | 1.12 1 |
| 52 | 9.03 | Under the predicted future climatic | Increase | is a face that the for a calls profile to flataral calarities such as | High |
| 52 | 9.03 | conditions, are the risks of dispersal within | Increase | typhoons and floods (Brändlin & Wingard, 2013) and their fitness | High |
| 52 | 9.03 | | Increase | | Hign |
| 52 | 9.03 | conditions, are the risks of dispersal within | mereuse | typhoons and floods (Brändlin & Wingard, 2013) and their fitness to counter act environmental tolerances, the risk of entry through accidental release from aquarium and would most likely increase | Hign |
| | | conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? | | typhoons and floods (Brändlin & Wingard, 2013) and their fitness to counter act environmental tolerances, the risk of entry through accidental release from aquarium and would most likely increase the dispersal of this taxon. | |
| | 9.03 | 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 | Higher | typhoons and floods (Brändlin & Wingard, 2013) and their fitness to counter act environmental tolerances, the risk of entry through accidental release from aquarium and would most likely increase the dispersal of this taxon. As this taxon can survive the future climatic conditions of the RA | High |
| | | 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 | | typhoons and floods (Brändlin & Wingard, 2013) and their fitness to counter act environmental tolerances, the risk of entry through accidental release from aquarium and would most likely increase the dispersal of this taxon. As this taxon can survive the future climatic conditions of the RA area and can establish viable population on it, it can pose a huge | |
| | | 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 | | typhoons and floods (Brändlin & Wingard, 2013) and their fitness to counter act environmental tolerances, the risk of entry through accidental release from aquarium and would most likely increase the dispersal of this taxon. As this taxon can survive the future climatic conditions of the RA area and can establish viable population on it, it can pose a huge impact on the biodiversity and ecological status of the RA area by | |
| 53 | | 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? | Higher | typhoons and floods (Brändlin & Wingard, 2013) and their fitness to counter act environmental tolerances, the risk of entry through accidental release from aquarium and would most likely increase the dispersal of this taxon. As this taxon can survive the future climatic conditions of the RA area and can establish viable population on it, it can pose a huge | High |
| 53 | 9.04 | 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 | | typhoons and floods (Brändlin & Wingard, 2013) and their fitness to counter act environmental tolerances, the risk of entry through accidental release from aquarium and would most likely increase the dispersal of this taxon. As this taxon can survive the future climatic conditions of the RA area and can establish viable population on it, it can pose a huge impact on the biodiversity and ecological status of the RA area by competing on food and nutrients of the local species in the area. | |
| 53 | 9.04 | 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 | Higher | typhoons and floods (Brändlin & Wingard, 2013) and their fitness to counter act environmental tolerances, the risk of entry through accidental release from aquarium and would most likely increase the dispersal of this taxon. As this taxon can survive the future climatic conditions of the RA area and can establish viable population on it, it can pose a huge impact on the biodiversity and ecological status of the RA area by competing on food and nutrients of the local species in the area. As this taxon can survive the future climatic conditions of the RA | High |
| 53 | 9.04 | 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 | Higher | typhoons and floods (Brändlin & Wingard, 2013) and their fitness to counter act environmental tolerances, the risk of entry through accidental release from aquarium and would most likely increase the dispersal of this taxon. As this taxon can survive the future climatic conditions of the RA area and can establish viable population on it, it can pose a huge impact on the biodiversity and ecological status of the RA area by competing on food and nutrients of the local species in the area. As this taxon can survive the future climatic conditions of the RA area and can establish viable population on it, it can pose a huge | High |
| 53 | 9.04 | 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 | Higher | typhoons and floods (Brändlin & Wingard, 2013) and their fitness to counter act environmental tolerances, the risk of entry through accidental release from aquarium and would most likely increase the dispersal of this taxon. As this taxon can survive the future climatic conditions of the RA area and can establish viable population on it, it can pose a huge impact on the biodiversity and ecological status of the RA area by competing on food and nutrients of the local species in the area. As this taxon can survive the future climatic conditions of the RA area and can establish viable population on it, it can pose a huge impact on the ecosystem services and socio-economic factors of | High |
| 53 | 9.04 | 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 | Higher | typhoons and floods (Brändlin & Wingard, 2013) and their fitness to counter act environmental tolerances, the risk of entry through accidental release from aquarium and would most likely increase the dispersal of this taxon. As this taxon can survive the future climatic conditions of the RA area and can establish viable population on it, it can pose a huge impact on the biodiversity and ecological status of the RA area by competing on food and nutrients of the local species in the area. As this taxon can survive the future climatic conditions of the RA area and can establish viable population on it, it can pose a huge impact on the ecosystem services and socio-economic factors of the RA area by competing on the existence of the local species | High |
| 53 | 9.04 | 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? | Higher Higher | typhoons and floods (Brändlin & Wingard, 2013) and their fitness to counter act environmental tolerances, the risk of entry through accidental release from aquarium and would most likely increase the dispersal of this taxon. As this taxon can survive the future climatic conditions of the RA area and can establish viable population on it, it can pose a huge impact on the biodiversity and ecological status of the RA area by competing on food and nutrients of the local species in the area. As this taxon can survive the future climatic conditions of the RA area and can establish viable population on it, it can pose a huge impact on the ecosystem services and socio-economic factors of the RA area by competing on the existence of the local species which would eventually replace their existence in the RA area, thus affecting the livelihood services and the genetic diversity of the ecosystem in the area. | High |
| 53 | 9.04 | 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 | Higher | typhoons and floods (Brändlin & Wingard, 2013) and their fitness to counter act environmental tolerances, the risk of entry through accidental release from aquarium and would most likely increase the dispersal of this taxon. As this taxon can survive the future climatic conditions of the RA area and can establish viable population on it, it can pose a huge impact on the biodiversity and ecological status of the RA area by competing on food and nutrients of the local species in the area. As this taxon can survive the future climatic conditions of the RA area and can establish viable population on it, it can pose a huge impact on the ecosystem services and socio-economic factors of the RA area by competing on the existence of the local species which would eventually replace their existence in the RA area, thus affecting the livelihood services and the genetic diversity of the ecosystem in the area. As this taxon can survive the future climatic conditions of the RA area, thus affecting the livelihood services and the genetic diversity of the ecosystem in the area. | High |
| 53 | 9.04 | 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 | Higher Higher | typhoons and floods (Brändlin & Wingard, 2013) and their fitness to counter act environmental tolerances, the risk of entry through accidental release from aquarium and would most likely increase the dispersal of this taxon. As this taxon can survive the future climatic conditions of the RA area and can establish viable population on it, it can pose a huge impact on the biodiversity and ecological status of the RA area by competing on food and nutrients of the local species in the area. As this taxon can survive the future climatic conditions of the RA area and can establish viable population on it, it can pose a huge impact on the ecosystem services and socio-economic factors of the RA area by competing on the existence of the local species which would eventually replace their existence in the RA area, thus affecting the livelihood services and the genetic diversity of the ecosystem in the area. As this taxon can survive the future climatic conditions of the RA area and can establish viable population on it, it can pose a huge | High |
| 53 | 9.04 | 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 | Higher Higher | typhoons and floods (Brändlin & Wingard, 2013) and their fitness to counter act environmental tolerances, the risk of entry through accidental release from aquarium and would most likely increase the dispersal of this taxon. As this taxon can survive the future climatic conditions of the RA area and can establish viable population on it, it can pose a huge impact on the biodiversity and ecological status of the RA area by competing on food and nutrients of the local species in the area. As this taxon can survive the future climatic conditions of the RA area and can establish viable population on it, it can pose a huge impact on the ecosystem services and socio-economic factors of the RA area by competing on the existence of the local species which would eventually replace their existence in the RA area, thus affecting the livelihood services and the genetic diversity of the accosystem in the area. As this taxon can survive the future climatic conditions of the RA area and can establish viable population on it, it can pose a huge impact on the ecosystem services and socio-economic factors of the ecosystem in the area. | High |
| 53 | 9.04 | 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 | Higher Higher | typhoons and floods (Brändlin & Wingard, 2013) and their fitness to counter act environmental tolerances, the risk of entry through accidental release from aquarium and would most likely increase the dispersal of this taxon. As this taxon can survive the future climatic conditions of the RA area and can establish viable population on it, it can pose a huge impact on the biodiversity and ecological status of the RA area by competing on food and nutrients of the local species in the area. As this taxon can survive the future climatic conditions of the RA area and can establish viable population on it, it can pose a huge impact on the ecosystem services and socio-economic factors of the RA area by competing on the existence of the local species which would eventually replace their existence in the RA area, thus affecting the livelihood services and the genetic diversity of the ecosystem in the area. As this taxon can survive the future climatic conditions of the RA area and can establish viable population on it, it can pose a huge impact on the ecosystem services and socio-economic factors of the A area by competing on the existence in the RA area, thus affecting the livelihood services and socio-economic factors of the account of the area. As this taxon can survive the future climatic conditions of the RA area and can establish viable population on it, it can pose a huge impact on the ecosystem services and socio-economic factors of the RA area by competing on the existence of the local species | High |
| 53 | 9.04 | 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 | Higher Higher | typhoons and floods (Brändlin & Wingard, 2013) and their fitness to counter act environmental tolerances, the risk of entry through accidental release from aquarium and would most likely increase the dispersal of this taxon. As this taxon can survive the future climatic conditions of the RA area and can establish viable population on it, it can pose a huge impact on the biodiversity and ecological status of the RA area by competing on food and nutrients of the local species in the area. As this taxon can survive the future climatic conditions of the RA area and can establish viable population on it, it can pose a huge impact on the ecosystem services and socio-economic factors of the RA area by competing on the existence of the local species which would eventually replace their existence in the RA area, thus affecting the livelihood services and the genetic diversity of the ecosystem in the area. As this taxon can survive the future climatic conditions of the RA area and can establish viable population on it, it can pose a huge impact on the ecosystem services and socio-economic factors of the RA area by competing on the existence of the local species which would eventually replace their existence of the local species which would eventually replace their existence of the local species which would eventually replace their existence of the local species | High High |
| 53 | 9.04 | 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 | Higher Higher | typhoons and floods (Brändlin & Wingard, 2013) and their fitness to counter act environmental tolerances, the risk of entry through accidental release from aquarium and would most likely increase the dispersal of this taxon. As this taxon can survive the future climatic conditions of the RA area and can establish viable population on it, it can pose a huge impact on the biodiversity and ecological status of the RA area by competing on food and nutrients of the local species in the area. As this taxon can survive the future climatic conditions of the RA area and can establish viable population on it, it can pose a huge impact on the ecosystem services and socio-economic factors of the RA area by competing on the existence of the local species which would eventually replace their existence in the RA area, thus affecting the livelihood services and the genetic diversity of the ecosystem in the area. As this taxon can survive the future climatic conditions of the RA area and can establish viable population on it, it can pose a huge impact on the ecosystem services and socio-economic factors of the A area by competing on the existence in the RA area, thus affecting the livelihood services and socio-economic factors of the account of the area. As this taxon can survive the future climatic conditions of the RA area and can establish viable population on it, it can pose a huge impact on the ecosystem services and socio-economic factors of the RA area by competing on the existence of the local species | High |

| Statistics | |
|------------------------------|------|
| Scores | |
| BRA | 53.0 |
| BRA Outcome | High |
| BRA+CCA | 65.0 |
| 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 | 29.0 |
| 4. Undesirable (or persistence) traits | 10.0 |
| 5. Resource exploitation | 7.0 |
| 6. Reproduction | 4.0 |
| 7. Dispersal mechanisms | 4.0 |
| 8. Tolerance attributes | 4.0 |
| C. Climate change | 12.0 |
| 9. Climate change | 12.0 |
| Answered Questions | |
| Total | 55 |
| A. Biogeography/Historical | 13 |
| 1. Domestication/Cultivation | 3 |
| 2. Climate, distribution and introduction risk | 5 |
| 3. Invasive elsewhere | 5 |
| B. Biology/Ecology | 36 |
| 4. Undesirable (or persistence) traits | 12 |
| 5. Resource exploitation | 2 |
| 6. Reproduction | 3 5 36 12 2 7 9 6 6 6 |
| 7. Dispersal mechanisms | 9 |
| 8. Tolerance attributes | 6 |
| C. Climate change | 6 |
| 9. Climate change | 6 |
| Sectors affected | |
| Commercial | 21 |
| Environmental | 17 |
| Species or population nuisance traits | 32 |
| | |
| Thresholds | |
| BRA | 34.5 |
| BRA+CCA | 34.5 |
| Confidence | |
| BRA+CCA | 0.87 |
| BRA | 0.88 |
| CCA | 0.79 |
| | |

Date and Time 03/05/2021 00:52:23

| Taxon and Assessor details | | | | | |
|------------------------------------|--|--|--|--|--|
| Category | Fishes and Lampreys (freshwater) | | | | |
| Taxon name | Carassius carassius | | | | |
| Common name | crucian carp | | | | |
| Assessor | Gilles, To | | | | |
| Risk screening context | | | | | |
| Reason and socio-economic benefits | Aquarium | | | | |
| Risk assessment area | Lake Taal | | | | |
| Taxonomy | Actinopteri (ray-finned fishes) > Cypriniformes (Carps) > Cyprinidae (Minnows or carps) > | | | | |
| Native range | Eurasia: North, Baltic, White, Barents, Black and Caspian Sea basins; Aegean Sea basin only in | | | | |
| Introduced range | Philippines, Thailand, China, Singapore etc. | | | | |
| URL | https://www.fishbase.se/summary/Carassius-carassius.html | | | | |

| | | | Response | Justification (references and/or other information) | Confidence |
|--------------|---------|--|----------------|---|-------------|
| Α. Ι | Biogeo | graphy/Historical | | | |
| 1. L | Domest | ication/Cultivation | | | |
| 1 | 1.01 | Has the taxon been the subject of | Yes | This taxon is farmed mainly in Asia and Eastern Europe. In China, | Very high |
| | | domestication (or cultivation) for at least 20 | | Taiwan and Belarus, it produced more than 1,500 tons in 2002 | |
| | | generations? | | and in Japan, Uzbekistan and Republic of Korea it produced more | |
| | | | | than 100 tonnes (FAO, 2009). | |
| 2 | 1.02 | Is the taxon harvested in the wild and likely | Yes | The taxon has been harvested in the wild for ornamental purposes | High |
| | | to be sold or used in its live form? | | as pets and aquarium species, for reacreational fishing and food | |
| 2 | 1.02 | | | (CABI, 2020) | |
| 3 | 1.03 | Does the taxon have invasive races, | Yes | One concrete example is the Carassius gibelio, which is considered | Very high |
| | | varieties, sub-taxa or congeners? | | to be invasive in Europe and North America and currently | |
| 2 (| limato | , distribution and introduction risk | | imposing adverse effects in the country's native species (CABI, | |
| 2. U 4 | | How similar are the climatic conditions of the | Medium | This taxon's native range (Eurasia) has a temperate climate, while | Very high |
| - | 2.01 | Risk Assessment (RA) area and the taxon's | riculum | the RA area has a tropical climate (CABI, 2020; FishBase, 2019; | very night |
| | | native range? | | U.S. Fish and Wildlife Service, 2014) | |
| 5 | 2.02 | What is the quality of the climate matching | High | Climatic Data from CABI, Fish Base and U.S. Fish and Wildlife | Very high |
| - | 2.02 | data? | | Service were used to generate climate analysis. | e, y mgn |
| 6 | 2.03 | Is the taxon already present outside of | Yes | The taxon is now present in pet stores for ornamental use, such | Very high |
| | | captivity in the RA area? | | as in Cartimar Market (Wild Gold Fish) where importation and sale | ., |
| | | . , | | of this taxon is highly abundant (Fish Base, 2019). | |
| 7 | 2.04 | How many potential vectors could the taxon | >1 | The taxon could be introduced through intentional introduction | High |
| | | use to enter in the RA area? | | with human intervention and aquarium escape. | - |
| 8 | 2.05 | Is the taxon currently found in close | Not applicable | | Medium |
| | | proximity to, and likely to enter into, the RA | | | |
| | | area in the near future (e.g. unintentional | | | |
| | | and intentional introductions)? | | | |
| | | e elsewhere | r | | |
| 9 | 3.01 | Has the taxon become naturalised | No | This taxon has not been considered as invasive. In United | Very high |
| | | (established viable populations) outside its | | States, this taxon has lived in the lagoons and parks of Chicago, | |
| | | native range? | | however reports indicates that this population was not established | |
| | | | | and eventually died out (CABI, 2019; Texas Invasive Sepcies | |
| 10 | 3.02 | In the taxon's introduced range, are there | Yes | "This taxon is known to increases turbidity affecting aquatic | High |
| | | known adverse impacts to wild stocks or | | community, compete with native species, can hybridize with other | |
| | | commercial taxa? | | carp species, and is a carrier of spring viraemia virus (U.S. Fish | |
| 1.1 | 2.02 | To the started interval was as any theory | Ma a | and Wildlife Service, 2014)" |) (and bigh |
| 11 | 3.03 | In the taxon's introduced range, are there | Yes | "This taxon is known to increases turbidity affecting aquatic | Very high |
| | | known adverse impacts to aquaculture? | | community, compete with native species, can hybridize with other | |
| | | | | carp species, and is a carrier of spring viraemia virus (U.S. Fish | |
| 12 | 3.04 | In the taxon's introduced range, are there | Yes | and Wildlife Service, 2014)" "This taxon is known to increases turbidity affecting aquatic | Very high |
| 12 | 5.04 | known adverse impacts to ecosystem | Tes | community, compete with native species, can hybridize with other | very nigh |
| | | services? | | carp species, and is a carrier of spring viraemia virus (U.S. Fish | |
| | | Services | | and Wildlife Service, 2014)" | |
| 13 | 3.05 | In the taxon's introduced range, are there | Yes | "This taxon is known to increases turbidity affecting aquatic | High |
| 15 | 5.05 | known adverse socio-economic impacts? | 103 | community, compete with native species, can hybridize with other | Ingn |
| | | anomic adverse socio economic impacts: | | carp species, and is a carrier of spring viraemia virus (U.S. Fish | |
| | | | | and Wildlife Service, 2014)" | |
| B . I | Biology | //Ecology | | | |
| 4. L | Indesir | able (or persistence) traits | | | |
| 14 | 4.01 | Is it likely that the taxon will be poisonous or | No | There are no records for this taxon to pose human threaths. | High |
| | | pose other risks to human health? | | | |
| 15 | 4.02 | Is it likely that the taxon will smother one or | Yes | As this taxon is known to increases water turbidity affecting | Very high |
| | | more native taxa (that are not threatened or | | aquatic community, compete with native species for food and | |
| | | protected)? | | space which can dispalce native species (U.S. Fish and Wildlife | |
| 16 | 4.03 | Are there any threatened or protected taxa | No | This taxon is unlikely to preadate or prasite threathened taxa in | High |
| | | that the non-native taxon would parasitise in | | the RA area. | |
| | | the RA area? | | | |
| 17 | 4.04 | Is the taxon adaptable in terms of climatic | Yes | This taxon has a high adaptability to different environmental | Very high |
| | | and other environmental conditions, thus | | conditions making them a habitat generalist. Also, this taxon has | |
| | | enhancing its potential persistence if it has | | an exceptional hypoxia and anoxia tolerance (CABI, 2020). | |
| 10 | 4.05 | invaded or could invade the RA area? | | |) (an this! |
| 18 | 4.05 | Is the taxon likely to disrupt food-web | Yes | As this taxon is known to increases turbidity affecting aquatic | Very high |
| | | structure/function in aquatic ecosystems if it | | community, compete with native species, can hybridize with other | |
| | | has invaded or is likely to invade the RA | | carp species, and is a carrier of spring viraemia virus (U.S. Fish | |
| 10 | 4.06 | area? | Voc | and Wildlife Service, 2014) | High |
| 19 | 4.00 | Is the taxon likely to exert adverse impacts | Yes | This taxon can potentially cause major impact to the aquaculture | High |
| | | on ecosystem services in the RA area? | | services of the RA area due to its physiological and morphological | |
| i | | | | characteristics. | 1 |

| 20 | 4.07 | Is it likely that the taxon will host, and/or | No | There are no reports that the taxon may carry pests or infectious | High |
|----------------|----------------|--|------------------|---|--------------------------------|
| | | act as a vector for, recognised pests and | | agents that are endemic in Lake Taal. | - |
| 21 | 4.08 | infectious agents that are endemic in the RA Is it likely that the taxon will host, and/or | Yes | This taxon is a known carrier of spring viraemia virus of carps | Very high |
| | | act as a vector for, recognised pests and | | (U.S. Fish and Wildlife Service, 2014) | , 5 |
| | | infectious agents that are absent from (novel | | | |
| 22 | 4.09 | to) the RA area? Is it likely that the taxon will achieve a body | Yes | This taxon can grow up to 64 cm (Fishbase, 2019) | High |
| | | size that will make it more likely to be | | ····· ································ | |
| | 4.40 | released from captivity? | | | |
| 23 | 4.10 | Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. | No | This taxon usally occur in shallow ponds, lakes rich in vegetation and slow moving rivers (FishBase, 2019) | High |
| | | versatile in habitat use)? | | | |
| 24 | 4.11 | Is it likely that the taxon's mode of existence | Yes | According to U.S. Fish and Wildlife Service (2014) This taxon is | Very high |
| | | (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for | | known to increases water turbidity which can cause habitat degradation. | |
| | | native taxa? | | | |
| 25 | 4.12 | Is the taxon likely to maintain a viable | No | There are no evidence of established populations of the organism | High |
| | | population even when present in low densities (or persisting in adverse conditions | | persisting at low density . | |
| | | by way of a dormant form)? | | | |
| | | ce exploitation | I | | |
| 26 | 5.01 | Is the taxon likely to consume threatened or protected native taxa in the RA area? | No | This taxon is usally abundant in the absence of other fish species | Very high |
| | | protected flative taxa in the RA area? | | and it does not occur in waters with rich ichthyofauna and abundant predatory species (U.S. Fish and Wildlife Service, 2014). | |
| 27 | 5.02 | Is the taxon likely to sequester food | Yes | As this taxon is known to feed on plankton, benthic invertebrates | High |
| | | resources (including nutrients) to the | | and plant materials which can be exploited at the expense of | |
| 6. I | Reprodu | detriment of native taxa in the RA area? | | native species (Fish Base, 2019) | |
| | | Is the taxon likely to exhibit parental care | No | The taxon does not exhibit any parental care, they just deposit | Very high |
| | | and/or to reduce age-at-maturity in response | | their eggs to aquatic weeds which serves as a substarata(FAO, | |
| 20 | 6.02 | to environmental conditions? Is the taxon likely to produce viable gametes | Yes | 2009) The conditions of the RA meets the required conditions for | High |
| | 0.02 | or propagules (in the RA area)? | | maturation and reproduction of this taxon, which will enable it to | |
| | | | | produce a viable gametes (Fish Base, 2019; FAO, 2009; CABI, | |
| 30 | 6.03 | Is the taxon likely to hybridise naturally with | No | The records only shows that it can only hybridize with other carp | High |
| | | native taxa? | | species such as the gold fish and prucian carp (U.S. Fish and Wildlife Service, 2014) | |
| 31 | 6.04 | Is the taxon likely to be hermaphroditic or to | No | There are no documented evidence of hermaphroditism/asexual | High |
| | | display asexual reproduction? | | reproduction of this species. | |
| 32 | 6.05 | Is the taxon dependent on the presence of another taxon (or specific habitat features) | No | This taxon only requires a substrate where they can lay their eggs and mature (FAO, 2019) | Very high |
| | | to complete its life cycle? | | | |
| 33 | 6.06 | Is the taxon known (or likely) to produce a | Yes | This taxon can spawn 130000-250000 per female from May-June | Very high |
| | | large number of propagules or offspring | | and hatches after 4-8 days (Fish Base, 2019). | |
| 34 | 6.07 | within a short time span (e.g. < 1 year)? How many time units (days, months, years) | 1 | This taxon reaches the age of maturity at 1.5 years old (CABI, | Very high |
| | 0.07 | does the taxon require to reach the age-at- | - | 2020) | ici, ingri |
| _ | . | first-reproduction? | | | |
| | | al mechanisms How many potential internal | One | The taxon can enter the RA area through natural dispersal and its | High |
| | | vectors/pathways could the taxon use to | | succes is increased because of its broad environmental | 5 |
| | | disperse within the RA area (with suitable | | tollerences. Also, it can be dispersed intentionally because of its | |
| | | habitats nearby)? | | abundant ornamental use and unintentionally through aquarium escape during natural calamities (flooding) which the RA area is | |
| | | | | prone to (CABI, 2020) | |
| 36 | 7.02 | Will any of these vectors/pathways bring the | Yes | The taxon can enter the RA area through natural dispersal and its | Very high |
| | | taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? | | succes is increased because of its broad environmental tollerences. Also, it can be dispersed intentionally because of its | |
| | | protected areas (e.g. MCZ, MPA, 3551)? | | abundant ornamental use and unintentionally through aquarium | |
| | | | | escape during natural calamities (flooding) which the RA area is | |
| 27 | 7.03 | Does the taxon have a means of actively | No | prone to (CABI, 2020). | High |
| / د | 1.03 | attaching itself to hard substrata (e.g. ship | NU | Their physical characteristics does not allow attachment to any substrata (Fish Base, 2019; CABI, 2020) | High |
| | 1 | | | | |
| | | hulls, pilings, buoys) such that it enhances | | | |
| 20 | 7.04 | the likelihood of dispersal? | No. | | |
| 38 | 7.04 | the likelihood of dispersal? Is natural dispersal of the taxon likely to | Yes | Since this taxon attahes their eggs to substares, it is possible for it to be dispersed by water currents (FAO, 2009) | Very high |
| 38 | 7.04 | the likelihood of dispersal? | Yes | Since this taxon attahes their eggs to substares, it is possible for it to be dispersed by water currents (FAO, 2009) | Very high |
| | 7.04 | the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to | Yes | it to be dispersed by water currents (FAO, 2009) Since this taxon attahes their eggs to substares, it is possible for | Very high High |
| | | the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as | | it to be dispersed by water currents (FAO, 2009) | |
| | | the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA | | it to be dispersed by water currents (FAO, 2009) Since this taxon attahes their eggs to substares, it is possible for | |
| 39 | | the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as | | it to be dispersed by water currents (FAO, 2009) Since this taxon attahes their eggs to substares, it is possible for | |
| 39 40 | 7.05 | the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? | Yes | it to be dispersed by water currents (FAO, 2009) Since this taxon attahes their eggs to substares, it is possible for it to be dispersed by water currents (FAO, 2009) This taxon does not have migratory characteristics (Fish Base, 2019; CABI, 2020) | High Very high |
| 39 40 | 7.05 | the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to | Yes | it to be dispersed by water currents (FAO, 2009) Since this taxon attahes their eggs to substares, it is possible for it to be dispersed by water currents (FAO, 2009) This taxon does not have migratory characteristics (Fish Base, 2019; CABI, 2020) Since this taxon does not exhibit parental care and it attaches its | High |
| 39 40 | 7.05 | the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? | Yes | it to be dispersed by water currents (FAO, 2009) Since this taxon attahes their eggs to substares, it is possible for it to be dispersed by water currents (FAO, 2009) This taxon does not have migratory characteristics (Fish Base, 2019; CABI, 2020) | High Very high |
| 39 40 41 | 7.05 7.06 7.07 | the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? | Yes No Yes | it to be dispersed by water currents (FAO, 2009) Since this taxon attahes their eggs to substares, it is possible for it to be dispersed by water currents (FAO, 2009) This taxon does not have migratory characteristics (Fish Base, 2019; CABI, 2020) Since this taxon does not exhibit parental care and it attaches its eggs to substares and after hatching the larvae it is possible for it to be dispersed by water currents making it available for preadation and dispersion of other animals (Fish Base, 2019) | High Very high Very high |
| 39 40 41 | 7.05 | the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or 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 | it to be dispersed by water currents (FAO, 2009) Since this taxon attahes their eggs to substares, it is possible for it to be dispersed by water currents (FAO, 2009) This taxon does not have migratory characteristics (Fish Base, 2019; CABI, 2020) Since this taxon does not exhibit parental care and it attaches its eggs to substares and after hatching the larvae it is possible for it to be dispersed by water currents making it available for preadation and dispersion of other animals (Fish Base, 2019) This taxon which is readily available in the market for aquaculture | High Very high |
| 39 40 41 | 7.05 7.06 7.07 | the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous | Yes No Yes | it to be dispersed by water currents (FAO, 2009) Since this taxon attahes their eggs to substares, it is possible for it to be dispersed by water currents (FAO, 2009) This taxon does not have migratory characteristics (Fish Base, 2019; CABI, 2020) Since this taxon does not exhibit parental care and it attaches its eggs to substares and after hatching the larvae it is possible for it to be dispersed by water currents making it available for preadation and dispersion of other animals (Fish Base, 2019) This taxon which is readily available in the market for aquaculture and as pets together with the fact that the RA area are prone to | High Very high Very high |
| 39 40 41 | 7.05 7.06 7.07 | the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the | Yes No Yes | it to be dispersed by water currents (FAO, 2009) Since this taxon attahes their eggs to substares, it is possible for it to be dispersed by water currents (FAO, 2009) This taxon does not have migratory characteristics (Fish Base, 2019; CABI, 2020) Since this taxon does not exhibit parental care and it attaches its eggs to substares and after hatching the larvae it is possible for it to be dispersed by water currents making it available for preadation and dispersion of other animals (Fish Base, 2019) This taxon which is readily available in the market for aquaculture | High Very high Very high |
| 39 40 41 | 7.05 7.06 7.07 | the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. either | Yes No Yes | it to be dispersed by water currents (FAO, 2009) Since this taxon attahes their eggs to substares, it is possible for it to be dispersed by water currents (FAO, 2009) This taxon does not have migratory characteristics (Fish Base, 2019; CABI, 2020) Since this taxon does not exhibit parental care and it attaches its eggs to substares and after hatching the larvae it is possible for it to be dispersed by water currents making it available for preadation and dispersion of other animals (Fish Base, 2019) This taxon which is readily available in the market for aquaculture and as pets together with the fact that the RA area are prone to natural calamities such as typhoons (Brändlin & Wingard, 2013) | High Very high Very high |

| | | Is dispersal of the taxon density dependent? | Not applicable | no record | Low |
|----|--------|---|----------------|---|-----------|
| | | 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? | Yes | This taxon can survive hypoxic and anoxic environments for several months (CABI, 2020) | 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 | Yes | This taxon is tollerant on high summer temperatures (up to 35°C), organic pollutants and very low oxygen levels in the water during winter and summer (U.S. Fish and Wildlife Service, 2014). | Very high |
| 46 | 8.03 | Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? | Not applicable | no record | Medium |
| 47 | 8.04 | Is the taxon likely to tolerate or benefit from environmental/human disturbance? | Yes | Due to their ability to survive in a wide range of environmental conditions and their capability to stay out of water for long periods of time, it is mostlikely, that they will benefit from environmental disturbances specially flooding which is prone in the RA area (CABI, 2020) | Very high |
| 48 | 8.05 | Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment? | No | The maximum recorded salinity that this taxon can survive is 17 ppt, but above 15 ppt is already harmful to them (Fish Base,2019; CABI, 2020) | Very high |
| 49 | 8.06 | Are there effective natural enemies (predators) of the taxon present in the RA | No | Based on fish species present in the RA area (Papa & Mamaril, 2011) there is no predator that can preadate the taxon in the RA | Very high |
| С. | Climat | e change | | | |
| | | change | | | |
| 50 | 9.01 | Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? | Increase | Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) the risk of entry through accidental release from aquarium would most likely increase the entry of this taxon. | High |
| 51 | 9.02 | Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? | Increase | Based on their different morphological characteristics, together with the fact that they can survive a wide range of environmental conditions and their fitness to counter act environmental tolerances, the risk of establishment of the taxon increases. | 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 | As a fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their fitness to counter act environmental tolerances, the risk of entry through accidental release from aquarium and would most likely increase the dispersal of this taxon. | 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 | As this taxon can survive the future climatic conditions of the RA area and can establish viable population on it, it can pose a huge impact on the biodiversity and ecological status of the RA area by competing on food and nutrients of the local species in the area. | High |
| 54 | 9.05 | Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? | Higher | As this taxon can survive the future climatic conditions of the RA area and can establish viable population on it, it can pose a huge impact on the ecosystem services and socio-economic factors of the RA area by competing on the existence of the local species which would eventually replace their existence in the RA area, thus affecting the livelihood services and the genetic diversity of the ecosystem in the area. | 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 | As this taxon can survive the future climatic conditions of the RA area and can establish viable population on it, it can pose a huge impact on the ecosystem services and socio-economic factors of the RA area by competing on the existence of the local species which would eventually replace their existence in the RA area, thus affecting the livelihood services and the genetic diversity of the ecosystem in the area. | High |

| Statistics | |
|--|--------------------------|
| Scores | |
| BRA | 33.0 |
| BRA Outcome | Medium |
| BRA+CCA | 45.0 |
| BRA+CCA Outcome | High |
| Score partition | |
| A. Biogeography/Historical | 14.0 |
| 1. Domestication/Cultivation | 4.0 |
| 2. Climate, distribution and introduction risk | 2.0 |
| 3. Invasive elsewhere | 8.0 |
| B. Biology/Ecology | 19.0 |
| 4. Undesirable (or persistence) traits | 7.0 |
| 5. Resource exploitation | 2.0 |
| 6. Reproduction | 2.0 |
| 7. Dispersal mechanisms | 3.0 |
| 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 | 3 5 5 36 |
| B. Biology/Ecology | |
| 4. Undesirable (or persistence) traits | 12 |
| 5. Resource exploitation | 2 |

| 6. R | eproduction | 7 | |
|---------------------------------------|--------------|------|--|
| 7. Dispersal n | nechanisms | 9 | |
| 8. Toleranc | e attributes | 6 | |
| C. Clima | ate change | 6 | |
| 9. Clim | ate change | 6 | |
| Sectors affected | | | |
| C | ommercial | 14 | |
| Envi | 10 | | |
| Species or population nuisance traits | | 25 | |
| | | | |
| Thresholds | | | |
| | BRA | 34.5 | |
| | BRA+CCA | 34.5 | |
| Confidence | | | |
| | | | |

BRA+CCA 0.85 BRA 0.87 CCA 0.75 Date and Time

03/05/2021 00:52:52

| Taxon and Assessor details | | | | |
|---|--|--|--|--|
| Category Fishes and Lampreys (freshwater) | | | | |
| Taxon name | Channa micropeltes | | | |
| Common name | Indonesian snakehead | | | |
| Assessor | Gilles, Pavia | | | |
| Risk screening context | | | | |
| Reason and socio-economic benefits | Ornamental and Aquaculture | | | |
| Risk assessment area | Lake Taal | | | |
| Taxonomy | Actinopteri (ray-finned fishes) > Anabantiformes (Gouramies, snakeheads) > Channidae | | | |
| Native range | Cambodia, Indonesia, Laos, Malaysia, Thailand, Viet Nam | | | |
| Introduced range | Philippines, Singapore, USA, China, Guam, Indonesia, Madagascar, New caledonia | | | |
| URL | https://www.fishbase.se/summary/Channa-micropeltes.html | | | |

| | | | Response | Justification (references and/or other information) | Confidence |
|------------------|----------------------|---|-----------------------|---|------------------|
| A. I | Biogeo | graphy/Historical | | | |
| | | ication/Cultivation | | | |
| 1 | 1.01 | Has the taxon been the subject of | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf | High |
| | | domestication (or cultivation) for at least 20 | | | |
| | | generations? | | | |
| 2 | 1.02 | Is the taxon harvested in the wild and likely | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf | Very high |
| | | to be sold or used in its live form? | | | |
| 3 | 1.03 | Does the taxon have invasive races, | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/Guerrero%20III%202 | Very high |
| | | varieties, sub-taxa or congeners? | | 014.pdf | |
| 2. C | Climate | , distribution and introduction risk | | | |
| 4 | 2.01 | How similar are the climatic conditions of the | High | file:///C:/Users/User/Desktop/Thesis%20Ref/Guerrero%20III%202 | High |
| | | Risk Assessment (RA) area and the taxon's | | 014.pdf | |
| | | native range? | | | |
| 5 | 2.02 | What is the quality of the climate matching | High | based on the koppen climate matching the native range ang the | High |
| _ | | data? | | introduced range have almost the climatic condition | |
| 6 | 2.03 | Is the taxon already present outside of | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf | Very high |
| _ | | captivity in the RA area? | - | | |
| / | 2.04 | How many potential vectors could the taxon | >1 | file:///C:/Users/User/Desktop/Thesis%20Ref/Guerrero%20III%202 | High |
| | 2.05 | use to enter in the RA area? | Not applicate | 014.pdf file:///Cr/llears/Decktop/Theois0/20Def/Cuerrers0/20UU0/202 | Vorubiat |
| 8 | 2.05 | Is the taxon currently found in close | NOT applicable | file:///C:/Users/User/Desktop/Thesis%20Ref/Guerrero%20III%202 | very nigh |
| | | proximity to, and likely to enter into, the RA | | 014.pdf | |
| | | area in the near future (e.g. unintentional and intentional introductions)? | | | |
| 2 1 | nyaciya | | | | |
| <u>3. 1</u> 9 | 3.01 | e elsewhere Has the taxon become naturalised | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/Guerrero%20III%202 | Very high |
| 9 | 5.01 | (established viable populations) outside its | 165 | 014.pdf file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf | very nigh |
| 10 | 3.02 | In the taxon's introduced range, are there | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf | Very high |
| | 5.02 | known adverse impacts to wild stocks or | | | ter, ngn |
| | | commercial taxa? | | | |
| 11 | 3.03 | In the taxon's introduced range, are there | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf | Very high |
| | | known adverse impacts to aquaculture? | | file:///C:/Users/User/Desktop/Thesis%20Ref/Guerrero%20III%202 | - / 5 |
| | | ······································ | | 014.pdf | |
| 12 | 3.04 | In the taxon's introduced range, are there | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/Guerrero%20III%202 | Very high |
| | | known adverse impacts to ecosystem | | 014.pdf | , - |
| 13 | 3.05 | In the taxon's introduced range, are there | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf | High |
| | | known adverse socio-economic impacts? | | | |
| | | y/Ecology | | | |
| | | able (or persistence) traits | 1 | | |
| 14 | 4.01 | Is it likely that the taxon will be poisonous or | No | The taxon were used for aquaculture and allowed to be consumed | Very high |
| 1 5 | 4.02 | pose other risks to human health? Is it likely that the taxon will smother one or | Yes | by people. file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf | Varyhigh |
| 12 | 4.02 | | res | | Very high |
| | | more native taxa (that are not threatened or protected)? | | file:///C:/Users/User/Desktop/Thesis%20Ref/Guerrero%20III%202 014.pdf | |
| 16 | 4.03 | Are there any threatened or protected taxa | Not applicable | No concrete data for this question (lack of reference) | Low |
| 10 | 1.05 | that the non-native taxon would parasitise in | not applicable | | 2011 |
| | | the RA area? | | | |
| 17 | 4.04 | Is the taxon adaptable in terms of climatic | Yes | file:///C:/Users/User/Desktop/papa%20et.alpdf | High |
| | | and other environmental conditions, thus | | · , , , · , · · · · · · · · · · · · · · | 5 |
| | | 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 | file:///C:/Users/User/Desktop/Thesis%20Ref/Guerrero%20III%202 | Very high |
| | | structure/function in aquatic ecosystems if it | | 014.pdf | |
| | | has invaded or is likely to invade the RA | | | |
| 19 | 1.00 | | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf | Medium |
| 19 | 4.06 | Is the taxon likely to exert adverse impacts | | | 1 |
| | | on ecosystem services in the RA area? | | | |
| | 4.06 | on ecosystem services in the RA area? Is it likely that the taxon will host, and/or | No | The taxon is considered as a food fish with high aquaculture value | Medium |
| | | 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 | The taxon is considered as a food fish with high aquaculture value and commands a good price in the market (Joshi 2016) | 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 | | and commands a good price in the market (Joshi 2016) | |
| 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 Is it likely that the taxon will host, and/or | | | Medium Low |
| 20 | 4.07 | on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and 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 | | and commands a good price in the market (Joshi 2016) | |
| 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 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 | | and commands a good price in the market (Joshi 2016) | |
| 20 21 | 4.07 4.08 | 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? | Not applicable | and commands a good price in the market (Joshi 2016) Lack of eveidence and literatue for this question | Low |
| 20 21 | 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 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 | | and commands a good price in the market (Joshi 2016) Lack of eveidence and literatue for this question consider as monster fish in most of the ornamental industry due | |
| 20 | 4.07 4.08 | 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 | Not applicable | and commands a good price in the market (Joshi 2016) Lack of eveidence and literatue for this question | Low |
| 20 21 22 | 4.07 4.08 4.09 | 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? | Not applicable Yes | and commands a good price in the market (Joshi 2016) Lack of eveidence and literatue for this question consider as monster fish in most of the ornamental industry due to its potential in becoming big | Low Very high |
| 20 21 22 | 4.07 4.08 | 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 | Not applicable | and commands a good price in the market (Joshi 2016) Lack of eveidence and literatue for this question consider as monster fish in most of the ornamental industry due to its potential in becoming big file:///C:/Users/User/Desktop/Thesis%20Ref/Guerrero%20III%202 | Low Very high |
| 20 21 22 | 4.07 4.08 4.09 | 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? | Not applicable Yes | and commands a good price in the market (Joshi 2016) Lack of eveidence and literatue for this question consider as monster fish in most of the ornamental industry due to its potential in becoming big | Low Very high |

| 24 | | Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa? | Not applicable | Lack of data to support this question | Low |
|----------------|---------|---|----------------|---|-----------|
| 25 | | 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 | file:///C:/Users/User/Desktop/Thesis%20Ref/Guerrero%20III%202 014.pdf | High |
| | esource | e exploitation | | | |
| 26 | | Is the taxon likely to consume threatened or | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/Guerrero%20III%202 | Very high |
| 27 | | protected native taxa in the RA area? Is the taxon likely to sequester food resources (including nutrients) to the | Yes | 014.pdf file:///C:/Users/User/Desktop/Thesis%20Ref/Guerrero%20III%202 014.pdf | Very high |
| | | detriment of native taxa in the RA area? | | | |
| | eprodu | | X | | N 1 . 1 |
| 28 | | Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? | Yes | parent usually guard there newly hatched eggs from predator until it becomes ready. | very nign |
| 29 | 6.02 | Is the taxon likely to produce viable gametes or propagules (in the RA area)? | Yes | for verification | High |
| 30 | | Is the taxon likely to hybridise naturally with native taxa? | Not applicable | Lack of data to support this question | High |
| | | Is the taxon likely to be hermaphroditic or to display asexual reproduction? | Yes | for verification | Very high |
| 32 | | Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? | No | for verification | Very high |
| 33 | 6.06 | Is the taxon known (or likely) to produce a large number of propagules or offspring | Yes | for verification | 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- | 4 | for verification | Medium |
| 7 0 | | first-reproduction? | <u> </u> | | <u> </u> |
| | | <i>I mechanisms</i> How many potential internal | >1 | deliberate release | Medium |
| | | vectors/pathways could the taxon use to disperse within the RA area (with suitable | | | |
| 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 | file:///C:/Users/User/Desktop/Thesis%20Ref/Guerrero%20III%202 014.pdf | Very high |
| 37 | | Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? | No | the taxon have no ablity to attached itself into any kinds of subtrates | Very high |
| 38 | 7.04 | Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? | No | for verification | 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 | the type of reproduction of the taxon have posibilities to carry out their juveniles by flowing water or can move between bodies of water | Medium |
| 10 | 7.06 | Are older life stages of the taxon likely to migrate in the RA area for reproduction? | Yes | for verification | Medium |
| 11 | 7.07 | Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? | No | since the parent guard there eggs this would not possible | 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. either unintentional or intentional) likely to be | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/Guerrero%20III%202 014.pdf | High |
| 13 | | Is dispersal of the taxon density dependent? | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/Guerrero%20III%202 014.pdf | High |
| | | e attributes | | | |
| 14 | | Is the taxon 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 | file:///C:/Users/User/Desktop/Thesis%20Ref/Guerrero%20III%202 014.pdf | Medium |
| 15 | 8.02 | cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being | Yes | file:///C:/Users/User/Desktop/papa%20et.alpdf | High |
| 1 6 | | Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? | Yes | for verification | High |
| 17 | 8.04 | agents/means? Is the taxon likely to tolerate or benefit from environmental/human disturbance? | Yes | Widespread. Found in canals, creeks, swamps, ponds, shallow areas of lakes | High |
| 18 | 8.05 | Is the taxon able to tolerate salinity levels that are higher or lower than those found in | Yes | file:///C:/Users/User/Desktop/papa%20et.alpdf | High |
| | | its usual environment? | | | |
| 19 | 8.06 | Are there effective natural enemies (predators) of the taxon present in the RA | No | file:///C:/Users/User/Desktop/Thesis%20Ref/Guerrero%20III%202 014.pdf | 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? | Increase | file:///C:/Users/User/Desktop/Thesis%20Ref/Guerrero%20III%202 014.pdf | |
|----|------|---|----------|--|-----------|
| 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 | file:///C:/Users/User/Desktop/Thesis%20Ref/Guerrero%20III%202 014.pdf | 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 | file:///C:/Users/User/Desktop/Thesis%20Ref/Guerrero%20III%202 014.pdf | 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 | file:///C:/Users/User/Desktop/Thesis%20Ref/Guerrero%20III%202 014.pdf | High |
| 54 | 9.05 | Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? | Higher | file:///C:/Users/User/Desktop/Thesis%20Ref/Guerrero%20III%202 014.pdf | 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 | file:///C:/Users/User/Desktop/Thesis%20Ref/Guerrero%20III%202 014.pdf | Very high |

Statistics

| Scores | |
|--|--|
| BRA | 50.0 |
| BRA Outcome | High |
| BRA+CCA | 62.0 |
| 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 | 26.0 |
| 4. Undesirable (or persistence) traits | 7.0 |
| 5. Resource exploitation | 7.0 |
| 6. Reproduction | 4.0 |
| 7. Dispersal mechanisms | 3.0 |
| 8. Tolerance attributes | 5.0 |
| C. Climate change | 12.0 |
| 9. Climate change | 12.0 |
| Answered Questions | |
| Total | 55 |
| A. Biogeography/Historical | 13 |
| | 2 |
| 1. Domestication/Cultivation | 3 |
| 2. Climate, distribution and introduction risk | 3 5 |
| 2. Climate, distribution and introduction risk 3. Invasive elsewhere | 3 5 5 |
| 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology | 36 |
| 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits | 36 |
| 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation | 36 |
| 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology / Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction | 36 12 2 7 |
| 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms | 36 12 2 7 9 |
| 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology / Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes | 36 12 2 7 9 6 |
| 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change | 36 12 2 7 9 6 6 |
| 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change | 36 12 2 7 9 6 |
| 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 | 36 12 2 7 9 6 6 6 6 |
| 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial | 36 12 2 7 9 6 6 6 6 21 |
| 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial Environmental | 36 12 2 7 9 6 6 6 6 6 21 16 |
| 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial | 36 12 2 7 9 6 6 6 6 21 |

| Inresnolas | | |
|---------------|---------|--------------|
| | BRA | 34.5 |
| | BRA+CCA | 34.5 |
| Confidence | | |
| | BRA+CCA | 0.77 |
| | BRA | 0.77 |
| | CCA | 0.79 |
| | | |
| Date and Time | | |
| | 14/04/2 | 019 00:36:41 |

| Taxon and Assessor details | | | | | |
|------------------------------------|--|--|--|--|--|
| Category | Fishes and Lampreys (freshwater) | | | | |
| Taxon name | Cichla temensis | | | | |
| Common name | speckled pavon | | | | |
| Assessor | Gilles | | | | |
| Risk screening context | | | | | |
| Reason and socio-economic benefits | Aquarium | | | | |
| Risk assessment area | Lake Taal | | | | |
| Taxonomy | Actinopteri (ray-finned fishes) > Cichliformes (Cichlids, convict blennies) > Cichlidae (Cichlids) > | | | | |
| Native range | outh America: Amazon River basin in the Negro and Uatuma River drainages; Orinoco River basin | | | | |
| Introduced range | Venezuela, USA | | | | |
| URL | https://www.fishbase.se/summary/Cichla-temensis.html | | | | |

| | | | Response | Justification (references and/or other information) | Confidence |
|--------|---------|--|----------------|--|------------|
| | | graphy/Historical | | | |
| 1. L | | ication/Cultivation | | | |
| 1 | 1.01 | Has the taxon been the subject of domestication (or cultivation) for at least 20 generations? | Yes | Speckled Pavon (Cichla temensis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, June 2019 Web Version, 5/1/2020 | High |
| 2 | 1.02 | Is the taxon harvested in the wild and likely to be sold or used in its live form? | Yes | Speckled Pavon (Cichla temensis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, June 2019 Web Version, 5/1/2020 | Very high |
| 3 | 1.03 | Does the taxon have invasive races, varieties, sub-taxa or congeners? | Yes | Speckled Pavon (Cichla temensis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, June 2019 Web Version, 5/1/2020 | 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 | Tropical; 27°C - 29°C https://www.fishbase.se/summary/Cichla- temensis.html | High |
| 5 | 2.02 | What is the quality of the climate matching data? | High | Tropical; 27°C - 29°C https://www.fishbase.se/summary/Cichla- temensis.html | Very high |
| 6 | 2.03 | Is the taxon already present outside of captivity in the RA area? | Yes | Speckled Pavon (Cichla temensis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, June 2019 Web Version, 5/1/2020 | Very high |
| 7 | 2.04 | How many potential vectors could the taxon use to enter in the RA area? | >1 | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology | 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 | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology | High |
| 3 1 | nyaciw | and intentional introductions)? | | | |
| 9 9 | 3.01 | Has the taxon become naturalised (established viable populations) outside its native range? | Yes | Speckled Pavon (Cichla temensis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, June 2019 Web Version. 5/1/2020 | High |
| 10 | 3.02 | In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? | Yes | Speckled Pavon (Cichla temensis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, June 2019 Web Version, 5/1/2020 | High |
| 11 | 3.03 | In the taxon's introduced range, are there known adverse impacts to aquaculture? | Yes | Speckled Pavon (Cichla temensis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, | High |
| 12 | 3.04 | In the taxon's introduced range, are there known adverse impacts to ecosystem services? | No | June 2019 Web Version, 5/1/2020 Speckled Pavon (Cichla temensis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, June 2019 Web Version, 5/1/2020 | Very high |
| 13 | 3.05 | In the taxon's introduced range, are there known adverse socio-economic impacts? | No | Speckled Pavon (Cichla temensis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, June 2019 Web Version, 5/1/2020 | High |
| B. I | Biology | y/Ecology | | | |
| | | able (or persistence) traits | | | |
| 14 | 4.01 | Is it likely that the taxon will be poisonous or pose other risks to human health? | No | Speckled Pavon (Cichla temensis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, June 2019 Web Version, 5/1/2020 | High |
| 15 | 4.02 | Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? | Yes | Speckled Pavon (Cichla temensis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, June 2019 Web Version, 5/1/2020 | High |
| 16 | 4.03 | Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? | No | Speckled Pavon (Cichla temensis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, June 2019 Web Version, 5/1/2020 | 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 | Speckled Pavon (Cichla temensis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, June 2019 Web Version, 5/1/2020 | Very high |
| 18 | 4.05 | Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA | Not applicable | no data | Medium |
| 19 | 4.06 | Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? | No | Speckled Pavon (Cichla temensis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, June 2019 Web Version, 5/1/2020 | 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 | Speckled Pavon (Cichla temensis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, June 2019 Web Version, 5/1/2020 | 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 | Speckled Pavon (Cichla temensis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, June 2019 Web Version, 5/1/2020 | High |
|-----|---------|--|----------------|--|-----------|
| 2 | 4.09 | To) the KA area? Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity? | Yes | Max length : 99.0 cm TL male/unsexed; FishBase 2020 | 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 | Speckled Pavon (Cichla temensis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, June 2019 Web Version, 5/1/2020 | High |
| 24 | 4.11 | Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa? | No | Speckled Pavon (Cichla temensis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, June 2019 Web Version, 5/1/2020 | 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 | Speckled Pavon (Cichla temensis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, June 2019 Web Version, 5/1/2020 | High |
| | | e exploitation | | | - 1 |
| 6 | 5.01 | Is the taxon likely to consume threatened or protected native taxa in the RA area? | Yes | Speckled Pavon (Cichla temensis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, June 2019 Web Version, 5/1/2020 | High |
| 27 | 5.02 | Is the taxon likely to sequester food resources (including nutrients) to the | Yes | Speckled Pavon (Cichla temensis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, June 2019 Web Version, 5/1/2020 | High |
| 5 6 | Reprodu | detriment of native taxa in the RA area? | | June 2019 Web Version, 5/1/2020 | |
| | | Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response | Yes | Speckled Pavon (Cichla temensis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, | High |
| 29 | 6.02 | to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? | Yes | June 2019 Web Version, 5/1/2020 Speckled Pavon (Cichla temensis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, | Very high |
| 30 | 6.03 | Is the taxon likely to hybridise naturally with native taxa? | No | June 2019 Web Version, 5/1/2020 Speckled Pavon (Cichla temensis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, June 2019 Web Version, 5/1/2020 | Very high |
| 31 | 6.04 | Is the taxon likely to be hermaphroditic or to display asexual reproduction? | No | Speckled Pavon (Cichla temensis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, June 2019 Web Version, 5/1/2020 | High |
| 32 | 6.05 | Is the taxon dependent on the presence of another taxon (or specific habitat features) | No | Speckled Pavon (Cichla temensis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, | High |
| 33 | 6.06 | to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring | Yes | June 2019 Web Version, 5/1/2020 Speckled Pavon (Cichla temensis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, | High |
| 34 | 6.07 | within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- | 5 | June 2019 Web Version, 5/1/2020 Speckled Pavon (Cichla temensis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, | High |
| 7 F | Disners | first-reproduction? al mechanisms | | June 2019 Web Version, 5/1/2020 | |
| | | How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable | >1 | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology | High |
| 86 | 7.02 | Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? | Yes | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology | 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? | Not applicable | no data | 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 | Speckled Pavon (Cichla temensis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, June 2019 Web Version, 5/1/2020 | Very high |
| 39 | 7.05 | Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? | No | Speckled Pavon (Cichla temensis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, June 2019 Web Version, 5/1/2020 | High |
| 10 | 7.06 | Are older life stages of the taxon likely to migrate in the RA area for reproduction? | Yes | Speckled Pavon (Cichla temensis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, June 2019 Web Version, 5/1/2020 | Very high |
| 1 | 7.07 | Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? | No | Speckled Pavon (Cichla temensis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, June 2019 Web Version, 5/1/2020 | 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. either unintentional or intentional) likely to be | Yes | Speckled Pavon (Cichla temensis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, June 2019 Web Version, 5/1/2020 | High |
| | 7.09 | Is dispersal of the taxon density dependent? | No | Speckled Pavon (Cichla temensis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, June 2019 Web Version, 5/1/2020 | High |
| | | ce attributes | No | Speckled Daven (Cichla temensia) Feelenist Disk Correct | Vonthist |
| 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 | Speckled Pavon (Cichla temensis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, June 2019 Web Version, 5/1/2020 | Very high |

| | | | L., | | |
|------------|------|--|----------------|--|-------------------|
| 45 | 8.02 | Is the taxon tolerant of a wide range of | Yes | Speckled Pavon (Cichla temensis) Ecological Risk Screening | High |
| | | water quality conditions relevant to that | | Summary U.S. Fish & Wildlife Service, February 2011 Revised, | |
| | | taxon? [In the Justification field, indicate the | | June 2019 Web Version, 5/1/2020 | |
| | | relevant water quality variable(s) being | | | |
| 46 | 8.03 | Can the taxon be controlled or eradicated in | Not applicable | no data | High |
| | | the wild with chemical, biological, or other | | | |
| | | agents/means? | | | |
| 47 | 8.04 | Is the taxon likely to tolerate or benefit from | Yes | Speckled Pavon (Cichla temensis) Ecological Risk Screening | Very high |
| | | environmental/human disturbance? | | Summary U.S. Fish & Wildlife Service, February 2011 Revised, | |
| | | | | June 2019 Web Version, 5/1/2020 | |
| 48 | 8.05 | Is the taxon able to tolerate salinity levels | Yes | https://www.fishbase.se/summary/Cichla-temensis.html | High |
| | | that are higher or lower than those found in | | | |
| | | its usual environment? | | | |
| 49 | 8.06 | Are there effective natural enemies | No | History of the biodiversity and limno-ecological studies on Lake | High |
| | | (predators) of the taxon present in the RA | | Taal with notes on the current state of Philippine limnology | |
| | | e change | | | |
| | | change | T | | |
| 50 | 9.01 | Under the predicted future climatic | Increase | History of the biodiversity and limno-ecological studies on Lake | High |
| | | conditions, are the risks of entry into the RA | | Taal with notes on the current state of Philippine limnology | |
| | | area posed by the taxon likely to increase, | | | |
| | | decrease or not change? | | | |
| 51 | 9.02 | Under the predicted future climatic | Increase | History of the biodiversity and limno-ecological studies on Lake | High |
| | | conditions, are the risks of establishment | | Taal with notes on the current state of Philippine limnology | |
| | | posed by the taxon likely to increase, | | | |
| | | decrease or not change? | | | |
| 52 | 9.03 | Under the predicted future climatic | No change | History of the biodiversity and limno-ecological studies on Lake | High |
| | | conditions, are the risks of dispersal within | | Taal with notes on the current state of Philippine limnology | |
| | | the RA area posed by the taxon likely to | | | |
| 52 | 0.04 | increase, decrease or not change? | l li ala au | I the second |) / a m a h i a h |
| 53 | 9.04 | Under the predicted future climatic | Higher | History of the biodiversity and limno-ecological studies on Lake | Very high |
| | | conditions, what is the likely magnitude of | | Taal with notes on the current state of Philippine limnology | |
| | | future potential impacts on biodiversity | | | |
| F 4 | 0.05 | and/or ecological integrity/status? | No. alegano a | | Marris hish |
| 54 | 9.05 | Under the predicted future climatic | No change | History of the biodiversity and limno-ecological studies on Lake | Very high |
| | | conditions, what is the likely magnitude of | | Taal with notes on the current state of Philippine limnology | |
| | | future potential impacts on ecosystem | | | |
| | 0.00 | structure and/or function? | l li ala au | | Marris Indianta |
| 55 | 9.06 | Under the predicted future climatic | Higher | History of the biodiversity and limno-ecological studies on Lake | Very high |
| | | conditions, what is the likely magnitude of | | Taal with notes on the current state of Philippine limnology | |
| | | future potential impacts on ecosystem | | | |
| | | services/socio-economic factors? | | | |

| Statistics | |
|--|------------------------------|
| Statistics | |
| BRA | 40.0 |
| BRA Outcome | High |
| BRA+CCA | 48.0 |
| BRA+CCA Outcome | High |
| Score partition | Ingh |
| A. Biogeography/Historical | 18.0 |
| 1. Domestication/Cultivation | 4.0 |
| 2. Climate, distribution and introduction risk | 4.0 |
| 3. Invasive elsewhere | 10.0 |
| B. Biology/Ecology | 22.0 |
| 4. Undesirable (or persistence) traits | 5.0 |
| 5. Resource exploitation | 7.0 |
| 6. Reproduction | 1.0 |
| 7. Dispersal mechanisms | 3.0 |
| 8. Tolerance attributes | 6.0 |
| C. Climate change | 8.0 |
| 9. Climate change | 8.0 |
| Answered Questions | |
| Total | 55 |
| A. Biogeography/Historical | 13 |
| 1. Domestication/Cultivation | 3 5 5 36 |
| 2. Climate, distribution and introduction risk | 5 |
| 3. Invasive elsewhere | 5 |
| B. Biology/Ecology | 36 |
| 4. Undesirable (or persistence) traits | 12 |
| 5. Resource exploitation | 2 |
| 6. Reproduction | 7 |
| 7. Dispersal mechanisms | 9 |
| 8. Tolerance attributes | 2 7 9 6 6 |
| C. Climate change | 6 6 |
| 9. Climate change | 6 |
| Sectors affected | 10 |
| Commercial Environmental | 19 |
| Environmental Species or population nuisance traits | 8 28 |
| species or population nuisance traits | 28 |
| Thresholds | |
| BRA | 34.5 |
| BRA+CCA | 34.5 |
| Confidence | |
| BDA+CCA | 0.82 |

ľ

| BRA+CCA | 0.82 |
|---------|------|
| | 0101 |

| | BRA | 0.82 |
|---------------|-----|------|
| | CCA | 0.88 |
| Date and Time | | |

02/04/2020 08:00:46

| Taxon and Assessor details | | | | | |
|------------------------------------|--|--|--|--|--|
| Category | Fishes and Lampreys (freshwater) | | | | |
| Taxon name | Cichlasoma bimaculatum | | | | |
| Common name | black acara | | | | |
| Assessor | Gilles | | | | |
| Risk screening context | | | | | |
| Reason and socio-economic benefits | Aquarium | | | | |
| Risk assessment area | Lake Taal | | | | |
| Taxonomy | Actinopteri (ray-finned fishes) > Cichliformes (Cichlids, convict blennies) > Cichlidae (Cichlids) > | | | | |
| Native range | South America: Orinoco River basin, in the Caroni in River Venezuela; Guianas, from the Essequibo | | | | |
| Introduced range | South America | | | | |
| URL | https://www.fishbase.se/summary/Cichlasoma-bimaculatum.html | | | | |

| | | | Response | Justification (references and/or other information) | Confidence |
|------|---------|---|----------|--|------------|
| | | graphy/Historical | | | |
| _ | | ication/Cultivation | | | |
| 1 | 1.01 | Has the taxon been the subject of domestication (or cultivation) for at least 20 | Yes | Black Acara (Cichlasoma bimaculatum) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, | Very high |
| 2 | 1.02 | generations? Is the taxon harvested in the wild and likely to be sold or used in its live form? | Yes | August 2014 and January 2018 Web Version, 4/5/2018 Black Acara (Cichlasoma bimaculatum) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, | Very high |
| 3 | 1.03 | Does the taxon have invasive races, | Yes | August 2014 and January 2018 Web Version, 4/5/2018 Black Acara (Cichlasoma bimaculatum) Ecological Risk Screening | Very high |
| - | | varieties, sub-taxa or congeners? | | Summary U.S. Fish & Wildlife Service, February 2011 Revised, August 2014 and January 2018 Web Version, 4/5/2018 | |
| 2. C | limate, | , distribution and introduction risk | | | |
| 4 | 2.01 | Risk Assessment (RA) area and the taxon's | High | Tropical; 16°C - 24°C; https://www.fishbase.se/summary/Cichlasoma-bimaculatum.html | High |
| 5 | 2.02 | native range? What is the quality of the climate matching data? | High | Tropical; 16°C - 24°C; https://www.fishbase.se/summary/Cichlasoma-bimaculatum.html | High |
| 6 | 2.03 | Is the taxon already present outside of captivity in the RA area? | Yes | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology | High |
| 7 | 2.04 | How many potential vectors could the taxon use to enter in the RA area? | >1 | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology | 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 | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology | High |
| | | and intentional introductions)? | | | |
| _ | | e elsewhere | 1 | | 1 |
| 9 | 3.01 | Has the taxon become naturalised (established viable populations) outside its native range? | Yes | Black Acara (Cichlasoma bimaculatum) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, August 2014 and January 2018 Web Version, 4/5/2018 | High |
| 10 | 3.02 | In the taxon's introduced range, are there known adverse impacts to wild stocks or | Yes | Black Acara (Cichlasoma bimaculatum) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, | High |
| 11 | 3.03 | commercial taxa? In the taxon's introduced range, are there known adverse impacts to aquaculture? | No | August 2014 and January 2018 Web Version, 4/5/2018 Black Acara (Cichlasoma bimaculatum) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, | High |
| 12 | 3.04 | In the taxon's introduced range, are there known adverse impacts to ecosystem | No | August 2014 and January 2018 Web Version, 4/5/2018 Black Acara (Cichlasoma bimaculatum) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, | High |
| 13 | 3.05 | services? In the taxon's introduced range, are there known adverse socio-economic impacts? | No | August 2014 and January 2018 Web Version, 4/5/2018 Black Acara (Cichlasoma bimaculatum) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, | High |
| | | | | August 2014 and January 2018 Web Version, 4/5/2018 | |
| | | y/Ecology | | | |
| | | able (or persistence) traits | I | | I |
| 14 | 4.01 | Is it likely that the taxon will be poisonous or pose other risks to human health? | No | Black Acara (Cichlasoma bimaculatum) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, August 2014 and January 2018 Web Version, 4/5/2018 | High |
| 15 | 4.02 | Is it likely that the taxon will smother one or more native taxa (that are not threatened or | No | Black Acara (Cichlasoma bimaculatum) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, | Very high |
| 16 | 4.03 | protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in | No | August 2014 and January 2018 Web Version, 4/5/2018 Black Acara (Cichlasoma bimaculatum) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, | High |
| | | the RA area? | | August 2014 and January 2018 Web Version, 4/5/2018 | |
| 17 | 4.04 | Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? | Yes | https://www.fishbase.se/summary/Cichlasoma-bimaculatum.html | High |
| 18 | 4.05 | Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it | No | Black Acara (Cichlasoma bimaculatum) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, | High |
| 19 | 4.06 | has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? | No | August 2014 and January 2018 Web Version, 4/5/2018 Black Acara (Cichlasoma bimaculatum) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, | Very high |
| 20 | 4.07 | Is it likely that the taxon will host, and/or act as a vector for, recognised pests and | No | August 2014 and January 2018 Web Version, 4/5/2018 Black Acara (Cichlasoma bimaculatum) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, | High |
| 21 | 4.08 | infectious agents that are endemic in the RA Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel | No | August 2014 and January 2018 Web Version, 4/5/2018 Black Acara (Cichlasoma bimaculatum) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, August 2014 and January 2018 Web Version, 4/5/2018 | High |

| 22 | | | | | |
|--|--|--|--|--|---|
| | 4.09 | Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity? | No | Max length : 12.3 cm SL male/unsexed; https://www.fishbase.se/summary/Cichlasoma-bimaculatum.html | High |
| 23 | 4.10 | Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)? | Yes | https://www.fishbase.se/summary/Cichlasoma-bimaculatum.html | 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 | Black Acara (Cichlasoma bimaculatum) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, August 2014 and January 2018 Web Version, 4/5/2018 | 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 | Black Acara (Cichlasoma bimaculatum) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, August 2014 and January 2018 Web Version, 4/5/2018 | Very high |
| 5. F | Resourd | ce exploitation | | | |
| | 5.01 | Is the taxon likely to consume threatened or protected native taxa in the RA area? | Yes | Black Acara (Cichlasoma bimaculatum) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, August 2014 and January 2018 Web Version, 4/5/2018 | 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 | Black Acara (Cichlasoma bimaculatum) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, August 2014 and January 2018 Web Version, 4/5/2018 | High |
| | Reprodu | uction | | | |
| 28 | 6.01 | Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? | Yes | Black Acara (Cichlasoma bimaculatum) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, August 2014 and January 2018 Web Version, 4/5/2018 | High |
| 29 | 6.02 | Is the taxon likely to produce viable gametes or propagules (in the RA area)? | Yes | Black Acara (Cichlasoma bimaculatum) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, August 2014 and January 2018 Web Version, 4/5/2018 | High |
| 30 | 6.03 | Is the taxon likely to hybridise naturally with native taxa? | No | Black Acara (Cichlasoma bimaculatum) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, August 2014 and January 2018 Web Version, 4/5/2018 | Very high |
| 31 | 6.04 | Is the taxon likely to be hermaphroditic or to display asexual reproduction? | No | Black Acara (Cichlasoma bimaculatum) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, August 2014 and January 2018 Web Version, 4/5/2018 | High |
| | 6.05 | Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? | No | Black Acara (Cichlasoma bimaculatum) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, August 2014 and January 2018 Web Version, 4/5/2018 | 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 | Black Acara (Cichlasoma bimaculatum) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, August 2014 and January 2018 Web Version, 4/5/2018 | High |
| 34 | 6.07 | How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? | 3 | Black Acara (Cichlasoma bimaculatum) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, August 2014 and January 2018 Web Version, 4/5/2018 | Very high |
| | | al mechanisms | | | |
| 35 | 7.01 | | | | |
| 36 | | How many potential internal vectors/pathways could the taxon use to disperse within the BA area (with suitable | >1 | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology | High |
| | 7.02 | vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more | >1 Yes | | High High |
| 37 | 7.02 | vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the | | Taal with notes on the current state of Philippine limnology History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology | |
| | | vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules | Yes | Taal with notes on the current state of Philippine limnology History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology no data Black Acara (Cichlasoma bimaculatum) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, | High |
| 38 | 7.03 | vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to | Yes Not applicable | Taal with notes on the current state of Philippine limnology History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology no data Black Acara (Cichlasoma bimaculatum) Ecological Risk Screening | High |
| 38 39 | 7.03 | vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA 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 Not applicable Yes | Taal with notes on the current state of Philippine limnology History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology no data Black Acara (Cichlasoma bimaculatum) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, August 2014 and January 2018 Web Version, 4/5/2018 Black Acara (Cichlasoma bimaculatum) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, | High High High |
| 38 39 40 | 7.03 7.04 7.05 | vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to | Yes Not applicable Yes No Yes No | Taal with notes on the current state of Philippine limnology History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology no data Black Acara (Cichlasoma bimaculatum) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, August 2014 and January 2018 Web Version, 4/5/2018 Black Acara (Cichlasoma bimaculatum) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, August 2014 and January 2018 Web Version, 4/5/2018 Black Acara (Cichlasoma bimaculatum) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, August 2014 and January 2018 Web Version, 4/5/2018 | High High High High |
| 38 39 40 | 7.03 7.04 7.05 7.06 | vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? | Yes Not applicable Yes No Yes No | Taal with notes on the current state of Philippine limnology History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology no data Black Acara (Cichlasoma bimaculatum) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, August 2014 and January 2018 Web Version, 4/5/2018 Black Acara (Cichlasoma bimaculatum) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, August 2014 and January 2018 Web Version, 4/5/2018 Black Acara (Cichlasoma bimaculatum) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, August 2014 and January 2018 Web Version, 4/5/2018 Black Acara (Cichlasoma bimaculatum) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, August 2014 and January 2018 Web Version, 4/5/2018 | High High High High Very high |
| 38 39 40 41 42 43 | 7.03 7.04 7.05 7.06 7.07 7.08 7.09 | vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. either unintentional or intentional) likely to be Is dispersal of the taxon density dependent? | Yes Not applicable Yes No Yes | Taal with notes on the current state of Philippine limnology History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology no data Black Acara (Cichlasoma bimaculatum) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, August 2014 and January 2018 Web Version, 4/5/2018 Black Acara (Cichlasoma bimaculatum) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, August 2014 and January 2018 Web Version, 4/5/2018 Black Acara (Cichlasoma bimaculatum) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, August 2014 and January 2018 Web Version, 4/5/2018 Black Acara (Cichlasoma bimaculatum) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, August 2014 and January 2018 Web Version, 4/5/2018 Black Acara (Cichlasoma bimaculatum) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, August 2014 and January 2018 Web Version, 4/5/2018 | High High High Very high High |
| 38 39 40 41 42 43 8. 1 | 7.03 7.04 7.05 7.06 7.07 7.08 7.09 | vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. either unintentional or intentional) likely to be | Yes Not applicable Yes No Yes Yes | Taal with notes on the current state of Philippine limnology History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology no data Black Acara (Cichlasoma bimaculatum) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, August 2014 and January 2018 Web Version, 4/5/2018 Black Acara (Cichlasoma bimaculatum) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, August 2014 and January 2018 Web Version, 4/5/2018 Black Acara (Cichlasoma bimaculatum) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, August 2014 and January 2018 Web Version, 4/5/2018 Black Acara (Cichlasoma bimaculatum) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, August 2014 and January 2018 Web Version, 4/5/2018 Black Acara (Cichlasoma bimaculatum) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, August 2014 and January 2018 Web Version, 4/5/2018 Black Acara (Cichlasoma bimaculatum) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, August 2014 and January 2018 Web Version, 4/5/2018 Black Acara (Cichlasoma bimaculatum) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, August 2014 and January 2018 Web Version, 4/5/2018 Black Acara (Cichlasoma bimaculatum) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, August 2014 and January 2018 Web Version, 4/5/2018 Black Acara (Cichlasoma bimaculatum) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, August 2014 and January 2018 Web Version, 4/5/20 | High High High Very high High |

| 46 | 8.03 | Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? | Not applicable | no data | High |
|------|---------|---|----------------|--|------|
| 47 | 8.04 | Is the taxon likely to tolerate or benefit from environmental/human disturbance? | No | Black Acara (Cichlasoma bimaculatum) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, August 2014 and January 2018 Web Version, 4/5/2018 | High |
| 48 | 8.05 | Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment? | Yes | Black Acara (Cichlasoma bimaculatum) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2011 Revised, August 2014 and January 2018 Web Version, 4/5/2018 | High |
| 49 | 8.06 | Are there effective natural enemies (predators) of the taxon present in the RA | No | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology | High |
| С. С | Climate | e change | | | |
| | | change | | | - |
| 50 | 9.01 | Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? | Increase | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology | 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 | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology | 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 | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology | 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 | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology | High |
| 54 | 9.05 | Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? | Higher | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology | 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 | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology | High |

| Statistics | |
|--|-------------------------|
| Scores | |
| BRA | 29.0 |
| BRA Outcome | Medium |
| BRA+CCA | 37.0 |
| BRA+CCA Outcome | High |
| Score partition | |
| A. Biogeography/Historical | 14.0 |
| 1. Domestication/Cultivation | 4.0 |
| 2. Climate, distribution and introduction risk | 4.0 |
| 3. Invasive elsewhere | 6.0 |
| B. Biology/Ecology | 15.0 |
| 4. Undesirable (or persistence) traits | 3.0 |
| 5. Resource exploitation | 5.0 |
| 6. Reproduction | 2.0 |
| 7. Dispersal mechanisms | 3.0 |
| 8. Tolerance attributes | 2.0 |
| C. Climate change | 8.0 |
| 9. Climate change | 8.0 |
| Answered Questions | |
| Total A. Biogeography/Historical | 55 13 |
| 1. Domestication/Cultivation | |
| 2. Climate, distribution and introduction risk | 5 |
| 3. Invasive elsewhere | 5 |
| B. Biology/Ecology | 3 5 5 36 12 |
| 4. Undesirable (or persistence) traits | 12 |
| 5. Resource exploitation | |
| 6. Reproduction | 7 |
| 7. Dispersal mechanisms | 2 7 9 |
| 8. Tolerance attributes | 6 |
| C. Climate change | 6 |
| 9. Climate change | 6 |
| Sectors affected | Ű |
| Commercial | 13 |
| Environmental | 8 |
| Species or population nuisance traits | 23 |
| | |
| Thresholds | |
| BRA | 34.5 |
| 2.01 | |

| BRA | 34.5 |
|------------|------|
| BRA+CCA | 34.5 |
| Confidence | |
| BRA+CCA | 0.79 |
| BRA | 0.80 |
| CCA | 0.75 |
| | |

Date and Time

02/04/2020 07:58:57

| Taxon and Assessor details | axon and Assessor details | | | | | |
|--|---|--|--|--|--|--|
| Category | Fishes and Lampreys (freshwater) | | | | | |
| Taxon name | Cirrhinus cirrhosus | | | | | |
| Common name | Mrigal carp | | | | | |
| Assessor | Gilles | | | | | |
| Risk screening context | | | | | | |
| Reason and socio-economic benefits | Aquaculture, Aquarium | | | | | |
| Risk assessment area | Lake Taal | | | | | |
| Taxonomy | Actinopteri (ray-finned fishes) > Cypriniformes (Carps) > Cyprinidae (Minnows or carps) > | | | | | |
| Native range Asia: native to large rivers in the Indian subcontinent | | | | | | |
| Introduced range | Philippines, Singapore, Japan, India, Malaysia etc. | | | | | |
| URL | https://www.fishbase.se/summary/Cirrhinus-cirrhosus.html | | | | | |

| | | | Response | Justification (references and/or other information) | Confidence |
|------|---------|---|----------------|---|------------|
| Α. Ι | Biogeo | graphy/Historical | | | |
| | Domesti | ication/Cultivation | | | |
| 1 | 1.01 | Has the taxon been the subject of | Yes | This taxon is farmed mainly in Asia and Eastern Europe. In China, | Very high |
| | | domestication (or cultivation) for at least 20 | | Taiwan and Belarus, it produced more than 1,500 tons in 2002 | |
| | | generations? | | and in Japan, Uzbekistan and Republic of Korea it produced more | |
| | | | | than 100 tonnes (FAO, 2009). | |
| 2 | 1.02 | Is the taxon harvested in the wild and likely | Yes | The taxon has been harvested in the wild for ornamental purposes | High |
| | | to be sold or used in its live form? | | as pets and aquarium species, for reacreational fishing and food | |
| | | | | (CABI, 2020) | |
| 3 | 1.03 | Does the taxon have invasive races, | Yes | One concrete example is the Carassius gibelio, which is considered | Very high |
| | | varieties, sub-taxa or congeners? | | to be invasive in Europe and North America and currently | |
| | | | | imposing adverse effects in the country's native species (CABI, | |
| | | , distribution and introduction risk | Madium | This terrents methics many (Europie) has a terrent elimeter subile | 1.U.a.b. |
| 4 | 2.01 | How similar are the climatic conditions of the | Medium | This taxon's native range (Eurasia) has a temperate climate, while | High |
| | | Risk Assessment (RA) area and the taxon's | | the RA area has a tropical climate (CABI, 2020; FishBase, 2019; | |
| 5 | 2.02 | native range? What is the quality of the climate matching | Lliab | U.S. Fish and Wildlife Service, 2014) Climatic Data from CABI, Fish Base and U.S. Fish and Wildlife | High |
| Э | 2.02 | data? | High | | nigii |
| 6 | 2.03 | Is the taxon already present outside of | Yes | Service were used to generate climate analysis. The taxon is now present in pet stores for ornamental use, such | Very high |
| 0 | 2.05 | captivity in the RA area? | 165 | as in Cartimar Market (Wild Gold Fish) where importation and sale | very nigh |
| | | captivity in the IVA area? | | of this taxon is highly abundant (Fish Base, 2019). | |
| 7 | 2.04 | How many potential vectors could the taxon | >1 | The taxon could be introduced through intentional introduction | High |
| ľ | | use to enter in the RA area? | - | with human intervention and aquarium escape. | |
| 8 | 2.05 | Is the taxon currently found in close | Not applicable | Not Applicable | High |
| | | proximity to, and likely to enter into, the RA | 21 applicable | | 5 |
| | | area in the near future (e.g. unintentional | | | |
| | | and intentional introductions)? | | | |
| 3. I | nvasive | e elsewhere | | | |
| 9 | 3.01 | Has the taxon become naturalised | No | This taxon has not been considered as invasive. In United | Very high |
| | | (established viable populations) outside its | | States, this taxon has lived in the lagoons and parks of Chicago, | |
| | | native range? | | however reports indicates that this population was not established | |
| | | | | and eventually died out (CABI, 2019; Texas Invasive Sepcies | |
| 10 | 3.02 | In the taxon's introduced range, are there | Yes | "This taxon is known to increases turbidity affecting aquatic | High |
| | | known adverse impacts to wild stocks or | | community, compete with native species, can hybridize with other | |
| | | commercial taxa? | | carp species, and is a carrier of spring viraemia virus (U.S. Fish | |
| 1 1 | 2.02 | In the tayon's introduced range, are there | Vaa | and Wildlife Service, 2014)" | Vorschigh |
| 11 | 3.03 | In the taxon's introduced range, are there | Yes | "This taxon is known to increases turbidity affecting aquatic | Very high |
| | | known adverse impacts to aquaculture? | | community, compete with native species, can hybridize with other | |
| | | | | carp species, and is a carrier of spring viraemia virus (U.S. Fish and Wildlife Service, 2014)" | |
| 12 | 3.04 | In the taxon's introduced range, are there | Yes | "This taxon is known to increases turbidity affecting aquatic | Very high |
| 12 | 5.04 | known adverse impacts to ecosystem | 103 | community, compete with native species, can hybridize with other | Very high |
| | | services? | | carp species, and is a carrier of spring viraemia virus (U.S. Fish | |
| | | | | and Wildlife Service, 2014)" | |
| 13 | 3.05 | In the taxon's introduced range, are there | Yes | "This taxon is known to increases turbidity affecting aquatic | High |
| | | known adverse socio-economic impacts? | | community, compete with native species, can hybridize with other | |
| | | | | carp species, and is a carrier of spring viraemia virus (U.S. Fish | |
| | | | | and Wildlife Service, 2014)" | |
| | | //Ecology | | | |
| | | able (or persistence) traits | | | |
| 14 | 4.01 | Is it likely that the taxon will be poisonous or | NO | There are no records for this taxon to pose human threaths. | Medium |
| 15 | 4.02 | pose other risks to human health? | Voc | As this taxon is known to incroaces water twitidity affecting | Von hich |
| 12 | 4.02 | Is it likely that the taxon will smother one or more native taxa (that are not threatened or | Yes | As this taxon is known to increases water turbidity affecting aquatic community, compete with native species for food and | Very high |
| | | protected)? | | space which can dispalce native species (U.S. Fish and Wildlife | |
| 16 | 4.03 | Are there any threatened or protected taxa | No | This taxon is unlikely to preadate or prasite threathened taxa in | Medium |
| Ť | | that the non-native taxon would parasitise in | | the RA area. | |
| | | the RA area? | | | |
| 17 | 4.04 | Is the taxon adaptable in terms of climatic | Yes | This taxon has a high adaptability to different environmental | Very high |
| | | and other environmental conditions, thus | | conditions making them a habitat generalist. Also, this taxon has | ., |
| | | enhancing its potential persistence if it has | | an exceptional hypoxia and anoxia tolerance (CABI, 2020). | |
| | | invaded or could invade the RA area? | | | |
| 18 | 4.05 | Is the taxon likely to disrupt food-web | Yes | As this taxon is known to increases turbidity affecting aquatic | Very high |
| | | structure/function in aquatic ecosystems if it | | community, compete with native species, can hybridize with other | |
| | | has invaded or is likely to invade the RA | | carp species, and is a carrier of spring viraemia virus (U.S. Fish | |
| | | area? | | and Wildlife Service, 2014) | |
| | 4.06 | Is the taxon likely to exert adverse impacts | Yes | This taxon can potentially cause major impact to the aquaculture | High |
| 19 | | | | | |
| 19 | | on ecosystem services in the RA area? | | services of the RA area due to its physiological and morphological characteristics. | |

| 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 | There are no reports that the taxon may carry pests or infectious agents that are endemic in Lake Taal. | Medium |
|-----|---------|---|----------------|---|-----------|
| 21 | 4.08 | Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area? | Yes | This taxon is a known carrier of spring viraemia virus of carps (U.S. Fish and Wildlife Service, 2014) | Very high |
| 22 | 4.09 | Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity? | Yes | This taxon can grow up to 64 cm (Fishbase, 2019) | 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 | This taxon usally occur in shallow ponds, lakes rich in vegetation and slow moving rivers (FishBase, 2019) | 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 | According to U.S. Fish and Wildlife Service (2014) This taxon is known to increases water turbidity which can cause habitat degradation. | Very high |
| 25 | 4.12 | Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions | No | There are no evidence of established populations of the organism persisting at low density . | Medium |
| 5 6 | Pesouro | by way of a dormant form)? e exploitation | | | |
| | | Is the taxon likely to consume threatened or protected native taxa in the RA area? | No | This taxon is usally abundant in the absence of other fish species and it does not occur in waters with rich ichthyofauna and | Very high |
| 27 | 5.02 | Is the taxon likely to sequester food resources (including nutrients) to the | Yes | abundant predatory species (U.S. Fish and Wildlife Service, 2014). As this taxon is known to feed on plankton, benthic invertebrates and plant materials which can be exploited at the expense of paties energies (Fick Bace, 2010). | High |
| 5 6 | Reprodu | detriment of native taxa in the RA area? | I | native species (Fish Base, 2019) | 1 |
| | | Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response | No | The taxon does not exhibit any parental care, they just deposit their eggs to aquatic weeds which serves as a substarata(FAO, | High |
| 29 | 6.02 | to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? | Yes | 2009) The conditions of the RA meets the required conditions for maturation and reproduction of this taxon, which will enable it to produce a viable gametes (Fish Base, 2019; FAO, 2009; CABI, | Very high |
| 30 | 6.03 | Is the taxon likely to hybridise naturally with native taxa? | No | The records only shows that it can only hybridize with other carp species such as the gold fish and prucian carp (U.S. Fish and Wildlife Service, 2014) | Very high |
| | 6.04 | Is the taxon likely to be hermaphroditic or to display asexual reproduction? | No | There are no documented evidence of hermaphroditism/asexual reproduction of this species. | Medium |
| 32 | 6.05 | Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? | No | This taxon only requires a substrate where they can lay their eggs and mature (FAO, 2019) | 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 | This taxon can spawn 130000-250000 per female from May-June and hatches after 4-8 days (Fish Base, 2019). | Very high |
| | 6.07 | How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? | 1 | This taxon reaches the age of maturity at 1.5 years old (CABI, 2020) | High |
| | | al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable habitats nearby)? | One | The taxon can enter the RA area through natural dispersal and its succes is increased because of its broad environmental tollerences. Also, it can be dispersed intentionally because of its abundant ornamental use and unintentionally through aquarium escape during natural calamities (flooding) which the RA area is where the (ADR) action of the second | 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 | prone to (CABI, 2020) The taxon can enter the RA area through natural dispersal and its succes is increased because of its broad environmental tollerences. Also, it can be dispersed intentionally because of its abundant ornamental use and unintentionally through aquarium escape during natural calamities (flooding) which the RA area is prone to (CABI, 2020). | 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 | Their physical characteristics does not allow attachment to any substrata (Fish Base, 2019; CABI, 2020) | 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 | Since this taxon attahes their eggs to substares, it is possible for it to be dispersed by water currents (FAO, 2009) | 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 | Since this taxon attahes their eggs to substares, it is possible for it to be dispersed by water currents (FAO, 2009) | High |
| | 7.06 | Are older life stages of the taxon likely to migrate in the RA area for reproduction? | No | This taxon does not have migratory characteristics (Fish Base, 2019; CABI, 2020) | High |
| | 7.07 | Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersed of the taxon along any of the | Yes | This taxon does not have migratory characteristics (Fish Base, 2019; CABI, 2020) This taxon which is readily available in the market for aquaculture. | 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. either unintentional or intentional) likely to be rapid? | Yes | This taxon which is readily available in the market for aquaculture and as pets together with the fact that the RA area are prone to natural calamities such as typhoons (Brändlin & Wingard, 2013) and its high adaptability to different environmental conditions (hypoxia and anoxia) making them a habitat generalist makes their dispersal rapid (CABI.2020). | Very high |
| · | 7.09 | Is dispersal of the taxon density dependent? | Not applicable | There are no records of that this taxon is density dependent in terms of dispersal. | High |

| 8. 1 | <u>Foleran</u> | ce attributes | | | |
|------|----------------|--|----------|--|-----------|
| 44 | 8.01 | Is the taxon able to withstand being out of | Yes | This taxon can survive hypoxic and anoxic environments for | Very high |
| | | water for extended periods (e.g. minimum of | | several months (CABI, 2020) | |
| | | one or more hours) at some stage of its life | | | |
| | | cycle? | | | |
| 45 | 8.02 | Is the taxon tolerant of a wide range of | Yes | This taxon is tollerant on high summer temperatures (up to | Very high |
| | | water quality conditions relevant to that | | 35°C), organic pollutants and very low oxygen levels in the water | |
| | | taxon? [In the Justification field, indicate the | | during winter and summer (U.S. Fish and Wildlife Service, 2014). | |
| | | relevant water quality variable(s) being | | | |
| 46 | 8.03 | Can the taxon be controlled or eradicated in | No | There are no records on control measures for this taxon | High |
| | | the wild with chemical, biological, or other | | (CABI,2020) | |
| | | agents/means? | | | |
| 47 | 8.04 | Is the taxon likely to tolerate or benefit from | Yes | Due to their ability to survive in a wide range of environmental | Very high |
| | | environmental/human disturbance? | | conditions and their capability to stay out of water for long periods | |
| | | | | of time, it is mostlikely, that they will benefit from environmental | |
| | | | | disturbances specially flooding which is prone in the RA area | |
| | | | | (CABI, 2020) | |
| 48 | 8.05 | Is the taxon able to tolerate salinity levels | No | The maximum recorded salinity that this taxon can survive is 17 | High |
| | | that are higher or lower than those found in | | ppt, but above 15 ppt is already harmful to them (Fish Base, 2019; | |
| | | its usual environment? | | CABI, 2020) | |
| 49 | 8.06 | Are there effective natural enemies | No | Based on fish species present in the RA area (Papa & Mamaril, | Very high |
| | | (predators) of the taxon present in the RA | | 2011) there is no predator that can preadate the taxon in the RA | |
| | | e change | | | |
| | | change | - | | N/ 111 |
| 50 | 9.01 | Under the predicted future climatic | Increase | Together with the fact that the RA area is prone to natural | Very high |
| | | conditions, are the risks of entry into the RA | | calamities such as typhoons and floods (Brändlin & Wingard, | |
| | | area posed by the taxon likely to increase, | | 2013) the risk of entry through accidental release from aquarium | |
| | | decrease or not change? | - | would most likely increase the entry of this taxon. | |
| 51 | 9.02 | Under the predicted future climatic | Increase | Based on their different morphological characteristics, together | Very high |
| | | conditions, are the risks of establishment | | with the fact that they can survive a wide range of environmental | |
| | | posed by the taxon likely to increase, | | conditions and their fitness to counter act environmental | |
| 50 | 0.00 | decrease or not change? | | tolerances, the risk of establishment of the taxon increases. | |
| 52 | 9.03 | Under the predicted future climatic | Increase | As a fact that the RA area is prone to natural calamities such as | High |
| | | conditions, are the risks of dispersal within | | typhoons and floods (Brändlin & Wingard, 2013) and their fitness | |
| | | the RA area posed by the taxon likely to | | to counter act environmental tolerances, the risk of entry through | |
| | | increase, decrease or not change? | | accidental release from aquarium and would most likely increase | |
| 52 | 9.04 | Under the predicted future climatic | Higher | the dispersal of this taxon. As this taxon can survive the future climatic conditions of the RA | Very high |
| 55 | 9.04 | conditions, what is the likely magnitude of | ingliel | area and can establish viable population on it, it can pose a huge | very mgn |
| | | future potential impacts on biodiversity | | impact on the biodiversity and ecological status of the RA area by | |
| | | and/or ecological integrity/status? | | competing on food and nutrients of the local species in the area. | |
| 54 | 9.05 | Under the predicted future climatic | Higher | As this taxon can survive the future climatic conditions of the RA | Verv high |
| 54 | 5.05 | conditions, what is the likely magnitude of | ingliel | area and can establish viable population on it, it can pose a huge | very mgn |
| | | future potential impacts on ecosystem | | | |
| | | structure and/or function? | | impact on the biodiversity and ecological status of the RA area by competing on food and nutrients of the local species in the area. | |
| 55 | 9.06 | Under the predicted future climatic | Higher | As this taxon can survive the future climatic conditions of the RA | Very high |
| 55 | 9.00 | conditions, what is the likely magnitude of | ingliel | area and can establish viable population on it, it can pose a huge | very mgn |
| | | future potential impacts on ecosystem | | | |
| | | services/socio-economic factors? | | impact on the biodiversity and ecological status of the RA area by competing on food and nutrients of the local species in the area. | |
| | 1 | Services/Socio-economic Tactors? | 1 | competing on rood and nutrients of the local species in the area. | |

| Statistics | |
|--|------------------------|
| Scores | |
| BRA | 34.0 |
| BRA Outcome | Medium |
| BRA+CCA | 46.0 |
| BRA+CCA Outcome | High |
| Score partition | |
| A. Biogeography/Historical | 14.0 |
| 1. Domestication/Cultivation | 4.0 |
| 2. Climate, distribution and introduction risk | 2.0 |
| 3. Invasive elsewhere | 8.0 |
| B. Biology/Ecology | 20.0 |
| 4. Undesirable (or persistence) traits | 7.0 |
| 5. Resource exploitation | 2.0 |
| 6. Reproduction | 2.0 |
| 7. Dispersal mechanisms | 3.0 |
| 8. Tolerance attributes | 6.0 |
| 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 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 | 14 |

| 10 |
|----------|
| 26 |
| |
| |
| 34.5 |
| 34.5 |
| |
| 0.86 |
| 0.85 |
| 0.96 |
| |
| |
| 08:00:01 |
| |

| Faxon and Assessor details | | | | | |
|------------------------------------|--|--|--|--|--|
| Category | Fishes and Lampreys (freshwater) | | | | |
| Taxon name | Clarias batrachus | | | | |
| Common name | Philippine catfish | | | | |
| Assessor | Gilles, Pavia | | | | |
| Risk screening context | | | | | |
| Reason and socio-economic benefits | Aquaculture and Ornamental | | | | |
| Risk assessment area | Lake Taal | | | | |
| Taxonomy | Order - Suliriformes Family - Clariidae | | | | |
| Native range | Indonesia | | | | |
| Introduced range | Philippines, Papua New Guinea, Japan, Guam, USA, Taiwan, Hongkong, China | | | | |
| URL | https://www.fishbase.se/summary/Clarias-batrachus.html | | | | |

| | | | Response | Justification (references and/or other information) | Confidence |
|----------|---------|--|----------|--|------------|
| | | graphy/Historical | | | |
| | | ication/Cultivation | | | |
| 1 | 1.01 | Has the taxon been the subject of | Yes | The taxon has been successfully cultured or cultivated in many | High |
| | | domestication (or cultivation) for at least 20 | | tropical countries in Southeast Asia, such as in Thailand, Sri | |
| | | generations? | | Lanka, India and Bangladesh (CABI, 2010). | |
| 2 | 1.02 | Is the taxon harvested in the wild and likely | Yes | The taxon has been harvested in the wild for ornamental purposes | High |
| | | to be sold or used in its live form? | | as pets and aquarium species (CABI, 2010) | |
| 3 | 1.03 | Does the taxon have invasive races, | Yes | One concrete example is the Clarias gariepinus, which is | High |
| | | varieties, sub-taxa or congeners? | | considered to be highly invasive in Singapore and currently | |
| _ | | | | imposing adverse effects in the country's native species (Ng et al., | |
| | 1 | , distribution and introduction risk | lue i | | Lue a |
| 4 | 2.01 | How similar are the climatic conditions of the | нıgn | The RA area and the taxon's native range has both tropical | High |
| | | Risk Assessment (RA) area and the taxon's | | climate. | |
| 5 | 2.02 | native range? What is the quality of the climate matching | High | The RA area belongs to the same part of the continent (Southeast | High |
| Э | 2.02 | data? | High | | High |
| 6 | 2.03 | Is the taxon already present outside of | Yes | Asia) where the taxon is native (CABI, 2010) The taxon can be found in many lakes, irrigation canals and rivers | High |
| 0 | 2.03 | captivity in the RA area? | Tes | in the RA area (CABI, 2010) | riigii |
| 7 | 2.04 | How many potential vectors could the taxon | >1 | The taxon could be introduced through ornamental and | High |
| ľ | 2.04 | use to enter in the RA area? | - 1 | aquaculture pathways and natural disasters like flooding (CABI, | · ··g·· |
| 8 | 2.05 | Is the taxon currently found in close | Yes | The taxon is now present in pet stores for ornamental use, such | High |
| ĭ | 2.00 | proximity to, and likely to enter into, the RA | | as in Cartimar Market where importation and sale of this taxon is | |
| 1 | | area in the near future (e.g. unintentional | | highly abundant. | |
| 1 | | and intentional introductions)? | | | |
| 3. I | nvasive | e elsewhere | | | |
| | | Has the taxon become naturalised | Yes | The taxon has been widely cultured in Taiwan and Hawaii since it | High |
| | | (established viable populations) outside its | | was introduced 100 years ago (Na-Nakorn & Brummett, 2009). | |
| 10 | 3.02 | In the taxon's introduced range, are there | Yes | This taxon has already affected Philippines, Taiwan, Singapore | High |
| | | known adverse impacts to wild stocks or | | and many Southeast Asian and American (Florida) countries | |
| | | commercial taxa? | | wherein they displaced the local wild fish species (CABI, 2010). | |
| | | | | Also, this taxon has already caused the transmission of enteric | |
| | | | | septicemia (ESC) caused by the bacterium Edwadsiella ictaluri | |
| 11 | 3.03 | In the taxon's introduced range, are there | Yes | In Florida fish farmers has already been implementing control | High |
| | | known adverse impacts to aquaculture? | | measures to prevent the entry of this taxa on their fish cages in | |
| | | | | the ponds for aquaculture because it preys on their fish stocks | |
| | | · · · · · · · · · · | | (CABI, 2010). | |
| 12 | 3.04 | In the taxon's introduced range, are there | Yes | This taxon has been recorded as one of the most invasive and | High |
| 12 | 2.05 | known adverse impacts to ecosystem | | harmful non-native species in the Gulf of Mexico ecosystem | Ll'ala |
| 13 | 3.05 | In the taxon's introduced range, are there | Yes | In many countries, this species has already caused major socio- | High |
| 1 | | known adverse socio-economic impacts? | | economic impacts wherein it affects the livelihood of the | |
| 1 | | | | community as it displaces many native and more economically important fish species as they eat large amounts of fish stocks | |
| | | | | together with crustaceans and other invertebrates (CABI, 2010; | |
| B. I | Biology | //Ecology | | | |
| | | able (or persistence) traits | | | |
| | | Is it likely that the taxon will be poisonous or | Yes | This taxon has already been recorded to be infected by pathogenic | High |
| 1 | | pose other risks to human health? | | bacteria, namely Aeromonas hydrophila, Escherichia coli, Vibrio | |
| 1 | | | | cholera and Vibrio Parahaemolyticus that could pose a serius | |
| | | | | threat to human health (Chandrakala & Geethalakshmi, 2016) | |
| 15 | 4.02 | Is it likely that the taxon will smother one or | Yes | Considering their feeding habits, wherein this taxon consumes | High |
| 1 | | more native taxa (that are not threatened or | | eggs and larvae of other fishes, small fishes, crustaceans and | |
| I | | protected)? | | insects and sometimes plants (Danoff-Burg, 2003). | |
| 16 | 4.03 | Are there any threatened or protected taxa | Yes | Considering their feeding habits, wherein this taxon consumes | High |
| Ĩ | | that the non-native taxon would parasitise in | | eggs and larvae of other fishes, small fishes, crustaceans and | |
| - | | the RA area? | | insects and sometimes plants (Danoff-Burg, 2003). | |
| 17 | 4.04 | Is the taxon adaptable in terms of climatic | Yes | This taxon is a "hardy fish which can thrive where many other fish | High |
| Ĩ | | and other environmental conditions, thus | | struggle to survive. In addition to lakes and rivers, they can be | |
| Ĩ | | enhancing its potential persistence if it has | | found in brackish waters or warm, stagnant, often hypoxic waters | |
| Ĩ | | invaded or could invade the RA area? | | such as muddy ponds, canals, ditches, swamps and flooded | |
| Ĩ | | | | prairies. They can remain dormant through periods of drought and | |
| | | | | go several months without eating" (Danoff-Burg, 2003, para. 13). | |
| 18 | 4.05 | Is the taxon likely to disrupt food-web | Yes | Considering their feeding habits, wherein this taxon consumes | High |
| 1 | | structure/function in aquatic ecosystems if it | | eggs and larvae of other fishes, small fishes, crustaceans | |
| 1 | I | has invaded or is likely to invade the RA | | (invertebrates) and insects and sometimes plants (Danoff-Burg, | |

| | 4.06 | Is the taxon likely to exert adverse impacts | Yes | This taxon has a record of carrying a dieses called enteric | High |
|--|--|--|--|--|--------------------------------------|
| | | on ecosystem services in the RA area? | | septicemia (ESC) caused by the bacterium Edwadsiella ictaluri which can infect other fish species present in the RA area | |
| | 1 | | | including those fish in farms that produces fish for human food | |
| | 1 | | | consumption (Danoff-Burg, 2003). Moreover, this taxon has been | |
| | I | | | recorded to displace many native species because of their compulsive and opportunistic feeding habits, high fecundity and | |
| 20 | 4.07 | Is it likely that the taxon will host, and/or | Yes | This taxon has already been recorded to be infected by pathogenic | Hiah |
| | | act as a vector for, recognised pests and | | bacteria, namely Aeromonas hydrophila, Escherichia coli, Vibrio | 5 |
| | l | infectious agents that are endemic in the RA | | cholera and Vibrio Parahaemolyticus that could pose a serius | |
| 1 | 4 00 | area? Is it likely that the taxon will host, and/or | Vac | threat to human health (Chandrakala & Geethalakshmi, 2016) | Madium |
| 11 | 4.08 | act as a vector for, recognised pests and | Yes | This taxon has already been recorded to be infected by pathogenic bacteria, namely Aeromonas hydrophila, Escherichia coli, Vibrio | Medium |
| | 1 | infectious agents that are absent from (novel | | cholera and Vibrio Parahaemolyticus that could pose a serius | |
| | | to) the RA area? | | threat to human health (Chandrakala & Geethalakshmi, 2016) | |
| 22 | 4.09 | Is it likely that the taxon will achieve a body | Yes | This taxon can achieve a maximum body size of 47.0 cm | High |
| | I | size that will make it more likely to be released from captivity? | | (FishBase, 2018) | |
| 23 | 4.10 | Is the taxon capable of sustaining itself in a | Yes | This taxon is a "hardy fish which can thrive where many other fish | High |
| | I | range of water velocity conditions (e.g. | | struggle to survive. In addition to lakes and rivers, they can be | |
| | I | versatile in habitat use)? | | found in brackish waters or warm, stagnant, often hypoxic waters such as muddy ponds, canals, ditches, swamps and flooded | |
| | I | | | prairies" (Danoff-Burg, 2003, para. 13). | |
| 24 | 4.11 | Is it likely that the taxon's mode of existence | Yes | This taxon has been recorded to displace many native species | High |
| | I | (e.g. excretion of by-products) or behaviours | | because of their compulsive and opportunistic feeding habits, high | |
| | I | (e.g. feeding) will reduce habitat quality for native taxa? | | fecundity and its ability for land migration (CABI, 2010). Also, | |
| | | | | during spawning periods this taxa dig holes in order to make nests in mud of rivers and dikes which can affect the water quality and | |
| | | | | ultimately the habitat of native species (FishBase, 2018; Danoff- | |
| 25 | 4.12 | Is the taxon likely to maintain a viable | Yes | This taxon can remain dormant up to long periods of drought by | High |
| | | population even when present in low | | burrowing into mud and also, can survive without eating for | |
| | | densities (or persisting in adverse conditions by way of a dormant form)? | | several months (Danoff-Burg, 2003). | |
| | | e exploitation | | | |
| 26 | 5.01 | Is the taxon likely to consume threatened or | Yes | | High |
| | | protected native taxa in the RA area? | | eggs and larvae of other fishes, small fishes, crustaceans and other invertebrates which can be a native taxa (Danoff-Burg, | |
| 27 | 5.02 | Is the taxon likely to sequester food | No | | High |
| | | resources (including nutrients) to the | | detrimental to the native taxa (Sakhare & Chalak, 2014) | |
| 5 0 | Reprodu | detriment of native taxa in the RA area? | l | | l |
| | 6.01 | Is the taxon likely to exhibit parental care | No | This taxon's parental care lasts only up to 24 hours following the | High |
| | 1 | and/or to reduce age-at-maturity in response | | hatching, after so, the frys are now independent and are no longer | - |
| | | to environmental conditions? | | protected by their parents (Rainey, 2018). | |
| 29 | 6.02 | Is the taxon likely to produce viable gametes or propagules (in the RA area)? | Yes | This taxon is cultivated mostly in tropical/warm countries such as the RA area itself. (CABI, 2010). | High |
| 30 | 6.03 | Is the taxon likely to hybridise naturally with | Yes | This taxon has been hybridized with many native species in other | High |
| | 1 | native taxa? | | countries such as the hybrid of Clarias gariepinus and H. longifilis | - |
| | 1 | | | in Africa and Clarias macrocephalus and Clarias gariepinus hybrid | |
| 31 | I | | | | |
| | 6.04 | Is the taxon likely to be hermanhroditic or to | Not applicable | in Asia (Na-Nakorn & Brummett, 2009). There are no documented evidence of hermanhroditism/asexual | Low |
| | 6.04 | Is the taxon likely to be hermaphroditic or to display asexual reproduction? | Not applicable | in Asia (Na-Nakorn & Brummett, 2009). There are no documented evidence of hermaphroditism/asexual reproduction of this species. | Low |
| 32 | 6.04 6.05 | display asexual reproduction? Is the taxon dependent on the presence of | Not applicable Yes | There are no documented evidence of hermaphroditism/asexual reproduction of this species. This taxon mostly spawn during rainy seasons, wherein the water | Low High |
| 32 | | display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) | | There are no documented evidence of hermaphroditism/asexual reproduction of this species. This taxon mostly spawn during rainy seasons, wherein the water level in the body of water such as in river rises, thus this taxon | |
| 32 | | display asexual reproduction? Is the taxon dependent on the presence of | | There are no documented evidence of hermaphroditism/asexual reproduction of this species. This taxon mostly spawn during rainy seasons, wherein the water level in the body of water such as in river rises, thus this taxon needs to excavate in submerged mud area of the river to spawn | |
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| | 6.05 | display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring | Yes | There are no documented evidence of hermaphroditism/asexual reproduction of this species. This taxon mostly spawn during rainy seasons, wherein the water level in the body of water such as in river rises, thus this taxon needs to excavate in submerged mud area of the river to spawn their eqgs and create a nest to protect them from water currents. This taxon has multiple spawning cycles and are highly fecund. They can produce an average of 8,000 offspring per spawning | High |
| 33 | 6.05 | display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? | Yes | There are no documented evidence of hermaphroditism/asexual reproduction of this species. This taxon mostly spawn during rainy seasons, wherein the water level in the body of water such as in river rises, thus this taxon needs to excavate in submerged mud area of the river to spawn their equs and create a nest to protect them from water currents. This taxon has multiple spawning cycles and are highly fecund. They can produce an average of 8,000 offspring per spawning process which can only take 20 hours (Rainey, 2018). | High High |
| 33 | 6.05 | display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) | Yes | There are no documented evidence of hermaphroditism/asexual reproduction of this species. This taxon mostly spawn during rainy seasons, wherein the water level in the body of water such as in river rises, thus this taxon needs to excavate in submerged mud area of the river to spawn their eqgs and create a nest to protect them from water currents. This taxon has multiple spawning cycles and are highly fecund. They can produce an average of 8,000 offspring per spawning process which can only take 20 hours (Rainey, 2018). The taxon reaches its reproductive maturity 1 year after its | High |
| 33 | 6.05 | display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? | Yes | There are no documented evidence of hermaphroditism/asexual reproduction of this species. This taxon mostly spawn during rainy seasons, wherein the water level in the body of water such as in river rises, thus this taxon needs to excavate in submerged mud area of the river to spawn their equs and create a nest to protect them from water currents. This taxon has multiple spawning cycles and are highly fecund. They can produce an average of 8,000 offspring per spawning process which can only take 20 hours (Rainey, 2018). | High High |
| 33 34 7. D | 6.05 6.06 6.07 | display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms | Yes Yes | There are no documented evidence of hermaphroditism/asexual reproduction of this species. This taxon mostly spawn during rainy seasons, wherein the water level in the body of water such as in river rises, thus this taxon needs to excavate in submerged mud area of the river to spawn their eqgs and create a nest to protect them from water currents. This taxon has multiple spawning cycles and are highly fecund. They can produce an average of 8,000 offspring per spawning process which can only take 20 hours (Rainey, 2018). The taxon reaches its reproductive maturity 1 year after its conception (Danoff-Burg, 2003). | High High High |
| 33 34 7. D | 6.05 6.06 6.07 | display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal | Yes | There are no documented evidence of hermaphroditism/asexual reproduction of this species. This taxon mostly spawn during rainy seasons, wherein the water level in the body of water such as in river rises, thus this taxon needs to excavate in submerged mud area of the river to spawn their eqgs and create a nest to protect them from water currents. This taxon has multiple spawning cycles and are highly fecund. They can produce an average of 8,000 offspring per spawning process which can only take 20 hours (Rainey, 2018). The taxon reaches its reproductive maturity 1 year after its conception (Danoff-Burg, 2003). | High High |
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| 33 34 7. D | 6.05 6.06 6.07 | display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable | Yes Yes | There are no documented evidence of hermaphroditism/asexual reproduction of this species. This taxon mostly spawn during rainy seasons, wherein the water level in the body of water such as in river rises, thus this taxon needs to excavate in submerged mud area of the river to spawn their eqgs and create a nest to protect them from water currents. This taxon has multiple spawning cycles and are highly fecund. They can produce an average of 8,000 offspring per spawning process which can only take 20 hours (Rainey, 2018). The taxon reaches its reproductive maturity 1 year after its conception (Danoff-Burg, 2003). One potential pathway is aquarium released (intentional or unintentional) since this taxon has been used for ornamental purposes. Also, this taxon has the ability to "walk" or migrate on land by the help of their pectoral fins, especially after heavy rainfall (typhoon or storm) making its introduction easier into the RA area if accidentally released during natural calamities (Danoff- | High High High |
| 33 34 7. D 35 | 6.05 6.06 6.07 | display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable | Yes Yes | There are no documented evidence of hermaphroditism/asexual reproduction of this species. This taxon mostly spawn during rainy seasons, wherein the water level in the body of water such as in river rises, thus this taxon needs to excavate in submerged mud area of the river to spawn their eqgs and create a nest to protect them from water currents. This taxon has multiple spawning cycles and are highly fecund. They can produce an average of 8,000 offspring per spawning process which can only take 20 hours (Rainey, 2018). The taxon reaches its reproductive maturity 1 year after its conception (Danoff-Burg, 2003). One potential pathway is aquarium released (intentional or unintentional) since this taxon has been used for ornamental purposes. Also, this taxon has the ability to "walk" or migrate on land by the help of their pectoral fins, especially after heavy rainfall (typhoon or storm) making its introduction easier into the RA area if accidentally released during natural calamities (Danoff-Burg, 2003; CABI, 2010; Rainey, 2018). | High High High |
| 33 34 7. D 35 | 6.05 6.06 6.07 7.01 | display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable habitats nearby)? | Yes Yes | There are no documented evidence of hermaphroditism/asexual reproduction of this species. This taxon mostly spawn during rainy seasons, wherein the water level in the body of water such as in river rises, thus this taxon needs to excavate in submerged mud area of the river to spawn their eqgs and create a nest to protect them from water currents. This taxon has multiple spawning cycles and are highly fecund. They can produce an average of 8,000 offspring per spawning process which can only take 20 hours (Rainey, 2018). The taxon reaches its reproductive maturity 1 year after its conception (Danoff-Burg, 2003). One potential pathway is aquarium released (intentional or unintentional) since this taxon has been used for ornamental purposes. Also, this taxon has the ability to "walk" or migrate on land by the help of their pectoral fins, especially after heavy rainfall (typhoon or storm) making its introduction easier into the RA area if accidentally released during natural calamities (Danoff-Burg, 2003; CABI, 2010; Rainey, 2018). | High High High |
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| 33 34 7 <u>. D</u> 35 | 6.05 6.06 6.07 7.01 7.02 | display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable habitats nearby)? Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? | Yes Yes 1 >1 Yes | There are no documented evidence of hermaphroditism/asexual reproduction of this species. This taxon mostly spawn during rainy seasons, wherein the water level in the body of water such as in river rises, thus this taxon needs to excavate in submerged mud area of the river to spawn their eqgs and create a nest to protect them from water currents. This taxon has multiple spawning cycles and are highly fecund. They can produce an average of 8,000 offspring per spawning process which can only take 20 hours (Rainey, 2018). The taxon reaches its reproductive maturity 1 year after its conception (Danoff-Burg, 2003). One potential pathway is aquarium released (intentional or unintentional) since this taxon has been used for ornamental purposes. Also, this taxon has the ability to "walk" or migrate on land by the help of their pectoral fins, especially after heavy rainfall (typhoon or storm) making its introduction easier into the RA area if accidentally released during natural calamities (Danoff-Burg, 2003; CABI, 2010; Rainey, 2018). | High High High |
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| 333 34 7. D 35 36 37 | 6.05 6.06 6.07 7.01 7.02 7.03 | display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable 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? | Yes Yes 1 >1 Yes No | There are no documented evidence of hermaphroditism/asexual reproduction of this species. This taxon mostly spawn during rainy seasons, wherein the water level in the body of water such as in river rises, thus this taxon needs to excavate in submerged mud area of the river to spawn their eqgs and create a nest to protect them from water currents. This taxon has multiple spawning cycles and are highly fecund. They can produce an average of 8,000 offspring per spawning process which can only take 20 hours (Rainey, 2018). The taxon reaches its reproductive maturity 1 year after its conception (Danoff-Burg, 2003). One potential pathway is aquarium released (intentional or unintentional) since this taxon has been used for ornamental purposes. Also, this taxon has the ability to "walk" or migrate on land by the help of their pectoral fins, especially after heavy rainfall (typhoon or storm) making its introduction easier into the RA area if accidentally released during natural calamities (Danoff-Burg, 2003; CABI, 2010; Rainey, 2018). Because this taxon has the ability to "walk" or migrate on land by the help of their pectoral fins, especially after heavy rainfall (typhoon or storm) making its introduction easier into the RA area if accidentally released during natural calamities (Danoff-Burg, 2003; CABI, 2010; Rainey, 2018). Their physical characteristics does not allow attachment to any substrata, although they mostly sessile but they only lie stationary in muddy substrates. (Danoff-Burg, 2003; CABI, 2010; Rainey, 2013; CABI, 2010; Rainey, 2018). | High High High High |
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| 33 34 7 <u>. D</u> 35 36 37 38 | 6.05 6.06 6.07 7.01 7.02 7.03 | display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable 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 | Yes Yes 1 >1 Yes No | There are no documented evidence of hermaphroditism/asexual reproduction of this species. This taxon mostly spawn during rainy seasons, wherein the water level in the body of water such as in river rises, thus this taxon needs to excavate in submerged mud area of the river to spawn their eqgs and create a nest to protect them from water currents. This taxon has multiple spawning cycles and are highly fecund. They can produce an average of 8,000 offspring per spawning process which can only take 20 hours (Rainey, 2018). The taxon reaches its reproductive maturity 1 year after its conception (Danoff-Burg, 2003). One potential pathway is aquarium released (intentional or unintentional) since this taxon has been used for ornamental purposes. Also, this taxon has the ability to "walk" or migrate on land by the help of their pectoral fins, especially after heavy rainfall (typhoon or storm) making its introduction easier into the RA area if accidentally released during natural calamities (Danoff-Burg, 2003; CABI, 2010; Rainey, 2018). Because this taxon has the ability to "walk" or migrate on land by the help of their pectoral fins, especially after heavy rainfall (typhoon or storm) making its introduction easier into the RA area if accidentally released during natural calamities (Danoff-Burg, 2003; CABI, 2010; Rainey, 2018). Their physical characteristics does not allow attachment to any substrata, although they mostly sessile but they only lie stationary in muddy substrates. (Danoff-Burg, 2003; CABI, 2010; Rainey, 2013). | High High High High |
| 33 34 7 <u>. D</u> 35 36 37 38 | 6.05 6.06 6.07 7.01 7.02 7.03 7.04 | 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? | Yes Yes 1 >1 Yes No No | There are no documented evidence of hermaphroditism/asexual reproduction of this species. This taxon mostly spawn during rainy seasons, wherein the water level in the body of water such as in river rises, thus this taxon needs to excavate in submerged mud area of the river to spawn their eqgs and create a nest to protect them from water currents. This taxon has multiple spawning cycles and are highly fecund. They can produce an average of 8,000 offspring per spawning process which can only take 20 hours (Rainey, 2018). The taxon reaches its reproductive maturity 1 year after its conception (Danoff-Burg, 2003). One potential pathway is aquarium released (intentional or unintentional) since this taxon has been used for ornamental purposes. Also, this taxon has the ability to "walk" or migrate on land by the help of their pectoral fins, especially after heavy rainfall (typhoon or storm) making its introduction easier into the RA area if accidentally released during natural calamities (Danoff-Burg, 2003; CABI, 2010; Rainey, 2018). Because this taxon has the ability to "walk" or migrate on land by the help of their pectoral fins, especially after heavy rainfall (typhoon or storm) thus, making its introduction easier into the RA area (Danoff-Burg, 2003; CABI, 2010; Rainey, 2018). Their physical characteristics does not allow attachment to any substrata, although they mostly sessile but they only lie stationary in muddy substrates. (Danoff-Burg, 2003; CABI, 2010; Rainey, 2013). Their physical characteristics does not allow attachment to any substrata, although they mostly sessile but they only lie stationary in muddy substrates. (Danoff-Burg, 2003; CABI, 2010; Rainey, 2013). This taxon's egg are very sensitive to environmental disturbances which gives them a very low survival on this stage of development (Rainey, 2018). | High High High High High |

| 40 | 7.06 | Are older life stages of the taxon likely to migrate in the RA area for reproduction? | Yes | During 1968 this taxon has accomplished long distance migration via interconnected canals or by land in South Florida wherein they | High |
|----|------|---|----------|---|------|
| 41 | 7.07 | Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? | No | were able to establish their population and became invasive Because during these stages they are highly protected by their parents and they are highly sensitive (Rainey, 2018). | 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. either unintentional or intentional) likely to be rapid? | Yes | This taxon which is readily available in the market for aquaculture and as pets together with the fact that the RA area are prone to natural calamities such as typhoons (Brändlin & Wingard, 2013) and its abilities such as migrating on land and can live even with a very low oxygen level (Danoff-Burg, 2003; CABI, 2010; Rainey, 2018), thus the dispersal of this taxon can be rapid weather it is intentionally or accidentally released. | High |
| | 7.09 | Is dispersal of the taxon density dependent? | Yes | This taxon has a record on their behavior that they participate in mass migration especially to newly flooded low lands (Rainey, | High |
| | | ce attributes | I | | T : |
| 44 | 8.01 | Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? | Yes | This taxon can stay out of water up to 31 hours because they have an accessory breathing organ (ABO) which enables them to breathe atmospheric oxygen (Chandra, & Banerjee, 2013) | High |
| 45 | 8.02 | Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being | Yes | Temperature: 20-26°C; pH: 6-9; Ammonia (unionized) >3.42; Ammonia (ionized) >15.78; Nitrite: >35.60 (CABI, 2010). Also, thrives on hypoxic waters such as canals and muddy ponds (Danoff-Burg, 2003) | High |
| 46 | 8.03 | Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? | Yes | In Clarias gariepinus, their morphological development was greatly affected upon exposure to chemicals such as cadmium and copper which causes reduction of pigmentation, NaPCP and malathion which causes yolk sac edema and chromium and malathion which causes deformation of the notochord in fish exposed to (Jansenn & Nauven, 2002). | High |
| 47 | 8.04 | Is the taxon likely to tolerate or benefit from environmental/human disturbance? | Yes | Since the taxon has the ability to migrate on land and can live even with a very low oxygen level, this taxon can tolerate and benefit from natural calamities such as typhoon and flood which can cause their dispersal and introduction (Danoff-Burg, 2003; CABI, 2010; Rainey, 2018). | 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 | On the study of Clarias batrachus Linnaeus and Clarias macrocephalus Gunther, it was found that they can survive in marine waters, however too much salinity level would be fatal to | High |
| 49 | 8.06 | Are there effective natural enemies (predators) of the taxon present in the RA area? | Yes | This taxon's predators include large reptiles such as crocodiles, birds like fish eagles and their number 1 predator - humans which consumes them for food (Rainey, 2018), | High |
| | | e change | | consumes them for food (namey, 2010); | |
| | | 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 | Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) the risk of entry through accidental release from aquarium would most likely increase the entry of this taxon. | High |
| 51 | 9.02 | Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? | Increase | Since the RA area and the taxon's native range has both tropical climate (CABI, 2010) the risk of establishment of this taxon would most likely increase. | High |
| 52 | 9.03 | Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? | Increase | As this taxon abilities to counter act the climatic conditions such as typhoons and storms through their ability of migrating on land and breathing through their accessory breathing organ makes their dispersal increase. | High |
| 53 | 9.04 | Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? | Higher | As this taxon can survive the future climatic conditions of the RA area and can establish viable population on it, it can pose a huge impact on the biodiversity and ecological status of the RA area by competing on food and nutrients of the local species in the area. | 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 | As this taxon can survive the future climatic conditions of the RA area and can establish viable population on it, it can pose a huge impact on the ecosystem services and socio-economic factors of the RA area by competing on the existence of the local species which would eventually replace their existence in the RA area, thus affecting the livelihood services and the genetic diversity of the ecosystem in the area. | 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 | As this taxon can survive the future climatic conditions of the RA area and can establish viable population on it, it can pose a huge impact on the ecosystem services and socio-economic factors of the RA area by competing on the existence of the local species which would eventually replace their existence in the RA area, thus affecting the livelihood services and the genetic diversity of the ecosystem in the area. | High |

| Statistics | |
|--|------|
| Scores | |
| BRA | 49.0 |
| BRA Outcome | High |
| BRA+CCA | 61.0 |
| BRA+CCA Outcome | High |
| Score partition | |
| A. Biogeography/Historical | 26.0 |
| 1. Domestication/Cultivation | 4.0 |
| 2. Climate, distribution and introduction risk | 4.0 |
| 3. Invasive elsewhere | 18.0 |
| B. Biology/Ecology | 23.0 |

| 4. Undesirable (or persistence) traits | 12.0 |
|--|---|
| 5. Resource exploitation | 5.0 |
| 6. Reproduction | 3.0 |
| 7. Dispersal mechanisms | 1.0 |
| 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 | 13 3 5 5 36 |
| 2. Climate, distribution and introduction risk | 5 |
| 3. Invasive elsewhere | 5 |
| B. Biology/Ecology | 36 |
| 4. Undesirable (or persistence) traits | 12 |
| 5. Resource exploitation | 2 |
| 6. Reproduction | 7 |
| 7. Dispersal mechanisms | 9 |
| 8. Tolerance attributes | 6 |
| C. Climate change | 12 2 7 9 6 6 6 |
| 9. Climate change | 6 |
| Sectors affected | |
| Commercial | 23 |
| Environmental | 17 |
| Species or population nuisance traits | 28 |
| | |
| | |

| Inresnolds | |
|---------------|---------------|
| BF | A 34.5 |
| BRA+CO | CA 34.5 |
| Confidence | |
| BRA+CO | CA 0.74 |
| BF | A 0.73 |
| CC | CA 0.75 |
| | |
| Date and Time | |
| 24/02 | 2019 23:47:24 |
| | 2019 23:47:24 |

| Taxon and Assessor details | axon and Assessor details | | | | | | |
|------------------------------------|--|--|--|--|--|--|--|
| Category | Fishes and Lampreys (freshwater) | | | | | | |
| Taxon name | Colossoma macropomum | | | | | | |
| Common name | cachama | | | | | | |
| Assessor | Gilles | | | | | | |
| Risk screening context | | | | | | | |
| Reason and socio-economic benefits | Aquarium | | | | | | |
| Risk assessment area | Lake Taal | | | | | | |
| Taxonomy | Actinopteri (ray-finned fishes) > Characiformes (Characins) > Serrasalmidae (Piranhas and pacus) | | | | | | |
| Native range | South America: Amazon and Orinoco basins as wild form; pisciculture form largely distributed in | | | | | | |
| Introduced range | Asia, including Philippines | | | | | | |
| URL | https://www.fishbase.se/summary/Colossoma-macropomum.html | | | | | | |

| | | | Response | Justification (references and/or other information) | Confidence |
|-----------|---------|--|----------|---|---------------------|
| A. | Biogeo | graphy/Historical | | | |
| 1. l | Domest | ication/Cultivation | | | |
| 1 | 1.01 | Has the taxon been the subject of | Yes | Tambaquí (Colossoma macropomum) Ecological Risk Screening | High |
| | | domestication (or cultivation) for at least 20 | | Summary U.S. Fish and Wildlife Service, August 2012 Revised, | |
| | | generations? | | October 2016 Web Version, 6/18/2018 | |
| 2 | 1.02 | Is the taxon harvested in the wild and likely | Yes | Tambaquí (Colossoma macropomum) Ecological Risk Screening | Very high |
| | | to be sold or used in its live form? | | Summary U.S. Fish and Wildlife Service, August 2012 Revised, | , - |
| | | | | October 2016 Web Version, 6/18/2018 | |
| 3 | 1.03 | Does the taxon have invasive races, | Yes | Tambaquí (Colossoma macropomum) Ecological Risk Screening | High |
| | | varieties, sub-taxa or congeners? | | Summary U.S. Fish and Wildlife Service, August 2012 Revised, | |
| | | ······ | | October 2016 Web Version, 6/18/2018 | |
| 2 (| | , distribution and introduction risk | | | |
| 4 | 2.01 | How similar are the climatic conditions of the | High | Tropical: 22°C - 28°C | Very high |
| 1 | | Risk Assessment (RA) area and the taxon's | | https://www.fishbase.se/summary/Colossoma-macropomum.html | ver, mgn |
| | | native range? | | | |
| 5 | 2.02 | What is the quality of the climate matching | High | Tropical; 22°C - 28°C | Very high |
| 5 | 2.02 | data? | nign | https://www.fishbase.se/summary/Colossoma-macropomum.html | very mgn |
| 6 | 2.02 | | Yes | | Vor high |
| б | 2.03 | Is the taxon already present outside of | res | Tambaquí (Colossoma macropomum) Ecological Risk Screening | Very high |
| 1 | | captivity in the RA area? | | Summary U.S. Fish and Wildlife Service, August 2012 Revised, | |
| - | 2.6.1 | | | October 2016 Web Version, 6/18/2018 | |
| 7 | 2.04 | How many potential vectors could the taxon | >1 | History of the biodiversity and limno-ecological studies on Lake | High |
| 1 | L | use to enter in the RA area? | | Taal with notes on the current state of Philippine limnology | |
| 8 | 2.05 | Is the taxon currently found in close | No | History of the biodiversity and limno-ecological studies on Lake | High |
| 1 | | proximity to, and likely to enter into, the RA | | Taal with notes on the current state of Philippine limnology | |
| 1 | | area in the near future (e.g. unintentional | | | |
| | | and intentional introductions)? | | | |
| 3.1 | nvasive | e elsewhere | | | |
| 9 | 3.01 | Has the taxon become naturalised | Yes | Tambaquí (Colossoma macropomum) Ecological Risk Screening | Very high |
| | | (established viable populations) outside its | | Summary U.S. Fish and Wildlife Service, August 2012 Revised, | |
| | | native range? | | October 2016 Web Version, 6/18/2018 | |
| 10 | 3.02 | In the taxon's introduced range, are there | No | Tambaquí (Colossoma macropomum) Ecological Risk Screening | High |
| | | known adverse impacts to wild stocks or | | Summary U.S. Fish and Wildlife Service, August 2012 Revised, | - |
| | | commercial taxa? | | October 2016 Web Version, 6/18/2018 | |
| 11 | 3.03 | In the taxon's introduced range, are there | No | Tambaquí (Colossoma macropomum) Ecological Risk Screening | High |
| | | known adverse impacts to aquaculture? | | Summary U.S. Fish and Wildlife Service, August 2012 Revised, | 5 |
| | | | | October 2016 Web Version, 6/18/2018 | |
| 12 | 3.04 | In the taxon's introduced range, are there | No | Tambaquí (Colossoma macropomum) Ecological Risk Screening | Very high |
| | | known adverse impacts to ecosystem | | Summary U.S. Fish and Wildlife Service, August 2012 Revised, | · • ·) · · · j · · |
| | | services? | | October 2016 Web Version, 6/18/2018 | |
| 13 | 3.05 | In the taxon's introduced range, are there | Yes | Tambaquí (Colossoma macropomum) Ecological Risk Screening | Very high |
| | 5.05 | known adverse socio-economic impacts? | | Summary U.S. Fish and Wildlife Service, August 2012 Revised, | ·c., …g. |
| | | known daverse socio economie impacts: | | October 2016 Web Version, 6/18/2018 | |
| R | Biology | y/Ecology | | | |
| | | able (or persistence) traits | | | |
| | | Is it likely that the taxon will be poisonous or | No | Tambaquí (Colossoma macropomum) Ecological Risk Screening | Very high |
| 14 | 4.01 | pose other risks to human health? | 110 | | very mgn |
| 1 | | pose other risks to numbri fieditif? | | Summary U.S. Fish and Wildlife Service, August 2012 Revised, | |
| 1 5 | 4.02 | Is it likely that the taxes will emother and an | No | October 2016 Web Version, 6/18/2018 | High |
| 12 | 4.02 | Is it likely that the taxon will smother one or | No | Tambaquí (Colossoma macropomum) Ecological Risk Screening | High |
| 1 | | more native taxa (that are not threatened or | | Summary U.S. Fish and Wildlife Service, August 2012 Revised, | |
| 1.5 | 4.00 | protected)? | NIE | October 2016 Web Version, 6/18/2018 | L B ala |
| 16 | 4.03 | Are there any threatened or protected taxa | No | Tambaquí (Colossoma macropomum) Ecological Risk Screening | High |
| 1 | | that the non-native taxon would parasitise in | | Summary U.S. Fish and Wildlife Service, August 2012 Revised, | |
| 1 | | the RA area? | | October 2016 Web Version, 6/18/2018 | |
| 17 | 4.04 | Is the taxon adaptable in terms of climatic | Yes | Freshwater; benthopelagic; pH range: 5.0 - 7.8; dH range: ? - 20; | Very high |
| 1 | | and other environmental conditions, thus | | potamodromous (Ref. 51243); depth range 5 - ? m. Tropical; | |
| 1 | | enhancing its potential persistence if it has | | 22°C - 28°C (Ref. 1672); 15°S - 35°S | |
| | | invaded or could invade the RA area? | | | |
| 18 | 4.05 | Is the taxon likely to disrupt food-web | No | Tambaquí (Colossoma macropomum) Ecological Risk Screening | High |
| 1 | | structure/function in aquatic ecosystems if it | | Summary U.S. Fish and Wildlife Service, August 2012 Revised, | |
| | | has invaded or is likely to invade the RA | | October 2016 Web Version, 6/18/2018 | |
| 19 | 4.06 | Is the taxon likely to exert adverse impacts | No | Tambaquí (Colossoma macropomum) Ecological Risk Screening | Very high |
| | | on ecosystem services in the RA area? | | Summary U.S. Fish and Wildlife Service, August 2012 Revised, | |
| 1 | | | | October 2016 Web Version, 6/18/2018 | |
| 20 | 4.07 | Is it likely that the taxon will host, and/or | No | Tambaquí (Colossoma macropomum) Ecological Risk Screening | High |
| 1 | | act as a vector for, recognised pests and | | Summary U.S. Fish and Wildlife Service, August 2012 Revised, | |
| 1 | | infectious agents that are endemic in the RA | | October 2016 Web Version, 6/18/2018 | |
| | | messado agenco chac are chacinic in tile NA | 1 | | 1 |

| 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 | Tambaquí (Colossoma macropomum) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, August 2012 Revised, October 2016 Web Version, 6/18/2018 | High |
|----|---------|--|----------------|--|-----------|
| 2 | 4.09 | to) the RA area? Is it likely that the taxon will achieve a body size that will make it more likely to be | Yes | Max length : 108 cm TL male/unsexed | Very high |
| 3 | 4.10 | released from captivity? Is the taxon capable of sustaining itself in a | Yes | https://www.fishbase.se/summary/Colossoma-macropomum.html | High |
| | | range of water velocity conditions (e.g. versatile in habitat use)? | | | |
| 4 | 4.11 | Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa? | Yes | https://www.fishbase.se/summary/Colossoma-macropomum.html | 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 | Tambaquí (Colossoma macropomum) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, August 2012 Revised, October 2016 Web Version, 6/18/2018 | Very high |
| | | e exploitation | | | I |
| 6 | 5.01 | Is the taxon likely to consume threatened or protected native taxa in the RA area? | Yes | Tambaquí (Colossoma macropomum) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, August 2012 Revised, October 2016 Web Version, 6/18/2018 | Very high |
| 7 | 5.02 | Is the taxon likely to sequester food resources (including nutrients) to the | Not applicable | | Very high |
| | | detriment of native taxa in the RA area? | | | |
| | Reprodu | | ¥ | | Marris |
| 8 | 0.01 | Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? | Yes | Tambaquí (Colossoma macropomum) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, August 2012 Revised, October 2016 Web Version, 6/18/2018 | Very high |
| 9 | 6.02 | Is the taxon likely to produce viable gametes or propagules (in the RA area)? | Yes | Tambaquí (Colossoma macropomum) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, August 2012 Revised, October 2016 Web Version, 6/18/2018 | Very high |
| 0 | 6.03 | Is the taxon likely to hybridise naturally with native taxa? | No | Tambaquí (Colossoma macropomum) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, August 2012 Revised, October 2016 Web Version, 6/18/2018 | High |
| 1 | 6.04 | Is the taxon likely to be hermaphroditic or to display asexual reproduction? | No | Tambaquí (Colossoma macropomum) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, August 2012 Revised, October 2016 Web Version, 6/18/2018 | Very high |
| 2 | 6.05 | Is the taxon dependent on the presence of another taxon (or specific habitat features) | No | Tambaquí (Colossoma macropomum) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, August 2012 Revised, | 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 | October 2016 Web Version, 6/18/2018 Tambaquí (Colossoma macropomum) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, August 2012 Revised, | High |
| 4 | 6.07 | within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- | 3 | October 2016 Web Version, 6/18/2018 Tambaquí (Colossoma macropomum) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, August 2012 Revised, | Very high |
| 1 | Jicporc | first-reproduction? al mechanisms | | October 2016 Web Version, 6/18/2018 | |
| | 7.01 | How many potential internal | >1 | History of the biodiversity and limno-ecological studies on Lake | High |
| | | vectors/pathways could the taxon use to disperse within the RA area (with suitable | | Taal with notes on the current state of Philippine limnology | |
| 5 | 7.02 | Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? | Yes | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology | High |
| 7 | 7.03 | Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances | Not applicable | no data | 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 | Tambaquí (Colossoma macropomum) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, August 2012 Revised, October 2016 Web Version, 6/18/2018 | 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? | No | Tambaquí (Colossoma macropomum) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, August 2012 Revised, October 2016 Web Version, 6/18/2018 | High |
| 0 | 7.06 | Are older life stages of the taxon likely to migrate in the RA area for reproduction? | Yes | Tambaquí (Colossoma macropomum) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, August 2012 Revised, October 2016 Web Version, 6/18/2018 | High |
| 1 | 7.07 | Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? | No | Tambaquí (Colossoma macropomum) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, August 2012 Revised, October 2016 Web Version, 6/18/2018 | 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. either unintentional or intentional) likely to be | Yes | Tambaquí (Colossoma macropomum) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, August 2012 Revised, October 2016 Web Version, 6/18/2018 | High |
| 3 | 7.09 | Is dispersal of the taxon density dependent? | No | Tambaquí (Colossoma macropomum) Ecological Risk Screening Summary U.S. Fish and Wildlife Service, August 2012 Revised, October 2016 Web Version, 6/18/2018 | Very high |
| _ | | | | | |
| | | ce attributes Is the taxon able to withstand being out of | No | Tambaquí (Colossoma macropomum) Ecological Risk Screening | High |

| | 0.00 | | | | |
|----|------|--|----------------|--|-----------|
| 45 | 8.02 | Is the taxon tolerant of a wide range of | Yes | Tambaquí (Colossoma macropomum) Ecological Risk Screening | High |
| | | water quality conditions relevant to that | | Summary U.S. Fish and Wildlife Service, August 2012 Revised, | |
| | | taxon? [In the Justification field, indicate the | | October 2016 Web Version, 6/18/2018 | |
| | | relevant water quality variable(s) being | | | |
| 46 | 8.03 | Can the taxon be controlled or eradicated in | Not applicable | no data | Very high |
| | | the wild with chemical, biological, or other | | | |
| | | agents/means? | | | |
| 47 | | Is the taxon likely to tolerate or benefit from | Yes | Tambaquí (Colossoma macropomum) Ecological Risk Screening | High |
| | | environmental/human disturbance? | | Summary U.S. Fish and Wildlife Service, August 2012 Revised, | |
| | | | | October 2016 Web Version, 6/18/2018 | |
| 48 | 8.05 | Is the taxon able to tolerate salinity levels | Yes | https://www.fishbase.se/summary/Colossoma-macropomum.html | High |
| | | that are higher or lower than those found in | | | |
| | | its usual environment? | | | |
| 49 | 8.06 | Are there effective natural enemies | No | History of the biodiversity and limno-ecological studies on Lake | High |
| | | (predators) of the taxon present in the RA | | Taal with notes on the current state of Philippine limnology | |
| | | e change | | | |
| | | change | | | -1 |
| 50 | 9.01 | Under the predicted future climatic | Increase | History of the biodiversity and limno-ecological studies on Lake | High |
| | | conditions, are the risks of entry into the RA | | Taal with notes on the current state of Philippine limnology | |
| | | area posed by the taxon likely to increase, | | | |
| | | decrease or not change? | | | |
| 51 | 9.02 | Under the predicted future climatic | No change | History of the biodiversity and limno-ecological studies on Lake | High |
| | | conditions, are the risks of establishment | | Taal with notes on the current state of Philippine limnology | |
| | | posed by the taxon likely to increase, | | | |
| | | decrease or not change? | | | |
| 52 | 9.03 | Under the predicted future climatic | Increase | History of the biodiversity and limno-ecological studies on Lake | High |
| | | conditions, are the risks of dispersal within | | Taal with notes on the current state of Philippine limnology | |
| | | the RA area posed by the taxon likely to | | | |
| | | increase, decrease or not change? | | | |
| 53 | 9.04 | Under the predicted future climatic | No change | History of the biodiversity and limno-ecological studies on Lake | Very high |
| | | conditions, what is the likely magnitude of | | Taal with notes on the current state of Philippine limnology | |
| |] | future potential impacts on biodiversity | | | |
| | | and/or ecological integrity/status? | | | |
| 54 | 9.05 | Under the predicted future climatic | Higher | History of the biodiversity and limno-ecological studies on Lake | High |
| |] | conditions, what is the likely magnitude of | | Taal with notes on the current state of Philippine limnology | |
| | | future potential impacts on ecosystem | | | |
| | | structure and/or function? | | | |
| 55 | 9.06 | Under the predicted future climatic | No change | History of the biodiversity and limno-ecological studies on Lake | Very high |
| | | conditions, what is the likely magnitude of | | Taal with notes on the current state of Philippine limnology | |
| | | future potential impacts on ecosystem | | | |
| | | services/socio-economic factors? | | | |

| Statistics | |
|--|------------------------------|
| Statistics | |
| BRA | 33.0 |
| BRA Outcome | Medium |
| BRA+CCA | 39.0 |
| BRA+CCA Outcome | High |
| Score partition | |
| A. Biogeography/Historical | 12.0 |
| 1. Domestication/Cultivation | 4.0 |
| 2. Climate, distribution and introduction risk | 2.0 |
| 3. Invasive elsewhere | 6.0 |
| B. Biology/Ecology | 21.0 |
| 4. Undesirable (or persistence) traits | 5.0 |
| 5. Resource exploitation | 5.0 |
| 6. Reproduction | 2.0 |
| 7. Dispersal mechanisms | 3.0 |
| 8. Tolerance attributes | 6.0 |
| C. Climate change | 6.0 |
| 9. Climate change | 6.0 |
| Answered Questions | |
| Total | 55 |
| A. Biogeography/Historical | 13 |
| 1. Domestication/Cultivation | 3 5 5 |
| 2. Climate, distribution and introduction risk | 5 |
| 3. Invasive elsewhere | 5 |
| B. Biology/Ecology | 36 |
| 4. Undesirable (or persistence) traits | 12 |
| 5. Resource exploitation | 2 |
| 6. Reproduction 7. Dispersal mechanisms | / |
| 8. Tolerance attributes | 9 |
| C. Climate change | 2 7 9 6 6 |
| 9. Climate change | 6 |
| Sectors affected | 0 |
| Commercial | 11 |
| Environmental | 9 |
| Species or population nuisance traits | 24 |
| | 24 |
| Thresholds | |
| BRA | 34.5 |
| BRA+CCA | 34.5 |
| Confidence | |
| BBA+CCA | 0.85 |

ŀ

| BRA+CCA | 0.85 |
|---------|------|

| | BRA | 0.86 |
|---------------|-----|------|
| | CCA | 0.83 |
| Date and Time | | |

02/04/2020 08:00:13

| Taxon and Assessor details | | | |
|------------------------------------|--|--|--|
| Category | Fishes and Lampreys (freshwater) | | |
| Taxon name | Coptodon zillii | | |
| Common name | redbelly tilapia | | |
| Assessor | Gilles | | |
| Risk screening context | | | |
| Reason and socio-economic benefits | Aquaculture | | |
| Risk assessment area | Lake Taal | | |
| Taxonomy | Actinopteri (ray-finned fishes) > Cichliformes (Cichlids, convict blennies) > Cichlidae (Cichlids) > | | |
| Native range | Africa and Eurasia: South Morocco, Sahara, Niger-Benue system, rivers Senegal, Sassandra, | | |
| Introduced range Asia, Philippines | | | |
| URL | https://www.fishbase.se/summary/Coptodon-zillii.html | | |

| | | | Response | Justification (references and/or other information) | Confidence |
|------|----------|---|----------|--|------------|
| | | graphy/Historical | | | |
| 1.1 | | ication/Cultivation | 1 | | 1 |
| 1 | 1.01 | Has the taxon been the subject of domestication (or cultivation) for at least 20 generations? | Yes | "This taxon is the second most important farmed fish in the Philippines produced in ponds, cages, and pens (Guerrero, 2019)." | Very high |
| 2 | 1.02 | Is the taxon harvested in the wild and likely to be sold or used in its live form? | Yes | This taxon has been introduced worldwide for aquaculture/farming and as food source (CABI, 2020). | Very high |
| 3 | 1.03 | Does the taxon have invasive races, varieties, sub-taxa or congeners? | Yes | The following varieties of the taxon were reported to cause adverse ecological impacts after introduction: Oreochromis niloticus baringoensis, Oreochromis niloticus cancellatus, Oreochromis niloticus eduardianus, Oreochromis niloticus filoa, Oreochromis niloticus niloticus, Oreochromis niloticus sugutae, Oreochromis niloticus tana and Oreochromis niloticus vulcani | Very high |
| 2. (| Climate | , distribution and introduction risk | | | |
| 4 | 2.01 | How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range? | High | The taxon's native range and the RA area both has a tropical climate (CABI, 2020; FishBase, 2020). | Very high |
| 5 | 2.02 | What is the quality of the climate matching data? | High | This taxon prefer tropical environments with water temperatures of 25-30°C, and optimal temperatures of 20-32°C. (CABI, 2020). | High |
| 6 | 2.03 | Is the taxon already present outside of captivity in the RA area? | Yes | The taxon has been introduced in the country for farming and breeding to be used as a food source (Guerrero, 2019). | Very high |
| 7 | 2.04 | How many potential vectors could the taxon use to enter in the RA area? | >1 | Accidental introduction from aquaculture activities and intentional introduction with human intervention (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 | The taxon has been introduced in the country for farming and breeding to be used as a food source (Guerrero, 2019). | Very high |
| 3. 1 | Invasive | e elsewhere | | | |
| 9 | | Has the taxon become naturalised (established viable populations) outside its native range? | Yes | This taxon has been established in the following countries worldwide: Antigua, Ethiopia, Guam, Iraq, Israel, Japan, Jordan, Kenya, Madagascar, Mauritius, Mexico, New Caledonia, Saudi Arabia, Tanzania, Thailand, Turkey, and Uganda (U.S. Fish and Wildlife Service, 2019). | Very high |
| | 3.02 | In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? | Yes | In Salton Sea, California, this taxon have caused in the decline of population of desert pupfish (Cyprinodon macularius). In Florida, it has records of being highly aggressive; which makes it a serious threat to native aquatic plants and to fish that rely on plants for cover, foraging, or spawning sites In Hyco Reservoir, North Carolina, this taxon has eliminated all aquatic macrophytes from the reservoir, together with the decline of native species (USGS, 2020). Further more, According to U.S. Fish and Wildlife Service (2019) this taxon can alter ecosystems processes (e.g. nutrient cycling, disturbance, productivity, etc.) and ecosystem services (e.g. waste decomposition, water supply, soil regeneration and protection) and habitat destruction for native aquatic species. | Very high |
| | 3.03 | In the taxon's introduced range, are there known adverse impacts to aquaculture? | Yes | In Salton Sea, California, this taxon have caused in the decline of population of desert pupfish (Cyprinodon macularius). In Florida, it has records of being highly aggressive; which makes it a serious threat to native aquatic plants and to fish that rely on plants for cover, foraging, or spawning sites In Hyco Reservoir, North Carolina, this taxon has eliminated all aquatic macrophytes from the reservoir, together with the decline of native species (USGS, 2020). Further more, According to U.S. Fish and Wildlife Service (2019) this taxon can alter ecosystems processes (e.g. nutrient cycling, disturbance, productivity, etc.) and ecosystem services (e.g. waste decomposition, water supply, soil regeneration and protection) and habitat destruction for native aquatic species. | Very high |
| 12 | 3.04 | In the taxon's introduced range, are there known adverse impacts to ecosystem services? | Yes | In Salton Sea, California, this taxon have caused in the decline of population of desert pupfish (Cyprinodon macularius). In Florida, it has records of being highly aggressive; which makes it a serious threat to native aquatic plants and to fish that rely on plants for cover, foraging, or spawning sites In Hyco Reservoir, North Carolina, this taxon has eliminated all aquatic macrophytes from the reservoir, together with the decline of native species (USGS, 2020). Further more, According to U.S. Fish and Wildlife Service (2019) this taxon can alter ecosystems processes (e.g. nutrient cycling, disturbance, productivity, etc.) and ecosystem services (e.g. waste decomposition, water supply, soil regeneration and protection) and habitat destruction for native aquatic species. | High |

| 13 | 3.05 | In the taxon's introduced range, are there known adverse socio-economic impacts? | No | The introduction of this taxon has resulted in a significant development of aquaculture because of its commercial importance, which improved the economic status of the introduced range (CABI,2020). | High |
|----|------|--|-----|--|-----------|
| | | /Ecology | | | |
| | | able (or persistence) traits | T | | I |
| 14 | 4.01 | Is it likely that the taxon will be poisonous or pose other risks to human health? | Yes | This taxon has records of being infected by a wide range of diseases and parasites such as: Acanthogyrus tilapiae, Euclinostomum heterostomum, Posthodiplostomum sp., Amirthalingamia macracantha, Cichildogyrus tilapiae, Polyacanthorhynchus kenyensis, Cichlidogyrus amphoratus, Cichlidogyrus digitatus, Cichlidogyrus yanni, Argulus sp., Porrocaecum sp., and Strigeidae sp. (U.S. Fish and Wildlife | High |
| 15 | 4.02 | Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? | Yes | In Salton Sea, California, this taxon have caused in the decline of population of desert pupfish (Cyprinodon macularius). In Florida, it has records of being highly aggressive; which makes it a serious threat to native aquatic plants and to fish that rely on plants for cover, foraging, or spawning sites In Hyco Reservoir, North Carolina, this taxon has eliminated all aquatic macrophytes from the reservoir, together with the decline of native species (USGS, 2020). Further more, According to U.S. Fish and Wildlife Service (2019) this taxon can alter ecosystems processes (e.g. nutrient cycling, disturbance, productivity, etc.) and ecosystem services (e.g. waste decomposition, water supply, soil regeneration and protection) and habitat destruction for native aquatic species | Very high |
| | 4.03 | Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? | Yes | In Salton Sea, California, this taxon have caused in the decline of population of desert pupfish (Cyprinodon macularius). In Florida, it has records of being highly aggressive; which makes it a serious threat to native aquatic plants and to fish that rely on plants for cover, foraging, or spawning sites In Hyco Reservoir, North Carolina, this taxon has eliminated all aquatic macrophytes from the reservoir, together with the decline of native species (USGS, 2020). Further more, According to U.S. Fish and Wildlife Service (2019) this taxon can alter ecosystems processes (e.g. nutrient cycling, disturbance, productivity, etc.) and ecosystem services (e.g. waste decomposition, water supply, soil regeneration and protection) and habitat destruction for native aquatic species | High |
| 17 | 4.04 | Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? | Yes | This taxon is considered hardy species, tolerant of a wide range of habitat conditions and water quality, specially it tolerates the high salinities waters and even surviving marine conditions (CABI, 2020; U.S. Fish and Wildlife Service, 2019). | 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 Salton Sea, California, this taxon have caused in the decline of population of desert pupfish (Cyprinodon macularius). In Florida, it has records of being highly aggressive; which makes it a serious threat to native aquatic plants and to fish that rely on plants for cover, foraging, or spawning sites In Hyco Reservoir, North Carolina, this taxon has eliminated all aquatic macrophytes from the reservoir, together with the decline of native species (USGS, 2020). Further more, According to U.S. Fish and Wildlife Service (2019) this taxon can alter ecosystems processes (e.g. nutrient cycling, disturbance, productivity, etc.) and ecosystem services (e.g. waste decomposition, water supply, soil regeneration and protection) and habitat destruction for native aquatic species. | High |
| | 4.06 | Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? | Yes | In Salton Sea, California, this taxon have caused in the decline of population of desert pupfish (Cyprinodon macularius). In Florida, it has records of being highly aggressive; which makes it a serious threat to native aquatic plants and to fish that rely on plants for cover, foraging, or spawning sites In Hyco Reservoir, North Carolina, this taxon has eliminated all aquatic macrophytes from the reservoir, together with the decline of native species (USGS, 2020). Further more, According to U.S. Fish and Wildlife Service (2019) this taxon can alter ecosystems processes (e.g. nutrient cycling, disturbance, productivity, etc.) and ecosystem services (e.g. waste decomposition, water supply, soil regeneration and protection) and habitat destruction for native aquatic species | High |
| 20 | 4.07 | Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA | No | There are no reports that the taxon may carry pests or infectious agents that are endemic in Lake Taal. Papa & Mamaril 2011 | Very high |
| | 4.08 | Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area? | Yes | This taxon has records of being infected by a wide range of diseases and parasites such as: Acanthogyrus tilapiae, Euclinostomum heterostomum, Posthodiplostomum sp., Amirthalingamia macracantha, Cichildogyrus tilapiae, Polyacanthorhynchus kenyensis, Cichlidogyrus amphoratus, Cichlidogyrus digitatus, Cichlidogyrus yanni, Argulus sp., Porrocaecum sp., and Strigeidae sp. (U.S. Fish and Wildlife | Very high |
| 22 | 4.09 | Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity? | Yes | This taxon can reach a large body size, having a maximum length of 40 cm (U.S. Fish and Wildlife Service, 2019). | Very high |
| 23 | 4.10 | Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)? | Yes | This taxon is considered hardy species, tolerant of a wide range of habitat conditions and water quality, specially it tolerates the high salinities waters and even surviving marine conditions (CABI, 2020; U.S. Fish and Wildlife Service, 2019). | Very high |

| | | | 36°C (U.S. Fish and Wildlife Service, 2019; CABI, 2020). | |
|----------|---|---|---|--|
| 0.03 | the wild with chemical, biological, or other agents/means? | | (mg/l): 0.02-0.5, Dissolved oxygen: 5-20, Salinity (part per thousand) 35-40, Water pH (pH): 6-9 and Temperature: 10.5 - | Very mgtt |
| 8.03 | relevant water quality variable(s) being | Yes | This taxon is tolerant of a range of conditions such as Ammonium | Very high |
| 0.02 | water quality conditions relevant to that | пос аррисаре | | Low |
| | water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? | | | |
| 8.01 | Is the taxon able to withstand being out of | Not applicable | There are no records about this taxon's density dependence. | Low |
| Folor | so attributor | | flooding and natural calamities which could rapidly disperesed this | I |
| 7.09 | Is dispersal of the taxon density dependent? | Yes | This taxon which is readily available in commercial markets (alive) and in aquaculture farms can be rapidly disperesed, knowing also the fact that the RA area is highly susceptable to | High |
| | vectors/pathways mentioned in the previous seven questions (35-41; i.e. either | - | substrate within the excavated nest in which it is guarded by its parents it is unlikey that it will be disperesed by other taxon | - , |
| 7.08 | | No | containment failures or when the cold temperatures set in, they migrate to deeper waters (IUCNGSID, 2020; Smithsonian Marine | Very high |
| 7.07 | Are propagules or eggs of the taxon likely to | Yes | can move between water bodies (CABI, 2020). This taxon has records of migrating in long distances as they | High |
| 7.06 | area? Are older life stages of the taxon likely to | Yes | Since this taxon can tolerate and adapt to differen water | Very high |
| 7.05 | Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as | Yes | Since this taxon can tolerate and adapt to differen water conditions such as from freshwater to marine waters, this taxon can move between water bodies (CABI, 2020). | Very high |
| 7.04 | Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules | No | Since the eggs are protected by the mother until it hatches (CABI,2020). | Very high |
| 1.03 | attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances | | substrata (FishBase, 2020). | very nign |
| | taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? | | fish farming pathway could bring this taxon in close proximity to one or more protected areas. | Very high |
| 7.02 | disperse within the RA area (with suitable | Yes | | High |
| 7.01 | How many potential internal | >1 | Accidental introduction from aquaculture activities and intentional | High |
| Dispersa | | | | |
| 6.07 | How many time units (days, months, years) does the taxon require to reach the age-at- | Not applicable | after (FishBase, 2019; CABI, 2020). | Medium |
| 6.06 | Is the taxon known (or likely) to produce a large number of propagules or offspring | Yes | This taxon have a huge reproductive capacity with a female producing upto 6000 eggs per spawn which hatches within 96 hours after spawning, and juyeniles swim freely about 4-6 days | High |
| 6.05 | Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? | Yes | This taxon requires a substrate and nesting sites in order for the egss to mature (FishBase, 2019; CABI, 2020). | High |
| 6.04 | Is the taxon likely to be hermaphroditic or to display asexual reproduction? | No | There are no documented evidence of hermaphroditism/asexual reproduction of this species. | High |
| | native taxa? | | that are morphologically difficult to identify such as the Oreochromis niloticus x O. aureus (USGS, 2020; CABI, 2020). | |
| | or propagules (in the RA area)? | | maturation and reproduction of this taxon, which will enable it to produce a viable gametes (CABI, 2020). | High |
| 6.02 | and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes | Yes | pairs to protect the young, eggs and larvae are usually guarded in a pit dug in the mud (FishBase, 2020). The conditions of the RA meets the required conditions for | Very high |
| | Is the taxon likely to exhibit parental care | Yes | Although this taxon is a substrate spawner, both parents form | High |
| Penrodu | detriment of native taxa in the RA area? | | plants for cover, foraging, or spawning sites (USGS, 2020). | |
| 5.02 | Is the taxon likely to sequester food resources (including nutrients) to the | Yes | In Florida, it has records of being highly aggressive; which makes it a serious threat to native aquatic plants and to fish that rely on | High |
| 5.01 | Is the taxon likely to consume threatened or protected native taxa in the RA area? | No | Sinice this taxon is herbivorous, wherein, the adults mainly feeds on leaves and stems of underwater plants as well as algae and vacately detribute (FiebBase 2010) | High |
| | e exploitation | | | 1 |
| | population even when present in low densities (or persisting in adverse conditions | | | |
| 4.12 | native taxa? Is the taxon likely to maintain a viable | Not applicable | decomposition, water supply, soil regeneration and protection) and habitat destruction for native aquatic species. no record | Medium |
| | (e.g. feeding) will reduce habitat quality for | | alter ecosystems processes (e.g. nutrient cycling, disturbance, productivity, etc.) and ecosystem services (e.g. waste | |
| | Sesourc 5.01 5.02 6.01 6.02 6.03 6.04 6.05 6.06 6.07 7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 | 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)? 2esource exploitation 5.01 Is the taxon likely to consume threatened or 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? 2eproduction 6.01 Is the taxon likely to sequester food resources (including autrients) to the detriment of native taxa in the RA area? 2eproduction 6.01 Is the taxon likely to produce viable gametes or propagules (in the RA area)? 6.02 Is the taxon likely to hybridise naturally with native taxa? 6.04 Is the taxon likely to be hermaphroditic or to display asexual reproduction? 6.05 Is the taxon likely to be hermaphroditic or to omplete its life cycle? 6.06 Is the taxon nikely to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? 6.07 How many time units (days, months, years) does the taxon require to reach the age-atfirst-reproduction? 7.04 Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? 7.03 Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersa? 7.04 Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants) in the RA area? 7.04 Is dispersal of the taxon likely to be dispersed in the RA area? 7.05 Is the taxon oller or eproduction? 7.07 Are propagules or eggs of the taxon likely to be cruer as eggs (for animals) or as fragments/seedlings (for plants) in the RA area? 7.04 Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (3-1+1; i.e. either un | 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)? Not applicable protected native taxa in the RA area? 5.01 Is the taxon likely to consume threatened or protected native taxa in the RA area? No 5.02 Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area? Yes 6.01 Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Yes 6.02 Is the taxon likely to hybridise naturally with native taxa? Yes 6.03 Is the taxon likely to hybridise naturally with native taxa? Yes 6.04 Is the taxon likely to be hermaphroditic or to display asexual reproduction? No 6.05 Is the taxon nor (likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? | and habitat detruction for native aquatic societs. and habitat detruction for native aquatic societs. bit applicable nercord bit applicable nercord bit applicable nercord bit applicable nercord construction nercord |

| 47 | 8.04 | Is the taxon likely to tolerate or benefit from | Yes | In Florida, the Freshwater and Game Commission used retenone | High |
|------|---------|---|----------|--|------|
| 18 | 8.05 | environmental/human disturbance? Is the taxon able to tolerate salinity levels | Yes | to eradicate this taxon (CABI, 2020). This taxon can tolerate a wide range of salinity from 35 to 40 ppt | High |
| 40 | 8.05 | that are higher or lower than those found in its usual environment? | Tes | (CABI, 2020). | Ingn |
| 49 | 8.06 | Are there effective natural enemies (predators) of the taxon present in the RA | Yes | Channa striata can be a predator of this taxon which is present in the RA area (CABI, 2020). | High |
| 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? | Increase | Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to survive the cilamatic conditions of a tropical waters, the risk of entry through accidental introduction from aquaculture activities, intentional introduction with human intervention and aquarium escape would most likely increase the | High |
| 51 | 9.02 | Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? | Increase | Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to survive the cilamatic conditions of a tropical waters, the risk of entry through accidental introduction from aquaculture activities, intentional introduction with human intervention and aquarium escape would most likely increase the | 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 | Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to survive the cilamatic conditions of a tropical waters, the risk of entry through accidental introduction from aquaculture activities, intentional introduction with human intervention and aquarium escape would most likely increase the | 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 | Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) which would increase the taxon's rate of dispersal and since they have the ability to survive the cilamatic conditions of a tropical waters, the following negative impacts might also happen in the RA area: In Salton Sea, California, this taxon have caused in the decline of population of desert pupfish (Cyprinodon macularius). In Florida, it has records of being highly aggressive; which makes it a serious threat to native aquatic plants and to fish that rely on plants for cover, foraging, or spawning sites In Hyco Reservoir, North Carolina, this taxon has eliminated all aquatic macrophytes from the reservoir, together with the decline of native species (USGS, 2020). Further more, According to U.S. Fish and Wildlife Service (2019) this taxon can alter ecosystems processes (e.g. nutrient cycling, disturbance, productivity, etc.) and ecosystem services (e.g. waste decomposition, water supply, soil regeneration and protection) and habitat destruction for | 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 | Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) which would increase the taxon's rate of dispersal and since they have the ability to survive the cilamatic conditions of a tropical waters, the following negative impacts might also happen in the RA area: In Salton Sea, California, this taxon have caused in the decline of population of desert pupfish (Cyprinodon macularius). In Florida, it has records of being highly aggressive; which makes it a serious threat to native aquatic plants and to fish that rely on plants for cover, foraging, or spawning sites In Hyco Reservoir, North Carolina, this taxon has eliminated all aquatic macrophytes from the reservoir, together with the decline of native species (USGS, 2020). Further more, According to U.S. Fish and Wildlife Service (2019) this taxon can alter ecosystems processes (e.g. nutrient cycling, disturbance, productivity, etc.) and ecosystem services (e.g. waste decomposition, water supply, soil reageneration and protection) and habitat destruction for | 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 | Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) which would increase the taxon's rate of dispersal and since they have the ability to survive the cilamatic conditions of a tropical waters, the following negative impacts might also happen in the RA area: In Salton Sea, California, this taxon have caused in the decline of population of desert pupfish (Cyprinodon macularius). In Florida, it has records of being highly aggressive; which makes it a serious threat to native aquatic plants and to fish that rely on plants for cover, foraging, or spawning sites In Hyco Reservoir, North Carolina, this taxon has eliminated all aquatic macrophytes from the reservoir, together with the decline of native species (USGS, 2020). Further more, According to U.S. Fish and Wildlife Service (2019) this taxon can alter ecosystems processes (e.g. nutrient cycling, disturbance, productivity, etc.) and ecosystem services (e.g. waste decomposition, water supply, soil regeneration and protection) and habitat destruction for | High |

| Statistics | |
|-----------------|------|
| Scores | |
| BRA | 43.0 |
| BRA Outcome | High |
| BRA+CCA | 55.0 |
| BRA+CCA Outcome | High |

| Score partition | |
|--|----------------------------------|
| A. Biogeography/Historical | 22.0 |
| 1. Domestication/Cultivation | 4.0 |
| 2. Climate, distribution and introduction risk | 4.0 |
| 3. Invasive elsewhere | 14.0 |
| B. Biology/Ecology | 21.0 |
| 4. Undesirable (or persistence) traits | 10.0 |
| 5. Resource exploitation | 2.0 |
| 6. Reproduction | 2.0 |
| 7. Dispersal mechanisms | 4.0 |
| 8. Tolerance attributes | 3.0 |
| C. Climate change | 12.0 |
| 9. Climate change | 12.0 |
| Answered Questions | |
| Total | 55 |
| A. Biogeography/Historical | 13 |
| 1. Domestication/Cultivation | 3 |
| 2. Climate, distribution and introduction risk | 3 5 5 |
| 3. Invasive elsewhere | 5 |
| B. Biology/Ecology | 36 |
| 4. Undesirable (or persistence) traits | 12 |
| 5. Resource exploitation | 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 | 18 |
| Environmental | 12 |
| Species or population nuisance traits | 31 |
| | |
| Thresholds | |
| BRA | 34.5 |
| BRA+CCA | 34.5 |
| Confidence | |

| BRA | 34.5 |
|---------------|--------------|
| BRA+CCA | 34.5 |
| Confidence | |
| BRA+CCA | 0.82 |
| BRA | 0.83 |
| CCA | 0.75 |
| | |
| Date and Time | |
| 03/05/2 | 021 00:53:05 |

| Taxon and Assessor details | | | | | | | |
|------------------------------------|---|--|--|--|--|--|--|
| Category | Fishes and Lampreys (freshwater) | | | | | | |
| Taxon name | Ctenopharyngodon idella | | | | | | |
| Common name | grass carp | | | | | | |
| Assessor | Gilles | | | | | | |
| Risk screening context | Risk screening context | | | | | | |
| Reason and socio-economic benefits | Aquaculture | | | | | | |
| Risk assessment area | Lake Taal | | | | | | |
| Taxonomy | Actinopteri (ray-finned fishes) > Cypriniformes (Carps) > Xenocyprididae (East Asian minnows) | | | | | | |
| Native range | Eastern China and Russia | | | | | | |
| Introduced range | Central and South East Asia | | | | | | |
| URL | https://www.fishbase.se/summary/Ctenopharyngodon-idella.html | | | | | | |

| | | | Response | Justification (references and/or other information) | Confidence |
|---------------------------------------|--|--|----------------|---|---------------------------|
| | | graphy/Historical | | | |
| | | ication/Cultivation | 1 | | T - |
| 1 | 1.01 | Has the taxon been the subject of | Yes | In western Europe and USA, grass carp has been used as a | High |
| | | domestication (or cultivation) for at least 20 | | biological weed control agent for which it has been introduced. In | |
| | | generations? | | India, grass carp is one of the species used in the so-called | |
| | | | | composite culture of Indian major carp and Chinese carp. In other | |
| | | | | countries they eventually became an important aquaculture | |
| 2 | 1 0 0 | | X | species, being farmed commercially (CABI, 2019). | |
| 2 | 1.02 | Is the taxon harvested in the wild and likely | Yes | The taxon has been harvested in the wild for commercial fisheries | Very high |
| | | to be sold or used in its live form? | | and is also valued as a game fish for anglers in other countries | |
| | | | | such as Poland and Czech Republic due to its size and peculiar | |
| 3 | 1.03 | Does the taxon have invasive races, | Yes | feeding habits (CABI, 2019). One concrete examples are the bighead carp, black carp, grass | High |
| 5 | 1.05 | varieties, sub-taxa or congeners? | Tes | carp, and silver carp which having its impacts in the Mississippi | riigii |
| | | varieties, sub-taxa or congeners? | | River and surrounding waters (USDA, 2019) | |
| 2 (| limate | , distribution and introduction risk | | (River and surrounding waters (03DA, 2019) | |
| | | How similar are the climatic conditions of the | High | The RA area and the taxon's native range has both tropical | Very high |
| - | 2.01 | Risk Assessment (RA) area and the taxon's | ingn | climate. (FishBase 2020) | Very high |
| | | native range? | | | |
| 5 | 2.02 | What is the quality of the climate matching | High | The RA area belongs to the same part of the continent where the | High |
| Ĩ | | data? | | taxon is native (CABI, 2019) | |
| 6 | 2.03 | Is the taxon already present outside of | Yes | The taxon has been introduced in the country for farming and | Very high |
| | | captivity in the RA area? | | breeding to used as a food source (NACA, 2013) | ., |
| 7 | 2.04 | How many potential vectors could the taxon | One | Accidental introduction from aquaculture activities, intentional | High |
| | | use to enter in the RA area? | _ | introduction with human intervention and aquarium escape | |
| | | | | (IUCNGSID, 2019). | |
| 8 | 2.05 | Is the taxon currently found in close | Yes | The taxon has been introduced in the country for farming and | High |
| | | proximity to, and likely to enter into, the RA | | breeding to used as a food source (NACA, 2013) | 5 |
| | | area in the near future (e.g. unintentional | | | |
| | | and intentional introductions)? | | | |
| 3. I | | e elsewhere | | | |
| 9 | 3.01 | Has the taxon become naturalised | Yes | One concrete examples are the bighead carp, black carp, grass | High |
| | | (established viable populations) outside its | | carp, and silver carp which having its impacts in the Mississippi | |
| | | native range? | | River and surrounding waters (USDA, 2019) | |
| 10 | 3.02 | In the taxon's introduced range, are there | Yes | Overstocking of grass carp cause a large influx of nutrients | Very high |
| | | known adverse impacts to wild stocks or | | derived from the carp faeces and a fast or substantial decrease of | |
| | | commercial taxa? | | macrophytes in lakes and ponds and as a results it reduces the | |
| | | | | spawning sites for other fishes, phytoplankton blooms, a decrease | |
| | | | | in the invertebrate numbers and diversity, disruption of | |
| | | | | macroinvertebrate food base and consequent reduction in | |
| | 2.02 | | X | centrarchid biomass in a reservoir and prevention of spawning | 1.11 |
| 11 | 3.03 | In the taxon's introduced range, are there | Yes | The taxon caused changes in water quality in lakes as a result of | High |
| | | known adverse impacts to aquaculture? | | drastic reduction of macrophytes by the grass carp include a | |
| | | | | decrease in dissolved oxygen and increase in carbon dioxide levels | |
| | | | | such as in a lake in Yugoslavia, and increase in Kjeldahl nitrogen | |
| 17 | 3.04 | In the taxon's introduced range, are there | No | and significant decrease in pH in a lake in Florida (CABI ,2019). | High |
| 12 | 5.04 | known adverse impacts to ecosystem | | The introduction of the taxon in many countries has generally | High |
| | | known adverse impacts to ecosystem | | resulted in a positive economic impact due to increase in | 1 |
| | | cervices? | | | |
| 12 | 3 05 | services? | No | aquaculture production and fisheries production in inland waters | High |
| 13 | 3.05 | In the taxon's introduced range, are there | No | The introduction of the taxon in many countries has generally | High |
| 13 | 3.05 | | No | The introduction of the taxon in many countries has generally resulted in a positive economic impact due to increase in | High |
| | | In the taxon's introduced range, are there known adverse socio-economic impacts? | No | The introduction of the taxon in many countries has generally | High |
| B. 8 | Biology | In the taxon's introduced range, are there known adverse socio-economic impacts? y/Ecology | No | The introduction of the taxon in many countries has generally resulted in a positive economic impact due to increase in | High |
| B. E 4. L | Biolog y Indesir | In the taxon's introduced range, are there known adverse socio-economic impacts? y/Ecology able (or persistence) traits | | The introduction of the taxon in many countries has generally resulted in a positive economic impact due to increase in | |
| B. E 4. L | Biolog y Indesir | In the taxon's introduced range, are there known adverse socio-economic impacts? y/Ecology | | The introduction of the taxon in many countries has generally resulted in a positive economic impact due to increase in aquaculture production and fisheries production in inland waters. | High Very high |
| B. I 4. U 14 | Biolog y Indesir | In the taxon's introduced range, are there known adverse socio-economic impacts? y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or | | The introduction of the taxon in many countries has generally resulted in a positive economic impact due to increase in aquaculture production and fisheries production in inland waters. There are no records of the taxon posing risk to human health. | |
| B. I 4. U 14 | Biology Indesiri 4.01 | In the taxon's introduced range, are there known adverse socio-economic impacts? y/Ecology <i>able (or persistence) traits</i> Is it likely that the taxon will be poisonous or pose other risks to human health? | No | The introduction of the taxon in many countries has generally resulted in a positive economic impact due to increase in aquaculture production and fisheries production in inland waters. | Very high |
| B. I 4. U 14 | Biology Indesiri 4.01 | In the taxon's introduced range, are there known adverse socio-economic impacts? //Ecology <i>able (or persistence) traits</i> Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or | No | The introduction of the taxon in many countries has generally resulted in a positive economic impact due to increase in aquaculture production and fisheries production in inland waters. There are no records of the taxon posing risk to human health. Fishbase 2020 Since this taxon only eats aquatic plants/vegetation (IUCNGSID, | Very high |
| B. I 4. (14 15 | Biology Indesiri 4.01 | In the taxon's introduced range, are there known adverse socio-economic impacts? y/Ecology <i>able (or persistence) traits</i> Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or | No | The introduction of the taxon in many countries has generally resulted in a positive economic impact due to increase in aquaculture production and fisheries production in inland waters. There are no records of the taxon posing risk to human health. Fishbase 2020 Since this taxon only eats aquatic plants/vegetation (IUCNGSID, | Very high |
| B. I 4. (14 15 | Biology Indesir 4.01 4.02 | In the taxon's introduced range, are there known adverse socio-economic impacts? y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? | No | The introduction of the taxon in many countries has generally resulted in a positive economic impact due to increase in aquaculture production and fisheries production in inland waters. There are no records of the taxon posing risk to human health. Fishbase 2020 Since this taxon only eats aquatic plants/vegetation (IUCNGSID, 2019) | Very high High |
| B. I 4. (14 15 | Biology Indesir 4.01 4.02 | In the taxon's introduced range, are there known adverse socio-economic impacts? y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa | No | The introduction of the taxon in many countries has generally resulted in a positive economic impact due to increase in aquaculture production and fisheries production in inland waters. There are no records of the taxon posing risk to human health. Fishbase 2020 Since this taxon only eats aquatic plants/vegetation (IUCNGSID, 2019) Since this taxon only eats aquatic plants/vegetation (IUCNGSID, | Very high High |
| B. I 4. (14 15 16 | Biology Indesir 4.01 4.02 | In the taxon's introduced range, are there known adverse socio-economic impacts? y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in | No | The introduction of the taxon in many countries has generally resulted in a positive economic impact due to increase in aquaculture production and fisheries production in inland waters. There are no records of the taxon posing risk to human health. Fishbase 2020 Since this taxon only eats aquatic plants/vegetation (IUCNGSID, 2019) Since this taxon only eats aquatic plants/vegetation (IUCNGSID, | Very high High |
| B. I 4. (14 15 16 | Biology <i>Indesin</i> 4.01 4.02 4.03 | In the taxon's introduced range, are there known adverse socio-economic impacts? y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? | No No No | The introduction of the taxon in many countries has generally resulted in a positive economic impact due to increase in aquaculture production and fisheries production in inland waters. There are no records of the taxon posing risk to human health. Fishbase 2020 Since this taxon only eats aquatic plants/vegetation (IUCNGSID, 2019) Since this taxon only eats aquatic plants/vegetation (IUCNGSID, 2019) | Very high High High |
| B. I 4. (14 15 16 | Biology <i>Indesin</i> 4.01 4.02 4.03 | In the taxon's introduced range, are there known adverse socio-economic impacts? y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic | No No No | The introduction of the taxon in many countries has generally resulted in a positive economic impact due to increase in aquaculture production and fisheries production in inland waters. There are no records of the taxon posing risk to human health. Fishbase 2020 Since this taxon only eats aquatic plants/vegetation (IUCNGSID, 2019) Since this taxon only eats aquatic plants/vegetation (IUCNGSID, 2019) The taxon is highly adaptable and tolerant, which may explain its | Very high High 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 | Overstocking of grass carp cause a large influx of nutrients derived from the carp faeces and a fast or substantial decrease of macrophytes in lakes and ponds and as a results it reduces the spawning sites for other fishes, phytoplankton blooms, a decrease in the invertebrate numbers and diversity, disruption of macroinvertebrate food base and consequent reduction in centrarchid biomass in a reservoir and prevention of spawning | Very high |
|------|---------|--|-----|---|-----------|
| 19 | 4.06 | Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? | No | The introduction of the taxon in many countries has generally resulted in a positive economic impact due to increase in aquaculture production and fisheries production in inland waters | High |
| 20 | 4.07 | Is it likely that the taxon will host, and/or act as a vector for, recognised pests and | No | There are no reports that the taxon may carry pests or infectious agents that are endemic in Lake Taal (Papa & Mamaril, 2011). | Very high |
| 21 | 4.08 | infectious agents that are endemic in the RA Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel | Yes | This taxon can carry diseases such as viral viruses (rhabdoviruses & herpesviruses), bacterial deseases (flexibacter &Aeromonas) and fungal deseases (Behrmann-Godel, 2015). | Very high |
| 22 | 4.09 | to) the RA area? Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity? | Yes | This taxon can reach a large body size, having a maximum length of 150 cm (Fish Base,2019). | Very high |
| 23 | 4.10 | Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. | Yes | During spawning, this taxon migrate long distances to seek turbulent waters to spawn (IUCNGSID, 2019). | High |
| 24 | 4.11 | versatile in habitat use)? Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa? | Yes | Overstocking of grass carp cause a large influx of nutrients derived from the carp faeces and a fast or substantial decrease of macrophytes in lakes and ponds and as a results it reduces the spawning sites for other fishes, phytoplankton blooms, a decrease in the invertebrate numbers and diversity, disruption of macroinvertebrate food base and consequent reduction in | 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)? | No | Centrarchid biomass in a reservoir and prevention of spawning The viablity of this taxon is influence by stocking density and size/age at stocking (CABI, 2019). | High |
| | | ce exploitation Is the taxon likely to consume threatened or | No | Since this taxon only eats aquatic plants/vegetation (IUCNGSID, | High |
| 20 | 5.01 | protected native taxa in the RA area? | 140 | 2019) | 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 | Overstocking of grass carp cause a large influx of nutrients derived from the carp faeces and a fast or substantial decrease of macrophytes in lakes and ponds and as a results it reduces the spawning sites for other fishes, phytoplankton blooms, a decrease in the invertebrate numbers and diversity, disruption of macroinvertebrate food base and consequent reduction in centrarchid biomass in a reservoir and prevention of spawning | High |
| 6. F | Reprodu | uction | I | | |
| 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 exhibit any parental care, they just spawn their eggs, left to drift downstream and are very much dependant on adequate oxygen flow, that is why usually they require long river streches of turbulent rising waters (IUCNGSID, 2019). | Very high |
| 29 | 6.02 | Is the taxon likely to produce viable gametes or propagules (in the RA area)? | Yes | The conditions of the RA meets the required conditions for maturation and reproduction of this taxon, which will enable it to produce a viable gametes (IUCNGSID, 2019) | High |
| | 6.03 | Is the taxon likely to hybridise naturally with native taxa? | Yes | There are already records of different hybrid forms of this taxon (CABI, 2019) | Very high |
| 31 | 6.04 | Is the taxon likely to be hermaphroditic or to display asexual reproduction? | Yes | There are no documented evidence of hermaphroditism/asexual reproduction of this species. | Very high |
| 32 | 6.05 | Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? | Yes | The taxon just spawn their eggs, left to drift downstream and are very much dependant on adequate oxygen flow, that is why usually they require long river streches of turbulent rising waters (IUCNGSID, 2019). | 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 | The taxon have a huge reproductive capacity with females producing 500,000-700,000 eggs and over 1,000,000 eggs in its native range (IUCNGSID, 2019). | High |
| 34 | 6.07 | How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? | 5 | This taxon reaches the age of maturity at 3-5 years old (CABI, 2019) | 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 | One | The taxon can enter the RA area through accidental introduction from aquaculture activities, intentional introduction with human intervention and aquarium escape. (IUCNGSID, 2019). | 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 | Because of the taxons commercial importance, the aquaculture pathway could bring this taxon in close proximity to one or more protected areas. | Very high |
| 37 | 7.03 | Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship | No | Their physical characteristics does not allow attachment to any substrata (CABI, 2019) | High |
| | | hulls, pilings, buoys) such that it enhances the likelihood of dispersal? | | | |
| 38 | 7.04 | the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? | Yes | Since this taxon spawn their eggs in high water velocities, it is possible for it to be dispersed by water currents (IUCNGSID, 2019). | Very high |

| 40 | 7.06 | Are older life stages of the taxon likely to | Yes | This taxon migrates to spawn (IUCNGSID, 2019). | Very high |
|-------------------------------------|--------------------------------------|---|--|---|--------------------------------|
| | 7.00 | migrate in the RA area for reproduction? | 105 | | very nigh |
| 41 | 7.07 | Are propagules or eggs of the taxon likely to | Yes | Since this taxon spawn their eggs in high water velocities, it is | Very high |
| | | be dispersed in the RA area by other animals? | | possible for it to be dispersed by water currents, making it | |
| | | | | available for preadation and dispersion of other animals | |
| 42 | 7.08 | Is dispersal of the taxon along any of the | Yes | This taxon which is readily available in commercial markets and in | High |
| | | vectors/pathways mentioned in the previous | | aquaculture farms can be rapidly disperesed, knowing also the | |
| | | seven questions (35-41; i.e. either | | fact that they are tolerant to changes in environmetal conditions | |
| 12 | 7.09 | unintentional or intentional) likely to be Is dispersal of the taxon density dependent? | Not applicable | (CABI, 2019). There are no records of that this taxon is density dependent in | Low |
| 43 | 7.09 | is dispersal of the taxoff density dependent? | Not applicable | terms of dispersal. | Low |
| 8. 7 | Foleran | ce attributes | 1 | | 1 |
| 44 | 8.01 | Is the taxon able to withstand being out of | Yes | This taxon can survive out of water for a long time | Very high |
| | | water for extended periods (e.g. minimum of | | (Anglersnet.co.uk, 2019). | |
| | | one or more hours) at some stage of its life | | | |
| | | cycle? | | | |
| 45 | 8.02 | Is the taxon tolerant of a wide range of | Yes | This taxon is tolerant of a range of conditions may inhabit | Very high |
| | | water quality conditions relevant to that | | temperatures of 0-33° C, oxygen levels as low as 0.5 ppm, and | |
| | | taxon? [In the Justification field, indicate the | | salinities as great as 10 ppt, although it is reported as capable of | |
| | | relevant water quality variable(s) being | | tolerating much greater salinities (IUCNGSID, 2019). | |
| 46 | 8.03 | Can the taxon be controlled or eradicated in | Yes | "In Michigan, the introduction of sterile males or monosex | High |
| | | the wild with chemical, biological, or other | | tetraploids could be an effective measure taken to reduce the | |
| | | agents/means? | | reproductive success of grass carp (Status and Strategy for Grass | |
| 47 | 0.04 | To the bound likely to take on her of the sec | ¥ | Carp Management, 2019)." | Marris biasb |
| 47 | 8.04 | Is the taxon likely to tolerate or benefit from | Yes | Due to their ability to survive in a wide range of environmental | Very high |
| | | environmental/human disturbance? | | conditions it can benefit from environmental/human distrubances | |
| 10 | 8.05 | Is the taxon able to tolerate salinity levels | Yes | (CABI, 2019). This taxon can tolerate salinities as great as 10 ppt, although it is | Very high |
| +0 | 0.05 | that are higher or lower than those found in | 165 | reported as capable of tolerating much greater salinities | very nigh |
| | | its usual environment? | | (IUCNGSID, 2019). | |
| 49 | 8.06 | Are there effective natural enemies | No | Based on fish species present in the RA area (Papa & Mamaril, | Hiah |
| 75 | 0.00 | (predators) of the taxon present in the RA | 140 | 2011) there is no predator that can preadate the taxon in the RA | ingn |
| С. (| | | | | |
| | Climate | e change | | | |
| | | | | | |
| 9. (| | e change | Increase | Together with the fact that the RA area is prone to natural | Very high |
| 9. (| Climate | e change change | Increase | Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, | Very high |
| 9. (| Climate | e change change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, | Increase | Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) the risk of entry through accidental release from | Very high |
| 9. (50 | <u>Climate</u> 9.01 | e change change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? | | Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) the risk of entry through accidental release from commercial fish farms would most likely increase the entry of this | |
| <u>9. (</u> 50 | Climate | e change change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic | Increase Increase | Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) the risk of entry through accidental release from commercial fish farms would most likely increase the entry of this As a fact that the RA area is prone to natural calamities such as | Very high Very high |
| 9. (50 | <u>Climate</u> 9.01 | e change change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment | | Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) the risk of entry through accidental release from commercial fish farms would most likely increase the entry of this As a fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability | |
| <u>9. (</u> 50 | <u>Climate</u> 9.01 | e change change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, | | Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) the risk of entry through accidental release from commercial fish farms would most likely increase the entry of this As a fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to spawn in high water volocity would most likely increase the | |
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| 9. (50 | <u>Climate</u> 9.01 | e change change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic | | Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) the risk of entry through accidental release from commercial fish farms would most likely increase the entry of this As a fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to spawn in high water volocity would most likely increase the dispersal of this taxon. As a fact that the RA area is prone to natural calamities such as | |
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| <u>9. (</u> 50 51 52 53 | 9.01 9.02 9.03 9.04 | e change change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem | Increase Increase Lower | Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) the risk of entry through accidental release from commercial fish farms would most likely increase the entry of this As a fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to spawn in high water volocity would most likely increase the dispersal of this taxon. As a fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to spawn in high water volocity would most likely increase the dispersal of this taxon. As a fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to spawn in high water volocity would most likely increase the dispersal of this taxon. According to CABI (2019), this taxon is environmentally safe, damage to native and introduced fisheries would be minimal, harmful effect of weed removal by fish would be much less than by herbicide or mechanical means. According to CABI (2019), this taxon is environmentally safe, damage to native and introduced fisheries would be minimal, harmful effect of weed removal by fish would be much less than by herbicide or mechanical means. | Very high High Very high |
| <u>9. (</u> 50 51 52 53 | 9.01 9.02 9.03 9.04 9.05 | e change change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? | Increase Increase Lower Lower | Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) the risk of entry through accidental release from commercial fish farms would most likely increase the entry of this As a fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to spawn in high water volocity would most likely increase the dispersal of this taxon. As a fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to spawn in high water volocity would most likely increase the dispersal of this taxon. As a fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to spawn in high water volocity would most likely increase the dispersal of this taxon. According to CABI (2019), this taxon is environmentally safe, damage to native and introduced fisheries would be much less than by herbicide or mechanical means. According to CABI (2019), this taxon is environmentally safe, damage to native and introduced fisheries would be much less than by herbicide or mechanical means. | Very high High Very high |
| <u>9. (</u> 50 51 52 53 | 9.01 9.02 9.03 9.04 | e change change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? Under the predicted future climatic | Increase Increase Lower | Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) the risk of entry through accidental release from commercial fish farms would most likely increase the entry of this As a fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to spawn in high water volocity would most likely increase the dispersal of this taxon. As a fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to spawn in high water volocity would most likely increase the dispersal of this taxon. As a fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to spawn in high water volocity would most likely increase the dispersal of this taxon. According to CABI (2019), this taxon is environmentally safe, damage to native and introduced fisheries would be minimal, harmful effect of weed removal by fish would be minimal, harmful effect of weed removal by fish would be minimal, harmful effect of weed removal by fish would be minimal, harmful effect of weed removal by fish would be minimal, harmful effect of weed removal by fish would be minimal, harmful effect of weed removal by fish would be minimal, harmful effect of weed removal by fish would be minimal, harmful effect of weed removal by fish would be minimal, harmful effect of weed removal by fish would be minimal, harmful effect of weed removal by fish would be minimal, harmful effect of weed removal by fish would be minimal, harmful effect of weed removal by fish would be minimal, harmful effect of weed removal by fish would be minimal, harmful effect of weed removal by fish would be minimal, harmful effect of weed removal by fish would be minimal, harmful effect of weed removal by fish would be much less than by herbicide or mechanical means. According to CABI (2019), this taxon is environmentally safe, | Very high High Very high |
| 9. (50 51 52 53 54 | 9.01 9.02 9.03 9.04 9.05 | e change change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? | Increase Increase Lower Lower | Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) the risk of entry through accidental release from commercial fish farms would most likely increase the entry of this As a fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to spawn in high water volocity would most likely increase the dispersal of this taxon. As a fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to spawn in high water volocity would most likely increase the dispersal of this taxon. As a fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to spawn in high water volocity would most likely increase the dispersal of this taxon. According to CABI (2019), this taxon is environmentally safe, damage to native and introduced fisheries would be much less than by herbicide or mechanical means. According to CABI (2019), this taxon is environmentally safe, damage to native and introduced fisheries would be much less than by herbicide or mechanical means. | Very high High Very high |

| Statistics | |
|--|--------------------|
| Scores | |
| BRA | 39.0 |
| BRA Outcome | High |
| BRA+CCA | 39.0 |
| BRA+CCA Outcome | High |
| Score partition | |
| A. Biogeography/Historical | 17.0 |
| 1. Domestication/Cultivation | 4.0 |
| 2. Climate, distribution and introduction risk | 3.0 |
| 3. Invasive elsewhere | 10.0 |
| B. Biology/Ecology | 22.0 |
| 4. Undesirable (or persistence) traits | 6.0 |
| 5. Resource exploitation | 2.0 |
| 6. Reproduction | 2.0 |
| 7. Dispersal mechanisms | 5.0 |
| 8. Tolerance attributes | 7.0 |
| 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 | <u>3</u> 5 5 |
| 3. Invasive elsewhere | 5 |
| B. Biology/Ecology | 36 |

| 12 | 4. Undesirable (or persistence) traits |
|------|--|
| 2 | 5. Resource exploitation |
| 7 | 6. Reproduction |
| 9 | 7. Dispersal mechanisms |
| 6 | 8. Tolerance attributes |
| 6 | C. Climate change |
| 6 | 9. Climate change |
| | Sectors affected |
| 13 | Commercial |
| -1 | Environmental |
| 32 | Species or population nuisance traits |
| | |
| | |
| | Thresholds |
| 34.5 | Thresholds |

| DRA | 54.5 |
|------------|------|
| BRA+CCA | 34.5 |
| Confidence | |
| BRA+CCA | 0.87 |
| BRA | 0.86 |
| CCA | 0.96 |
| | |
| | |

Date and Time 03/05/2021 00:53:16

| Taxon and Assessor details | | |
|------------------------------------|---|--|
| Category | Fishes and Lampreys (freshwater) | |
| Taxon name | Cyprinus carpio | |
| Common name common carp | | |
| Assessor | Gilles, To | |
| Risk screening context | | |
| Reason and socio-economic benefits | Aquaculture | |
| Risk assessment area | Lake Taal | |
| Taxonomy | Actinopteri (ray-finned fishes) > Cypriniformes (Carps) > Cyprinidae (Minnows or carps) > | |
| Native range | Europe to Asia: Black, Caspian and Aral Sea basins. | |
| Nutive runge | Lurope to Asia. Diack, Caspian and Arai Sea Dasins. | |
| Introduced range | Introduced throughout the world | |

| | | | Response | Justification (references and/or other information) | Confidence |
|------|---------|--|----------|---|----------------|
| | | ography/Historical | | | |
| | | ication/Cultivation | N | | he i |
| 1 | 1.01 | Has the taxon been the subject of | Yes | In China, this taxon has been cultivated for human consumption | High |
| | | domestication (or cultivation) for at least 20 | | for 3000 years and in 1997 more than 250 000 tonnes of carp for | |
| | | generations? | | human consumption were produced (IUCNGSID, 2019). | |
| 2 | 1.02 | Is the taxon harvested in the wild and likely | Yes | At least 80 species of this taxon are harvested as a fishery | Very high |
| | | to be sold or used in its live form? | | resource today, and many of them are now exploited as a source | |
| | | | | of protein around the world. The production of C. Carpio is the | |
| | | | | second highest farmed fish production in the world, specially in | |
| | | | | Asia. Also, this taxon are important in aquarium culture industry, | |
| | | | | including ornamental varieties known as \"koi\" in china | |
| ; | 1.03 | Does the taxon have invasive races, | Yes | One concrete examples are the bighead carp, black carp, grass | Very high |
| | 1.05 | varieties, sub-taxa or congeners? | 105 | carp, and silver carp which are causing now negative impacts in | very mgn |
| | | varieties, sub-taxa or congeners: | | the Mississippi River and surrounding waters (USDA, 2019). | |
| 2. (| Climate | , distribution and introduction risk | | The Mississippi River and surrounding waters (USDA, 2019). | |
| | 2.01 | How similar are the climatic conditions of the | High | The RA area and the taxon's native range has both tropical to | Very high |
| | | Risk Assessment (RA) area and the taxon's | 5 | subtropical climate. FishBase 2020 | -, 5 |
| | | native range? | | | |
| | 2.02 | What is the quality of the climate matching | High | The RA area belongs to the same part of the continent where the | Very high |
| | 2.02 | data? | nign | | very nigh |
| | 2.02 | Is the taxon already present outside of | Yes | taxon is native (CABI, 2019). The taxon has been introduced in the country for farming and | Vorschich |
| | 2.03 | | res | , _ | Very high |
| | | captivity in the RA area? | | breeding to be used as a food source and also for ornametnal | |
| _ | 2.6.1 | | | purposes (NACA, 2013). | |
| | 2.04 | How many potential vectors could the taxon | One | Accidental introduction from aquaculture activities, intentional | High |
| | | use to enter in the RA area? | | introduction with human intervention and aquarium escape | |
| | | | | (IUCNGSID, 2019). | |
| | 2.05 | Is the taxon currently found in close | Yes | The taxon has been introduced in the country for farming and | Very high |
| | | proximity to, and likely to enter into, the RA | | breeding to be used as a food source and also for ornametnal | |
| | | area in the near future (e.g. unintentional | | purposes (NACA, 2013). | |
| | | and intentional introductions)? | | | |
| . 1 | nvasiv | e elsewhere | | | |
| | 3.01 | Has the taxon become naturalised | Yes | One concrete examples are the bighead carp, black carp, grass | Very high |
| | | (established viable populations) outside its | | carp, and silver carp which are now having its negative impacts in | , - |
| | | native range? | | the Mississippi River and surrounding waters (USDA, 2019). | |
| 0 | 3.02 | In the taxon's introduced range, are there | Yes | This taxon destroys the spawning substrata, consumes eggs of | Very high |
| č | 0.02 | known adverse impacts to wild stocks or | | native species and competes with species having similar feeding | ter, ingit |
| | | commercial taxa? | | habit causing the decline of the populations of native species | |
| 1 | 3.03 | In the taxon's introduced range, are there | Yes | This taxon destroys the spawning substrata, consumes eggs of | High |
| Ŧ | 5.05 | known adverse impacts to aquaculture? | 165 | native species and competes with species having similar feeding | riigii |
| | | known adverse impacts to aquaculture: | | | |
| | | | | habit causing the decline of the populations of native species. | |
| ~ | | | | Also, (CABI, 2019). | |
| 2 | 3.04 | In the taxon's introduced range, are there | Yes | By stirring up river substrate and reducing aquatic vegetation, this | High |
| | | known adverse impacts to ecosystem | | taxon can make waterways unattractive and can render the water | |
| | | services? | | unsuitable for swimming or for drinking by livestock (IUCNGSID, | |
| | | | | 2019). | |
| 3 | 3.05 | In the taxon's introduced range, are there | No | The introduction of this taxon has resulted in a significant | Very high |
| | | known adverse socio-economic impacts? | | development of aquaculture which improved the economic status | |
| | | | | of the introduced range (CABI,2019). | |
| | | y/Ecology | | | |
| | 1 | able (or persistence) traits | 1 | | 1 |
| 4 | 4.01 | Is it likely that the taxon will be poisonous or | No | There are no records of the taxon posing risk to human | Very high |
| | | pose other risks to human health? | | health.FishBase 2020 | |
| 5 | 4.02 | Is it likely that the taxon will smother one or | Yes | This taxon has a record of preying on macroinvertebrates and on | High |
| | | more native taxa (that are not threatened or | | the eggs of native fish species, which can drive native species | |
| _ | | protected)? | | extinction (IUCNGSID, 2019). | |
| 6 | 4.03 | Are there any threatened or protected taxa | Yes | This taxon has a record of preying on macroinvertebrates and on | Very high |
| | | that the non-native taxon would parasitise in | | the eggs of native fish species, which can drive native species | |
| | | the RA area? | | extinction (IUCNGSID, 2019). | |
| 7 | 4.04 | Is the taxon adaptable in terms of climatic | Yes | This taxon can still grow on eutrophic waters and has the ability to | Very high |
| • | | and other environmental conditions, thus | | tolerate adverse environmental conditions (CABI, 2019). | , . |
| | | enhancing its potential persistence if it has | | | |
| | | invaded or could invade the RA area? | | | |
| Q | 4.05 | | Yes | This taxon destroys the spawning substrata, consumes eggs of | Von/ bigh |
| 0 | 4.05 | Is the taxon likely to disrupt food-web | 165 | , | Very high |
| | | structure/function in aquatic ecosystems if it | | native species and competes with species having similar feeding | |
| ~ | | has invaded or is likely to invade the RA | | habit causing the decline of the populations of native species | |
| 9 | 4.06 | Is the taxon likely to exert adverse impacts | Yes | By stirring up river substrate and reducing aquatic vegetation, this | High |
| | 1 | on ecosystem services in the RA area? | | taxon can make waterways unattractive and can render the water | |
| | | | | | 1 |
| | | | | unsuitable for swimming or for drinking by livestock (IUCNGSID, | |

| 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 | There are no reports that the taxon may carry pests or infectious agents that are endemic in Lake Taal. (Papa & Mamaramil, 2011) | High |
|------------|---------|--|----------------|---|-----------|
| 1 | 4.08 | Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area? | Yes | This taxon can carry diseases such as viral viruses (rhabdoviruses & herpesviruses), bacterial deseases (flexibacter &Aeromonas) and fungal deseases (Behrmann-Godel, 2015). | Very high |
| 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? | Yes | This taxon can reach a large body size, having a maximum length of 120 cm (Fish Base,2019). | High |
| 3 | 4.10 | Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)? | No | This taxon inhabits only still or slowly flowing waters (IUCNGSID, 2019). | 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 | This taxon can stir up bottom sediments during feeding which results in increased siltation and bioturbidity reducing water quality and degrading aquatic habitats (IUCNGSID, 2019). | Very high |
| 5 | 4.12 | Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)? | Not applicable | There are no reports of etablished population of this taxon persisting at low density. | Low |
| R | Resourc | e exploitation | | | 1 |
| 6 | 5.01 | Is the taxon likely to consume threatened or protected native taxa in the RA area? | Yes | This taxon destroys the spawning substrata, consumes eggs of native species and competes with species having similar feeding habit causing the decline of the populations of native species, that is why they are likely to consume thereatened or protected native taxa in the RA area (CABI, 2019). | High |
| 7 | 5.02 | Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area? | No | This increase nutrients in the water colum by sediment resuspension and by excretion (IUCNGSID, 2019). | High |
| | Reprodu | iction | | | 1 |
| 8 | 6.01 | Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? | No | The taxon does not exhibit any parental care, they just spawn their eggs and it attaches to substratum (IUCNGSID, 2019). | Very high |
| 9 | 6.02 | Is the taxon likely to produce viable gametes or propagules (in the RA area)? | Yes | The conditions of the RA meets the required conditions for maturation and reproduction of this taxon, which will enable it to produce a viable gametes (IUCNGSID, 2019) | Very high |
| 0 | 6.03 | Is the taxon likely to hybridise naturally with native taxa? | Yes | The conditions of the RA meets the required conditions for maturation and reproduction of this taxon, which will enable it to produce a viable gametes (IUCNGSID, 2019) | High |
| 1 | 6.04 | Is the taxon likely to be hermaphroditic or to display asexual reproduction? | No | There are no documented evidence of hermaphroditism/asexual reproduction of this species. | Very high |
| 2 | 6.05 | Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? | Yes | This taxon requires a substrata for their eggs, specifically floodplains, slow flowing pools, and other shallow habitats with dense macrophyte covers (IUCNGSID, 2019). | Very high |
| 3 | 6.06 | Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? | Yes | The taxon have a huge reproductive capacity with females producing up to 100,000 - 300,000 eggs (IUCNGSID, 2019). | High |
| 4 | 6.07 | How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? | 1 | This taxon reaches the age of maturity at 1 years old (IUCNGSID, 2019). | Very high |
| . <i>C</i> | Dispers | al mechanisms | | | |
| 5 | 7.01 | How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable | One | Accidental introduction from aquaculture activities, intentional introduction with human intervention and aquarium escape (IUCNGSID, 2019). | High |
| 6 | 7.02 | | Yes | Because of the taxons commercial importance, the aquaculture and ornamental pathway could bring this taxon in close proximity to one or more protected areas. | High |
| | 7.03 | Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? | No | Their physical characteristics does not allow attachment to any substrata (CABI, 2019) | Very high |
| 8 | 7.04 | Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? | Yes | Since this taxon migrates to spawn and they attaches their eggs on subtrata, the eggs of this taxon could be taken by water currents (IUCNGSID, 2019). | 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 | Since this taxon migrates to spawn and they attaches their eggs on subtrata, the eggs of this taxon could be taken by water currents (IUCNGSID, 2019). | Very high |
| | 7.06 | Are older life stages of the taxon likely to migrate in the RA area for reproduction? | Yes | This taxon migrates to suitable backwaters and flooded meadows to spawn (FishBase, 2019). | Very high |
| | 7.07 | Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? | Yes | Since this taxon migrates to spawn and they attaches their eggs on subtrata, the eggs of this taxon could be taken by water currents (IUCNGSID, 2019). | High |
| | 7.08 | Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. either unintentional or intentional) likely to be | Yes | This taxon which is readily available in commercial ornamental markets and in aquaculture farms can be rapidly disperesed, knowing also the fact that the RA area is highly susceptable to flooding and natural calamities which could rapidly disperesed this | Very high |
| | 7.09 | Is dispersal of the taxon density dependent? | Not applicable | There are no records of that this taxon is density dependent in terms of dispersal. | Low |
| | | ce attributes | Vec | This taxon can survive out of water for a long time | High |
| + | 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 | This taxon can survive out of water for a long time (Anglersnet.co.uk, 2019). | High |

| - | | 1 | 1 | | r |
|----|------|--|-----------|--|-----------|
| 45 | 8.02 | Is the taxon tolerant of a wide range of | Yes | This taxon is tolerant of a range of conditions such as pH range of | Very high |
| | | water quality conditions relevant to that | | 7.0 to 7.5, temperature of 3°C to 32°C, Carbon Dioxide (mg/l): | |
| | | taxon? [In the Justification field, indicate the | | <10 preferred, <20 tolerated and salinity: <1 preferred, <5 | |
| I | | relevant water quality variable(s) being | | tolerated (CABI, 2019 & IUCNGSID, 2019). | |
| 46 | 8.03 | Can the taxon be controlled or eradicated in | Yes | In USA, rotenone, a non-selective natural chemical that is | High |
| | | the wild with chemical, biological, or other | | relatively safe is used to control the taxon. Also, bio-control of | |
| | | agents/means? | | carp using the Spring Viraemia of Carp Virus (SVCV) (Rhabdovirus | |
| | | | | carpio), fatal gene technology, inducible sterility gene and | |
| | | | | Integrated Pest Management has been used (IUCNGSID, 2019). | |
| 47 | 8.04 | Is the taxon likely to tolerate or benefit from | Yes | Due to their ability to survive in a wide range of environmental | Very high |
| | | environmental/human disturbance? | | conditions it can benefit from environmental/human distrubances | |
| | | | | (CABI, 2019). | |
| 48 | 8.05 | Is the taxon able to tolerate salinity levels | Yes | This taxon can tolerate relatively high salinities. They are known | High |
| | | that are higher or lower than those found in | | to survive brackish water of up to 17 500 mg L-1 salinity | |
| | 0.05 | its usual environment? | | (IUCNGSID, 2019). | |
| 49 | 8.06 | Are there effective natural enemies | No | Based on fish species present in the RA area (Papa & Mamaril, | High |
| | | (predators) of the taxon present in the RA | <u> </u> | 2011) there is no predator that can preadate the taxon in the RA | I |
| | | e change | _ | | _ |
| | | Under the predicted future climatic | Increase | Together with the fact that the RA area is prone to natural | High |
| 50 | 2.01 | conditions, are the risks of entry into the RA | inci cusc | calamities such as typhoons and floods (Brändlin & Wingard, | |
| | | area posed by the taxon likely to increase, | | 2013) and their ability to still grow on eutrophic waters and to | |
| | | decrease or not change? | | tolerate adverse environmental conditions, the risk of entry | |
| | | acciedate of not change: | | through accidental introduction from aquaculture activities, | |
| | | | | intentional introduction with human intervention and aquarium | |
| | | | | escape would most likely increase the risk of entry of this taxon. | |
| 51 | 9.02 | Under the predicted future climatic | Increase | The ability of this taxon to still grow on eutrophic waters and to | High |
| | | conditions, are the risks of establishment | | tolerate adverse environmental conditions, the risk of entry | 5 |
| | | posed by the taxon likely to increase, | | through accidental introduction from aguaculture activities, | |
| Í | | decrease or not change? | 1 | intentional introduction with human intervention and aquarium | |
| 1 | | | | escape would most likely increase the risk of entry of this taxon, | |
| | | | | the risk of establishment of the taxon increases. | |
| 52 | 9.03 | Under the predicted future climatic | Increase | As a fact that the RA area is prone to natural calamities such as | Very high |
| | | conditions, are the risks of dispersal within | | typhoons and floods (Brändlin & Wingard, 2013) and their | |
| | | the RA area posed by the taxon likely to | | migratory behavior would most likely increase the dispersal of this | |
| | | increase, decrease or not change? | | taxon. | |
| 53 | 9.04 | Under the predicted future climatic | Higher | Since this taxon has the ability can stir up bottom sediments | High |
| | | conditions, what is the likely magnitude of | | during feeding which results in increased siltation and bioturbidity | |
| | | future potential impacts on biodiversity | | reducing water quality and degrading aquatic habitats (IUCNGSID, | |
| | | and/or ecological integrity/status? | | 2019). | |
| 54 | 9.05 | Under the predicted future climatic | Higher | Since this taxon has the ability can stir up bottom sediments | High |
| | | conditions, what is the likely magnitude of | | during feeding which results in increased siltation and bioturbidity | |
| | | future potential impacts on ecosystem | | reducing water quality and degrading aquatic habitats and they | |
| | | structure and/or function? | | destroys spawning substrata, consumes eggs of native species and | |
| | | | | competes with species having similar feeding habit causing the | |
| | | | | decline of the populations of native species (IUCNGSID, 2019). | |
| 55 | 9.06 | Under the predicted future climatic | Higher | Since this taxon has the ability to stir up bottom sediments during | Very high |
| | | conditions, what is the likely magnitude of | | feeding which results in increased siltation and bioturbidity | |
| | | future potential impacts on ecosystem | | reducing water quality and degrading aquatic habitats, they can | |
| Í | | services/socio-economic factors? | 1 | make waterways unattractive and can render the water unsuitable | |
| | | | | for swimming or for drinking by livestock in the RA area. | |

| Statistics | |
|--|---------------|
| Scores | |
| BRA | 48.0 |
| BRA Outcome | High |
| BRA+CCA | 60.0 |
| BRA+CCA Outcome | High |
| Score partition | 21.0 |
| A. Biogeography/Historical | 21.0 |
| 1. Domestication/Cultivation | 4.0 |
| 2. Climate, distribution and introduction risk | 3.0 |
| 3. Invasive elsewhere | 14.0 |
| B. Biology/Ecology | 27.0 |
| 4. Undesirable (or persistence) traits | 8.0 |
| 5. Resource exploitation | 5.0 |
| 6. Reproduction | 2.0 |
| 7. Dispersal mechanisms | 5.0 |
| 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 | <u>3</u> 5 |
| 2. Climate, distribution and introduction risk | 5 |
| 3. Invasive elsewhere | 5 |
| B. Biology/Ecology | 36 |
| 4. Undesirable (or persistence) traits | 12 |
| 5. Resource exploitation | 2 |
| 6. Reproduction | 7 |
| 7. Dispersal mechanisms | 9 |
| 8. Tolerance attributes | 6 |
| C. Climate change | 6 6 |
| 9. Climate change | 6 |

| Sectors affected | |
|---------------------------------------|--------------|
| Commercial | 17 |
| Environmental | 17 |
| Species or population nuisance traits | 31 |
| | |
| Thresholds | |
| BRA | 34.5 |
| BRA+CCA | 34.5 |
| Confidence | |
| BRA+CCA | 0.86 |
| BRA | 0.86 |
| CCA | 0.83 |
| | |
| Date and Time | |
| 03/05/20 | 021 00:53:29 |

| Taxon and Assessor details | | | |
|------------------------------------|--|--|--|
| Category | Fishes and Lampreys (freshwater) | | |
| Taxon name | n name Gambusia affinis | | |
| Common name western mosquitofish | | | |
| Assessor | Gilles, To | | |
| Risk screening context | | | |
| Reason and socio-economic benefits | aquarium: commercial | | |
| Risk assessment area | Lake Taal | | |
| Taxonomy | Actinopteri (ray-finned fishes) > Cyprinodontiformes (Rivulines, killifishes and live bearers) > | | |
| Native range | North and Central America: | | |
| Introduced range | Laos, Malaysia, Thailand, VietNam, Philippines stc. | | |
| URL | https://www.fishbase.se/summary/Gambusia-affinis.html | | |

| | | | Response | Justification (references and/or other information) | Confidence |
|------|----------|---|----------|---|------------|
| | | graphy/Historical | | | |
| 1. | | ication/Cultivation | | | be 11 : |
| 1 | 1.01 | Has the taxon been the subject of domestication (or cultivation) for at least 20 generations? | Yes | This taxon is regarded as a mosquito-control agent, that is why it has been stocked routinely and indiscriminately in temperate and tropical areas around the world resulting in a wide distribution, | Very high |
| 2 | 1.02 | Is the taxon harvested in the wild and likely to be sold or used in its live form? | Yes | making them the most widespread freshwater fish in the world The taxon has been harvested in the wild for ornamental purposes as pets or aquarium species and as a mosquito-control agent (CABI, 2020). | Very high |
| 3 | 1.03 | Does the taxon have invasive races, varieties, sub-taxa or congeners? | Yes | Once concerete example is the Poecilia latipinna which already have records of invasion and its associated negative impacts. According to Juliano et al. (1989), in the Philippines, this taxon competes with the native milkfish or Chanos chanos, for food. On the other hand Englund (1999) implicated that this taxon and other introduced Poeciliids (Xiphophorus hellerii and Gambusia species) is responsible for the decline of native damselflies or Megalagrion species on Oahu, Hawaii. Morover in California, this taxon caused the the decline of the desert pupfish, Cyprinodon macularius (U.S. Fish and Wildlife Service. 1983: Robins. 2014: | Very high |
| 2. (| | , distribution and introduction risk | r. | | - |
| 4 | 2.01 | Risk Assessment (RA) area and the taxon's native range? | High | The RA area and the taxon's native ranges obtained a high score in the climate matching using the Climatch application. | Very high |
| 5 | 2.02 | What is the quality of the climate matching data? | High | Data from Climatch were used to facilitate the climate analysis. | Very high |
| 6 | 2.03 | Is the taxon already present outside of captivity in the RA area? | Yes | The taxon is now present in pet stores for ornamental use, such as in Cartimar Market where importation and sale of this taxon is highly abundant. | Very high |
| 7 | 2.04 | How many potential vectors could the taxon use to enter in the RA area? | One | The taxon could be introduced through intentional introduction with human intervention and aquarium escape. | 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 is now present in pet stores for ornamental use, such as in Cartimar Market where importation and sale of this taxon is highly abundant. | High |
| 3 | Invasive | e elsewhere | | | |
| 9 | 3.01 | Has the taxon become naturalised (established viable populations) outside its native range? | Yes | This taxon is regarded as a mosquito-control agent, that is why it has been stocked routinely and indiscriminately in temperate and tropical areas around the world resulting in a wide distribution, making them the most widespread freshwater fish in the world | Very high |
| | 3.02 | In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? | Yes | Among Poecillids species, this taxon have had the greatest ecological impact so far. It is due to their aggressiveness and predatory behavior. This taxon may negatively affect fish populations, specially small fishes through predation and competition. Altough regarded as a mosquito-control agent, in some habitats, there are records that this taxon has displaced some native fish species which is considered as more efficient in mosquito control. Also, it caused the displacement or decline of populations of federally endangered and threatened species such as in Nevada and Arizona, it reduced the number of Railroad Valley springfish (Crenichthys baileyi) and the Sonoran topminnow (Poeciliopsis occidentalis) respectively. Moreover, mosquitofish are known to prey on eggs, larvae, juveniles and even adults of smaller species of various fishes, and it can also induce algal blooms when they eat the zoonlankton grazers | Very high |
| 11 | 3.03 | In the taxon's introduced range, are there known adverse impacts to aquaculture? | Yes | Among Poecillids species, this taxon have had the greatest ecological impact so far. It is due to their aggressiveness and predatory behavior. This taxon may negatively affect fish populations, specially small fishes through predation and competition. Altough regarded as a mosquito-control agent, in some habitats, there are records that this taxon has displaced some native fish species which is considered as more efficient in mosquito control. Also, it caused the displacement or decline of populations of federally endangered and threatened species such as in Nevada and Arizona, it reduced the number of Railroad Valley springfish (Crenichthys baileyi) and the Sonoran topminnow (Poeciliopsis occidentalis) respectively. Moreover, mosquitofish are known to prey on eggs, larvae, juveniles and even adults of smaller species of various fishes, and it can also linduce algal blooms when they eat the zoonlankton grazers | Very high |

| .2 | 3.04 | In the taxon's introduced range, are there known adverse impacts to ecosystem services? | Yes | Among Poecillids species, this taxon have had the greatest ecological impact so far. It is due to their aggressiveness and predatory behavior. This taxon may negatively affect fish populations, specially small fishes through predation and competition. Altough regarded as a mosquito-control agent, in | Very high |
|----------|---------|--|-----------|---|-------------------|
| | | | | some habitats, there are records that this taxon has displaced some native fish species which is considered as more efficient in mosquito control. Also, it caused the displacement or decline of | |
| | | | | populations of federally endangered and threatened species such | |
| | | | | as in Nevada and Arizona, it reduced the number of Railroad | |
| | | | | Valley springfish (Crenichthys baileyi) and the Sonoran | |
| | | | | topminnow (Poeciliopsis occidentalis) respectively. Moreover, | |
| | | | | mosquitofish are known to prey on eggs, larvae, juveniles and | I |
| | | | | even adults of smaller species of various fishes, and it can also induce algal blooms when they eat the zooplankton grazers | |
| .3 | 3.05 | In the taxon's introduced range, are there | No | This taxon is a very popular ornamental fish and live feed for | High |
| | | known adverse socio-economic impacts? | | large fishes commercially sold in per stores, which gave fish pet | |
| 2 F | Biology | y/Ecology | | traders income (CABI, 2020). | |
| | | able (or persistence) traits | | | |
| | | Is it likely that the taxon will be poisonous or | Yes | This taxon has records of being an intermediate host of | Very high |
| | | pose other risks to human health? | | nematodes of genus Falcaustra which typically infest reptile or | |
| - | 4.00 | | ¥ | amphibian hosts (Smithsonian Institution, 2020). |) (aur i biab |
| .5 | 4.02 | Is it likely that the taxon will smother one or more native taxa (that are not threatened or | Yes | Among Poecillids species, this taxon have had the greatest ecological impact so far. It is due to their aggressiveness and | Very high |
| | | protected)? | | predatory behavior. Also, it caused the displacement or decline of | 1 |
| | | proceeding. | | populations of federally endangered and threatened species in | 1 |
| | | | | some introduced areas, Moreover, they are known to prey on | 1 |
| | | | | eggs, larvae, juveniles and even adults of smaller species of | |
| | | | | various fishes, and it can also induce algal blooms when they eat | 1 |
| <i>c</i> | 4.00 | | × | the zooplankton grazers (USGS, 2020; CABI, 2020; U.S. Fish and | 1.1 |
| 6 | 4.03 | Are there any threatened or protected taxa | Yes | Among Poecillids species, this taxon have had the greatest | Very high |
| | | that the non-native taxon would parasitise in the RA area? | | ecological impact so far. It is due to their aggressiveness and predatory behavior. Also, it caused the displacement or decline of | |
| | | | | populations of federally endangered and threatened species in | |
| | | | | some introduced areas, Moreover, they are known to prey on | |
| | | | | eggs, larvae, juveniles and even adults of smaller species of | |
| | | | | various fishes, and it can also induce algal blooms when they eat | |
| | | | | the zooplankton grazers (USGS, 2020; CABI, 2020; U.S. Fish and | |
| 7 | 4.04 | Is the taxon adaptable in terms of climatic | Yes | Compared to other species, this taxon is more tolerant of | Very high |
| | | and other environmental conditions, thus | | pollution. It tolerates waters with low dissolved oxygen levels, | |
| | | enhancing its potential persistence if it has invaded or could invade the RA area? | | high salinities (including twice that of sea water) and temperatures of up to 42°C for short periods (U.S. Fish and | |
| 8 | 4.05 | Is the taxon likely to disrupt food-web | Yes | Among Poecillids species, this taxon have had the greatest | Very high |
| - | | structure/function in aquatic ecosystems if it | | ecological impact so far. It is due to their aggressiveness and | -, 5 |
| | | has invaded or is likely to invade the RA | | predatory behavior. This taxon may negatively affect fish | |
| | | area? | | populations, specially small fishes through predation and | |
| | | | | competition. Altough regarded as a mosquito-control agent, in | |
| | | | | some habitats, there are records that this taxon has displaced some native fish species which is considered as more efficient in | |
| | | | | mosquito control. Also, it caused the displacement or decline of | |
| | | | | populations of federally endangered and threatened species such | |
| | | | | as in Nevada and Arizona, it reduced the number of Railroad | |
| | | | | Valley springfish (Crenichthys baileyi) and the Sonoran | |
| | | | | topminnow (Poeciliopsis occidentalis) respectively. Moreover, | |
| | | | | mosquitofish are known to prey on eggs, larvae, juveniles and | 1 |
| | | | | even adults of smaller species of various fishes, and it can also | 1 |
| 9 | 4.06 | Is the taxon likely to exert adverse impacts | Yes | induce algal blooms when they eat the zooplankton grazers Among Poecillids species, this taxon have had the greatest | Very high |
| | | on ecosystem services in the RA area? | | ecological impact so far. It is due to their aggressiveness and | . , |
| | | | 1 | predatory behavior. This taxon may negatively affect fish | 1 |
| | | | | | |
| | | | | populations, specially small fishes through predation and | |
| | | | | populations, specially small fishes through predation and competition. Altough regarded as a mosquito-control agent, in | |
| | | | | populations, specially small fishes through predation and competition. Altough regarded as a mosquito-control agent, in some habitats, there are records that this taxon has displaced | |
| | | | | populations, specially small fishes through predation and competition. Altough regarded as a mosquito-control agent, in some habitats, there are records that this taxon has displaced some native fish species which is considered as more efficient in | |
| | | | | populations, specially small fishes through predation and competition. Altough regarded as a mosquito-control agent, in some habitats, there are records that this taxon has displaced some native fish species which is considered as more efficient in mosquito control. Also, it caused the displacement or decline of | |
| | | | | populations, specially small fishes through predation and competition. Altough regarded as a mosquito-control agent, in some habitats, there are records that this taxon has displaced some native fish species which is considered as more efficient in mosquito control. Also, it caused the displacement or decline of populations of federally endangered and threatened species such | |
| | | | | populations, specially small fishes through predation and competition. Altough regarded as a mosquito-control agent, in some habitats, there are records that this taxon has displaced some native fish species which is considered as more efficient in mosquito control. Also, it caused the displacement or decline of | |
| | | | | populations, specially small fishes through predation and competition. Altough regarded as a mosquito-control agent, in some habitats, there are records that this taxon has displaced some native fish species which is considered as more efficient in mosquito control. Also, it caused the displacement or decline of populations of federally endangered and threatened species such as in Nevada and Arizona, it reduced the number of Railroad | |
| | | | | populations, specially small fishes through predation and competition. Altough regarded as a mosquito-control agent, in some habitats, there are records that this taxon has displaced some native fish species which is considered as more efficient in mosquito control. Also, it caused the displacement or decline of populations of federally endangered and threatened species such as in Nevada and Arizona, it reduced the number of Railroad Valley springfish (Crenichthys baileyi) and the Sonoran topminnow (Poeciliopsis occidentalis) respectively. Moreover, mosquitofish are known to prey on eggs, larvae, juveniles and | |
| | | | | populations, specially small fishes through predation and competition. Altough regarded as a mosquito-control agent, in some habitats, there are records that this taxon has displaced some native fish species which is considered as more efficient in mosquito control. Also, it caused the displacement or decline of populations of federally endangered and threatened species such as in Nevada and Arizona, it reduced the number of Railroad Valley springfish (Crenichthys baileyi) and the Sonoran topminnow (Poeciliopsis occidentalis) respectively. Moreover, mosquitofish are known to prey on eggs, larvae, juveniles and even adults of smaller species of various fishes, and it can also | |
| 0 | 4 07 | Is it likely that the taxon will best and/or | No | populations, specially small fishes through predation and competition. Altough regarded as a mosquito-control agent, in some habitats, there are records that this taxon has displaced some native fish species which is considered as more efficient in mosquito control. Also, it caused the displacement or decline of populations of federally endangered and threatened species such as in Nevada and Arizona, it reduced the number of Railroad Valley springfish (Crenichthys baileyi) and the Sonoran topminnow (Poeciliopsis occidentalis) respectively. Moreover, mosquitofish are known to prey on eggs, larvae, juveniles and even adults of smaller species of various fishes, and it can also induce algal blooms when they eat the zoonlankton grazers | High |
| D | 4.07 | Is it likely that the taxon will host, and/or act as a vector for, recognised pests and | No | populations, specially small fishes through predation and competition. Altough regarded as a mosquito-control agent, in some habitats, there are records that this taxon has displaced some native fish species which is considered as more efficient in mosquito control. Also, it caused the displacement or decline of populations of federally endangered and threatened species such as in Nevada and Arizona, it reduced the number of Railroad Valley springfish (Crenichthys baileyi) and the Sonoran topminnow (Poeciliopsis occidentalis) respectively. Moreover, mosquitofish are known to prey on eggs, larvae, juveniles and even adults of smaller species of various fishes, and it can also induce alcal blooms when they eat the zoonlankton grazers There are no reports that the taxon may carry pests or infectious | High |
| D | 4.07 | act as a vector for, recognised pests and | No | populations, specially small fishes through predation and competition. Altough regarded as a mosquito-control agent, in some habitats, there are records that this taxon has displaced some native fish species which is considered as more efficient in mosquito control. Also, it caused the displacement or decline of populations of federally endangered and threatened species such as in Nevada and Arizona, it reduced the number of Railroad Valley springfish (Crenichthys baileyi) and the Sonoran topminnow (Poeciliopsis occidentalis) respectively. Moreover, mosquitofish are known to prey on eggs, larvae, juveniles and even adults of smaller species of various fishes, and it can also induce algal blooms when they eat the zoonlankton grazers | High |
| | 4.07 | | No Yes | populations, specially small fishes through predation and competition. Altough regarded as a mosquito-control agent, in some habitats, there are records that this taxon has displaced some native fish species which is considered as more efficient in mosquito control. Also, it caused the displacement or decline of populations of federally endangered and threatened species such as in Nevada and Arizona, it reduced the number of Railroad Valley springfish (Crenichthys baileyi) and the Sonoran topminnow (Poeciliopsis occidentalis) respectively. Moreover, mosquitofish are known to prey on eggs, larvae, juveniles and even adults of smaller species of various fishes, and it can also induce alcal blooms when they eat the zoonlankton grazers There are no reports that the taxon may carry pests or infectious | High Very high |
| | | act as a vector for, recognised pests and infectious agents that are endemic in the RA | | populations, specially small fishes through predation and competition. Altough regarded as a mosquito-control agent, in some habitats, there are records that this taxon has displaced some native fish species which is considered as more efficient in mosquito control. Also, it caused the displacement or decline of populations of federally endangered and threatened species such as in Nevada and Arizona, it reduced the number of Railroad Valley springfish (Crenichthys baileyi) and the Sonoran topminnow (Poeciliopsis occidentalis) respectively. Moreover, mosquitofish are known to prey on eggs, larvae, juveniles and even adults of smaller species of various fishes, and it can also induce algal blooms when they eat the zoonlankton grazers There are no reports that the taxon may carry pests or infectious agents that are endemic in Lake Taal. | |
| | | 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 | | populations, specially small fishes through predation and competition. Altough regarded as a mosquito-control agent, in some habitats, there are records that this taxon has displaced some native fish species which is considered as more efficient in mosquito control. Also, it caused the displacement or decline of populations of federally endangered and threatened species such as in Nevada and Arizona, it reduced the number of Railroad Valley springfish (Crenichthys baileyi) and the Sonoran topminnow (Poeciliopsis occidentalis) respectively. Moreover, mosquitofish are known to prey on eggs, larvae, juveniles and even adults of smaller species of various fishes, and it can also induce algal blooms when they eat the zoonlankton grazers. There are no reports that the taxon may carry pests or infectious agents that are endemic in Lake Taal. This taxon has records of being an intermediate host of | |
| 1 | 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? | Yes | populations, specially small fishes through predation and competition. Altough regarded as a mosquito-control agent, in some habitats, there are records that this taxon has displaced some native fish species which is considered as more efficient in mosquito control. Also, it caused the displacement or decline of populations of federally endangered and threatened species such as in Nevada and Arizona, it reduced the number of Railroad Valley springfish (Crenichthys baileyi) and the Sonoran topminnow (Poeciliopsis occidentalis) respectively. Moreover, mosquitofish are known to prey on eggs, larvae, juveniles and even adults of smaller species of various fishes, and it can also induce algal blooms when they eat the zoonlankton grazers. There are no reports that the taxon may carry pests or infectious agents that are endemic in Lake Taal. This taxon has records of being an intermediate host of nematodes of genus Falcaustra which typically infest reptile or amphibian hosts (Smithsonian Institution, 2020). | Very high |
| 1 | | 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 | | populations, specially small fishes through predation and competition. Altough regarded as a mosquito-control agent, in some habitats, there are records that this taxon has displaced some native fish species which is considered as more efficient in mosquito control. Also, it caused the displacement or decline of populations of federally endangered and threatened species such as in Nevada and Arizona, it reduced the number of Railroad Valley springfish (Crenichthys baileyi) and the Sonoran topminnow (Poeciliopsis occidentalis) respectively. Moreover, mosquitofish are known to prey on eggs, larvae, juveniles and even adults of smaller species of various fishes, and it can also induce aloal hlooms when they eat the zoonlankhon grazers. There are no reports that the taxon may carry pests or infectious agents that are endemic in Lake Taal. | |

| 23 | 4.10 | Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. | No | This taxon commonly inhabit lower reaches of streams, where they inhabit brackish, standing to slow-flowing water (IUCNGSID, | High |
|------|--------------|---|----------------|---|-------------------|
| 4 | 4.11 | versatile in habitat use)? Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for | Yes | 2020). This taxon can induce algal blooms when they eat the zooplankton grazers (USGS, 2020; CABI, 2020; U.S. Fish and Wildlife Service, 2017). | High |
| 5 | 4.12 | native taxa? Is the taxon likely to maintain a viable population even when present in low | No | This taxon require a high density of refuges to maintain populations at or near their asymptotic density (USGS, 2020). | Very high |
| | | densities (or persisting in adverse conditions by way of a dormant form)? | | | |
| | | ce exploitation | | | |
| | 5.01 | Is the taxon likely to consume threatened or protected native taxa in the RA area? | Yes | Among Poecillids species, this taxon have had the greatest ecological impact so far. It is due to their aggressiveness and predatory behavior. Also, it caused the displacement or decline of populations of federally endangered and threatened species in some introduced areas, Moreover, they are known to prey on eggs, larvae, juveniles and even adults of smaller species of various fishes (USGS. 2020: CABI. 2020: U.S. Fish and Wildlife | High |
| 27 | 5.02 | Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area? | Yes | This organism can compete with food source of native species as they consume plants and algal matter, periphyton, aquatic invertebrates and mosquito larvae/pupae (CABI, 2020). | High |
| 5. 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? | No | The taxon does not exhibit any parental care, they are live bearing fishes (CABI, 2020). | High |
| 29 | 6.02 | Is the taxon likely to produce viable gametes or propagules (in the RA area)? | Yes | The conditions of the RA meets the required conditions for maturation and reproduction of this taxon, which will enable them | High |
| | 6.03 | Is the taxon likely to hybridise naturally with native taxa? | Yes | to produce a viable gametes (Fish Base, 2019) This taxon has record of interbreeding with Gambusia heterochir (U.S. Fish and Wildlife Service, 2017). | High |
| | 6.04 6.05 | Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of | No | There are no documented evidence of hermaphroditism/asexual reproduction of this species. There are no requirments for this taxon being dependent on the | High Very high |
| | | another taxon (or specific habitat features) to complete its life cycle? | | other taxon since they are livebearers (CABI, 2020). | |
| 33 | 6.06 | Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? | Yes | This taxon produces broods of 1-300 youngs after 21-28 days of gestation (U.S. Fish and Wildlife Service, 2017). | High |
| 34 | 6.07 | How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? | 1 | This taxon reaches the age of maturity in 1 month (Smithsonian Institution, 2020). | High |
| | | al mechanisms | r | | |
| 35 | 7.01 | How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable habitats nearby)? | One | The taxon can enter the RA area through natural dispersal and its succes is increased because of its broad environmental tollerences. Also, it can be dispersed intentionally because of its abundant ornamental use and unintentionally through aquarium escape during natural calamities (flooding) which the RA area is prone to (CABI, 2020). | 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)? | Yes | The taxon can enter the RA area through natural dispersal and its succes is increased because of its broad environmental tollerences. Also, it can be dispersed intentionally because of its abundant ornamental use and unintentionally through aquarium escape during natural calamities (flooding) which the RA area is prone to (CABI, 2020). | High |
| 7 | 7.03 | Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? | No | Their physical characteristics does not allow attachment to any substrata (Fish Base, 2019) | Very high |
| 88 | 7.04 | Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? | No | Since this taxon is a livebearer fish (CABI, 2020). | High |
| | 7.05 | Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? | Yes | The taxon can enter the RA area through natural dispersal and its succes is increased because of its broad environmental tollerences. Also, it can be dispersed intentionally because of its abundant ornamental use and unintentionally through aquarium escape during natural calamities (flooding) which the RA area is prone to (CABI, 2020). | Very high |
| 10 | 7.06 | Are older life stages of the taxon likely to | No | This taxon does not have migratory characteristics (CABI 2020, | 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 | IUCNGSID, 2020). Since this taxon does not exhibit parental care, it makes the broods available for preadation and dispersion by other animals (CABI, 2020). | High |
| 1 | | | 1 | This taxon which is readily available in the market for aquaculture | High |
| | 7.08 | Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. either unintentional or intentional) likely to be rapid? | Yes | and as pets together with the fact that the RA area is prone to natural calamities such as typhoons (Brändlin & Wingard, 2013) and its high adaptability to different environmental conditions making them a habitat generalist makes their dispersal rapid | |
| 12 | 7.09 | vectors/pathways mentioned in the previous seven questions (35-41; i.e. either unintentional or intentional) likely to be rapid? Is dispersal of the taxon density dependent? | | natural calamities such as typhoons (Brändlin & Wingard, 2013) | Low |
| 12 | 7.09 | vectors/pathways mentioned in the previous seven questions (35–41; i.e. either unintentional or intentional) likely to be rapid? | Not applicable | natural calamities such as typhoons (Brändlin & Wingard, 2013) and its high adaptability to different environmental conditions making them a habitat generalist makes their dispersal rapid There are no records that this taxon is density dependent in terms | Low |

| 4 - | 0.00 | To the target tale want of a wide want of | No. | Weter alls C.O. Terrarenteres 120C 420C and Calificity at Caret | Mara biab |
|------------|------|--|----------|--|------------------|
| 45 | 8.02 | Is the taxon tolerant of a wide range of water quality conditions relevant to that | Yes | Water pH: 6-8, Temperature: 12°C - 42°C, and Salinity: <16 ppt (optimum) (CABI, 2020; IUCNGSID, 2020). | Very high |
| | | taxon? [In the Justification field, indicate the | | (optimum) (CABI, 2020; IOCNGSID, 2020). | |
| | | relevant water quality variable(s) being | | | |
| 16 | 8.03 | Can the taxon be controlled or eradicated in | Yes | There are record that this taxon was chemically controlled using | High |
| 40 | 0.05 | the wild with chemical, biological, or other | 165 | retenone (IUCNGSID, 2020; CABI, 2020). | ingn |
| | | agents/means? | | 100N031D, 2020, CADI, 2020). | |
| 47 | 8.04 | Is the taxon likely to tolerate or benefit from | Yes | As this taxon has wide range of environmental tolerances, they can | Very high |
| ., | 0.01 | environmental/human disturbance? | 105 | tolerate high ranges of temperature, salinity and oxygen levels, | very night |
| | | | | they have the ability to colonize anthropogenically disturbed | |
| | | | | habitats and to give birth to live offspring, and they grow in fast | |
| | | | | rates, it is mostlikely, that they will benefit from environmental | |
| | | | | disturbances specially flooding which is prone in the RA area | |
| 48 | 8.05 | Is the taxon able to tolerate salinity levels | Yes | Since this taxon is a hardy species, it can survive high salinities | High |
| | | that are higher or lower than those found in | | which includes as much as twice that of sea water (IUCNGSID, | 5 |
| | | its usual environment? | | 2020). | |
| 49 | 8.06 | Are there effective natural enemies | Yes | Micropterus salmoides can predate this taxon in the RA area | Very high |
| | | (predators) of the taxon present in the RA | | (Guerrero, 2014). | |
| | | e change | | | |
| | | change | 1 | | T |
| 50 | 9.01 | Under the predicted future climatic | Increase | Together with the fact that the RA area is prone to natural | Very high |
| | | conditions, are the risks of entry into the RA | | calamities such as typhoons and floods (Brändlin & Wingard, | |
| | | area posed by the taxon likely to increase, | | 2013) the risk of entry through accidental release from aquarium | |
| F 1 | 9.02 | decrease or not change? | T | would most likely increase the entry of this taxon. | Llink |
| 51 | 9.02 | Under the predicted future climatic | Increase | Based on their different morphological characteristics, together | High |
| | | conditions, are the risks of establishment | | with the fact that this taxon can survive a wide range of environmental conditions, (they can tolerate high ranges of | |
| | | posed by the taxon likely to increase, decrease or not change? | | temperature, salinity and oxygen levels, they have the ability to | |
| | | | | colonize anthropogenically disturbed habitats, to give birth to live | |
| | | | | offspring, and they grow in fast rates), the risk of establishment of | |
| | | | | the taxon increases (CABI , 2020). | |
| 52 | 9.03 | Under the predicted future climatic | Increase | As a fact that the RA area is prone to natural calamities such as | Very high |
| | | conditions, are the risks of dispersal within | | typhoons and floods (Brändlin & Wingard, 2013) together with | · · · , · · · g. |
| | | the RA area posed by the taxon likely to | | their ability to survive a wide range of environmental conditions | |
| | | increase, decrease or not change? | | (temperature, salinity, low oxygen level, disturbed habitats and | |
| | | | | etc.) the risk of entry through accidental release from aquarium | |
| | | | | would most likely increase the dispersal of this taxon. | |
| 53 | 9.04 | Under the predicted future climatic | Higher | As this taxon can survive the future climatic conditions of the RA | High |
| | | conditions, what is the likely magnitude of | | area and can establish viable population on it, it can pose a huge | |
| | | future potential impacts on biodiversity | | impact on the biodiversity and ecological status of the RA area by | |
| | | and/or ecological integrity/status? | | competing on food and nutrients of the local species and by | |
| | | | | introducing new diseases. | |
| 54 | 9.05 | Under the predicted future climatic | Higher | As this taxon can survive the future climatic conditions of the RA | High |
| | | conditions, what is the likely magnitude of | | area and can establish viable population on it, it can pose a huge | |
| | | future potential impacts on ecosystem | | impact on the ecosystem services and socio-economic factors of | |
| | | structure and/or function? | | the RA area by competing on the existence of the local species | |
| | | | | which would eventually replace their existence in the RA area, | |
| | | | | thus affecting the livelihood services and the genetic diversity of | |
| 55 | 9.06 | Under the predicted future climatic | Higher | the ecosystem in the area. As this taxon can survive the future climatic conditions of the RA | High |
| 55 | 5.00 | conditions, what is the likely magnitude of | ingliei | area and can establish viable population on it, it can pose a huge | ingli |
| | | future potential impacts on ecosystem | | impact on the ecosystem services and socio-economic factors of | |
| | | services/socio-economic factors? | | the RA area by competing on the existence of the local species | |
| | | | | which would eventually replace their existence in the RA area, | |
| | | | | thus affecting the livelihood services and the genetic diversity of | |
| | | | | the ecosystem in the area. | |

| Statistics | |
|--|-------------------------|
| Scores | |
| BRA | 45.0 |
| BRA Outcome | High |
| BRA+CCA | 57.0 |
| BRA+CCA Outcome | High |
| Score partition | |
| A. Biogeography/Historical | 21.0 |
| 1. Domestication/Cultivation | 4.0 |
| 2. Climate, distribution and introduction risk | 3.0 |
| 3. Invasive elsewhere | 14.0 |
| B. Biology/Ecology | 24.0 |
| 4. Undesirable (or persistence) traits | 8.0 |
| 5. Resource exploitation | 7.0 |
| 6. Reproduction | 4.0 |
| 7. Dispersal mechanisms | 1.0 |
| 8. Tolerance attributes | 4.0 |
| C. Climate change | 12.0 |
| 9. Climate change | 12.0 |
| Answered Questions | |
| Total | 55 |
| A. Biogeography/Historical | 13 |
| 1. Domestication/Cultivation | 3 |
| 2. Climate, distribution and introduction risk | 5 |
| 3. Invasive elsewhere | 13 3 5 5 36 |
| B. Biology/Ecology | |
| 4. Undesirable (or persistence) traits | 12 |
| 5. Resource exploitation | 2 |

| 7 | 6. Reproduction | | |
|------|---------------------------------------|--|--|
| 9 | 7. Dispersal mechanisms | | |
| 6 | 8. Tolerance attributes | | |
| 6 | C. Climate change | | |
| 6 | 9. Climate change | | |
| | Sectors affected | | |
| 17 | Commercial | | |
| 17 | Environmental | | |
| 28 | Species or population nuisance traits | | |
| | | | |
| | Thresholds | | |
| 34.5 | BRA | | |
| 24 5 | | | |
| 34.5 | BRA+CCA | | |
| 34.5 | BRA+CCA Confidence | | |

 BRA+CCA
 0.85

 BRA
 0.85

 CCA
 0.83

Date and Time 03/05/2021 00:52:08

| Taxon and Assessor details | |
|------------------------------------|---|
| Category | Fishes and Lampreys (freshwater) |
| Taxon name | Hypophthalmichthys molitrix |
| Common name | silver carp |
| Assessor | Gilles, To |
| Risk screening context | |
| Reason and socio-economic benefits | commercial; aquaculture: commercial |
| Risk assessment area | Lake Taal |
| Taxonomy | Actinopteri (ray-finned fishes) > Cypriniformes (Carps) > Xenocyprididae (East Asian minnows) |
| Native range | Native to most major Pacific dainages of East Asia from Amur to Xi Jiang, China |
| Introduced range | Taiwan, Japan, Israel, Malaysia, Philippines etc |
| LIRI | https://www.fishbase.se/summary/Hypophthalmichthys-molitrix.html |

| | | | Response | Justification (references and/or other information) | Confidence |
|-------------|---------|--|----------|--|------------|
| | | graphy/Historical | | | |
| | | ication/Cultivation | | | N/ 1 · 1 |
| L | 1.01 | Has the taxon been the subject of | Yes | This taxon have been introduced around the world for aquaculture | Very high |
| | | domestication (or cultivation) for at least 20 | | purposes and also for controlling excessive growth of | |
| | 1.02 | generations? | 24 | phytoplankton in natural waters (IUCNGSID, 2019). | |
| | 1.02 | Is the taxon harvested in the wild and likely | Yes | The taxon has been harvested in the wild for human consumption | Very high |
| _ | 1 | to be sold or used in its live form? | | (IUCNGSID, 2019). | |
| 3 | 1.03 | Does the taxon have invasive races, | Yes | One concrete examples are the bighead carp, black carp, grass | High |
| | | varieties, sub-taxa or congeners? | | carp, and silver carp which having its impacts in the Mississippi | |
| _ | | | | River and surrounding waters (USDA, 2019) | |
| . (| 7 | , distribution and introduction risk | r | | T . |
| | 2.01 | How similar are the climatic conditions of the | High | The RA area and the taxon's native range has both tropical | High |
| | | Risk Assessment (RA) area and the taxon's | | climate. | |
| | | native range? | | | |
| 5 | 2.02 | What is the quality of the climate matching | High | The RA area belongs to the same part of the continent where the | Very high |
| | | data? | | taxon is native (IUCNGSID, 2019) | |
| | 2.03 | Is the taxon already present outside of | Yes | The taxon has been introduced in the country for farming and | High |
| | | captivity in the RA area? | - | breeding to be used as a food source (NACA, 2013) | |
| | 2.04 | How many potential vectors could the taxon | One | Accidental introduction from aquaculture activities, intentional | Very high |
| | | use to enter in the RA area? | | introduction with human intervention and aquarium escape | |
| | | | | (IUCNGSID, 2019) | |
| 3 | 2.05 | Is the taxon currently found in close | Yes | The taxon has been introduced in the country for farming and | High |
| | | proximity to, and likely to enter into, the RA | | breeding to used as a food source (NACA, 2013) | |
| | | area in the near future (e.g. unintentional | | | |
| | | and intentional introductions)? | | | |
| <i>3. 1</i> | 1 | e elsewhere | | | 1 |
| 9 | 3.01 | Has the taxon become naturalised | Yes | One concrete examples are the bighead carp, black carp, grass | High |
| | | (established viable populations) outside its | | carp, and silver carp which having its impacts in the Mississippi | |
| | | native range? | | River and surrounding waters (USDA, 2019) | |
| 10 | 3.02 | In the taxon's introduced range, are there | Yes | This taxon have the potential to reduce native diversity by being a | Very high |
| | | known adverse impacts to wild stocks or | | competitor with some native fishes for food source, for instance, | |
| | | commercial taxa? | | gizzard shad, that also rely on plankton for food, altering the food | |
| | | | | web . Also, this taxon have also been found to carry and transmit | |
| | | | | the disease Salmonella typhimurium (IUCNGSID & USGS, 2019). | |
| 11 | 3.03 | In the taxon's introduced range, are there | Yes | This taxon have the potential to reduce native diversity by being a | Very high |
| | | known adverse impacts to aquaculture? | | competitor with some native fishes for food source, for instance, | |
| | | | | gizzard shad, that also rely on plankton for food, altering the food | |
| | | | | web . Also, this taxon have also been found to carry and transmit | |
| | | | | the disease Salmonella typhimurium (IUCNGSID & USGS, 2019). | |
| 12 | 3.04 | In the taxon's introduced range, are there | Yes | In USA, this taxon a pose considerable hazards to fishermen and | Very high |
| | | known adverse impacts to ecosystem | | waterskiers, due to the ability of this taxon to jump up to six feet | |
| | | services? | | high out of the water causing damage by landing in boats and | |
| | | | | causing human injuries. Also, people in some states of America | |
| | | | | such as western Kentucky, Missouri, and Illinois try to prevent this | |
| | | | | taxon beacuse it destroys the sport and commercial fisheries, and | |
| | | | | endangering recreational boaters and water skiers (CABI,2019). | |
| 13 | 3.05 | In the taxon's introduced range, are there | Yes | In USA, this taxon a pose considerable hazards to fishermen and | Very high |
| | | known adverse socio-economic impacts? | | waterskiers, due to the ability of this taxon to jump up to six feet | - |
| | | | | high out of the water causing damage by landing in boats and | |
| | | | | causing human injuries. Also, people in some states of America | |
| | | | | such as western Kentucky, Missouri, and Illinois try to prevent this | |
| | | | | taxon beacuse it destroys the sport and commercial fisheries, and | |
| | | | | endangering recreational boaters and water skiers (CABI.2019). | |
| 3. I | Biology | y/Ecology | | | |
| I. L | Indesir | able (or persistence) traits | | | |
| | 4.01 | Is it likely that the taxon will be poisonous or | Yes | This taxon have been found to carry and transmit the disease | High |
| | | pose other risks to human health? | | Salmonella typhimurium which can infect humans (IUCNGSID, | - |
| 15 | 4.02 | Is it likely that the taxon will smother one or | No | According to Stone et al. (2000) this taxon feeds only | Very high |
| | | more native taxa (that are not threatened or | | zooplankton, along with larger phytoplankton, making them filter | , , , |
| | | protected)? | | feeders using their fine, comb-like gill rakers to strain tiny | |
| | | · · · · · · · · · · · · · · · · · · · | | animals and large algae from the water, that is why they are less | |
| | | | | likely to smother on or more native taxa (IUCNGSID, 2019). | |
| 6 | 4.03 | Are there any threatened or protected taxa | No | According to Stone et al. (2000) this taxon feeds only | Very high |
| | | that the non-native taxon would parasitise in | | zooplankton, along with larger phytoplankton, making them filter | . cr, mgn |
| | | the RA area? | | feeders using their fine, comb-like gill rakers to strain tiny | |
| | | | | 5 , 5 , | |
| | 1 | | 1 | animals and large algae from the water, that is why there are no | |
| | | | | protected taxa that this taxon would parasite (IUCNGSID, 2019). | |

| 17 | | | | | |
|--|--|---|---|--|--|
| | 4.04 | Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has | Yes | This taxon can tolerate extreme water temperatures and highly turbid waters and can therefore be cultured in many areas (CABI, 2019). | High |
| | | invaded or could invade the RA area? | | | |
| 18 | 4.05 | Is the taxon likely to disrupt food-web | Yes | This taxon are known to consume large amounts of zooplankton, | Very high |
| | | structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA | | blue-green algae, and insect larvae and adults, they have the potential to deplete zooplankton populations. Thus they compete | |
| | | area? | | with the populations of native species that rely on plankton for | |
| | | | | food. These include all larval fishes, some adult fishes, and | |
| 19 | 4.06 | Is the taxon likely to exert adverse impacts | Yes | In USA, this taxon a pose considerable hazards to fishermen and | High |
| | | on ecosystem services in the RA area? | | waterskiers, due to the ability of this taxon to jump up to six feet | |
| | | | | high out of the water causing damage by landing in boats and | |
| | | | | causing human injuries. Also, people in some states of America such as western Kentucky, Missouri, and Illinois try to prevent this | |
| | | | | taxon beacuse it destroys the sport and commercial fisheries, and | |
| | | | | endangering recreational boaters and water skiers (CABI.2019). | |
| 20 | 4.07 | Is it likely that the taxon will host, and/or | No | There are no reports that the taxon may carry pests or infectious | Very high |
| | | act as a vector for, recognised pests and infectious agents that are endemic in the RA | | agents that are endemic in Lake Taal. | |
| 21 | 4.08 | Is it likely that the taxon will host, and/or | Yes | This taxon have been found to carry and transmit the disease | High |
| | | act as a vector for, recognised pests and | | Salmonella typhimurium which can infect humans (IUCNGSID, | _ |
| | | infectious agents that are absent from (novel | | 2019). | |
| 22 | 4.09 | to) the RA area? Is it likely that the taxon will achieve a body | Yes | This taxon can reach a large body size, baying a maximum length | Vony high |
| ۷۷ | 4.09 | size that will make it more likely to be | 103 | This taxon can reach a large body size, having a maximum length of 105 cm (Fish Base,2019). | Very high |
| | | released from captivity? | | x | |
| 23 | 4.10 | Is the taxon capable of sustaining itself in a | Yes | This taxon inhabits lakes, rivers and reservoirs and they normally | High |
| | | range of water velocity conditions (e.g. | | dwell in the upper layer of the water column and prefers high | |
| | | versatile in habitat use)? | | fertility water with abundant natural food.Also, according to Stone et al. (2000) this taxon is native to large rivers and will not spawn | |
| | | | | in still waters or small streams (IUCNGSID, 2019). | |
| 24 | 4.11 | Is it likely that the taxon's mode of existence | No | This taxon has been used extensively in the management of | High |
| | | (e.g. excretion of by-products) or behaviours | | inland waters which resulted in the prevention of intense blooms | |
| | | (e.g. feeding) will reduce habitat quality for native taxa? | | of phytoplankton particularly blue-green algae, and the increase in biomass of zoobenthos especially chironomids (CABI, 2019) | |
| 25 | 4.12 | Is the taxon likely to maintain a viable | Not applicable | There are no reports of etablished population of this taxon | Medium |
| | | population even when present in low | | persisting at low density. | |
| | | densities (or persisting in adverse conditions | | | |
| 5 / | esour | by way of a dormant form)? | I | | l |
| | 5.01 | Is the taxon likely to consume threatened or | No | This taxon only competes with some native fishes for food source, | Very high |
| | | protected native taxa in the RA area? | | for instance, gizzard shad, that also rely on plankton for food, | , - |
| | | | | | |
| | | | | altering the food web, that is why they are less likely to consume | |
| 27 | 5.02 | Is the taxon likely to sequester food | Yes | thereatened or protected native taxa in the RA area (IUCNGSID, | Very high |
| 27 | 5.02 | Is the taxon likely to sequester food resources (including nutrients) to the | Yes | | Very high |
| 27 | 5.02 | | Yes | thereatened or protected native taxa in the RA area (IUCNGSID, This taxon have the potential to reduce native diversity by being a competitor with some native fishes for food source, for instance, gizzard shad, that also rely on plankton for food, altering the food | Very high |
| | | resources (including nutrients) to the detriment of native taxa in the RA area? | Yes | thereatened or protected native taxa in the RA area (IUCNGSID, This taxon have the potential to reduce native diversity by being a competitor with some native fishes for food source, for instance, | Very high |
| 6. F | 5.02 2.02 2.02 6.01 | resources (including nutrients) to the detriment of native taxa in the RA area? uction | Yes | thereatened or protected native taxa in the RA area (IUCNGSID, This taxon have the potential to reduce native diversity by being a competitor with some native fishes for food source, for instance, gizzard shad, that also rely on plankton for food, altering the food web (IUCNGSID & USGS, 2019). | Very high |
| 6. F | eprodu | resources (including nutrients) to the detriment of native taxa in the RA area? | | thereatened or protected native taxa in the RA area (IUCNGSID, This taxon have the potential to reduce native diversity by being a competitor with some native fishes for food source, for instance, gizzard shad, that also rely on plankton for food, altering the food | |
| <u>6.</u> 28 | eprodu 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? | No | thereatened or protected native taxa in the RA area (IUCNGSID, This taxon have the potential to reduce native diversity by being a competitor with some native fishes for food source, for instance, gizzard shad, that also rely on plankton for food, altering the food web (IUCNGSID & USGS, 2019). The taxon does not exhibit any parental care, they just spawn their eggs after migration (IUCNGSID, 2019). | Very high |
| <u>6.</u> 28 | eprodu | 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 | | thereatened or protected native taxa in the RA area (IUCNGSID, This taxon have the potential to reduce native diversity by being a competitor with some native fishes for food source, for instance, gizzard shad, that also rely on plankton for food, altering the food web (IUCNGSID & USGS, 2019). The taxon does not exhibit any parental care, they just spawn their eggs after migration (IUCNGSID, 2019). The conditions of the RA meets the required conditions for | |
| <u>6.</u> 28 | eprodu 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? | No | thereatened or protected native taxa in the RA area (IUCNGSID, This taxon have the potential to reduce native diversity by being a competitor with some native fishes for food source, for instance, gizzard shad, that also rely on plankton for food, altering the food web (IUCNGSID & USGS, 2019). The taxon does not exhibit any parental care, they just spawn their eggs after migration (IUCNGSID, 2019). The conditions of the RA meets the required conditions for maturation and reproduction of this taxon, which will enable it to | Very high |
| <u>6. F</u> 28 29 | eprodu 6.01 | 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 | No | thereatened or protected native taxa in the RA area (IUCNGSID, This taxon have the potential to reduce native diversity by being a competitor with some native fishes for food source, for instance, gizzard shad, that also rely on plankton for food, altering the food web (IUCNGSID & USGS, 2019). The taxon does not exhibit any parental care, they just spawn their eggs after migration (IUCNGSID, 2019). The conditions of the RA meets the required conditions for | Very high |
| <u>6. </u> 28 29 30 | 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)? Is the taxon likely to hybridise naturally with native taxa? | No Yes Yes | thereatened or protected native taxa in the RA area (IUCNGSID, This taxon have the potential to reduce native diversity by being a competitor with some native fishes for food source, for instance, gizzard shad, that also rely on plankton for food, altering the food web (IUCNGSID & USGS, 2019). The taxon does not exhibit any parental care, they just spawn their eggs after migration (IUCNGSID, 2019). The conditions of the RA meets the required conditions for maturation and reproduction of this taxon, which will enable it to produce a viable gametes (IUCNGSID, 2019). This taxon has been reported to be capable of hybridizing in the wild (CABI, 2019). | Very high High Very high |
| <u>6. </u> 28 29 30 | <u>eprodu</u> 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 | No Yes | thereatened or protected native taxa in the RA area (IUCNGSID, This taxon have the potential to reduce native diversity by being a competitor with some native fishes for food source, for instance, gizzard shad, that also rely on plankton for food, altering the food web (IUCNGSID & USGS, 2019). The taxon does not exhibit any parental care, they just spawn their eggs after migration (IUCNGSID, 2019). The conditions of the RA meets the required conditions for maturation and reproduction of this taxon, which will enable it to produce a viable gametes (IUCNGSID, 2019). This taxon has been reported to be capable of hybridizing in the wild (CABI, 2019). There are no documented evidence of hermaphroditism/asexual | Very high High |
| <u>6.</u> 28 29 30 31 | 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? | No Yes Yes No | thereatened or protected native taxa in the RA area (IUCNGSID, This taxon have the potential to reduce native diversity by being a competitor with some native fishes for food source, for instance, gizzard shad, that also rely on plankton for food, altering the food web (IUCNGSID & USGS, 2019). The taxon does not exhibit any parental care, they just spawn their eggs after migration (IUCNGSID, 2019). The conditions of the RA meets the required conditions for maturation and reproduction of this taxon, which will enable it to produce a viable gametes (IUCNGSID, 2019). This taxon has been reported to be capable of hybridizing in the wild (CABI, 2019). There are no documented evidence of hermaphroditism/asexual reproduction of this species. | Very high High Very high |
| <u>6.</u> 28 29 30 31 | 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)? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) | No Yes Yes | thereatened or protected native taxa in the RA area (IUCNGSID, This taxon have the potential to reduce native diversity by being a competitor with some native fishes for food source, for instance, gizzard shad, that also rely on plankton for food, altering the food web (IUCNGSID & USGS, 2019). The taxon does not exhibit any parental care, they just spawn their eggs after migration (IUCNGSID, 2019). The conditions of the RA meets the required conditions for maturation and reproduction of this taxon, which will enable it to produce a viable gametes (IUCNGSID, 2019). This taxon has been reported to be capable of hybridizing in the wild (CABI, 2019). There are no documented evidence of hermaphroditism/asexual | Very high High Very high High |
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| 5. F 28 29 30 31 32 33 34 7. L 35 36 | eprodu 6.01 6.02 6.03 6.04 6.05 6.06 6.07 0ispers. 7.01 7.02 | 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)? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances | No Yes Yes Yes Yes 3 One Yes | thereatened or protected native taxa in the RA area (IUCNGSID, This taxon have the potential to reduce native diversity by being a competitor with some native fishes for food source, for instance, gizzard shad, that also rely on plankton for food, altering the food web (IUCNGSID & USGS, 2019). The taxon does not exhibit any parental care, they just spawn their eggs after migration (IUCNGSID, 2019). The conditions of the RA meets the required conditions for maturation and reproduction of this taxon, which will enable it to produce a viable gametes (IUCNGSID, 2019). This taxon has been reported to be capable of hybridizing in the wild (CABI, 2019). There are no documented evidence of hermaphroditism/asexual reproduction of this species. This taxon requires bodies of water with some current for eggs to float and develop properly (IUCNGSID, 2019). The taxon have a huge reproductive capacity with females producing up to 5,400 eggs (IUCNGSID, 2019). This taxon reaches the age of maturity at 2-4 years old (USGS, 2019). Accidental introduction from aquaculture activities, intentional introduction with human intervention and aquarium escape (IUCNGSID, 2019) Because of the taxons commercial importance, the aquaculture pathway could bring this taxon in close proximity to one or more protected areas. Their physical characteristics does not allow attachment to any | Very high High Very high High Very high High Very high |
| 5. <i>F</i> 28 29 30 31 32 33 33 34 35 36 37 | 6.01 6.02 6.03 6.04 6.05 6.06 6.07 7.01 7.02 7.03 | resources (including nutrients) to the detriment of native taxa in the RA area? <i>uction</i> Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon knewn (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? | No Yes Yes Yes Yes 3 One Yes No | thereatened or protected native taxa in the RA area (IUCNGSID, This taxon have the potential to reduce native diversity by being a competitor with some native fishes for food source, for instance, gizzard shad, that also rely on plankton for food, altering the food web (IUCNGSID & USGS, 2019). The taxon does not exhibit any parental care, they just spawn their eggs after migration (IUCNGSID, 2019). The conditions of the RA meets the required conditions for maturation and reproduction of this taxon, which will enable it to produce a viable gametes (IUCNGSID, 2019). This taxon has been reported to be capable of hybridizing in the wild (CABI, 2019). There are no documented evidence of hermaphroditism/asexual reproduction of this species. This taxon nequires bodies of water with some current for eggs to float and develop properly (IUCNGSID, 2019). The taxon have a huge reproductive capacity with females producing up to 5,400 eggs (IUCNGSID, 2019). This taxon reaches the age of maturity at 2-4 years old (USGS, 2019). Accidental introduction from aquaculture activities, intentional introduction with human intervention and aquarium escape (IUCNGSID, 2019) Because of the taxons commercial importance, the aquaculture pathway could bring this taxon in close proximity to one or more protected areas. Their physical characteristics does not allow attachment to any substrata (CABI, 2019). | Very high High Very high High Very high High Very high High |
| 6. F 28 29 30 31 32 33 33 33 33 33 33 33 33 | eprodu 6.01 6.02 6.03 6.04 6.05 6.06 6.07 0ispers. 7.01 7.02 | 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)? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances | No Yes Yes Yes Yes 3 One Yes | thereatened or protected native taxa in the RA area (IUCNGSID, This taxon have the potential to reduce native diversity by being a competitor with some native fishes for food source, for instance, gizzard shad, that also rely on plankton for food, altering the food web (IUCNGSID & USGS, 2019). The taxon does not exhibit any parental care, they just spawn their eggs after migration (IUCNGSID, 2019). The conditions of the RA meets the required conditions for maturation and reproduction of this taxon, which will enable it to produce a viable gametes (IUCNGSID, 2019). This taxon has been reported to be capable of hybridizing in the wild (CABI, 2019). There are no documented evidence of hermaphroditism/asexual reproduction of this species. This taxon requires bodies of water with some current for eggs to float and develop properly (IUCNGSID, 2019). The taxon have a huge reproductive capacity with females producing up to 5,400 eggs (IUCNGSID, 2019). This taxon reaches the age of maturity at 2-4 years old (USGS, 2019). Accidental introduction from aquaculture activities, intentional introduction with human intervention and aquarium escape (IUCNGSID, 2019) Because of the taxons commercial importance, the aquaculture pathway could bring this taxon in close proximity to one or more protected areas. Their physical characteristics does not allow attachment to any | Very high High Very high High Very high High Very high |

| 39 | 7.05 | Is natural dispersal of the taxon likely to | Yes | This taxon requires bodies of water with some current for eggs to | Very high |
|-----|---------|---|----------------|--|-------------------|
| | | occur as larvae/juveniles (for animals) or as | | float and develop properly, making it possible for the taxon to be | |
| | | fragments/seedlings (for plants) in the RA | | dispersed by water currents (IUCNGSID, 2019). | |
| | | area? | | | |
| 40 | 7.06 | Are older life stages of the taxon likely to | Yes | This taxon is known to migrate to their communal spawning | High |
| | | migrate in the RA area for reproduction? | | grounds during spring flooding (IUCNGSID, 2019). | |
| 41 | 7.07 | Are propagules or eggs of the taxon likely to | Yes | This taxon requires bodies of water with some current for eggs to | Very high |
| | | be dispersed in the RA area by other animals? | | float and develop properly, making it possible for the taxon to be | |
| | | | | dispersed by water currents and by other animals (IUCNGSID, | |
| 42 | 7.08 | Is dispersal of the taxon along any of the | Yes | This taxon which is readily available in commercial markets and in | Very high |
| | | vectors/pathways mentioned in the previous | | aquaculture farms can be rapidly disperesed, knowing also the | |
| | | seven questions (35-41; i.e. either | | fact that the RA area is highly susceptable to flooding and natural | |
| 4.2 | 7.00 | unintentional or intentional) likely to be | | calamities which could rapidly disperesed this taxon (CABI, 2019). | 1.0.1 |
| 43 | 7.09 | Is dispersal of the taxon density dependent? | Yes | This taxon prefer to spawn in small groups of 15 to 25 fish | High |
| 0 7 | Foloran | ce attributes | | (IUCNGSID, 2019). | |
| | | Is the taxon able to withstand being out of | Yes | This taxon can survive out of water for a long time | Very high |
| 44 | 0.01 | water for extended periods (e.g. minimum of | 165 | (Anglersnet.co.uk, 2019). | very nigh |
| | | one or more hours) at some stage of its life | | (Angicishet.co.uk, 2015). | |
| | | cycle? | | | |
| 45 | 8.02 | Is the taxon tolerant of a wide range of | Yes | This taxon can tolerate salinities up to 12 ppt and low dissolved | Very high |
| | | water quality conditions relevant to that | | oxygen (3mg/L) (USGS, 2019). | ., |
| | | taxon? [In the Justification field, indicate the | | | |
| | | relevant water quality variable(s) being | | | |
| 46 | 8.03 | Can the taxon be controlled or eradicated in | Not applicable | There are no records about their eradication through chemical, | Low |
| | | the wild with chemical, biological, or other | | biological and other agents. | |
| | | agents/means? | | | |
| 47 | 8.04 | Is the taxon likely to tolerate or benefit from | Yes | Due to their ability to survive in a wide range of environmental | Very high |
| | | environmental/human disturbance? | | conditions it can benefit from environmental/human distrubances | |
| | | | | (CABI, 2019). | |
| 48 | 8.05 | Is the taxon able to tolerate salinity levels | Yes | This taxon can tolerate up to 12 ppt of salinity (USGS, 2019). | Very high |
| | | that are higher or lower than those found in | | | |
| | | its usual environment? | | | |
| 49 | 8.06 | Are there effective natural enemies | No | Based on fish species present in the RA area (Papa & Mamaril, | Very high |
| | | (predators) of the taxon present in the RA | | 2011) there is no predator that can preadate the taxon in the RA | |
| | | e change | | | |
| | 9.01 | Under the predicted future climatic | Increase | Together with the fact that the RA area is prone to natural | High |
| 50 | 5.01 | conditions, are the risks of entry into the RA | mereuse | calamities such as typhoons and floods (Brändlin & Wingard, | i iigii |
| | | area posed by the taxon likely to increase, | | 2013) the risk of entry through accidental release from | |
| | | decrease or not change? | | commercial fish farms would most likely increase the entry of this | |
| 51 | 9.02 | Under the predicted future climatic | Increase | Based on their different morphological characteristics, together | High |
| | | conditions, are the risks of establishment | | with the fact that they can survive a wide range of environmental | 5 |
| | | posed by the taxon likely to increase, | | conditions, the risk of establishment of the taxon increases. | |
| | | decrease or not change? | | | |
| 52 | 9.03 | Under the predicted future climatic | Increase | As a fact that the RA area is prone to natural calamities such as | Very high |
| | 1 | | | | very mgn |
| | | conditions, are the risks of dispersal within | | typhoons and floods (Brändlin & Wingard, 2013) and their | very nigh |
| | | | | typhoons and floods (Brändlin & Wingard, 2013) and their migratory behavior would most likely increase the dispersal of this | very nigh |
| | | conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? | | migratory behavior would most likely increase the dispersal of this taxon. | |
| 53 | 9.04 | 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 | Higher | migratory behavior would most likely increase the dispersal of this taxon. This taxon are known to consume large amounts of zooplankton, | High |
| 53 | 9.04 | 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 | Higher | migratory behavior would most likely increase the dispersal of this taxon. This taxon are known to consume large amounts of zooplankton, blue-green algae, and insect larvae and adults, they have the | |
| 53 | 9.04 | conditions, are the risks of dispersal within the RA area posed by the taxon likely to <u>increase, decrease or not change?</u> Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity | Higher | migratory behavior would most likely increase the dispersal of this taxon. This taxon are known to consume large amounts of zooplankton, blue-green algae, and insect larvae and adults, they have the potential to deplete zooplankton populations. Making them a | |
| 53 | 9.04 | 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 | Higher | migratory behavior would most likely increase the dispersal of this taxon. This taxon are known to consume large amounts of zooplankton, blue-green algae, and insect larvae and adults, they have the potential to deplete zooplankton populations. Making them a competetor with the populations of native species that rely on | |
| | | 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? | | migratory behavior would most likely increase the dispersal of this taxon. This taxon are known to consume large amounts of zooplankton, blue-green algae, and insect larvae and adults, they have the potential to deplete zooplankton populations. Making them a competetor with the populations of native species that rely on plankton for food which include all larval fishes, some adult fishes, | High |
| | 9.04 | 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 | Higher | migratory behavior would most likely increase the dispersal of this taxon. This taxon are known to consume large amounts of zooplankton, blue-green algae, and insect larvae and adults, they have the potential to deplete zooplankton populations. Making them a competetor with the populations of native species that rely on plankton for food which include all larval fishes, some adult fishes. This taxon has been used extensively in the management of | |
| | | 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 | | migratory behavior would most likely increase the dispersal of this taxon. This taxon are known to consume large amounts of zooplankton, blue-green algae, and insect larvae and adults, they have the potential to deplete zooplankton populations. Making them a competetor with the populations of native species that rely on plankton for food which include all larval fishes, some adult fishes. This taxon has been used extensively in the management of inland waters which resulted in the prevention of intense blooms | High |
| | | conditions, are the risks of dispersal within the RA area posed by the taxon likely to <u>increase, decrease or not change?</u> 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 | | migratory behavior would most likely increase the dispersal of this taxon. This taxon are known to consume large amounts of zooplankton, blue-green algae, and insect larvae and adults, they have the potential to deplete zooplankton populations. Making them a competetor with the populations of native species that rely on plankton for food which include all larval fishes, some adult fishes. This taxon has been used extensively in the management of inland waters which resulted in the prevention of intense blooms of phytoplankton particularly blue-green algae, and the increase | High |
| 54 | 9.05 | 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? | Lower | migratory behavior would most likely increase the dispersal of this taxon. This taxon are known to consume large amounts of zooplankton, blue-green algae, and insect larvae and adults, they have the potential to deplete zooplankton populations. Making them a competetor with the populations of native species that rely on plankton for food which include all larval fishes, some adult fishes. This taxon has been used extensively in the management of inland waters which resulted in the prevention of intense blooms of phytoplankton particularly blue-green algae, and the increase in biomass of zoobenthos especially chironomids (CABI, 2019). | High Very high |
| 54 | | conditions, are the risks of dispersal within the RA area posed by the taxon likely to <u>increase</u> , <u>decrease or not change</u> ? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity 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 | | migratory behavior would most likely increase the dispersal of this taxon. This taxon are known to consume large amounts of zooplankton, blue-green algae, and insect larvae and adults, they have the potential to deplete zooplankton populations. Making them a competetor with the populations of native species that rely on plankton for food which include all larval fishes, some adult fishes, This taxon has been used extensively in the management of inland waters which resulted in the prevention of intense blooms of phytoplankton particularly blue-green algae, and the increase in biomass of zoobenthos especially chironomids (CABI, 2019). In USA, this taxon a pose considerable hazards to fishermen and | High |
| 54 | 9.05 | 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 | Lower | migratory behavior would most likely increase the dispersal of this taxon. This taxon are known to consume large amounts of zooplankton, blue-green algae, and insect larvae and adults, they have the potential to deplete zooplankton populations. Making them a competetor with the populations of native species that rely on plankton for food which include all larval fishes, some adult fishes, This taxon has been used extensively in the management of inland waters which resulted in the prevention of intense blooms of phytoplankton particularly blue-green algae, and the increase in biomass of zoobenthos especially chironomids (CABI, 2019). In USA, this taxon a pose considerable hazards to fishermen and waterskiers, due to the ability of this taxon to jump up to six feet | High Very high |
| 54 | 9.05 | 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? | Lower | migratory behavior would most likely increase the dispersal of this taxon. This taxon are known to consume large amounts of zooplankton, blue-green algae, and insect larvae and adults, they have the potential to deplete zooplankton populations. Making them a competetor with the populations of native species that rely on plankton for food which include all larval fishes, some adult fishes, This taxon has been used extensively in the management of inland waters which resulted in the prevention of intense blooms of phytoplankton particularly blue-green algae, and the increase in biomass of zoobenthos especially chironomids (CABI, 2019). In USA, this taxon a pose considerable hazards to fishermen and waterskiers, due to the ability of this taxon to jump up to six feet high out of the water causing damage by landing in boats and | High Very high |
| 54 | 9.05 | 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 | Lower | migratory behavior would most likely increase the dispersal of this taxon. This taxon are known to consume large amounts of zooplankton, blue-green algae, and insect larvae and adults, they have the potential to deplete zooplankton populations. Making them a competetor with the populations of native species that rely on plankton for food which include all larval fishes, some adult fishes. This taxon has been used extensively in the management of inland waters which resulted in the prevention of intense blooms of phytoplankton particularly blue-green algae, and the increase in biomass of zoobenthos especially chironomids (CABI, 2019). In USA, this taxon a pose considerable hazards to fishermen and waterskiers, due to the ability of this taxon to jump up to six feet high out of the water causing damage by landing in boats and causing human injuries. Also, people in some states of America | High Very high |
| 54 | 9.05 | 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? | Lower | migratory behavior would most likely increase the dispersal of this taxon. This taxon are known to consume large amounts of zooplankton, blue-green algae, and insect larvae and adults, they have the potential to deplete zooplankton populations. Making them a competetor with the populations of native species that rely on plankton for food which include all larval fishes, some adult fishes. This taxon has been used extensively in the management of inland waters which resulted in the prevention of intense blooms of phytoplankton particularly blue-green algae, and the increase in biomass of zoobenthos especially chironomids (CABI, 2019). In USA, this taxon a pose considerable hazards to fishermen and waterskiers, due to the ability of this taxon to jump up to six feet high out of the water causing damage by landing in boats and causing human injuries. Also, people in some states of America such as western Kentucky, Missouri, and Illinois try to prevent this | High Very high |
| 54 | 9.05 | 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? | Lower | migratory behavior would most likely increase the dispersal of this taxon. This taxon are known to consume large amounts of zooplankton, blue-green algae, and insect larvae and adults, they have the potential to deplete zooplankton populations. Making them a competetor with the populations of native species that rely on plankton for food which include all larval fishes, some adult fishes. This taxon has been used extensively in the management of inland waters which resulted in the prevention of intense blooms of phytoplankton particularly blue-green algae, and the increase in biomass of zoobenthos especially chironomids (CABI, 2019). In USA, this taxon a pose considerable hazards to fishermen and waterskiers, due to the ability of this taxon to jump up to six feet high out of the water causing damage by landing in boats and causing human injuries. Also, people in some states of America | High Very high |

| Statistics | |
|--|------|
| Scores | |
| BRA | 49.0 |
| BRA Outcome | High |
| BRA+CCA | 57.0 |
| BRA+CCA Outcome | High |
| Score partition | |
| A. Biogeography/Historical | 25.0 |
| 1. Domestication/Cultivation | 4.0 |
| 2. Climate, distribution and introduction risk | 3.0 |
| 3. Invasive elsewhere | 18.0 |
| B. Biology/Ecology | 24.0 |
| 4. Undesirable (or persistence) traits | 7.0 |
| 5. Resource exploitation | 2.0 |
| 6. Reproduction | 1.0 |
| 7. Dispersal mechanisms | 6.0 |
| 8. Tolerance attributes | 8.0 |
| C. Climate change | 8.0 |
| 9. Climate change | 8.0 |

| Answered Questions | |
|--|--------------------|
| Total | 55 |
| A. Biogeography/Historical | 13 |
| 1. Domestication/Cultivation | 3 |
| 2. Climate, distribution and introduction risk | 3 5 5 |
| 3. Invasive elsewhere | 5 |
| B. Biology/Ecology | 36 |
| 4. Undesirable (or persistence) traits | 12 |
| 5. Resource exploitation | 2 |
| 6. Reproduction | 7 |
| 7. Dispersal mechanisms | 9 |
| 8. Tolerance attributes | 9 6 6 |
| C. Climate change | 6 |
| 9. Climate change | 6 |
| Sectors affected | |
| Commercial | 21 |
| Environmental | 7 |
| Species or population nuisance traits | 34 |
| | |
| Threadealda | |

| Thresholds | |
|---------------|------|
| BRA | 34.5 |
| BRA+CCA | 34.5 |
| Confidence | |
| BRA+CCA | 0.88 |
| BRA | 0.88 |
| CCA | 0.88 |
| | |
| Date and Time | |
| | |

03/05/2021 00:53:42

| Taxon and Assessor details | |
|------------------------------------|---|
| Category | Fishes and Lampreys (freshwater) |
| Taxon name | Hypophthalmichthys nobilis |
| Common name | bighead carp |
| Assessor | Gilles, To |
| Risk screening context | |
| Reason and socio-economic benefits | Fisheries: highly commercial; aquaculture: commercial; aquarium: public aquariums |
| Risk assessment area | Lake Taal |
| Taxonomy | Actinopteri (ray-finned fishes) > Cypriniformes (Carps) > Xenocyprididae (East Asian minnows) |
| Native range | Asia:China |
| Introduced range | Introduced to numerous countries and has achieved a near global distribution. |
| URL | https://www.fishbase.se/summary/Hypophthalmichthys-nobilis.html |

| - | | | Response | Justification (references and/or other information) | Confidence |
|------|---------|--|----------|--|--------------|
| | | graphy/Historical | | | |
| | | ication/Cultivation | 1 | | T |
| 1 | 1.01 | Has the taxon been the subject of | Yes | The taxon have reportedly become well established in the Missouri | Very high |
| | | domestication (or cultivation) for at least 20 | | River and their proportion in the commercial harvest has | |
| | | generations? | | increased since 1990. This taxon are now found within or along | |
| | | | | the borders of at least 23 states in the USA and are reportedly | |
| 2 | 1.02 | | Yes | growing in number in many midwestern rivers (CABI, 2019). The taxon has been harvested in the wild for commercial fisheries | Mara hiah |
| Z | 1.02 | Is the taxon harvested in the wild and likely to be sold or used in its live form? | res | and according to Stone et al. (2000) "In worldwide aquaculture, | Very high |
| | | to be sold of used in its live form? | | Aristichthys nobilis ranks fourth in production (2.8 billion pounds | |
| | | | | in 1995)" (IUCNGSID, 2019). | |
| 3 | 1.03 | Does the taxon have invasive races, | Yes | One concrete examples are the bighead carp, black carp, grass | Very high |
| 5 | 1.05 | varieties, sub-taxa or congeners? | 105 | carp, and silver carp which having its impacts in the Mississippi | very night |
| | | | | River and surrounding waters (USDA, 2019) | |
| 2. C | limate, | , distribution and introduction risk | | | |
| | | How similar are the climatic conditions of the | High | The RA area and the taxon's native range has both tropical | High |
| | | Risk Assessment (RA) area and the taxon's | 5 | climate. | 5 |
| | | native range? | | | |
| 5 | 2.02 | What is the quality of the climate matching | High | The RA area belongs to the same part of the continent where the | High |
| | | data? | | taxon is native (CABI, 2019) | |
| 6 | 2.03 | Is the taxon already present outside of | Yes | The taxon has been introduced in the country for farming and | Very high |
| | | captivity in the RA area? | | breeding to be used as a food source (NACA, 2013) | |
| 7 | 2.04 | How many potential vectors could the taxon | One | Accidental introduction from aquaculture activities, intentional | High |
| | | use to enter in the RA area? | | introduction with human intervention and aquarium escape | |
| | | | | (IUCNGSID, 2019). | |
| 8 | 2.05 | Is the taxon currently found in close | Yes | The taxon has been introduced in the country for farming and | Very high |
| | | proximity to, and likely to enter into, the RA | | breeding to used as a food source (NACA, 2013) | |
| | | area in the near future (e.g. unintentional | | | |
| | | and intentional introductions)? | | | |
| | | e elsewhere | 1 | | |
| 9 | 3.01 | Has the taxon become naturalised | Yes | One concrete examples are the bighead carp, black carp, grass | Very high |
| | | (established viable populations) outside its | | carp, and silver carp which having its impacts in the Mississippi | |
| 10 | 2.02 | native range? | 24 | River and surrounding waters (USDA, 2019) | |
| 10 | 3.02 | In the taxon's introduced range, are there | Yes | This taxon are known to consume large amounts of zooplankton, | Very high |
| | | known adverse impacts to wild stocks or | | blue-green algae, and insect larvae and adults, they have the | |
| | | commercial taxa? | | potential to deplete zooplankton populations. Making them a | |
| | | | | competetor with the populations of native species that rely on | |
| 11 | 3.03 | In the taxon's introduced range, are there | Yes | plankton for food which include all larval fishes, some adult fishes, This taxon are known to consume large amounts of zooplankton, | Very high |
| 11 | 5.05 | known adverse impacts to aquaculture? | 103 | blue-green algae, and insect larvae and adults, they have the | Very high |
| | | | | potential to deplete zooplankton populations. Making them a | |
| | | | | competetor with the populations of native species that rely on | |
| | | | | plankton for food which include all larval fishes, some adult fishes, | |
| 12 | 3.04 | In the taxon's introduced range, are there | No | The introduction of this taxon gave an additional source of cheap | High |
| | | known adverse impacts to ecosystem | - | and much needed protein for the improvement of human nutrition | 5 |
| | | services? | | in many countries. Also, hatcheries and growout farms of this | |
| | | | | taxon provided jobs that help upgrade the standard of living of the | |
| | | | | workers and their families (CABI, 2019). | |
| 13 | 3.05 | In the taxon's introduced range, are there | No | The introduction of this taxon gave an additional source of cheap | High |
| | | known adverse socio-economic impacts? | | and much needed protein for the improvement of human nutrition | - |
| | | | | in many countries. Also, hatcheries and growout farms of this | |
| | | | | taxon provided jobs that help upgrade the standard of living of the | |
| | | | | workers and their families (CABI, 2019). | |
| | | //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 | There are no records of the taxon posing risk to human health. | High |
| 15 | 4.02 | Is it likely that the taxon will smother one or | No | According to Stone et al. (2000) this taxon feeds only | Very high |
| | | more native taxa (that are not threatened or | | zooplankton, along with larger phytoplankton, making them filter | |
| | | protected)? | | feeders using their fine, comb-like gill rakers to strain tiny | |
| | | | | animals and large algae from the water, that is why they are less | |
| | | | | likely to smother on or more native taxa (IUCNGSID, 2019). | |
| | | 4 | No | According to Stone et al. (2000) this taxon feeds only | Very high |
| 16 | 4.03 | Are there any threatened or protected taxa | No | According to Stone et al. (2000) this taxon reeds only | |
| 16 | 4.03 | | NO | | re.,g. |
| 16 | 4.03 | that the non-native taxon would parasitise in | NO | zooplankton, along with larger phytoplankton, making them filter | i ci y ingli |
| 16 | 4.03 | | NO | | , |

| 17 | 4.04 | Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? | Yes | This taxon can tolerate extreme water temperatures and highly turbid waters and can therefore be cultured in many areas. (CABI, 2019). | 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 | This taxon are known to consume large amounts of zooplankton, blue-green algae, and insect larvae and adults, they have the potential to deplete zooplankton populations. Thus they compete with the populations of native species that rely on plankton for food. These include all larval fishes, some adult fishes, and | High |
| 19 | 4.06 | Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? | No | The introduction of the taxon in many countries has generally resulted in a positive economic impact due to increase in aquaculture production and fisheries production in inland waters | 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 | There are no reports that the taxon may carry pests or infectious agents that are endemic in Lake Taal. | High |
| | 4.08 4.09 | Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area? Is it likely that the taxon will achieve a body | Yes Yes | This taxon can carry diseases such as Pseudomonas fluorescens, Pseudomonas putida, Salmonella enterica, Lepeophtheirus salmonis (salmon louse) and Caligus rogercresseyi (Sea louse) (Purdue Asian Carp Pathogen Report, 2014) This taxon can reach a large body size, having a maximum length | Very high High |
| | 1.10 | size that will make it more likely to be released from captivity? | | of 146 cm (Fish Base,2019). | |
| 23 | 4.10 | Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)? | Yes | This taxon inhabits lakes, rivers and reservoirs and they normally dwell in the upper layer of the water column and prefers high fertility water with abundant natural food.Also, according to Stone et al. (2000) this taxon is native to large rivers and will not spawn in still waters or small streams (IUCNGSID, 2019). | 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 | This taxon has been used extensively in the management of inland waters which resulted in the prevention of intense blooms of phytoplankton particularly blue-green algae, and the increase in biomass of zoobenthos especially chironomids (CABI, 2019) | 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)? | Not applicable | There are no reports of etablished population of this taxon persisting at low density. | Low |
| | esourc 5.01 | te exploitation Is the taxon likely to consume threatened or | No | According to Stope at al. (2000) this tayon foods only | Very high |
| 20 | 5.01 | protected native taxa in the RA area? | INO | According to Stone et al. (2000) this taxon feeds only zooplankton, along with larger phytoplankton, making them filter feeders using their fine, comb-like gill rakers to strain tiny animals and large algae from the water, that is why they are less likely to consume thereatened or protected native taxa in the RA | Very high |
| 27 | 5.02 | Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area? | Yes | This taxon are known to consume large amounts of zooplankton, blue-green algae, and insect larvae and adults, they have the potential to deplete zooplankton populations. Thus they compete with the populations of native species that rely on plankton for food. These include all larval fishes, some adult fishes, and | High |
| | eprodu 6.01 | Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response | No | The taxon does not exhibit any parental care, they just spawn their eggs after migration (IUCNGSID, 2019). | Very high |
| 29 | 6.02 | to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? | Yes | The conditions of the RA meets the required conditions for maturation and reproduction of this taxon, which will enable it to produce a viable gametes (IUCNGSID, 2019) | High |
| 30 | 6.03 | Is the taxon likely to hybridise naturally with native taxa? | Yes | This taxon has been reported to be capable of hybridizing in the wild (CABJ, 2019). | Very high |
| | 6.04 | Is the taxon likely to be hermaphroditic or to display asexual reproduction? | No | There are no documented evidence of hermaphroditism/asexual reproduction of this species. | High |
| | 6.05 | Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? | Yes | This taxon is a semi-migratory fish, its broodstock migrate from lakes to rivers, until it reaches the spawning ground in the upper reaches of the major rivers in its native range. Also, they reuquire flowing water and changes in water level as an environmental stimuli for natural spawning (IUCNGSID, 2019). | 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 | The taxon have a huge reproductive capacity with females producing up to 100,000 eggs (IUCNGSID, 2019). | High |
| 34 | 6.07 | How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? | 3 | This taxon reaches the age of maturity at 2-3 years old (Nico et al., 2019) | Very high |
| | | al mechanisms | | | |
| 35 | 7.01 | How many potential internal vectors/pathways could the taxon use to disparse within the PA area (with suitable | One | Accidental introduction from aquaculture activities, intentional introduction with human intervention and aquarium escape | 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, SSS1)2 | Yes | (IUCNGSID, 2019) Because of the taxons commercial importance, the aquaculture pathway could bring this taxon in close proximity to one or more | 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 | protected areas. Their physical characteristics does not allow attachment to any substrata (CABI, 2019) | 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 | This taxon is a semi-migratory fish and flowing water and changes in water level are essential environmental stimuli for natural spawning, making it possible for the taxon to be dispersed by water currents (IUCNGSID, 2019). | Very high |

| 20 | | | | | |
|------|--------------|--|--------------------|--|------------------------|
| 39 | 7.05 | Is natural dispersal of the taxon likely to | Yes | This taxon is a semi-migratory fish and flowing water and changes | High |
| | | occur as larvae/juveniles (for animals) or as | | in water level are important environmental stimuli for natural | |
| | | fragments/seedlings (for plants) in the RA | | spawning , making it possible for the taxon to be dispersed by | |
| | | area? | | water currents (IUCNGSID, 2019). | |
| 40 | 7.06 | Are older life stages of the taxon likely to | Yes | This taxon is a semi-migratory fish, its broodstock migrate from | Very high |
| | | migrate in the RA area for reproduction? | | lakes to rivers, until it reaches the spawning ground in the upper | |
| | | | | reaches of the major rivers in its native range (IUCNGSID, 2019). | |
| 41 | 7.07 | Are propagules or eggs of the taxon likely to | Yes | This taxon is a semi-migratory fish and flowing water and changes | High |
| | | be dispersed in the RA area by other animals? | | in water level are important environmental stimuli for natural | |
| | | | | spawning , making it possible for the eggs to be dispersed by | |
| | | | | other animals (IUCNGSID, 2019). | |
| 42 | 7.08 | Is dispersal of the taxon along any of the | Yes | This taxon which is readily available in commercial markets and in | Very high |
| | | vectors/pathways mentioned in the previous | | aquaculture farms can be rapidly disperesed, knowing also the | |
| | | seven questions (35-41; i.e. either | | fact that the RA area is highly susceptable to flooding and natural | |
| | | unintentional or intentional) likely to be | | calamities which could rapidly disperesed this taxon (CABI, 2019). | |
| 43 | 7.09 | Is dispersal of the taxon density dependent? | Not applicable | There are no records of that this taxon is density dependent in | Low |
| | | | | terms of dispersal. | |
| 8. 7 | Foleran | ce attributes | | | |
| 44 | 8.01 | Is the taxon able to withstand being out of | Yes | This taxon can survive out of water for a long time | Very high |
| | | water for extended periods (e.g. minimum of | | (Anglersnet.co.uk, 2019). | |
| | | one or more hours) at some stage of its life | | | |
| | | cycle? | | | |
| 45 | 8.02 | Is the taxon tolerant of a wide range of | Yes | This taxon is tolerant of a range of conditions such as | Very high |
| | | water quality conditions relevant to that | | temperatures of 0.5-38°C, oxygen levels of 6 -12 mg/l and | - |
| | | taxon? [In the Justification field, indicate the | | hardness of 300 -500 mg/l of Calcium Carbonate (CABI, 2019). | |
| | | relevant water quality variable(s) being | | | |
| 46 | 8.03 | Can the taxon be controlled or eradicated in | Not applicable | There are no records about their eradication through chemical, | Low |
| | | the wild with chemical, biological, or other | | biological and other agents. | |
| | | agents/means? | | 5 | |
| 47 | 8.04 | Is the taxon likely to tolerate or benefit from | Yes | Due to their ability to survive in a wide range of environmental | High |
| | | environmental/human disturbance? | | conditions it can benefit from environmental/human distrubances | 5 |
| | | · · · · · · · · · · · · · · · · · · · | | (CABI, 2019). | |
| 48 | 8.05 | Is the taxon able to tolerate salinity levels | No | This taxon can only tolerate low salinity levels (Nico et al., 2019). | Very high |
| | | that are higher or lower than those found in | - | | -, 5 |
| | | its usual environment? | | | |
| 49 | 8.06 | Are there effective natural enemies | No | Based on fish species present in the RA area (Papa & Mamaril, | Very high |
| | | (predators) of the taxon present in the RA | - | 2011) there is no predator that can preadate the taxon in the RA | -, 5 |
| C. (| Climat | e change | | | |
| | | change | | | |
| 50 | 9.01 | Under the predicted future climatic | Increase | Together with the fact that the RA area is prone to natural | High |
| | | conditions, are the risks of entry into the RA | | calamities such as typhoons and floods (Brändlin & Wingard, | - |
| | | area posed by the taxon likely to increase, | | 2013) the risk of entry through accidental release from | |
| | | decrease or not change? | | commercial fish farms would most likely increase the entry of this | |
| 51 | 9.02 | Under the predicted future climatic | Increase | Based on their different morphological characteristics, together | High |
| | | conditions, are the risks of establishment | | with the fact that they can survive a wide range of environmental | |
| | | posed by the taxon likely to increase, | | conditions, the risk of establishment of the taxon increases. | |
| | | | 1 | , | 1 |
| | | decrease or not change? | | | |
| 52 | 9.03 | decrease or not change? Under the predicted future climatic | Increase | As a fact that the RA area is prone to natural calamities such as | High |
| 52 | 9.03 | Under the predicted future climatic | Increase | As a fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their | High |
| 52 | 9.03 | Under the predicted future climatic conditions, are the risks of dispersal within | Increase | typhoons and floods (Brändlin & Wingard, 2013) and their | 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 | typhoons and floods (Brändlin & Wingard, 2013) and their migratory behavior would most likely increase the dispersal of this | High |
| | | Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? | | typhoons and floods (Brändlin & Wingard, 2013) and their migratory behavior would most likely increase the dispersal of this taxon. | - |
| | 9.03 9.04 | Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic | Increase Higher | typhoons and floods (Brändlin & Wingard, 2013) and their migratory behavior would most likely increase the dispersal of this taxon. This taxon are known to consume large amounts of zooplankton, | High Very high |
| | | Under the 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 | | typhoons and floods (Brändlin & Wingard, 2013) and their migratory behavior would most likely increase the dispersal of this taxon. This taxon are known to consume large amounts of zooplankton, blue-green algae, and insect larvae and adults, they have the | - |
| | | Under the 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 | | typhoons and floods (Brändlin & Wingard, 2013) and their migratory behavior would most likely increase the dispersal of this taxon. This taxon are known to consume large amounts of zooplankton, blue-green algae, and insect larvae and adults, they have the potential to deplete zooplankton populations. Making them a | - |
| | | Under the 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 | | typhoons and floods (Brändlin & Wingard, 2013) and their migratory behavior would most likely increase the dispersal of this taxon. This taxon are known to consume large amounts of zooplankton, blue-green algae, and insect larvae and adults, they have the potential to deplete zooplankton populations. Making them a competetor with the populations of native species that rely on | - |
| 53 | 9.04 | Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? | Higher | typhoons and floods (Brändlin & Wingard, 2013) and their migratory behavior would most likely increase the dispersal of this taxon. This taxon are known to consume large amounts of zooplankton, blue-green algae, and insect larvae and adults, they have the potential to deplete zooplankton populations. Making them a competetor with the populations of native species that rely on plankton for food which include all larval fishes, some adult fishes, | Very high |
| 53 | | Under the 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 | | typhoons and floods (Brändlin & Wingard, 2013) and their migratory behavior would most likely increase the dispersal of this taxon. This taxon are known to consume large amounts of zooplankton, blue-green algae, and insect larvae and adults, they have the potential to deplete zooplankton populations. Making them a competeror with the populations of native species that rely on plankton for food which include all larval fishes, some adult fishes, This taxon has been used extensively in the management of | - |
| 53 | 9.04 | Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of | Higher | typhoons and floods (Brändlin & Wingard, 2013) and their migratory behavior would most likely increase the dispersal of this taxon. This taxon are known to consume large amounts of zooplankton, blue-green algae, and insect larvae and adults, they have the potential to deplete zooplankton populations. Making them a competetor with the populations of native species that rely on plankton for food which include all larval fishes, some adult fishes, This taxon has been used extensively in the management of inland waters which resulted in the prevention of intense blooms | Very high |
| 53 | 9.04 | Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem | Higher | typhoons and floods (Brändlin & Wingard, 2013) and their migratory behavior would most likely increase the dispersal of this taxon. This taxon are known to consume large amounts of zooplankton, blue-green algae, and insect larvae and adults, they have the potential to deplete zooplankton populations. Making them a competetor with the populations of native species that rely on plankton for food which include all larval fishes, some adult fishes, This taxon has been used extensively in the management of inland waters which resulted in the prevention of intense blooms of phytoplankton particularly blue-green algae, and the increase | Very high |
| 53 | 9.04 | Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? | Higher Lower | typhoons and floods (Brändlin & Wingard, 2013) and their migratory behavior would most likely increase the dispersal of this taxon. This taxon are known to consume large amounts of zooplankton, blue-green algae, and insect larvae and adults, they have the potential to deplete zooplankton populations. Making them a competetor with the populations of native species that rely on plankton for food which include all larval fishes, some adult fishes, This taxon has been used extensively in the management of inland waters which resulted in the prevention of intense blooms of phytoplankton particularly blue-green algae, and the increase in biomass of zoobenthos especially chironomids (CABI, 2019). | Very high Very high |
| 53 | 9.04 | Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? Under the predicted future climatic | Higher | typhoons and floods (Brändlin & Wingard, 2013) and their migratory behavior would most likely increase the dispersal of this taxon. This taxon are known to consume large amounts of zooplankton, blue-green algae, and insect larvae and adults, they have the potential to deplete zooplankton populations. Making them a competetor with the populations of native species that rely on plankton for food which include all larval fishes, some adult fishes, This taxon has been used extensively in the management of inland waters which resulted in the prevention of intense blooms of phytoplankton particularly blue-green algae, and the increase in biomass of zoobenthos especially chironomids (CABI, 2019). The introduction of this taxon gave an additional source of cheap | Very high |
| 53 | 9.04 | Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity 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 | Higher Lower | typhoons and floods (Brändlin & Wingard, 2013) and their migratory behavior would most likely increase the dispersal of this taxon. This taxon are known to consume large amounts of zooplankton, blue-green algae, and insect larvae and adults, they have the potential to deplete zooplankton populations. Making them a competetor with the populations of native species that rely on plankton for food which include all larval fishes, some adult fishes, This taxon has been used extensively in the management of inland waters which resulted in the prevention of intense blooms of phytoplankton particularly blue-green algae, and the increase in biomass of zoobenthos especially chironomids (CABI, 2019). The introduction of this taxon gave an additional source of cheap and much needed protein for the improvement of human nutrition | Very high Very high |
| 53 | 9.04 | Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity 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? | Higher Lower | typhoons and floods (Brändlin & Wingard, 2013) and their migratory behavior would most likely increase the dispersal of this taxon. This taxon are known to consume large amounts of zooplankton, blue-green algae, and insect larvae and adults, they have the potential to deplete zooplankton populations. Making them a competetor with the populations of native species that rely on plankton for food which include all larval fishes, some adult fishes, This taxon has been used extensively in the management of inland waters which resulted in the prevention of intense blooms of phytoplankton particularly blue-green algae, and the increase in biomass of zoobenthos especially chironomids (CABI, 2019). The introduction of this taxon gave an additional source of cheap and much needed protein for the improvement of human nutrition in many countries.Also, hatcheries and growout farms of this | Very high Very high |
| 53 | 9.04 | Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity 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 | Higher Lower | typhoons and floods (Brändlin & Wingard, 2013) and their migratory behavior would most likely increase the dispersal of this taxon. This taxon are known to consume large amounts of zooplankton, blue-green algae, and insect larvae and adults, they have the potential to deplete zooplankton populations. Making them a competetor with the populations of native species that rely on plankton for food which include all larval fishes, some adult fishes, This taxon has been used extensively in the management of inland waters which resulted in the prevention of intense blooms of phytoplankton particularly blue-green algae, and the increase in biomass of zoobenthos especially chironomids (CABI, 2019). The introduction of this taxon gave an additional source of cheap and much needed protein for the improvement of human nutrition | Very high Very high |

| Statistics | |
|--|------|
| Scores | |
| BRA | 35.0 |
| BRA Outcome | High |
| BRA+CCA | 39.0 |
| BRA+CCA Outcome | High |
| Score partition | |
| A. Biogeography/Historical | 17.0 |
| 1. Domestication/Cultivation | 4.0 |
| 2. Climate, distribution and introduction risk | 3.0 |
| 3. Invasive elsewhere | 10.0 |
| B. Biology/Ecology | 18.0 |
| 4. Undesirable (or persistence) traits | 5.0 |
| 5. Resource exploitation | 2.0 |
| 6. Reproduction | 1.0 |
| 7. Dispersal mechanisms | 5.0 |
| 8. Tolerance attributes | 5.0 |
| C. Climate change | 4.0 |
| 9. Climate change | 4.0 |

| Answered Questions | | | | |
|--|----|--|--|--|
| Total | 55 | | | |
| A. Biogeography/Historical | 13 | | | |
| 1. Domestication/Cultivation | 3 | | | |
| 2. Climate, distribution and introduction risk | 5 | | | |
| 3. Invasive elsewhere | 5 | | | |
| B. Biology/Ecology | 36 | | | |
| 4. Undesirable (or persistence) traits | 12 | | | |
| 5. Resource exploitation | 2 | | | |
| 6. Reproduction | 7 | | | |
| 7. Dispersal mechanisms | 9 | | | |
| 8. Tolerance attributes | 6 | | | |
| C. Climate change | 6 | | | |
| 9. Climate change | 6 | | | |
| Sectors affected | | | | |
| Commercial | 13 | | | |
| Environmental | 2 | | | |
| Species or population nuisance traits | 29 | | | |
| | | | | |
| Thresholds | | | | |

| Thesholds | |
|---------------|------|
| BRA | 34.5 |
| BRA+CCA | 34.5 |
| Confidence | |
| BRA+CCA | 0.85 |
| BRA | 0.85 |
| CCA | 0.88 |
| | |
| Date and Time | |
| | |

03/05/2021 00:53:59

| Faxon and Assessor details | | | | | |
|------------------------------------|---|--|--|--|--|
| Category | Fishes and Lampreys (freshwater) | | | | |
| Taxon name | Micropterus floridanus | | | | |
| Common name | Florida largemouth bass | | | | |
| Assessor | Gilles | | | | |
| Risk screening context | | | | | |
| Reason and socio-economic benefits | | | | | |
| Risk assessment area | Lake Taal | | | | |
| Taxonomy | Actinopteri (ray-finned fishes) > Centrarchiformes (Basses) > Centrarchidae (Sunfishes) | | | | |
| Native range | North America: Florida, USA. | | | | |
| Introduced range | | | | | |
| URL | https://www.fishbase.se/summary/Micropterus-floridanus.html | | | | |

| | | | Response | Justification (references and/or other information) | Confidence | |
|------|------------------------------|---|----------|---|------------|--|
| Α. | Biogeo | graphy/Historical | | | | |
| | 1. Domestication/Cultivation | | | | | |
| 1 | | Has the taxon been the subject of | Yes | Largemouth Bass (Micropterus floridanus) Ecological Risk | Medium | |
| | | domestication (or cultivation) for at least 20 | | Screening Summary U.S. Fish & Wildlife Service, February 2019 | | |
| | 1.00 | generations? | | Web Version, 8/26/2019 | | |
| 2 | 1.02 | Is the taxon harvested in the wild and likely | Yes | Largemouth Bass (Micropterus floridanus) Ecological Risk | High | |
| | | to be sold or used in its live form? | | Screening Summary U.S. Fish & Wildlife Service, February 2019 | | |
| 3 | 1.03 | Does the taxon have invasive races, | Yes | Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk | High | |
| 5 | 1.05 | varieties, sub-taxa or congeners? | 165 | Screening Summary U.S. Fish & Wildlife Service, February 2019 | riigii | |
| | | valieties, sub-taxa of congeners. | | Web Version, 8/26/2019 | | |
| 2. (| Climate | , distribution and introduction risk | | | | |
| 4 | 2.01 | How similar are the climatic conditions of the | Medium | Subtropical https://www.fishbase.se/summary/Micropterus- | High | |
| | | Risk Assessment (RA) area and the taxon's | | floridanus.html | | |
| | | native range? | | | | |
| 5 | 2.02 | What is the quality of the climate matching | Medium | Subtropical https://www.fishbase.se/summary/Micropterus- | High | |
| G | 2.02 | data? | Voc | floridanus.html | High | |
| 6 | 2.03 | Is the taxon already present outside of | Yes | Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 | High | |
| 1 | | captivity in the RA area? | | Web Version, 8/26/2019 | | |
| 7 | 2.04 | How many potential vectors could the taxon | >1 | History of the biodiversity and limno-ecological studies on Lake | Very high | |
| ľ | | use to enter in the RA area? | - | Taal with notes on the current state of Philippine limnology | ,gii | |
| 8 | 2.05 | Is the taxon currently found in close | Yes | History of the biodiversity and limno-ecological studies on Lake | High | |
| 1 | | proximity to, and likely to enter into, the RA | | Taal with notes on the current state of Philippine limnology | | |
| 1 | | area in the near future (e.g. unintentional | | | | |
| | | and intentional introductions)? | | | | |
| | | e elsewhere | | | | |
| 9 | 3.01 | Has the taxon become naturalised | Yes | Largemouth Bass (Micropterus floridanus) Ecological Risk | High | |
| | | (established viable populations) outside its | | Screening Summary U.S. Fish & Wildlife Service, February 2019 | | |
| 10 | 3.02 | native range? In the taxon's introduced range, are there | Yes | Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk | Very high | |
| 10 | 5.02 | known adverse impacts to wild stocks or | 103 | Screening Summary U.S. Fish & Wildlife Service, February 2019 | very nigh | |
| | | commercial taxa? | | Web Version, 8/26/2019 | | |
| 11 | 3.03 | In the taxon's introduced range, are there | No | Largemouth Bass (Micropterus floridanus) Ecological Risk | High | |
| | | known adverse impacts to aquaculture? | | Screening Summary U.S. Fish & Wildlife Service, February 2019 | | |
| I | | | | Web Version, 8/26/2019 | | |
| 12 | 3.04 | In the taxon's introduced range, are there | No | Largemouth Bass (Micropterus floridanus) Ecological Risk | Very high | |
| 1 | | known adverse impacts to ecosystem | | Screening Summary U.S. Fish & Wildlife Service, February 2019 | | |
| 12 | 3.05 | services? In the taxon's introduced range, are there | No | Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk | High | |
| 13 | 5.05 | known adverse socio-economic impacts? | NU | Screening Summary U.S. Fish & Wildlife Service, February 2019 | High | |
| 1 | | | | Web Version, 8/26/2019 | | |
| В. | Biology | y/Ecology | | | | |
| | | able (or persistence) traits | | | | |
| | | Is it likely that the taxon will be poisonous or | No | Largemouth Bass (Micropterus floridanus) Ecological Risk | High | |
| 1 | | pose other risks to human health? | | Screening Summary U.S. Fish & Wildlife Service, February 2019 | | |
| - | | | | Web Version, 8/26/2019 | | |
| 15 | 4.02 | Is it likely that the taxon will smother one or | Yes | Largemouth Bass (Micropterus floridanus) Ecological Risk | High | |
| 1 | | more native taxa (that are not threatened or | | Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 | | |
| 16 | 4.03 | protected)? Are there any threatened or protected taxa | No | Largemouth Bass (Micropterus floridanus) Ecological Risk | High | |
| 10 | -1.03 | that the non-native taxon would parasitise in | 110 | Screening Summary U.S. Fish & Wildlife Service, February 2019 | ngn | |
| 1 | | the RA area? | | Web Version, 8/26/2019 | | |
| 17 | 4.04 | Is the taxon adaptable in terms of climatic | Yes | Largemouth Bass (Micropterus floridanus) Ecological Risk | High | |
| 1 | | and other environmental conditions, thus | | Screening Summary U.S. Fish & Wildlife Service, February 2019 | , J | |
| 1 | | enhancing its potential persistence if it has | | Web Version, 8/26/2019 | | |
| 1 | | invaded or could invade the RA area? | | | | |
| 18 | 4.05 | Is the taxon likely to disrupt food-web | No | Largemouth Bass (Micropterus floridanus) Ecological Risk | Very high | |
| 1 | | structure/function in aquatic ecosystems if it | | Screening Summary U.S. Fish & Wildlife Service, February 2019 | | |
| 10 | 1.00 | has invaded or is likely to invade the RA | N | Web Version, 8/26/2019 | 1.12 - 1- | |
| 19 | 4.06 | Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? | No | Largemouth Bass (Micropterus floridanus) Ecological Risk | High | |
| 1 | | on ecosystem services in the KA area? | | Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 | | |
| 20 | 4.07 | Is it likely that the taxon will host, and/or | No | Largemouth Bass (Micropterus floridanus) Ecological Risk | Very high | |
| Ē | | act as a vector for, recognised pests and | | Screening Summary U.S. Fish & Wildlife Service, February 2019 | ,gii | |
| 1 | | infectious agents that are endemic in the RA | | Web Version, 8/26/2019 | | |
| - | • | | | | | |

| 1 | | | | | |
|---|--|---|---|---|---|
| - | 4.08 | Is it likely that the taxon will host, and/or act as a vector for, recognised pests and | No | Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 | Very high |
| | | infectious agents that are absent from (novel to) the RA area? | | Web Version, 8/26/2019 | |
| 2 | 4.09 | Is it likely that the taxon will achieve a body | Yes | Largemouth Bass (Micropterus floridanus) Ecological Risk | High |
| | | size that will make it more likely to be released from captivity? | | Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 | |
| ; | 4.10 | Is the taxon capable of sustaining itself in a | Yes | Largemouth Bass (Micropterus floridanus) Ecological Risk | High |
| | | range of water velocity conditions (e.g. | | Screening Summary U.S. Fish & Wildlife Service, February 2019 | |
| | 4.11 | versatile in habitat use)? Is it likely that the taxon's mode of existence | Yes | Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk | High |
| | | (e.g. excretion of by-products) or behaviours | | Screening Summary U.S. Fish & Wildlife Service, February 2019 | |
| | | (e.g. feeding) will reduce habitat quality for | | Web Version, 8/26/2019 | |
| 5 | 4.12 | native taxa? Is the taxon likely to maintain a viable | Yes | Largemouth Bass (Micropterus floridanus) Ecological Risk | Very high |
| | 1.12 | population even when present in low | 105 | Screening Summary U.S. Fish & Wildlife Service, February 2019 | very mgn |
| | | densities (or persisting in adverse conditions | | Web Version, 8/26/2019 | |
| . / | Resourc | by way of a dormant form)? ce exploitation | | | |
| | | Is the taxon likely to consume threatened or | Yes | Largemouth Bass (Micropterus floridanus) Ecological Risk | High |
| | | protected native taxa in the RA area? | | Screening Summary U.S. Fish & Wildlife Service, February 2019 | |
| 7 | 5.02 | Is the taxon likely to sequester food | No | Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk | High |
| | | resources (including nutrients) to the | - | Screening Summary U.S. Fish & Wildlife Service, February 2019 | 5 |
| 2 | Donre i' | detriment of native taxa in the RA area? | | Web Version, 8/26/2019 | |
| | Reprodu 6.01 | Is the taxon likely to exhibit parental care | Yes | Largemouth Bass (Micropterus floridanus) Ecological Risk | High |
| | | and/or to reduce age-at-maturity in response | | Screening Summary U.S. Fish & Wildlife Service, February 2019 | |
| 0 | 6.02 | to environmental conditions? | Vac | Web Version, 8/26/2019 | High |
| Э | 6.02 | Is the taxon likely to produce viable gametes or propagules (in the RA area)? | Yes | Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 | High |
| | | | | Web Version, 8/26/2019 | |
| 0 | 6.03 | Is the taxon likely to hybridise naturally with | No | Largemouth Bass (Micropterus floridanus) Ecological Risk | High |
| | | native taxa? | | Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 | |
| 1 | 6.04 | Is the taxon likely to be hermaphroditic or to | No | Largemouth Bass (Micropterus floridanus) Ecological Risk | Very high |
| | | display asexual reproduction? | | Screening Summary U.S. Fish & Wildlife Service, February 2019 | |
| 2 | 6.05 | Is the taxon dependent on the presence of | No | Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk | High |
| - | | another taxon (or specific habitat features) | | Screening Summary U.S. Fish & Wildlife Service, February 2019 | |
| _ | 6.05 | to complete its life cycle? | No | Web Version, 8/26/2019 | |
| 3 | 6.06 | Is the taxon known (or likely) to produce a large number of propagules or offspring | Yes | Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 | Very high |
| | | within a short time span (e.g. < 1 year)? | | Web Version, 8/26/2019 | |
| 4 | 6.07 | How many time units (days, months, years) | 2 | Largemouth Bass (Micropterus floridanus) Ecological Risk | High |
| | | does the taxon require to reach the age-at- first-reproduction? | | Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 | |
| | Dicnerc | al mechanisms | | | |
| 5 | _ | | >1 | History of the biodiversity and limno-ecological studies on Lake | High |
| 0 | 7.01 | How many potential internal | -1 | | ingn |
| | _ | How many potential internal vectors/pathways could the taxon use to | ~1 | Taal with notes on the current state of Philippine limnology | i iigii |
| | _ | How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the | Yes | Taal with notes on the current state of Philippine limnology History of the biodiversity and limno-ecological studies on Lake | High |
| | 7.01 | How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more | | Taal with notes on the current state of Philippine limnology | _ |
| 6 | 7.01 | How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? | | Taal with notes on the current state of Philippine limnology History of the biodiversity and limno-ecological studies on Lake | _ |
| 6 | 7.01 | How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship | Yes | Taal with notes on the current state of Philippine limnology History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 | High |
| 6 | 7.01 | How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, 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 | Taal with notes on the current state of Philippine limnology History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Largemouth Bass (Micropterus floridanus) Ecological Risk | High |
| 6 | 7.01 7.02 7.03 | How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship | Yes | Taal with notes on the current state of Philippine limnology History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 | High |
| 6 | 7.01 | How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules | Yes | Taal with notes on the current state of Philippine limnology History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Kester Screening Summary U.S. Fish & Wildlife Service, February 2019 | High |
| 6 7 8 | 7.01 7.02 7.03 7.04 | How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? | Yes | Taal with notes on the current state of Philippine limnology History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 | High High High |
| 6 7 8 | 7.01 7.02 7.03 | How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules | Yes | Taal with notes on the current state of Philippine limnology History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Kester Screening Summary U.S. Fish & Wildlife Service, February 2019 | High |
| 6 7 8 | 7.01 7.02 7.03 7.04 | How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA | Yes | Taal with notes on the current state of Philippine limnology History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk | High High High |
| 6 7 8 9 | 7.01 7.02 7.03 7.04 7.05 | How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? | Yes No Yes No | Taal with notes on the current state of Philippine limnology History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 | High High High High |
| 6 7 8 9 | 7.01 7.02 7.03 7.04 | How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA | Yes | Taal with notes on the current state of Philippine limnology History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 | High High High |
| 6 7 8 9 | 7.01 7.02 7.03 7.04 7.05 7.06 | How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? | Yes No Yes Yes | Taal with notes on the current state of Philippine limnology History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 | High High High High Very high |
| 5 7 9 | 7.01 7.02 7.03 7.04 7.05 | How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? | Yes No Yes No | Taal with notes on the current state of Philippine limnology History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk | High High High High |
| 5 7 9 | 7.01 7.02 7.03 7.04 7.05 7.06 | How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? | Yes No Yes Yes | Taal with notes on the current state of Philippine limnology History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 | High High High High Very high |
| 6 7 8 9 | 7.01 7.02 7.03 7.04 7.05 7.06 | How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? | Yes No Yes Yes | Taal with notes on the current state of Philippine limnology History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk | High High High High Very high |
| 6 7 8 9 | 7.01 7.02 7.03 7.04 7.05 7.06 7.07 | How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous | Yes No Yes No No | Taal with notes on the current state of Philippine limnology History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (M | High High High High Very high Very high |
| 6 7 8 9 0 | 7.01 7.02 7.03 7.04 7.05 7.06 7.07 | How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for plants) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. either | Yes No Yes No No | Taal with notes on the current state of Philippine limnology History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (M | High High High High Very high Very high |
| 6 7 8 9 0 1 | 7.01 7.02 7.03 7.04 7.05 7.06 7.07 | How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous | Yes No Yes No No | Taal with notes on the current state of Philippine limnology History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (M | High High High High Very high Very high |
| 6 7 8 9 0 1 | 7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 | How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. either unintentional or intentional) likely to be | Yes No Yes No Yes | Taal with notes on the current state of Philippine limnology History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (M | High High High High Very high Very high |
| 6 7 8 9 1 2 3 | 7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 | How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. either unintentional or intentional) likely to be Is dispersal of the taxon density dependent? | Yes No Yes No Yes | Taal with notes on the current state of Philippine limnology History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (M | High High High High Very high Very high |
| 6 7 8 9 9 0 1 1 2 3 | 7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 | How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. either unintentional or intentional) likely to be | Yes No Yes No Yes | Taal with notes on the current state of Philippine limnology History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (Micropterus floridanus) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, February 2019 Web Version, 8/26/2019 Largemouth Bass (M | High High High High Very high Very high |
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| | 0.00 | | 1 | | |
|----|------|--|----------------|--|-----------|
| 45 | 8.02 | Is the taxon tolerant of a wide range of | No | Largemouth Bass (Micropterus floridanus) Ecological Risk | High |
| | | water quality conditions relevant to that | | Screening Summary U.S. Fish & Wildlife Service, February 2019 | |
| | | taxon? [In the Justification field, indicate the | | Web Version, 8/26/2019 | |
| | | relevant water quality variable(s) being | | | |
| 46 | 8.03 | Can the taxon be controlled or eradicated in | Not applicable | no data | Medium |
| | | the wild with chemical, biological, or other | | | |
| | | agents/means? | | | |
| 47 | 8.04 | Is the taxon likely to tolerate or benefit from | Yes | Largemouth Bass (Micropterus floridanus) Ecological Risk | High |
| | | environmental/human disturbance? | | Screening Summary U.S. Fish & Wildlife Service, February 2019 | |
| | | | | Web Version, 8/26/2019 | |
| 48 | 8.05 | Is the taxon able to tolerate salinity levels | Yes | Largemouth Bass (Micropterus floridanus) Ecological Risk | Very high |
| | | that are higher or lower than those found in | | Screening Summary U.S. Fish & Wildlife Service, February 2019 | |
| | | its usual environment? | | Web Version, 8/26/2019 | |
| 49 | 8.06 | Are there effective natural enemies | No | History of the biodiversity and limno-ecological studies on Lake | High |
| | | (predators) of the taxon present in the RA | | Taal with notes on the current state of Philippine limnology | |
| | | e change | | | |
| | | change | | | |
| 50 | 9.01 | Under the predicted future climatic | Increase | History of the biodiversity and limno-ecological studies on Lake | High |
| | | conditions, are the risks of entry into the RA | | Taal with notes on the current state of Philippine limnology | |
| | | area posed by the taxon likely to increase, | | | |
| | | decrease or not change? | | | |
| 51 | 9.02 | Under the predicted future climatic | Increase | History of the biodiversity and limno-ecological studies on Lake | High |
| | | conditions, are the risks of establishment | | Taal with notes on the current state of Philippine limnology | |
| | | posed by the taxon likely to increase, | | | |
| | | decrease or not change? | | | |
| 52 | 9.03 | Under the predicted future climatic | No change | History of the biodiversity and limno-ecological studies on Lake | High |
| | | conditions, are the risks of dispersal within | | Taal with notes on the current state of Philippine limnology | |
| | | the RA area posed by the taxon likely to | | | |
| | | increase, decrease or not change? | | | |
| 53 | 9.04 | Under the predicted future climatic | Higher | History of the biodiversity and limno-ecological studies on Lake | Medium |
| | | conditions, what is the likely magnitude of | | Taal with notes on the current state of Philippine limnology | |
| | | future potential impacts on biodiversity | | | |
| | | and/or ecological integrity/status? | | | |
| 54 | 9.05 | Under the predicted future climatic | No change | History of the biodiversity and limno-ecological studies on Lake | High |
| | | conditions, what is the likely magnitude of | | Taal with notes on the current state of Philippine limnology | |
| | | future potential impacts on ecosystem | | | |
| | | structure and/or function? | | | |
| 55 | 9.06 | Under the predicted future climatic | Higher | History of the biodiversity and limno-ecological studies on Lake | High |
| | | conditions, what is the likely magnitude of | | Taal with notes on the current state of Philippine limnology | |
| | | future potential impacts on ecosystem | | | |
| | | services/socio-economic factors? | | | |

| Statistics | |
|---|---|
| Statistics | |
| BRA | 31.5 |
| BRA Outcome | Medium |
| BRA+CCA | 39.5 |
| BRA+CCA Outcome | High |
| Score partition | Ingn |
| A. Biogeography/Historical | 12.5 |
| 1. Domestication/Cultivation | 4.0 |
| 2. Climate, distribution and introduction risk | 4.0 |
| <i>3. Invasive elsewhere</i> | 4.5 |
| B. Biology/Ecology | 19.0 |
| 4. Undesirable (or persistence) traits | 6.0 |
| 5. Resource exploitation | 5.0 |
| 6. Reproduction | 2.0 |
| 7. Dispersal mechanisms | 2.0 |
| 8. Tolerance attributes | 4.0 |
| C. Climate change | 8.0 |
| 9. Climate change | 8.0 |
| Answered Questions | |
| Total | 55 |
| A. Biogeography/Historical | 13 |
| 1. Domestication/Cultivation | 3 5 36 12 2 7 9 6 6 |
| 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 | / |
| <i>7. Dispersal mechanisms</i> 8. Tolerance attributes | 9 |
| C. Climate change | 0 |
| 9. Climate change | 6 |
| Sectors affected | 0 |
| Commercial | 14 |
| Environmental | 9 |
| Species or population nuisance traits | 24 |
| Species of population huisance traits | 27 |
| Thresholds | |
| BRA | 34.5 |
| BRA+CCA | 34.5 |
| Confidence | |
| BDA+CCA | 0.80 |

ł

BRA+CCA 0.80

| | BRA | 0.81 |
|---------------|-----|------|
| | CCA | 0.71 |
| Date and Time | | |

02/04/2020 08:00:29

| Taxon and Assessor details | |
|------------------------------------|---|
| Category | Fishes and Lampreys (freshwater) |
| Taxon name | Misgurnus anguillicaudatus |
| Common name | oriental weatherfish |
| Assessor | Gilles |
| Risk screening context | |
| Reason and socio-economic benefits | Fisheries: commercial; aquaculture: commercial; aquarium: commercial; bait |
| Risk assessment area | Lake Taal |
| Taxonomy | Actinopteri (ray-finned fishes) > Cypriniformes (Carps) > Cobitidae (Longfin loaches) |
| Native range | Native to Siberia |
| Introduced range | Philippines, USA, Italy, Peru, Germany etc. |
| URL | https://www.fishbase.se/summary/Misgurnus-anguillicaudatus.html |

| | | | Response | Justification (references and/or other information) | Confidence |
|--|--|---|-------------------------------------|--|---|
| Α. | Biogeo | ography/Historical | | | |
| 1. l | Domest | tication/Cultivation | | | |
| 1 | 1.01 | Has the taxon been the subject of | Yes | http://www.scielo.br/pdf/alb/v23n3/alb_aop_230302.pdf | High |
| | | domestication (or cultivation) for at least 20 | | | |
| | | generations? | | | |
| 2 | 1.02 | Is the taxon harvested in the wild and likely | Yes | http://www.scielo.br/pdf/alb/v23n3/alb_aop_230302.pdf | High |
| | | to be sold or used in its live form? | | | |
| 3 | 1.03 | Does the taxon have invasive races, | Yes | http://www.scielo.br/pdf/alb/v23n3/alb_aop_230302.pdf | High |
| | | varieties, sub-taxa or congeners? | | | |
| 2. (| | e, distribution and introduction risk | | | I . |
| 4 | 2.01 | How similar are the climatic conditions of the | Medium | file:///C:/Users/User/Desktop/Thesis%20Ref/kottek2006.pdf | High |
| | | Risk Assessment (RA) area and the taxon's | | | |
| _ | | native range? | | | |
| 5 | 2.02 | What is the quality of the climate matching | High | file:///C:/Users/User/Desktop/Thesis%20Ref/kottek2006.pdf | High |
| ~ | 2.02 | data? | N | file: ///C: ////////D///Thi-0/ 20D-f// |) (am think |
| 6 | 2.03 | Is the taxon already present outside of | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/kottek2006.pdf | Very high |
| - | 2.04 | captivity in the RA area? | . 1 | |) (and biab |
| 1 | 2.04 | How many potential vectors could the taxon | >1 | file:///C:/Users/User/Desktop/Thesis%20Ref/Guerrero%20III%202 | very nign |
| 8 | 2.05 | use to enter in the RA area? Is the taxon currently found in close | Yes | 014.pdf file:///C:/Users/User/Desktop/Thesis%20Ref/Guerrero%20III%202 | Very high |
| ľ | 2.05 | proximity to, and likely to enter into, the RA | 105 | 014.pdf | very night |
| 1 | | area in the near future (e.g. unintentional | | o 17. pui | |
| 1 | | and intentional introductions)? | | | |
| 2 1 | Invaciv | e elsewhere | I | | 1 |
| <u>э.</u> 1 а | 3.01 | Has the taxon become naturalised | Yes | https://www.fishbase.de/Introductions/IntroductionsList.php?ID=1 | High |
| ſ | 5.01 | (established viable populations) outside its | 103 | 2276&GenusName=Pangio&SpeciesName=kuhlii&fc=127&StockCo | ingn |
| | | native range? | | de=12603 | |
| 10 | 3.02 | In the taxon's introduced range, are there | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/Gomez%20et%20al | High |
| - 0 | 0.02 | known adverse impacts to wild stocks or | | %202011.pdf | |
| | | commercial taxa? | | | |
| 11 | 3.03 | In the taxon's introduced range, are there | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/Gomez%20et%20al | Very high |
| | | known adverse impacts to aquaculture? | | %202011.pdf | , - |
| 12 | 3.04 | In the taxon's introduced range, are there | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/Gomez%20et%20al | High |
| | | | | 0/ 202011 pdf | |
| 1 | | known adverse impacts to ecosystem | | %202011.pdf | |
| 13 | 3.05 | In the taxon's introduced range, are there | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/Gomez%20et%20al | Very high |
| | | In the taxon's introduced range, are there known adverse socio-economic impacts? | Yes | | Very high |
| B. | Biolog | In the taxon's introduced range, are there known adverse socio-economic impacts? y/Ecology | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/Gomez%20et%20al | Very high |
| B. 4. (| Biolog Undesir | In the taxon's introduced range, are there known adverse socio-economic impacts? y/Ecology able (or persistence) traits | | file:///C:/Users/User/Desktop/Thesis%20Ref/Gomez%20et%20al %202011.pdf | |
| B. 4. (| Biolog Undesir | In the taxon's introduced range, are there known adverse socio-economic impacts? y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or | | file:///C:/Users/User/Desktop/Thesis%20Ref/Gomez%20et%20al | Very high High |
| B. 4. (14 | Biolog Undesir 4.01 | In the taxon's introduced range, are there known adverse socio-economic impacts? y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? | No | file:///C:/Users/User/Desktop/Thesis%20Ref/Gomez%20et%20al %202011.pdf https://www.fishbase.de/summary/Pangio-kuhlii.html | High |
| B. 4. (14 | Biolog Undesir | In the taxon's introduced range, are there known adverse socio-economic impacts? y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or | | file:///C:/Users/User/Desktop/Thesis%20Ref/Gomez%20et%20al %202011.pdf | |
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| B. 4. (14 15 | Biolog Undesir 4.01 4.02 | In the taxon's introduced range, are there known adverse socio-economic impacts? y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? | No | file:///C:/Users/User/Desktop/Thesis%20Ref/Gomez%20et%20al %202011.pdf https://www.fishbase.de/summary/Pangio-kuhlii.html https://www.fishbase.de/summary/Pangio-kuhlii.html | High |
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| B. 4. () 14 15 16 17 18 19 20 21 | Biology Jindesir 4.01 4.02 4.03 4.04 4.05 4.06 4.07 4.08 | In the taxon's introduced range, are there known adverse socio-economic impacts? y/Ecology Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area? | No No No Yes Yes Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/Gomez%20et%20al %202011.pdf https://www.fishbase.de/summary/Pangio-kuhlii.html https://www.fishbase.de/summary/Pangio-kuhlii.html https://www.fishbase.de/summary/Pangio-kuhlii.html https://www.fishbase.de/summary/Pangio-kuhlii.html https://www.fishbase.de/summary/Pangio-kuhlii.html https://www.fishbase.de/summary/Pangio-kuhlii.html https://www.fishbase.de/summary/Pangio-kuhlii.html https://www.fishbase.de/biseases/DiseasesList.php?ID=12276&St ockCode=12603 https://www.fishbase.de/Diseases/DiseasesList.php?ID=12276&St ockCode=12603 | High High Very high High High High |
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| B. 4. (14 15 16 17 18 19 20 21 | Biology Jindesir 4.01 4.02 4.03 4.04 4.05 4.06 4.07 4.08 | In the taxon's introduced range, are there known adverse socio-economic impacts? y/Ecology Table (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area? Is it likely that the taxon will achieve a body size that will make it more likely to be | No No No Yes Yes Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/Gomez%20et%20al %202011.pdf https://www.fishbase.de/summary/Pangio-kuhlii.html https://www.fishbase.de/summary/Pangio-kuhlii.html https://www.fishbase.de/summary/Pangio-kuhlii.html https://www.fishbase.de/summary/Pangio-kuhlii.html https://www.fishbase.de/summary/Pangio-kuhlii.html https://www.fishbase.de/summary/Pangio-kuhlii.html https://www.fishbase.de/summary/Pangio-kuhlii.html https://www.fishbase.de/biseases/DiseasesList.php?ID=12276&St ockCode=12603 https://www.fishbase.de/Diseases/DiseasesList.php?ID=12276&St ockCode=12603 | High High Very high High High High |
| B. 4. (14 15 16 17 18 19 20 21 22 | Biolog Jndesiri 4.01 4.02 4.03 4.04 4.05 4.06 4.07 4.08 4.09 | In the taxon's introduced range, are there known adverse socio-economic impacts? y/Ecology Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA Is the likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area? Is likely that the taxon will achieve a body size that will make it more likely to be released from captivity? | No No No Yes Yes Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/Gomez%20et%20al %202011.pdf https://www.fishbase.de/summary/Pangio-kuhlii.html https://www.fishbase.de/summary/Pangio-kuhlii.html https://www.fishbase.de/summary/Pangio-kuhlii.html https://www.fishbase.de/summary/Pangio-kuhlii.html https://www.fishbase.de/summary/Pangio-kuhlii.html https://www.fishbase.de/summary/Pangio-kuhlii.html https://www.fishbase.de/summary/Pangio-kuhlii.html https://www.fishbase.de/biseases/DiseasesList.php?ID=12276&St ockCode=12603 https://www.fishbase.de/Diseases/DiseasesList.php?ID=12276&St ockCode=12603 file:///C:/Users/User/Desktop/Thesis%20Ref/Gomez%20et%20al %202011.pdf | High High Very high High High High High |
| B. 4. () 14 15 16 17 18 19 20 21 22 | Biology Jindesir 4.01 4.02 4.03 4.04 4.05 4.06 4.07 4.08 | In the taxon's introduced range, are there known adverse socio-economic impacts? y/Ecology Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA. Is ti likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area? Is ti likely that the taxon will achieve a body size that will make it more likely to be released from captivity? Is the taxon capable of sustaining itself in a | No No No Yes Yes Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/Gomez%20et%20al %202011.pdf https://www.fishbase.de/summary/Pangio-kuhlii.html https://www.fishbase.de/summary/Pangio-kuhlii.html https://www.fishbase.de/summary/Pangio-kuhlii.html https://www.fishbase.de/summary/Pangio-kuhlii.html https://www.fishbase.de/summary/Pangio-kuhlii.html https://www.fishbase.de/summary/Pangio-kuhlii.html https://www.fishbase.de/summary/Pangio-kuhlii.html https://www.fishbase.de/Diseases/DiseasesList.php?ID=12276&St ockCode=12603 https://www.fishbase.de/Diseases/DiseasesList.php?ID=12276&St ockCode=12603 file:///C:/Users/User/Desktop/Thesis%20Ref/Gomez%20et%20al %202011.pdf file:///C:/Users/User/Desktop/Thesis%20Ref/Gomez%20et%20al | High High Very high High High High |
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| 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 | file:///C:/Users/User/Desktop/Thesis%20Ref/Gomez%20et%20al %202011.pdf | 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 | file:///C:/Users/User/Desktop/Thesis%20Ref/Gomez%20et%20al %202011.pdf | High |
| 5. Re | esourc | e exploitation | • | | • • |
| 26 ! | 5.01 | Is the taxon likely to consume threatened or | No | https://www.fishbase.de/summary/Pangio-kuhlii.html | High |
| | | protected native taxa in the RA area? | | | |
| 27 ! | 5.02 | Is the taxon likely to sequester food | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/Gomez%20et%20al | High |
| | | resources (including nutrients) to the | | %202011.pdf | |
| | | detriment of native taxa in the RA area? | | | |
| | eprodu | | | | |
| 28 (| 6.01 | Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? | No | https://www.fishbase.de/Reproduction/FishReproSummary.php?ID =12276&GenusName=Pangio&SpeciesName=kuhlii&fc=127&Stock Code=12603 | High |
| 29 (| 6.02 | Is the taxon likely to produce viable gametes | Yes | http://animal- | High |
| | 0.02 | or propagules (in the RA area)? | | world.com/encyclo/fresh/loaches/KuhliLoach.php#Breeding%20/% 20Reproduction | |
| 30 (| 6.03 | Is the taxon likely to hybridise naturally with | No | http://animal- | High |
| | | native taxa? | | world.com/encyclo/fresh/loaches/KuhliLoach.php#Breeding%20/% 20Reproduction | |
| 31 (| 6.04 | Is the taxon likely to be hermaphroditic or to display asexual reproduction? | No | https://www.fishbase.de/Reproduction/FishReproSummary.php?ID =12276&GenusName=Pangio&SpeciesName=kuhlii&fc=127&Stock Code=12603 | High |
| 32 (| 6.05 | Is the taxon dependent on the presence of | No | | High |
| | | another taxon (or specific habitat features) | | =12276&GenusName=Pangio&SpeciesName=kuhlii&fc=127&Stock | |
| | | to complete its life cycle? | | Code=12603 | |
| 33 (| 6.06 | Is the taxon known (or likely) to produce a | Yes | | High |
| | | large number of propagules or offspring | | =12276&GenusName=Pangio&SpeciesName=kuhlii&fc=127&Stock | |
| 24 | 6.07 | within a short time span (e.g. < 1 year)? | 1 | Code=12603 | L li ala |
| 34 1 | 6.07 | How many time units (days, months, years) | 1 | http://animal- | High |
| | | does the taxon require to reach the age-at- first-reproduction? | | world.com/encyclo/fresh/loaches/KuhliLoach.php#Breeding%20/% 20Reproduction | |
| 7. DI | | al mechanisms | | | |
| | | How many potential internal | >1 | file:///C:/Users/User/Desktop/Thesis%20Ref/Gomez%20et%20al | High |
| | | vectors/pathways could the taxon use to | | %202011.pdf | |
| | | disperse within the RA area (with suitable | | | |
| 36 | 7.02 | Will any of these vectors/pathways bring the | Not applicable | no data for this question | Medium |
| | | taxon in close proximity to one or more | | | |
| | | protected areas (e.g. MCZ, MPA, SSSI)? | | | |
| 37 | 7.03 | Does the taxon have a means of actively | No | https://www.fishbase.de/summary/Pangio-kuhlii.html | High |
| | | attaching itself to hard substrata (e.g. ship | | | |
| | | hulls, pilings, buoys) such that it enhances the likelihood of dispersal? | | | |
| 38 | 7.04 | Is natural dispersal of the taxon likely to | Yes | https://www.fishbase.de/summary/Pangio-kuhlii.html | High |
| | | occur as eggs (for animals) or as propagules | | | |
| | | (for plants: seeds, spores) in the RA area? | | | |
| 39 | 7.05 | Is natural dispersal of the taxon likely to | Yes | https://www.fishbase.de/summary/Pangio-kuhlii.html | 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 | No | https://www.fishbase.de/summary/Pangio-kuhlii.html | Medium |
| 44 | 7 07 | migrate in the RA area for reproduction? | Net en 11 11 | | L l'ala |
| 41 | 7.07 | Are propagules or eggs of the taxon likely to | Not applicable | no data for this question | High |
| 42 | 7.08 | be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the | Yes | https://www.fishbase.de/summary/Pangio-kuhlii.html | High |
| · ~ | | vectors/pathways mentioned in the previous | | | |
| | | | | | |
| | | seven questions (35–41; i.e. either | | | |
| | | seven questions (35-41; i.e. either unintentional or intentional) likely to be | | | |
| | | unintentional or intentional) likely to be Is dispersal of the taxon density dependent? | Not applicable | no data for this question | Medium |
| 8. To | olerand | unintentional or intentional) likely to be Is dispersal of the taxon density dependent? ce attributes | | | |
| 8. To | olerand | 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 | Not applicable Yes | no data for this question https://www.fishbase.de/summary/Pangio-kuhlii.html | Medium High |
| 3. Ta | olerand | 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 | | | |
| 8. Ta | olerand | 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 | | | |
| 8. To 44 | olerano 8.01 | 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 | https://www.fishbase.de/summary/Pangio-kuhlii.html | High |
| 8. To 44 8 | olerano 8.01 | 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 | | | |
| 3. To 14 8 | olerano 8.01 | 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 | https://www.fishbase.de/summary/Pangio-kuhlii.html | High |
| <u>3. To</u> 14 8 | olerano 8.01 | 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 | https://www.fishbase.de/summary/Pangio-kuhlii.html | High |
| <u>3. To</u> 14 1 15 1 | olerano 8.01 | 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 | https://www.fishbase.de/summary/Pangio-kuhlii.html https://www.fishbase.de/summary/Pangio-kuhlii.html | High |
| <u>3. To</u> 14 1 15 1 | <u>olerano</u> 8.01 8.02 | unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being | Yes | https://www.fishbase.de/summary/Pangio-kuhlii.html https://www.fishbase.de/summary/Pangio-kuhlii.html | High Medium |
| <u>3. To</u> 14 1 15 1 | <u>olerano</u> 8.01 8.02 | unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in | Yes | https://www.fishbase.de/summary/Pangio-kuhlii.html https://www.fishbase.de/summary/Pangio-kuhlii.html | High Medium |
| <u>3. Tc</u> 14 1 15 1 16 1 | <u>olerano</u> 8.01 8.02 8.03 | unintentional or intentional) likely to be Is dispersal of the taxon density dependent? ce attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other | Yes | https://www.fishbase.de/summary/Pangio-kuhlii.html https://www.fishbase.de/summary/Pangio-kuhlii.html | High Medium |
| <u>3. Tc</u> 14 1 15 1 16 1 | <u>olerano</u> 8.01 8.02 8.03 | unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? | Yes Yes Not applicable | https://www.fishbase.de/summary/Pangio-kuhlii.html https://www.fishbase.de/summary/Pangio-kuhlii.html No records file:///C:/Users/User/Desktop/Thesis%20Ref/Mutia%20et%20al% 202018.pdf | High Medium Medium |
| <u>3. Tc</u> 44 4 45 4 45 4 46 4 | 8.01 8.02 8.02 8.03 8.04 | unintentional or intentional) likely to be Is dispersal of the taxon density dependent? ce attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Is the taxon likely to tolerate or benefit from | Yes Yes Not applicable | https://www.fishbase.de/summary/Pangio-kuhlii.html https://www.fishbase.de/summary/Pangio-kuhlii.html No records file:///C:/Users/User/Desktop/Thesis%20Ref/Mutia%20et%20al% | High Medium Medium |
| <u>3. Tc</u> 44 4 45 4 45 4 46 4 | 8.01 8.02 8.02 8.03 8.04 | unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Is the taxon likely to tolerate or benefit from environmental/human disturbance? | Yes Yes Not applicable No | https://www.fishbase.de/summary/Pangio-kuhlii.html https://www.fishbase.de/summary/Pangio-kuhlii.html No records file:///C:/Users/User/Desktop/Thesis%20Ref/Mutia%20et%20al% 202018.pdf | High Medium Medium High |
| <u>3. Tc</u> 144 1 15 1 15 1 16 1 17 1 18 1 | 8.01 8.02 8.03 8.04 8.05 | unintentional or intentional) likely to be Is dispersal of the taxon density dependent? ce attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Is the taxon likely to tolerate or benefit from environmental/human disturbance? Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment? | Yes Yes Not applicable No | https://www.fishbase.de/summary/Pangio-kuhlii.html https://www.fishbase.de/summary/Pangio-kuhlii.html No records file:///C:/Users/User/Desktop/Thesis%20Ref/Mutia%20et%20al% 202018.pdf file:///C:/Users/User/Desktop/Thesis%20Ref/Mutia%20et%20al% 202018.pdf | High Medium Medium High |
| <u>3. Tc</u> 144 1 15 1 15 1 16 1 17 1 18 1 | 8.01 8.02 8.03 8.04 8.05 | unintentional or intentional) likely to be Is dispersal of the taxon density dependent? ce attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Is the taxon likely to tolerate or benefit from environmental/human disturbance? Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment? Are there effective natural enemies | Yes Yes Not applicable No | https://www.fishbase.de/summary/Pangio-kuhlii.html https://www.fishbase.de/summary/Pangio-kuhlii.html No records file:///C:/Users/User/Desktop/Thesis%20Ref/Mutia%20et%20al% 202018.pdf file:///C:/Users/User/Desktop/Thesis%20Ref/Mutia%20et%20al% file:///C:/Users/User/Desktop/Thesis%20Ref/Mutia%20et%20al% | High Medium Medium High |
| 8. Tc 44 45 45 46 47 48 49 | 8.01 8.02 8.03 8.04 8.05 8.06 | unintentional or intentional) likely to be Is dispersal of the taxon density dependent? ce attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Is the taxon likely to tolerate or benefit from environmental/human disturbance? Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment? | Yes Yes Not applicable No | https://www.fishbase.de/summary/Pangio-kuhlii.html https://www.fishbase.de/summary/Pangio-kuhlii.html No records file:///C:/Users/User/Desktop/Thesis%20Ref/Mutia%20et%20al% 202018.pdf file:///C:/Users/User/Desktop/Thesis%20Ref/Mutia%20et%20al% 202018.pdf | High Medium Medium High High |

| 50 | 9.01 | Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? | Increase | https://www.fishbase.de/summary/Pangio-kuhlii.html | 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 | https://www.fishbase.de/summary/Pangio-kuhlii.html | 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.fishbase.de/summary/Pangio-kuhlii.html | 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 | https://www.fishbase.de/summary/Pangio-kuhlii.html | High |
| 54 | 9.05 | Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? | No change | https://www.fishbase.de/summary/Pangio-kuhlii.html | High |
| 55 | 9.06 | Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors? | No change | https://www.fishbase.de/summary/Pangio-kuhlii.html | High |

Statistics

| Scores | | | | |
|--|-------------------------|--|--|--|
| BRA | 29.0 | | | |
| BRA Outcome | Medium | | | |
| BRA+CCA | 35.0 | | | |
| BRA+CCA Outcome | High | | | |
| Score partition | | | | |
| A. Biogeography/Historical | 17.0 | | | |
| 1. Domestication/Cultivation | 4.0 | | | |
| 2. Climate, distribution and introduction risk | 4.0 | | | |
| <i>3. Invasive elsewhere</i> | 9.0 | | | |
| B. Biology/Ecology | 12.0 | | | |
| 4. Undesirable (or persistence) traits | 5.0 | | | |
| 5. Resource exploitation | 2.0 | | | |
| 6. Reproduction | 2.0 | | | |
| 7. Dispersal mechanisms | 2.0 | | | |
| 8. Tolerance attributes | 1.0 | | | |
| C. Climate change | 6.0 | | | |
| 9. Climate change | 6.0 | | | |
| Answered Questions | | | | |
| Total A. Biogeography/Historical | 55 | | | |
| 1. Domestication/Cultivation | 2 | | | |
| 2. Climate, distribution and introduction risk | 13 3 5 5 36 | | | |
| 3. Invasive elsewhere | 5 | | | |
| B. Biology/Ecology | 36 | | | |
| 4. Undesirable (or persistence) traits | 12 | | | |
| 5. Resource exploitation | 2 | | | |
| 6. Reproduction | 2 | | | |
| 7. Dispersal mechanisms | 9 | | | |
| 8. Tolerance attributes | 9 | | | |
| C. Climate change | 6 | | | |
| 9. Climate change | 6 | | | |
| Sectors affected | | | | |
| Commercial | 15 | | | |
| Environmental | 3 | | | |
| Species or population nuisance traits | 23 | | | |
| | | | | |
| Thresholds | | | | |

| Thresholds | |
|---------------|--------------|
| BRA | 34.5 |
| BRA+CCA | 34.5 |
| Confidence | |
| BRA+CCA | 0.75 |
| BRA | 0.76 |
| CCA | 0.75 |
| | |
| Date and Time | |
| 02/04/2 | 020 07:57:36 |

| Taxon and Assessor details | |
|------------------------------------|----------------------------------|
| Category | Fishes and Lampreys (freshwater) |
| Taxon name | Oreochromis aureus |
| Common name | blue tilapia |
| Assessor | Gilles, To |
| Risk screening context | |
| Reason and socio-economic benefits | |
| Risk assessment area | Lake Taal |
| Taxonomy | |
| Native range | |
| Introduced range | |
| URL | |

| | | | Response | Justification (references and/or other information) | Confidence |
|------------------|------------------------|--|----------|--|------------|
| | | graphy/Historical | _ | | |
| | | ication/Cultivation | Voc | This taxon is a productive and televant encodes that has been | Von hich |
| 1 | 1.01 | Has the taxon been the subject of domestication (or cultivation) for at least 20 generations? | Yes | This taxon is a productive and tolerant species that has been introduced worldwide for aquaculture/farming, angling, and the control of aquatic vegetation (GSID, 2020). | Very high |
| 2 | 1.02 | Is the taxon harvested in the wild and likely | Yes | This taxon is a productive and tolerant species that has been | Very high |
| 2 | 1.02 | to be sold or used in its live form? | 165 | introduced worldwide for aquaculture/farming, angling, and the control of aquatic vegetation (GSID, 2020). | very night |
| 3 | 1.03 | Does the taxon have invasive races, | Yes | The following subspecies of the taxon were reported to cause | Very high |
| | | varieties, sub-taxa or congeners? | | adverse ecological impacts after introduction: Oreochromis | , 5 |
| | | | | niloticus baringoensis, Oreochromis niloticus cancellatus, | |
| | | | | Oreochromis niloticus eduardianus, Oreochromis niloticus filoa, | |
| | | | | Oreochromis niloticus niloticus, Oreochromis niloticus sugutae, | |
| | | | | Oreohromis niloticus tana and Oreohromis niloticus vulcani | |
| <u>2. (</u> | | , distribution and introduction risk | Lue 1 | | N/ 1 · 1 |
| 4 | 2.01 | How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range? | High | This taxon is cold tolerant but prefers a tropical climate, the temperatures ranges from 8-30°C and tolerating up to 41°C (CABI,2020; FishBAse, 2019). | Very high |
| 5 | 2.02 | What is the quality of the climate matching | High | This taxon is cold tolerant but prefers a tropical climate, the | Very high |
| - | | data? | | temperatures ranges from 8-30°C and tolerating up to 41°C which | ., |
| | | | | is the climate in the RA area (CABI,2020; FishBAse, 2019). | |
| 6 | 2.03 | Is the taxon already present outside of | Yes | The taxon has been introduced in the country for farming and | Very high |
| | | captivity in the RA area? | | breeding to be used as a food source (Guerrero, 2019). | |
| 7 | 2.04 | How many potential vectors could the taxon | >1 | Accidental introduction from aquaculture activities and intentional | High |
| | | use to enter in the RA area? | | introduction with human intervention (CABI, 2020). | |
| 8 | 2.05 | Is the taxon currently found in close | Yes | The taxon has been introduced in the country for farming and | Very high |
| | | proximity to, and likely to enter into, the RA | | breeding to be used as a food source (Guerrero, 2019). | |
| | | area in the near future (e.g. unintentional | | | |
| 2 - | · | and intentional introductions)? | | | |
| <u>3. 1</u> 0 | <i>nvasive</i> 3.01 | e elsewhere Has the taxon become naturalised | Yes | This taxon has been established in different parts of the Unitited | Very high |
| 9 | 5.01 | (established viable populations) outside its | res | States, namely: Arizona, California, Florida, Nevada, North | very nigh |
| | | native range? | | Carolina, and Texas. This taxon has been considered the most | |
| | | | | widespread foreign fish in Florida for more than a decade (U.S. | |
| | | | | Fish and Wildlife Service, 2011). | |
| 10 | 3.02 | In the taxon's introduced range, are there | Yes | This taxon mainly competes with native fishes for food, spawning | Very high |
| | | known adverse impacts to wild stocks or | | area, and space, and exhibits aggressive behavior. Their | |
| | | commercial taxa? | | introductions have caused reductions in abundance of native | |
| | | | | fishes, vegetation and even molluscs and there are reports that in | |
| | | | | some introduced areas, they have caused the lost of most and | |
| | | | | nearly all native fishes such as in the warm springs area of | |
| | 2.02 | · · · · · · · · · · · · · · · · · · · | X | Nevada, USA (USGS, 2020; IUCNGSID, 2020). | |
| 11 | 3.03 | In the taxon's introduced range, are there | Yes | This taxon mainly competes with native fishes for food, spawning | Very high |
| | | known adverse impacts to aquaculture? | | area, and space, and exhibits aggressive behavior. Their | |
| | | | | introductions have caused reductions in abundance of native | |
| | | | | fishes, vegetation and even molluscs and there are reports that in | |
| | | | | some introduced areas, they have caused the lost of most and nearly all native fishes such as in the warm springs area of | |
| | | | | Nevada, USA (USGS, 2020; IUCNGSID, 2020). | |
| 12 | 3.04 | In the taxon's introduced range, are there | Yes | This taxon mainly competes with native fishes for food, spawning | Very high |
| | | known adverse impacts to ecosystem | | area, and space, and exhibits aggressive behavior. Their | -, |
| | | services? | | introductions have caused reductions in abundance of native | |
| | | | | fishes, vegetation and even molluscs and there are reports that in | |
| | | | | some introduced areas, they have caused the lost of most and | |
| | | | | nearly all native fishes such as in the warm springs area of | |
| | | | | Nevada, USA (USGS, 2020; IUCNGSID, 2020). | |
| 13 | 3.05 | In the taxon's introduced range, are there | No | The introduction of this taxon has resulted in a significant | Very high |
| | | known adverse socio-economic impacts? | | development of aquaculture because of its commercial | |
| | | | | importance, which improved the economic status of the introduced | |
| R C | Biology | //Ecology | I | range (CABI,2020). | |
| | | able (or persistence) traits | | | |
| | | Is it likely that the taxon will be poisonous or | Yes | This taxon has records of being infected by a wide range of | Very high |
| • | | pose other risks to human health? | | diseases and parasites, such as, Flexibacter columnaris (Bacteria), | ., |
| | | ľ | 1 | Apiosoma piscicolum, Epistylis colisarum, Trichodina sp., | |
| | | | | | |
| | | | | | |
| | | | | Trypanoplasma sp. (Protozoa), Cichlidogyrus tilapiae, Gyrodactylus cichlidarum and Neobedenia melleni (Monogenea) | |

| 15 | 4.02 | Is it likely that the taxon will smother one or | Yes | This taxon mainly competes with native fishes for food, spawning | Very high |
|----|-----------------------|--|----------------|--|-----------|
| | | more native taxa (that are not threatened or protected)? | | area, and space, and exhibits aggressive behavior. Their introductions have caused reductions in abundance of native fishes, vegetation and even molluscs and there are reports that in some introduced areas, they have caused the lost of most and nearly all native fishes such as in the warm springs area of Nevada, USA (USGS, 2020; IUCNGSID, 2020). | |
| 16 | 4.03 | Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? | Yes | This taxon mainly competes with native fishes for food, spawning area, and space, and exhibits aggressive behavior. Their introductions have caused reductions in abundance of native fishes, vegetation and even molluscs and there are reports that in some introduced areas, they have caused the lost of most and nearly all native fishes such as in the warm springs area of | 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 | Nevada, USA (USGS, 2020; IUCNGSID, 2020). This taxon is considered hardy species, tolerant of a wide range of habitat conditions and water quality (CABI, 2020). | High |
| 18 | 4.05 | Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA area? | Yes | This taxon mainly competes with native fishes for food, spawning area, and space, and exhibits aggressive behavior. Their introductions have caused reductions in abundance of native fishes, vegetation and even molluscs and there are reports that in some introduced areas, they have caused the lost of most and nearly all native fishes such as in the warm springs area of | Very high |
| 19 | 4.06 | Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? | Yes | Nevada. USA (USGS. 2020: IUCNGSID. 2020). This taxon mainly competes with native fishes for food, spawning area, and space, and exhibits aggressive behavior. Their introductions have caused reductions in abundance of native fishes, vegetation and even molluscs and there are reports that in some introduced areas, they have caused the lost of most and nearly all native fishes such as in the warm springs area of | 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 | Nevada. USA (USGS. 2020: IUCNGSID. 2020). There are no reports that the taxon may carry pests or infectious agents that are endemic in Lake Taal. | High |
| 21 | 4.08 | Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area? | Yes | There are many viruses that are associated with this taxa, examples are: betanodavirus, tilapia larvae encephalitis virus (TELV) and tilapia lake virus disease (TiLV) (Jansen et al., 2018). | Very high |
| 22 | 4.09 | Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity? | Yes | This taxon can reach a large body size, having a maximum length of 50.8 cm (IUCNGSID,2020). | Very high |
| 23 | 4.10 | Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)? | Yes | This taxon is considered hardy species, tolerant of a wide range of habitat conditions and water quality. It is usually found in estuarine habitats, lakes, water courses, warm ponds, dam reservoirs and in open water, among vegetation and stones (CABI, | 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 | This taxon can stir up bottom sediments as they create nesting areas which causes siltation and bioturbidity reducing water quality and degrading aquatic habitats (CABI, 2020). | 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)? | Not applicable | There are no reports of etablished population of this taxon persisting at low density. | High |
| | <u>esourc</u> 5.01 | e exploitation Is the taxon likely to consume threatened or | Yes | Considiring that this taxon competes with native fishes for food, | Very high |
| | | protected native taxa in the RA area? | | spawning area, and space, and exhibits aggressive behaviour. Their introductions have caused reductions in abundance of native fishes, vegetation and even molluscs and there are reports that in some introduced areas, they have caused the lost of most and nearly all native fishes such as in the warm springs area of Nevada. USA (USGS. 2020: IUCNGSID. 2020). | |
| 27 | 5.02 | Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area? | Yes | As this taxon feeds primarily on phytoplankton and epiphytic algae, insects, zooplankton, vascular plants, and larval and juvenile fishes (IUCNGSID, 2020). | High |
| | eprodu | | | | |
| | 6.01 | Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? | Yes | This taxon are maternal mouthbrooders. When a female lays her eggs in a nest prepared by the male. Then the male fertilizes the eggs, afterwhich the female picks up the eggs and incubates them in her mouth (CABI, 2020). | Very high |
| 29 | 6.02 | Is the taxon likely to produce viable gametes or propagules (in the RA area)? | Yes | The conditions of the RA meets the required conditions for maturation and reproduction of this taxon, which will enable it to produce a viable gametes (CABI, 2020). | Very high |
| 30 | 6.03 | Is the taxon likely to hybridise naturally with native taxa? | Yes | This taxon can hybridize with its congeners and produces hybrids that are morphologically difficult to identify such as the Oreochromis niloticus x O. aureus (USGS, 2020; CABI, 2020). | Very high |
| 31 | 6.04 | Is the taxon likely to be hermaphroditic or to | No | There are no documented evidence of hermaphroditism/asexual | High |
| 32 | 6.05 | display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? | Yes | reproduction of this species. This taxon requires nesting sites in order for the egss to be fertilized before the female can incubate them in their mouth (CABI, 2020). | 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 | This taxon have a huge reproductive capacity with a female producing of upto 2000 eggs which hatches 3 days after fertilization (CABI, 2020). | High |

| | c c= | | - | | 1 |
|----|---------|---|---------------|--|------------|
| 34 | 6.07 | How many time units (days, months, years) | 5 | This taxon reaches the age of maturity at 5-6 months (IUCNGSID, | Very high |
| | | does the taxon require to reach the age-at- first-reproduction? | | 2020). | |
| | Dicnerc | al mechanisms | | | |
| | | How many potential internal | >1 | Accidental introduction from aquaculture activities and intentional | High |
| 5 | 7.01 | vectors/pathways could the taxon use to | ~1 | introduction with human intervention (USGS, 2020). | ingn |
| | | disperse within the RA area (with suitable | | | |
| 6 | 7.02 | Will any of these vectors/pathways bring the | Yes | Because of the taxons commercial importance, the aquaculture/ | Very high |
| | 7.02 | taxon in close proximity to one or more | 103 | fish farming pathway could bring this taxon in close proximity to | very night |
| | | protected areas (e.g. MCZ, MPA, SSSI)? | | one or more protected areas. | |
| 7 | 7.03 | Does the taxon have a means of actively | No | Their physical characteristics does not allow attachment to any | Very high |
| | 7.05 | attaching itself to hard substrata (e.g. ship | NO | substrata (FishBase, 2020) | very nigh |
| | | hulls, pilings, buoys) such that it enhances | | Substrata (Fishbase, 2020) | |
| | | the likelihood of dispersal? | | | |
| Q | 7.04 | Is natural dispersal of the taxon likely to | No | Since the eggs are protected by the mother until it hatches | High |
| 0 | 7.04 | occur as eggs (for animals) or as propagules | NO | (CABI,2020) | ingn |
| | | (for plants: seeds, spores) in the RA area? | | (CABI,2020) | |
| 0 | 7.05 | Is natural dispersal of the taxon likely to | No | Since the eggs are protected by the mother until it hatches and | Very high |
| 9 | 7.05 | occur as larvae/juveniles (for animals) or as | NO | even when the fry are free-swimming they will return to the | very nigh |
| | | fragments/seedlings (for plants) in the RA | | mouth of the female for protection (CABI,2020). | |
| | | area? | | mouth of the female for protection (CABI,2020). | |
| 0 | 7.06 | | No | There are no records about this taxon's migratory hobaviour | High |
| J | 1.00 | Are older life stages of the taxon likely to | NO | There are no records about this taxon's migratory behaviour. | High |
| 1 | 7.07 | migrate in the RA area for reproduction? | Voc | As this taxon lives in shallow waters in which can easily be | Vonubiah |
| т | 7.07 | Are propagules or eggs of the taxon likely to | Yes | | Very high |
| 2 | 7.08 | be dispersed in the RA area by other animals? | Voc | targeted and in return they can be predated by birds (CABI, 2020). | Vonubiah |
| -2 | 7.08 | Is dispersal of the taxon along any of the | Yes | This taxon which is readily available in commercial markets | Very high |
| | 1 | vectors/pathways mentioned in the previous | | (alive) and in aquaculture farms can be rapidly dispersed, | |
| | 1 | seven questions (35–41; i.e. either unintentional or intentional) likely to be | | knowing also the fact that the RA area is highly susceptable to flooding and natural calamities which could rapidly disperesed this | |
| 2 | 7.09 | Is dispersal of the taxon density dependent? | Net englissed | | 11: |
| | | ce attributes | | There are no records about this taxon's density dependence. | High |
| | | | Vac | "This taxon is tolerant of a range of conditions such as Ammonium | Vorschigh |
| 4 | 0.01 | Is the taxon able to withstand being out of water for extended periods (e.g. minimum of | Yes | | Very high |
| | | | | (mg/l): 0.02 - 0.5, Dissolved oxygen (mg/l): 3 optimum, Salinity | |
| | | one or more hours) at some stage of its life | | (part per thousand) 29-45, Water pH (pH): 3.7 - 11 and 8-30°C | |
| _ | | cycle? | | and tolerating up to 41°C (CABI, 2020)." | |
| 5 | 8.02 | Is the taxon tolerant of a wide range of | Yes | For biological control, the predatory fish Morone saxatilis X Morone | Very high |
| | | water quality conditions relevant to that | | chrysops, Sciaenops ocellatus, Channa striata, Megalops | |
| | | taxon? [In the Justification field, indicate the | | cyprinoides, Nile perch, Hemichromis fasciatus, and Cichlasoma | |
| | | relevant water quality variable(s) being | | managuens was usedto reduce wild spawning among tilapia | |
| | | considered.] | | hybrids in aquaculture growout ponds. For the physical control, in | |
| | | | | Brunner Island, Pennsylvania a condenser was used to cool the | |
| | | | | down the water until it became lethal to the taxon (IUCNGSID, | |
| 6 | 8.03 | Can the taxon be controlled or eradicated in | Yes | Due to their ability to survive in a wide range of environmental | High |
| | | the wild with chemical, biological, or other | | conditions specialy in tropical countries (RA area) it can benefit | |
| | | agents/means? | | from environmental/human distrubances (CABI, 2020). | |
| 17 | 8.04 | Is the taxon likely to tolerate or benefit from | Yes | Due to their ability to survive in a wide range of environmental | High |
| | | environmental/human disturbance? | | conditions specialy in tropical countries (RA area) it can benefit | |
| | | | | from environmental/human distrubances (CABI, 2020). | |
| -8 | 8.05 | Is the taxon able to tolerate salinity levels | Yes | This taxon can tolerate a wide range of salinity from 29 to 45 ppt | Very high |
| | | that are higher or lower than those found in | | (CABI, 2020). | |
| | | its usual environment? | | | |
| 9 | 8.06 | Are there effective natural enemies | Yes | Channa striata can be a predator if this taxon which is present in | High |
| | | (predators) of the taxon present in the RA | <u> </u> | the RA area (CABI, 2020). | |
| | | e change | | | |
| | | change | 1 | | |
| 0 | 9.01 | Under the predicted future climatic | Increase | Together with the fact that the RA area is prone to natural | High |
| | 1 | conditions, are the risks of entry into the RA | | calamities such as typhoons and floods (Brändlin & Wingard, | |
| | 1 | area posed by the taxon likely to increase, | | 2013) and their ability to survive the cilamatic conditions of a | |
| | 1 | decrease or not change? | | tropical environtment waters, the risk of entry through accidental | |
| | 1 | | | introduction from aquaculture activities, intentional introduction | |
| | 1 | | | with human intervention and aquarium escape would most likely | |
| | | | | increase the risk of entry of this taxon. | |
| 1 | 9.02 | Under the predicted future climatic | Increase | Together with the fact that the RA area is prone to natural | High |
| | 1 | conditions, are the risks of establishment | | calamities such as typhoons and floods (Brändlin & Wingard, | |
| | 1 | posed by the taxon likely to increase, | | 2013) and their ability to survive the cilamatic conditions of a | |
| | 1 | decrease or not change? | | tropical environtment waters, the risk of entry through accidental | |
| | 1 | | | introduction from aquaculture activities, intentional introduction | |
| | 1 | | | with human intervention and aquarium escape would most likely | |
| | 1 | | | increase the risk of entry of this taxon. | |
| 2 | 9.03 | Under the predicted future climatic | Increase | Together with the fact that the RA area is prone to natural | High |
| ۷ | 5.05 | | THCI Case | calamities such as typhoons and floods (Brändlin & Wingard, | ingii |
| | 1 | conditions, are the risks of dispersal within | | | |
| | 1 | the RA area posed by the taxon likely to | | 2013) and their ability to survive the cilamatic conditions of a | |
| | | | | | |
| | | increase, decrease or not change? | | tropical environtment waters, the risk of entry through accidental | |
| | | increase, decrease or not change? | | introduction from aquaculture activities, intentional introduction | |
| | | increase, decrease or not change? | | | |

| 9.04 | Under the predicted future climatic | Higher | Since this taxon mainly competes with native fishes for food, | Very high |
|------|---|---|---|--|
| | conditions, what is the likely magnitude of | - | spawning area, and space, and exhibits aggressive behavior. Their | , - |
| | future potential impacts on biodiversity | | introductions have caused reductions in abundance of native | |
| | and/or ecological integrity/status? | | fishes, vegetation and even molluscs and there are reports that in | |
| | | | some introduced areas, they have caused the lost of most and | |
| | | | nearly all native fishes such as in the warm springs area of | |
| | | | Nevada, USA. Morover, since this taxon has records of being | |
| | | | infected by a wide range of diseases and parasites, there is a | |
| | | | chance that these diseases may be introduced in the RA area also | |
| | | | (CABI, 2020; USGS, 2020; IUCNGSID, 2020). | |
| 9.05 | | Higher | | Very high |
| | | | | |
| | | | | |
| | structure and/or function? | | , 3 | |
| | | | | |
| | | | , | |
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| 0.00 | I had a white a superficiency of features and the second | L l'ala au | | Mana hiah |
| 9.06 | | Higher | | Very high |
| | | | | |
| | | | | |
| | Services/socio-economic factors? | | , 3 | |
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| | | | · · · · · · · · · · · · · · · · · · · | |
| | | | | |
| | | | (CABL 2020: USGS, 2020: IUCNGSID, 2020). | |
| | 9.04 | conditions, what is the likely magnitude of 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? | 9.05 Under the predicted future climatic conditions, what is the likely magnitude of 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? 9.06 Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem 9.06 Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem | conditions, what is the likely magnitude of 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? 9.06 Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? 9.06 Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? 9.06 Higher the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? 9.06 Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? 9.06 Higher the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors? 9.06 Higher the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors? 9.06 Higher the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors? 9.06 Higher the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors? 9.06 Higher the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors? 9.06 Higher the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors? 9.06 Higher the predicted future climatic conditions, what is t |

| Statistics | |
|--|--------------------------|
| Scores | |
| BRA | 45.0 |
| BRA Outcome | High |
| BRA+CCA | 57.0 |
| BRA+CCA Outcome | High |
| Score partition | |
| A. Biogeography/Historical | 22.0 |
| 1. Domestication/Cultivation | 4.0 |
| 2. Climate, distribution and introduction risk | 4.0 |
| 3. Invasive elsewhere | 14.0 |
| B. Biology/Ecology | 23.0 |
| 4. Undesirable (or persistence) traits | 10.0 |
| 5. Resource exploitation | 7.0 |
| 6. Reproduction | 1.0 |
| 7. Dispersal mechanisms | 0.0 |
| 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 2. Climate, distribution and introduction risk | 3 |
| 2. Climate, distribution and introduction risk 3. Invasive elsewhere | 5 |
| B. Biology/Ecology | 3 5 5 36 |
| 4. Undesirable (or persistence) traits | 12 |
| 5. Resource exploitation | 12 |
| 6. Reproduction | 12 12 7 |
| 7. Dispersal mechanisms | 9 |
| 8. Tolerance attributes | 6 |
| C. Climate change | 6 |
| 9. Climate change | 6 |
| Sectors affected | |
| Commercial | 19 |
| Environmental | 17 |
| Species or population nuisance traits | 28 |
| | |
| Thresholds | |
| BRA | 34.5 |
| BRA+CCA | 34.5 |
| Confidence | |
| BRA+CCA | 0.92 |
| BRA | 0.92 |
| CCA | 0.88 |

Date and Time 05/07/2020 22:34:09

| Taxon and Assessor details | |
|------------------------------------|--|
| Category | Fishes and Lampreys (freshwater) |
| Taxon name | Oreochromis mossambicus |
| Common name | Mozambique tilapia |
| Assessor | Gilles, To |
| Risk screening context | |
| Reason and socio-economic benefits | High aquaculture |
| Risk assessment area | Lake Taal |
| Taxonomy | Actinopteri (ray-finned fishes) > Cichliformes (Cichlids, convict blennies) > Cichlidae (Cichlids) > |
| Native range | Africa |
| Introduced range | Elswhere including th philippines |
| URL | https://www.fishbase.se/summary/Oreochromis-mossambicus.html |

Response Justification (references and/or other information)

Confidence

| A . | liogoa | graphy (Historical | Response | Justification (references and/or other information) | Confidence |
|---------------------|----------------------------|---|----------|--|---------------------------|
| | | ography/Historical tication/Cultivation | | | |
| | 1.01 | Has the taxon been the subject of | Yes | This taxon was the first tilapia to be widely distributed as a | Very high |
| - | 1.01 | domestication (or cultivation) for at least 20 | 103 | farmed fish.For example in Java (1930s) where it rapidly spread | very mgn |
| | | generations? | | and it was farmed and became a popular food across Indonesia | |
| 2 | 1.02 | Is the taxon harvested in the wild and likely | Yes | This taxon has been introduced worldwide for | Very high |
| - | 1.02 | to be sold or used in its live form? | 105 | aquaculture/farming, food source, angling, and control agent for | veryingn |
| | | | | | |
| 3 | 1.03 | Does the taxon have invasive races, | Yes | insects and aquatic vegetation (USGS, 2020). The following subspecies of the taxon were reported to cause | Very high |
| , | 1.05 | varieties, sub-taxa or congeners? | 105 | adverse ecological impacts after introduction: Oreochromis | very night |
| | | varieties, sub-taxa or congeners: | | niloticus baringoensis, Oreochromis niloticus cancellatus, | |
| | | | | | |
| | | | | Oreochromis niloticus eduardianus, Oreochromis niloticus filoa, | |
| | | | | Oreochromis niloticus niloticus, Oreochromis niloticus sugutae, | |
| | limate | , distribution and introduction risk | I | Oreohromis niloticus tana and Oreohromis niloticus vulcani | 1 |
| | 2.01 | How similar are the climatic conditions of the | High | This taxon is usually seen in warm, weedy pools of sluggish | Very high |
| | 2.01 | Risk Assessment (RA) area and the taxon's | i iigii | stream, canals, and ponds, it occurs at temperatures ranging from | very mgn |
| | | native range? | | 10° to 42° C. which is simillar to the tropical climate of the RA | |
| | | | | area (CABI,2020; FAO, 2003). | |
| | 2.02 | What is the quality of the climate matching | High | This taxon is usually seen in warm, weedy pools of sluggish | Very high |
| | 2.02 | data? | · ···g·· | stream, canals, and ponds, it occurs at temperatures ranging from | very myn |
| | | uutu: | | 8° to 42° C. which is simillar to the tropical climate of the RA area | |
| | | | | (CABI,2020; FAO, 2003). | |
| 5 | 2.03 | Is the taxon already present outside of | Yes | The taxon has been introduced in the country for farming and | High |
| | 2.05 | captivity in the RA area? | 165 | breeding to be used as a food source (Guerrero, 2019). | riigii |
| 7 | 2.04 | How many potential vectors could the taxon | >1 | Accidental introduction from aquaculture activities and intentional | High |
| | 2.04 | use to enter in the RA area? | ~1 | introduction with human intervention (CABI, 2020). | riigii |
| 3 | 2.05 | Is the taxon currently found in close | Yes | The taxon has been introduced in the country for farming and | High |
| | 2.05 | proximity to, and likely to enter into, the RA | 103 | breeding to be used as a food source (Guerrero, 2019). | gii |
| | | area in the near future (e.g. unintentional | | | |
| | | and intentional introductions)? | | | |
| 3 1 | nvaciv | e elsewhere | | | 1 |
| | 3.01 | Has the taxon become naturalised | Yes | This taxon has been established in seven states in USA: Arizona, | Very high |
| | 5.51 | (established viable populations) outside its | | California, Colorado, Florida, Hawaii, Idaho, and Texas.This taxon | · ··· ··· ··· ··· |
| | | native range? | | is suspected as a threat to native species such as striped mullet | |
| | | | | Mugil cephalus in Hawaii (USGS, 2020). | |
| 0 | 3.02 | In the taxon's introduced range, are there | Yes | This taxon affects native fishes through competition for food | Very high |
| | 5.52 | known adverse impacts to wild stocks or | | and/or space, or through secondary effects. It is generally | · · · · · · · · · · · · · |
| | | commercial taxa? | | considered to be pests, in Hawai'i, this species threathens native | |
| | | | | species such as the striped mullet (Mugil cephalus). Also, in | |
| | | | | Salton Sea area, this taxon has been considered as a major factor | |
| | | | | in the decline of the desert pupfish (Cyprinodon macularius) | |
| 1 | 3.03 | In the taxon's introduced range, are there | Yes | This taxon affects native fishes through competition for food | High |
| | 5.55 | known adverse impacts to aquaculture? | | and/or space, or through secondary effects. It is generally | |
| | | adverse impacts to aquaculture! | | considered to be pests, in Hawai'i, this species threathens native | |
| | | | | | |
| | | | | species such as the striped mullet (Mugil cephalus). Also, in | |
| | | | | Salton Sea area, this taxon has been considered as a major factor | |
| 2 | 3.04 | In the taxon's introduced range, are there | Yes | in the decline of the desert pupfish (Cvprinodon macularius) This taxon affects native fishes through competition for food | High |
| . ∠ | 5.04 | known adverse impacts to ecosystem | 105 | and/or space, or through secondary effects. It is generally | ingii |
| | | services? | | | |
| | | SEI VILES! | | considered to be pests, in Hawai'i, this species threathens native | |
| | | | | species such as the striped mullet (Mugil cephalus). Also, in | |
| | | | | Salton Sea area, this taxon has been considered as a major factor | |
| | 3.05 | In the tayon's introduced war as and the | No | in the decline of the desert pupfish (Cyprinodon macularius) | High |
| 2 | | In the taxon's introduced range, are there | No | The introduction of this taxon has resulted in a significant | High |
| .3 | 5.05 | known advance coole communic immedia | 1 | development of aquaculture because of its commercial | |
| 13 | 5.05 | known adverse socio-economic impacts? | | importance which improved the | |
| .3 | 5.05 | known adverse socio-economic impacts? | | importance, which improved the economic status of the introduced | |
| | | | | importance, which improved the economic status of the introduced range (CABI,2020). | |
| 3. E | Biology | y/Ecology | | | |
| В. Е 4. Ц | Biolog y Indesir | y/Ecology able (or persistence) traits | Vec | range (CABI,2020). | Voryhigh |
| В. В | Biolog y Indesir | y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or | Yes | This taxon has records of being infected by a wide range of | Very high |
| B. E 4. L | Biolog y Indesir | y/Ecology able (or persistence) traits | Yes | Trange (CABI,2020). This taxon has records of being infected by a wide range of diseases and parasites, such as, Flexibacter columnaris (Bacteria), | Very high |
| В. Е 4. Ц | Biolog y Indesir | y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or | Yes | This taxon has records of being infected by a wide range of diseases and parasites, such as, Flexibacter columnaris (Bacteria), Apiosoma piscicolum, Epistylis colisarum, Trichodina sp., | Very high |
| B. E 4. L | Biolog y Indesir | y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or | Yes | range (CABI,2020). This taxon has records of being infected by a wide range of diseases and parasites, such as, Flexibacter columnaris (Bacteria), Apiosoma piscicolum, Epistylis colisarum, Trichodina sp., Trypanoplasma sp. (Protozoa), Cichlidogyrus tilapiae, | Very high |
| B. E 4. L | Biolog y Indesir | y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or | Yes | This taxon has records of being infected by a wide range of diseases and parasites, such as, Flexibacter columnaris (Bacteria), Apiosoma piscicolum, Epistylis colisarum, Trichodina sp., | Very high |

| 15 | | | i. | | |
|---|---|---|---------------------------------------|--|--|
| | 4.02 | Is it likely that the taxon will smother one or more native taxa (that are not threatened or | Yes | This taxon affects native fishes through competition for food and/or space, or through secondary effects. It is generally | Very high |
| | | protected)? | | considered to be pests, in Hawai'i, this species threathens native | |
| | | | | species such as the striped mullet (Mugil cephalus). Also, in | |
| | | | | Salton Sea area, this taxon has been considered as a major factor | |
| 10 | 4.02 | And there any threatened as such at a ' | Vec | in the decline of the desert pupfish (Cyprinodon macularius) | High |
| τņ | 4.03 | Are there any threatened or protected taxa that the non-native taxon would parasitise in | Yes | This taxon affects native fishes through competition for food and/or space, or through secondary effects. It is generally | High |
| | | the RA area? | | considered to be pests, in Hawai'i, this species threathens native | |
| | | | | species such as the striped mullet (Mugil cephalus). Also, in | |
| | | | | Salton Sea area, this taxon has been considered as a major factor | |
| | | | | in the decline of the desert pupfish (Cyprinodon macularius) | |
| 17 | 4.04 | Is the taxon adaptable in terms of climatic | Yes | This taxon is considered hardy species, tolerant of a wide range of | High |
| | | and other environmental conditions, thus | | habitat conditions and water quality, specially it tolerates the high | |
| | | enhancing its potential persistence if it has | | salinities waters and it is considered as a 'pioneer' species, which | |
| | | invaded or could invade the RA area? | | means that they can thrive in disturbed habitats, opportunistically | |
| 1.0 | 4.05 | Is the taxon likely to disrupt food-web | Yes | migrating and reproducing. (CABI, 2020; IUCNGSID, 2020). This taxon affects native fishes through competition for food | Very high |
| 10 | 4.05 | structure/function in aquatic ecosystems if it | 165 | and/or space, or through secondary effects. It is generally | very nigh |
| | | has invaded or is likely to invade the RA | | considered to be pests, in Hawai'i, this species threathens native | |
| | | area? | | species such as the striped mullet (Mugil cephalus). Also, in | |
| | | | | Salton Sea area, this taxon has been considered as a major factor | |
| | | | | in the decline of the desert pupfish (Cyprinodon macularius) | |
| 19 | 4.06 | Is the taxon likely to exert adverse impacts | Yes | This taxon affects native fishes through competition for food | Very high |
| | | on ecosystem services in the RA area? | | and/or space, or through secondary effects. It is generally | |
| | | | | considered to be pests, in Hawai'i, this species threathens native | 1 |
| | | | | species such as the striped mullet (Mugil cephalus). Also, in | |
| | | | | Salton Sea area, this taxon has been considered as a major factor in the decline of the desert pupfish (Cyprinodon macularius) | 1 |
| 20 | 4.07 | Is it likely that the taxon will host, and/or | No | There are no reports that the taxon may carry pests or infectious | High |
| | , | act as a vector for, recognised pests and | | agents that are endemic in Lake Taal. | |
| | | infectious agents that are endemic in the RA | | | |
| 21 | 4.08 | Is it likely that the taxon will host, and/or | Yes | There are many viruses that are associated with this taxa, | Very high |
| | | act as a vector for, recognised pests and | | examples are: betanodavirus, tilapia larvae encephalitis virus | 1 |
| | | infectious agents that are absent from (novel | | (TELV) and tilapia lake virus disease (TiLV) (Jansen et al., 2018). | 1 |
| | 4.00 | to) the RA area? | | | LU - b |
| 22 | 4.09 | Is it likely that the taxon will achieve a body | Yes | This taxon can reach a large body size, having a maximum length | High |
| | | size that will make it more likely to be released from captivity? | | of 40 cm (IUCNGSID,2020). | |
| 23 | 4.10 | Is the taxon capable of sustaining itself in a | Yes | This taxon is considered hardy species, tolerant of a wide range of | Very high |
| | | range of water velocity conditions (e.g. | | habitat conditions and water quality, specially it tolerates the high | . c. , mgn |
| | | versatile in habitat use)? | | salinities waters and it is considered as a 'pioneer' species, which | 1 |
| | | | | means that they can thrive in disturbed habitats, opportunistically | |
| | | | | migrating and reproducing (CABI, 2020; IUCNGSID, 2020). | |
| 24 | 4.11 | Is it likely that the taxon's mode of existence | Yes | This taxon can stir up bottom sediments as they create nesting | Very high |
| | | | | | , 5 |
| | | (e.g. excretion of by-products) or behaviours | | areas which causes siltation and bioturbidity reducing water | , 5 |
| | | (e.g. feeding) will reduce habitat quality for | | areas which causes siltation and bioturbidity reducing water quality and degrading aquatic habitats (CABI, 2020). | , , |
| 25 | 4 17 | (e.g. feeding) will reduce habitat quality for native taxa? | Not applicable | quality and degrading aquatic habitats (CABI, 2020). | |
| 25 | 4.12 | (e.g. feeding) will reduce habitat quality for native taxa? Is the taxon likely to maintain a viable | Not applicable | quality and degrading aquatic habitats (CABI, 2020). There are no reports of etablished population of this taxon | High |
| 25 | 4.12 | (e.g. feeding) will reduce habitat quality for native taxa? Is the taxon likely to maintain a viable population even when present in low | Not applicable | quality and degrading aquatic habitats (CABI, 2020). | |
| 25 | 4.12 | (e.g. feeding) will reduce habitat quality for native taxa? Is the taxon likely to maintain a viable | Not applicable | quality and degrading aquatic habitats (CABI, 2020). There are no reports of etablished population of this taxon | |
| 5. F | esourc | (e.g. feeding) will reduce habitat quality for native taxa? Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)? the exploitation | | quality and degrading aquatic habitats (CABI, 2020). There are no reports of etablished population of this taxon persisting at low density. | High |
| 5. F | esourc | (e.g. feeding) will reduce habitat quality for native taxa? Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)? <i>is exploitation</i> Is the taxon likely to consume threatened or | Not applicable | quality and degrading aquatic habitats (CABI, 2020). There are no reports of etablished population of this taxon persisting at low density. Considiring that this taxon affects native fishes through | |
| 5. F | esourc | (e.g. feeding) will reduce habitat quality for native taxa? Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)? the exploitation | | quality and degrading aquatic habitats (CABI, 2020). There are no reports of etablished population of this taxon persisting at low density. Considiring that this taxon affects native fishes through competition for food and/or space, or through secondary effects. It | High |
| 5. F | esourc | (e.g. feeding) will reduce habitat quality for native taxa? Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)? <i>is exploitation</i> Is the taxon likely to consume threatened or | | quality and degrading aquatic habitats (CABI, 2020). There are no reports of etablished population of this taxon persisting at low density. Considiring that this taxon affects native fishes through competition for food and/or space, or through secondary effects. It is generally considered to be pests, in Hawai'i, this species | High |
| 5. F | esourc | (e.g. feeding) will reduce habitat quality for native taxa? Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)? <i>is exploitation</i> Is the taxon likely to consume threatened or | | quality and degrading aquatic habitats (CABI, 2020). There are no reports of etablished population of this taxon persisting at low density. Considiring that this taxon affects native fishes through competition for food and/or space, or through secondary effects. It is generally considered to be pests, in Hawai'i, this species threathens native species such as the striped mullet (Mugil | High |
| 5. F | esourc | (e.g. feeding) will reduce habitat quality for native taxa? Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)? <i>is exploitation</i> Is the taxon likely to consume threatened or | | quality and degrading aquatic habitats (CABI, 2020). There are no reports of etablished population of this taxon persisting at low density. Considiring that this taxon affects native fishes through competition for food and/or space, or through secondary effects. It is generally considered to be pests, in Hawai'i, this species threathens native species such as the striped mullet (Mugil cephalus). Also, in Salton Sea area, this taxon has been | High |
| 5. F | esourc | (e.g. feeding) will reduce habitat quality for native taxa? Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)? <i>is exploitation</i> Is the taxon likely to consume threatened or | | quality and degrading aquatic habitats (CABI, 2020). There are no reports of etablished population of this taxon persisting at low density. Considiring that this taxon affects native fishes through competition for food and/or space, or through secondary effects. It is generally considered to be pests, in Hawai'i, this species threathens native species such as the striped mullet (Mugil cephalus). Also, in Salton Sea area, this taxon has been considered as a major factor in the decline of the desert pupfish | High |
| 5. R | esourc | (e.g. feeding) will reduce habitat quality for native taxa? Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)? <i>is exploitation</i> Is the taxon likely to consume threatened or | | quality and degrading aquatic habitats (CABI, 2020). There are no reports of etablished population of this taxon persisting at low density. Considiring that this taxon affects native fishes through competition for food and/or space, or through secondary effects. It is generally considered to be pests, in Hawai'i, this species threathens native species such as the striped mullet (Mugil cephalus). Also, in Salton Sea area, this taxon has been considered as a major factor in the decline of the desert pupfish (Cyprinodon macularius). This taxon is also considered as near- | High |
| 5. R | esourc | (e.g. feeding) will reduce habitat quality for native taxa? Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)? <i>is exploitation</i> Is the taxon likely to consume threatened or | | quality and degrading aquatic habitats (CABI, 2020). There are no reports of etablished population of this taxon persisting at low density. Considiring that this taxon affects native fishes through competition for food and/or space, or through secondary effects. It is generally considered to be pests, in Hawai'i, this species threathens native species such as the striped mullet (Mugil cephalus). Also, in Salton Sea area, this taxon has been considered as a major factor in the decline of the desert pupfish | High |
| <u>5. R</u> 26 | esourc 5.01 | (e.g. feeding) will reduce habitat quality for native taxa? Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)? re exploitation Is the taxon likely to consume threatened or protected native taxa in the RA area? Is the taxon likely to sequester food | | quality and degrading aquatic habitats (CABI, 2020). There are no reports of etablished population of this taxon persisting at low density. Considiring that this taxon affects native fishes through competition for food and/or space, or through secondary effects. It is generally considered to be pests, in Hawai'i, this species threathens native species such as the striped mullet (Mugil cephalus). Also, in Salton Sea area, this taxon has been considered as a major factor in the decline of the desert pupfish (Cyprinodon macularius). This taxon is also considered as near- exclusive carnivor with individuals preying on small fish and invertebrates (IUCNGSID, 2020: USGS, 2020: Smithsonian Marine As this taxon feeds primarily on phytoplankton and epiphytic | High |
| <u>5. R</u> 26 | esourc 5.01 | (e.g. feeding) will reduce habitat quality for native taxa? Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)? <i>The exploitation</i> Is the taxon likely to consume threatened or protected native taxa in the RA area? | Yes | quality and degrading aquatic habitats (CABI, 2020). There are no reports of etablished population of this taxon persisting at low density. Considiring that this taxon affects native fishes through competition for food and/or space, or through secondary effects. It is generally considered to be pests, in Hawai'i, this species threathens native species such as the striped mullet (Mugil cephalus). Also, in Salton Sea area, this taxon has been considered as a major factor in the decline of the desert pupfish (Cyprinodon macularius). This taxon is also considered as near-exclusive carnivor with individuals preying on small fish and invertebrates (IUCNGSID. 2020: USGS. 2020: Smithsonian Marine As this taxon feeds primarily on phytoplankton and epiphytic algae, insects, zooplankton, vascular plants, and larval and | High Very high |
| <u>5. R</u> 26 27 | 8 <u>esourc</u> 5.01 | (e.g. feeding) will reduce habitat quality for native taxa? Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)? <i>te exploitation</i> Is the taxon likely to consume threatened or protected native taxa in the RA area? Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area? | Yes | quality and degrading aquatic habitats (CABI, 2020). There are no reports of etablished population of this taxon persisting at low density. Considiring that this taxon affects native fishes through competition for food and/or space, or through secondary effects. It is generally considered to be pests, in Hawai'i, this species threathens native species such as the striped mullet (Mugil cephalus). Also, in Salton Sea area, this taxon has been considered as a major factor in the decline of the desert pupfish (Cyprinodon macularius). This taxon is also considered as near- exclusive carnivor with individuals preying on small fish and invertebrates (IUCNGSID, 2020: USGS, 2020: Smithsonian Marine As this taxon feeds primarily on phytoplankton and epiphytic | High Very high |
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| 5. R 26 27 5. R 29 30 31 | 5.02 5.02 6.02 6.03 6.04 | (e.g. feeding) will reduce habitat quality for native taxa? Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)? <i>e exploitation</i> Is the taxon likely to consume threatened or protected native taxa in the RA area? Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area? Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction? | Yes Yes Yes Yes No | quality and degrading aquatic habitats (CABI, 2020). There are no reports of etablished population of this taxon persisting at low density. Considiring that this taxon affects native fishes through competition for food and/or space, or through secondary effects. It is generally considered to be pests, in Hawai'i, this species threathens native species such as the striped mullet (Mugil cephalus). Also, in Salton Sea area, this taxon has been considered as a major factor in the decline of the desert pupfish (Cyprinodon macularius). This taxon is also considered as near-exclusive carnivor with individuals preying on small fish and invertebrates (IUCNGSID. 2020: USGS. 2020: Smithsonian Marine As this taxon feeds primarily on phytoplankton and epiphytic algae, insects, zooplankton, vascular plants, and larval and juvenile fishes (IUCNGSID, 2020). This taxon are maternal mouthbrooders. When a female lays her eggs in a nest prepared by the male. Then the male fertilizes the eggs, afterwhich the female picks up the eggs and incubates them in her mouth (CABI, 2020). This conditions of the RA meets the required conditions for maturation and reproduction of this taxon, which will enable it to produce a viable gametes (CABI, 2020). There are no documented evidence of hermaphroditism/asexual reproduction of this species. This taxon requires nesting sites in order for the egss to be fertilized before the female can incubate them in their mouth | High Very high Very high High Very high Very high |
| 5. R 26 27 6. R 29 30 31 32 | 25.01 5.02 6.02 6.03 6.04 6.05 | (e.g. feeding) will reduce habitat quality for native taxa? Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)? <i>exexploitation</i> Is the taxon likely to consume threatened or protected native taxa in the RA area? Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area? Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon likely to be hermaphroditic for to another taxon or specific habitat features) to complete its life cycle? | Yes Yes Yes Yes No Yes | quality and degrading aquatic habitats (CABI, 2020). There are no reports of etablished population of this taxon persisting at low density. Considiring that this taxon affects native fishes through competition for food and/or space, or through secondary effects. It is generally considered to be pests, in Hawai'i, this species threathens native species such as the striped mullet (Mugil cephalus). Also, in Salton Sea area, this taxon has been considered as a major factor in the decline of the desert pupfish (Cyprinodon macularius). This taxon is also considered as near-exclusive carnivor with individuals preying on small fish and invertebrates (IUCNGSID, 2020: USGS, 2020: Smithsonian Marine As this taxon feeds primarily on phytoplankton and epiphytic algae, insects, zooplankton, vascular plants, and larval and iuvenile fishes (IUCNGSID, 2020). This taxon are maternal mouthbrooders. When a female lays her eggs in a nest prepared by the male. Then the male fertilizes the eggs, afterwhich the female picks up the eggs and incubates them in her mouth (CABI, 2020). The conditions of the RA meets the required conditions for maturation and reproduction of this taxon, which will enable it to produce a viable gametes (CABI, 2020). There are no documented evidence of hermaphroditism/asexual reproduction of this species. This taxon requires nesting sites in order for the egss to be fertilized before the female can incubate them in their mouth (CABI, 2020). | High Very high Very high High Very high High Very high |
| 5. R 26 27 6. R 29 30 31 32 | 5.02 5.02 6.02 6.03 6.04 | (e.g. feeding) will reduce habitat quality for native taxa? Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)? <i>e exploitation</i> Is the taxon likely to consume threatened or protected native taxa in the RA area? Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area? Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction? | Yes Yes Yes Yes No | quality and degrading aquatic habitats (CABI, 2020). There are no reports of etablished population of this taxon persisting at low density. Considiring that this taxon affects native fishes through competition for food and/or space, or through secondary effects. It is generally considered to be pests, in Hawai'i, this species threathens native species such as the striped mullet (Mugil cephalus). Also, in Salton Sea area, this taxon has been considered as a major factor in the decline of the desert pupfish (Cyprinodon macularius). This taxon is also considered as near-exclusive carnivor with individuals preying on small fish and invertebrates (IUCNGSID. 2020: USGS. 2020: Smithsonian Marine As this taxon feeds primarily on phytoplankton and epiphytic algae, insects, zooplankton, vascular plants, and larval and juvenile fishes (IUCNGSID, 2020). This taxon are maternal mouthbrooders. When a female lays her eggs in a nest prepared by the male. Then the male fertilizes the eggs, afterwhich the female picks up the eggs and incubates them in her mouth (CABI, 2020). This conditions of the RA meets the required conditions for maturation and reproduction of this taxon, which will enable it to produce a viable gametes (CABI, 2020). There are no documented evidence of hermaphroditism/asexual reproduction of this species. This taxon requires nesting sites in order for the egss to be fertilized before the female can incubate them in their mouth | High Very high Very high High Very high Very high |

| 34 | 6.07 | How many time units (days, months, years) | 5 | This taxon reaches the age of maturity at 5-6 months (IUCNGSID, | Very high |
|------|------|---|----------------|---|-----------|
| | | does the taxon require to reach the age-at- | - | 2020). | |
| | | first-reproduction? | | | |
| | | al mechanisms | One | Assidental introduction from acupaulture activities and intentional | High |
| 35 | 7.01 | How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable | One | Accidental introduction from aquaculture activities and intentional introduction with human intervention (USGS, 2020). | High |
| 36 | 7.02 | Will any of these vectors/pathways bring the taxon in close proximity to one or more | Yes | Because of the taxons commercial importance, the aquaculture/ fish farming pathway could bring this taxon in close proximity to | High |
| 27 | 7.03 | protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively | No | one or more protected areas. Their physical characteristics does not allow attachment to any | High |
| 57 | 7.03 | attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances | NO | substrata (FishBase, 2020) | Ingn |
| 38 | 7.04 | the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? | No | Since the eggs are protected by the mother until it hatches (CABI,2020) | Very high |
| 39 | 7.05 | Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA | No | Since the eggs are protected by the mother until it hatches and even when the fry are free-swimming they will return to the mouth of the female for protection (CABI,2020). | Very high |
| 40 | 7.06 | area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? | Yes | This taxon has records of migrating in long distances as they escaped from aquaculture farms during loading-harvesting or via containment failures or when the cold temperatures set in, they migrate to deeper waters (IUCNGSID, 2020; Smithsonian Marine | High |
| 41 | 7.07 | Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? | Yes | As this taxon lives in shallow waters in which can easily be targeted and in return they can be predated by birds with their eggs being dispersed (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. either unintentional or intentional) likely to be | Yes | This taxon which is readily available in commercial markets (alive) and in aquaculture farms can be rapidly disperesed, knowing also the fact that the RA area is highly susceptable to flooding and natural calamities which could rapidly disperesed this | High |
| 43 | 7.09 | | Not applicable | There are no records about this taxon's density dependence. | High |
| 8. T | | 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? | Not applicable | There are no records about this taxon's density dependence. | High |
| 45 | 8.02 | Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being | Yes | This taxon is tolerant of a range of conditions such as Ammonium (mg/l): <0.01, Dissolved oxygen (mg/l): 4-7 optimum, Salinity (part per thousand) 35-40, Water pH (pH): 6-8 and Temperature: 8-42°C (FAO, 2020; CABI, 2020). | Very high |
| 46 | 8.03 | Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? | Yes | They can be eradicated through intensive fishing to prevent overpopulations from affecting native populations (IUCNGSID, 2020). | High |
| 47 | 8.04 | Is the taxon likely to tolerate or benefit from environmental/human disturbance? | Yes | Due to their ability to survive in a wide range of environmental conditions specialy in tropical countries (RA area) it can benefit from environmental/human distrubances (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? | Yes | This taxon can tolerate a wide range of salinity from 35 to 40 ppt (CABI, 2020). | High |
| | | Are there effective natural enemies (predators) of the taxon present in the RA | Yes | Channa striata can be a predator of this taxon which is present in the RA area (CABI, 2020). | High |
| | | e change | | | |
| | - | change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? | Increase | Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to survive the cilamatic conditions of a tropical waters, the risk of entry through accidental introduction from aquaculture activities, intentional introduction with human intervention and aquarium escape would most likely increase the | 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 | Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to survive the cilamatic conditions of a tropical waters, the risk of entry through accidental introduction from aquaculture activities, intentional introduction with human intervention and aquarium escape would most likely increase the | Very high |
| 52 | 9.03 | Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? | Increase | Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to survive the cilamatic conditions of a tropical waters, the risk of entry through accidental introduction from aquaculture activities, intentional introduction with human intervention and aquarium escape would most likely increase the | Very high |

| 53 | 9.04 | Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? | Higher | spawning area, and space, and exhibits aggressive behavior. Their introductions have caused reductions in abundance of native fishes, vegetation and even molluscs and there are reports that in some introduced areas, they have caused the lost of most and nearly all native fishes such as in the warm springs area of Nevada, USA. Morover, since this taxon has records of being infected by a wide range of diseases and parasites, such as, Flexibacter columnaris (Bacteria), Apiosoma piscicolum, Epistylis colisarum, Trichodina sp., Trypanoplasma sp. (Protozoa), Cichlidogyrus tilapiae, Gyrodactylus cichlidarum and Neobedenia melleni (Monogenea), there is a chance that these deseases may | High |
|----|------|---|--------|--|------|
| 54 | 9.05 | Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? | Higher | spawning area, and space, and exhibits aggressive behavior. Their introductions have caused reductions in abundance of native fishes, vegetation and even molluscs and there are reports that in some introduced areas, they have caused the lost of most and nearly all native fishes such as in the warm springs area of Nevada, USA. Morover, since this taxon has records of being infected by a wide range of diseases and parasites, such as, Flexibacter columnaris (Bacteria), Apiosoma piscicolum, Epistylis colisarum, Trichodina sp., Trypanoplasma sp. (Protozoa), Cichlidogyrus tilapiae, Gyrodactylus cichlidarum and Neobedenia melleni (Monogenea), there is a chance that these deseases may | 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 | he introduced in the RA area also (CARL 2020: LISGS 2020: Since this taxon mainly competes with native fishes for food, spawning area, and space, and exhibits aggressive behavior. Their introductions have caused reductions in abundance of native fishes, vegetation and even molluscs and there are reports that in some introduced areas, they have caused the lost of most and nearly all native fishes such as in the warm springs area of Nevada, USA. Morover, since this taxon has records of being infected by a wide range of diseases and parasites, such as, Flexibacter columnaris (Bacteria), Apiosoma piscicolum, Epistylis colisarum, Trichodina sp., Trypanoplasma sp. (Protozoa), Cichlidogyrus tilapiae, Gyrodactylus cichlidarum and Neobedenia melleni (Monogenea), there is a chance that these deseases may be introduced in the RA area also (CABL 2020: LISGS 2020: | High |

| Statistics | |
|--|------------------------------|
| Statistics | |
| BRA | 45.0 |
| BRA Outcome | High |
| BRA+CCA | 57.0 |
| BRA+CCA Outcome | High |
| Score partition | |
| A. Biogeography/Historical | 22.0 |
| 1. Domestication/Cultivation | 4.0 |
| 2. Climate, distribution and introduction risk | 4.0 |
| 3. Invasive elsewhere | 14.0 |
| B. Biology/Ecology | 23.0 |
| 4. Undesirable (or persistence) traits | 10.0 |
| 5. Resource exploitation | 7.0 |
| 6. Reproduction | 1.0 |
| 7. Dispersal mechanisms | 1.0 |
| 8. Tolerance attributes | 4.0 |
| C. Climate change | 12.0 |
| 9. Climate change | 12.0 |
| Answered Questions | |
| Total | 55 |
| A. Biogeography/Historical | 13 |
| 1. Domestication/Cultivation | 3 5 5 |
| 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 | 2 7 9 6 6 |
| C. Climate change | 6 |
| 9. Climate change | 6 |
| Sectors affected | |
| Commercial | 18 |
| Environmental | 17 |
| | 20 |
| Species or population nuisance traits | 28 |
| | 28 |
| Thresholds | 28 |
| | 34.5 34.5 |

| BRA | 34.5 |
|------------|------|
| BRA+CCA | 34.5 |
| Confidence | |
| BRA+CCA | 0.88 |
| BRA | 0.88 |
| CCA | 0.88 |
| | |

Time 05/07/2020 22:47:57

Date and Time

| Taxon and Assessor details | |
|------------------------------------|--|
| Category | Fishes and Lampreys (freshwater) |
| Taxon name | Oreochromis niloticus |
| Common name | Nile tilapia |
| Assessor | Gilles, To |
| Risk screening context | |
| Reason and socio-economic benefits | Hihgly aquacuture |
| Risk assessment area | Lake Taal |
| Taxonomy | Actinopteri (ray-finned fishes) > Cichliformes (Cichlids, convict blennies) > Cichlidae (Cichlids) > |
| Native range | Africa |
| Introduced range | Elswhere including the Philippines |
| URL | https://www.fishbase.se/summary/Oreochromis-niloticus.html |

| | | | Response | Justification (references and/or other information) | Confidence |
|-----------|---------|--|----------|---|------------|
| Α. | Biogeo | graphy/Historical | | | |
| | | ication/Cultivation | | | |
| 1 | 1.01 | Has the taxon been the subject of | Yes | This taxon is considered to be the second most intensively farmed | Very high |
| | | domestication (or cultivation) for at least 20 | | species in the world. In China, it produces almost half of the | |
| | | generations? | | worlds' tilapia supply (IUCNGSID, 2020; CABI,2020) | |
| 2 | 1.02 | Is the taxon harvested in the wild and likely | Yes | This taxon is a very important fish in aquaculture, it harvested for | Very high |
| | | to be sold or used in its live form? | | its protein source which in return gives income to people. It is | |
| | | | | also used as a laboratory model and for sport fishing (IUCNGSID, | |
| _ | | | | 2020; CABI,2020). | |
| 3 | 1.03 | Does the taxon have invasive races, | Yes | The following subspecies of the taxon were reported to cause | Very high |
| | | varieties, sub-taxa or congeners? | | adverse ecological impacts after introduction: Oreochromis | |
| | | | | niloticus baringoensis, Oreochromis niloticus cancellatus, | |
| | | | | Oreochromis niloticus eduardianus, Oreochromis niloticus filoa, | |
| | | | | Oreochromis niloticus niloticus, Oreochromis niloticus sugutae, | |
| 2 (| limato | , distribution and introduction risk | | Oreohromis niloticus tana and Oreohromis niloticus vulcani | |
| ∠. (⊿ | 2.01 | How similar are the climatic conditions of the | High | The RA area and the taxon's native range has both tropical | Very high |
| - | 2.01 | Risk Assessment (RA) area and the taxon's | ingn | climate (CABI,2020; FishBAse, 2019) | Very mgn |
| 1 | | native range? | | | |
| 5 | 2.02 | What is the quality of the climate matching | High | The RA area belongs to the same part of the continent where the | Very high |
| 1 | | data? | | taxon is native (CABI, 2020, FishBase, 2019). | |
| 6 | 2.03 | Is the taxon already present outside of | Yes | The taxon has been introduced in the country for farming and | Very high |
| 1 | | captivity in the RA area? | | breeding to be used as a food source (Guerrero, 2019). | |
| 7 | 2.04 | How many potential vectors could the taxon | One | Accidental introduction from aquaculture activities and intentional | High |
| | | use to enter in the RA area? | | introduction with human intervention (CABI, 2020). | - |
| 8 | 2.05 | Is the taxon currently found in close | Yes | The taxon has been introduced in the country for farming and | Very high |
| 1 | | proximity to, and likely to enter into, the RA | | breeding to be used as a food source (Guerrero, 2019). | |
| 1 | | area in the near future (e.g. unintentional | | | |
| _ | | and intentional introductions)? | | | |
| | | e elsewhere | | | N |
| 9 | 3.01 | Has the taxon become naturalised | Yes | This taxon is the third most farmed fish in the world after carps | Very high |
| | | (established viable populations) outside its | | and salmonids and it accounts for 4% of global aquaculture | |
| | | native range? | | production. It is currently mass produced in Asia (China, Thailand | |
| | | | | and etc.) and it has already established populations in many | |
| | | | | tropical to subtropical countries. In United States this taxon is | |
| | | | | already established in the lakes and rivers of Mississippi, Florida and Georgia (FAO,2020; CABI,2020). | |
| 10 | 3.02 | In the taxon's introduced range, are there | Yes | This taxon is known to reproduce at a rapid rate, which in return | High |
| 10 | 5.02 | known adverse impacts to wild stocks or | 105 | overcrowds and causes competition pressures on native fishes. | ingn |
| | | commercial taxa? | | Also, they are known to prey on amphibians and juveniles of other | |
| | | | | fish species which leads to species dispalcement and eventually to | |
| 1 | | | | the loss of biodiversity, genetic erosion and greater susceptibility | |
| 1 | | | | to disease for native species. In Nevada and Arizona, the | |
| 1 | | | | introduction of this taxon has casued the decline and dispalcemet | |
| 1 | | | | of endangered Moapa Dace, Moapa White and the Redspotted | |
| | | | | Sunfish (IUCNGSID.2020: USGS. 2020). | |
| 11 | 3.03 | In the taxon's introduced range, are there | Yes | This taxon is known to reproduce at a rapid rate, which in return | Very high |
| 1 | | known adverse impacts to aquaculture? | | overcrowds and causes competition pressures on native fishes. | |
| Í | | | | Also, they are known to prey on amphibians and juveniles of other | |
| 1 | | | | fish species which leads to species dispalcement and eventually to | |
| 1 | | | | the loss of biodiversity, genetic erosion and greater susceptibility | |
| 1 | | | | to disease for native species. In Nevada and Arizona, the | |
| 1 | | | | introduction of this taxon has casued the decline and dispalcemet | |
| 1 | | | | of endangered Moapa Dace, Moapa White and the Redspotted | |
| 12 | 3.04 | In the taxon's introduced range, are there | Yes | Sunfish (IUCNGSID.2020: USGS. 2020). | Veny high |
| 12 | 3.04 | known adverse impacts to ecosystem | 105 | This taxon is known to reproduce at a rapid rate, which in return overcrowds and causes competition pressures on native fishes. | Very high |
| 1 | | services? | | Also, they are known to prey on amphibians and juveniles of other | |
| 1 | | | | fish species which leads to species dispalcement and eventually to | |
| 1 | | | | the loss of biodiversity, genetic erosion and greater susceptibility | |
| 1 | | | | to disease for native species. In Nevada and Arizona, the | |
| 1 | | | | introduction of this taxon has casued the decline and dispalcemet | |
| 1 | | | | of endangered Moapa Dace, Moapa White and the Redspotted | |
| 1 | | | | Sunfish (IUCNGSID.2020; USGS, 2020). | |
| 13 | 3.05 | In the taxon's introduced range, are there | No | The introduction of this taxon has resulted in a significant | High |
| | | known adverse socio-economic impacts? | | development of aquaculture which improved the economic status | , j |
| L | | | | of the introduced range (CABI,2019). | |
| | | //Ecology | | | |
| 4. (| Indesir | able (or persistence) traits | | | |

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 | Records in Malaysia shows that the cancer risk calculations due to consumption of Tilapia exceeded the USEPA's acceptable risk level for cadmium (2.1×10 -6) and nickel (7.3×10 -4). In this case, cadmium can adversely affect organisms at relatively low level exposure and can affect liver, testis, nervous system, kidney, | Very high |
|----------------------------------|--------------------------------------|--|-------------------------|--|------------------------------|
| | | | | spleen and bone marrow of humans (Alam et al., 2016). | |
| 15 | 4.02 | Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? | Yes | This taxon has a record of preying on amphibians and juveniles of other fish species which leads to species dispalcement and eventually to the loss of biodiversity, genetic erosion and greater | Very high |
| | | | | susceptibility to disease for native species (USGS, 2020). | |
| 16 | 4.03 | Are there any threatened or protected taxa | Yes | This taxon has a record of preying on amphibians and juveniles of | Very high |
| | | that the non-native taxon would parasitise in the RA area? | | other fish species which leads to species dispalcement and eventually to the loss of biodiversity, genetic erosion and greater | |
| | | | | susceptibility to disease for native species (USGS, 2020). | |
| 17 | 4.04 | Is the taxon adaptable in terms of climatic | Yes | This taxon has a record of preying on amphibians and juveniles of | High |
| | | and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? | | other fish species which leads to species dispalcement and eventually to the loss of biodiversity, genetic erosion and greater susceptibility to disease for native species (USGS, 2020). | |
| 18 | 4.05 | Is the taxon likely to disrupt food-web | Yes | This taxon has a hardy nature and has a wide range of trophic and | Very high |
| | | structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA | | ecological adaptations. Its adaptive life history characteristics enabled this taxon to occupy many different tropical and sub- | |
| | | area? | | tropical freshwater niches (CABI, 2020). | |
| 19 | 4.06 | Is the taxon likely to exert adverse impacts | Yes | This taxon is known to reproduce at a rapid rate, which in return | Very high |
| | | on ecosystem services in the RA area? | | overcrowds and causes competition pressures on native fishes. | |
| | | | | Also, they are known to prey on amphibians and juveniles of other fich species which leads to species dispatcement and eventually to | |
| | | | | fish species which leads to species dispalcement and eventually to the loss of biodiversity, genetic erosion and greater susceptibility | |
| | | | | to disease for native species. In Nevada and Arizona, the | |
| | | | | introduction of this taxon has casued the decline and dispalcemet | |
| | | | | of endangered Moapa Dace, Moapa White and the Redspotted | |
| | | | | Sunfish (IUCNGSID.2020; USGS, 2020). | |
| 20 | 4.07 | Is it likely that the taxon will host, and/or | No | There are no reports that the taxon may carry pests or infectious | Very high |
| | | act as a vector for, recognised pests and infectious agents that are endemic in the RA | | agents that are endemic in Lake Taal. | |
| 21 | 4.08 | Is it likely that the taxon will host, and/or | Yes | There are many viruses that are associated with this taxa, | High |
| | | act as a vector for, recognised pests and | | examples are: betanodavirus, tilapia larvae encephalitis virus | |
| | | infectious agents that are absent from (novel | | (TELV) and tilapia lake virus disease (TiLV) (Jansen et al., 2018). | |
| | 4 00 | to) the RA area? | ¥ | This taxan and a laws had, since he was increased |) (aux : la i a la |
| 22 | 4.09 | Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity? | Yes | This taxon can reach a large body size, having a maximum length of 60 cm (Fish Base,2019). | Very high |
| 23 | 4.10 | Is the taxon capable of sustaining itself in a | Yes | This taxon can live in a wide range of water velocity (Tsadik & | Very high |
| | | range of water velocity conditions (e.g. | | Bart 2007). | , 5 |
| | | versatile in habitat use)? | | | |
| 24 | 4.11 | Is it likely that the taxon's mode of existence | Yes | This taxon can stir up bottom sediments as they create nesting | Very high |
| | | (e.g. excretion of by-products) or behaviours | | areas which causes siltation and bioturbidity reducing water | |
| | | (e.g. feeding) will reduce habitat quality for native taxa? | | quality and degrading aquatic habitats (CABI, 2020). | |
| 25 | 4.12 | Is the taxon likely to maintain a viable | Not applicable | There are no reports of etablished population of this taxon | High |
| | | population even when present in low | | persisting at low density. | 5 |
| | | densities (or persisting in adverse conditions | | | |
| | | by way of a dormant form)? | | | |
| _ | 7 | e exploitation | | | 1. m. 1 |
| 20 | 5.01 | Is the taxon likely to consume threatened or protected native taxa in the RA area? | Yes | Knowing that this taxon has a record of preying on amphibians and juveniles of other fish species which leads to species | High |
| | | protected native taxa in the KA area: | | dispalcement and eventually to the loss of biodiversity, genetic erosion and greater susceptibility to disease for native species | |
| 27 | 5.02 | Is the taxon likely to sequester food | No | Since this taxon is omnivorous it feeds on phytoplankton, | High |
| | | resources (including nutrients) to the | | periphyton, aquatic plants, small invertebrates, benthic fauna, and | |
| | | detriment of native taxa in the RA area? | | detritus materials (IUCNGSID,2020) | |
| 6 5 | | | | | |
| | <u>Reprodu</u> | uction | Voc | This taxon are maternal monthbuoders When a family law | Vonchish |
| | | <i>liction</i> Is the taxon likely to exhibit parental care | Yes | This taxon are maternal mouthbrooders. When a female lays her | Very high |
| | | Iction Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response | Yes | eggs in a nest prepared by the male. Then the male fertilizes the | Very high |
| | | <i>liction</i> Is the taxon likely to exhibit parental care | Yes | eggs in a nest prepared by the male. Then the male fertilizes the eggs, afterwhich the female picks up the eggs and incubates them | Very high |
| 28 | | Iction Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response | Yes | eggs in a nest prepared by the male. Then the male fertilizes the | Very high High |
| 28 | 6.01 | Iction Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? | | eggs in a nest prepared by the male. Then the male fertilizes the eggs, afterwhich the female picks up the eggs and incubates them in her mouth (CABI, 2020). The conditions of the RA meets the required conditions for maturation and reproduction of this taxon, which will enable it to | |
| 28 29 | 6.01 | Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? | Yes | eggs in a nest prepared by the male. Then the male fertilizes the eggs, afterwhich the female picks up the eggs and incubates them in her mouth (CABI, 2020). The conditions of the RA meets the required conditions for maturation and reproduction of this taxon, which will enable it to produce a viable gametes (CABI, 2020). | High |
| 28 29 | 6.01 | Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with | | eggs in a nest prepared by the male. Then the male fertilizes the eggs, afterwhich the female picks up the eggs and incubates them in her mouth (CABI, 2020). The conditions of the RA meets the required conditions for maturation and reproduction of this taxon, which will enable it to produce a viable gametes (CABI, 2020). This taxon can hybridize with its congeners and produces hybrids | |
| 28 29 | 6.01 | Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? | Yes | eggs in a nest prepared by the male. Then the male fertilizes the eggs, afterwhich the female picks up the eggs and incubates them in her mouth (CABI, 2020). The conditions of the RA meets the required conditions for maturation and reproduction of this taxon, which will enable it to produce a viable gametes (CABI, 2020). This taxon can hybridize with its congeners and produces hybrids that are morphologically difficult to identify such as the | High |
| 28 29 30 | 6.01 6.02 6.03 | Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa? | Yes | eggs in a nest prepared by the male. Then the male fertilizes the eggs, afterwhich the female picks up the eggs and incubates them in her mouth (CABI, 2020). The conditions of the RA meets the required conditions for maturation and reproduction of this taxon, which will enable it to produce a viable gametes (CABI, 2020). This taxon can hybridize with its congeners and produces hybrids that are morphologically difficult to identify such as the Oreochromis niloticus x O. aureus (USGS, 2020; CABI, 2020). | High |
| 28 29 30 | 6.01 | Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to | Yes | eggs in a nest prepared by the male. Then the male fertilizes the eggs, afterwhich the female picks up the eggs and incubates them in her mouth (CABI, 2020). The conditions of the RA meets the required conditions for maturation and reproduction of this taxon, which will enable it to produce a viable gametes (CABI, 2020). This taxon can hybridize with its congeners and produces hybrids that are morphologically difficult to identify such as the Oreochromis niloticus x O. aureus (USGS, 2020; CABI, 2020). There are no documented evidence of hermaphroditism/asexual | High |
| 28 29 30 31 | 6.01 6.02 6.03 | Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa? | Yes | eggs in a nest prepared by the male. Then the male fertilizes the eggs, afterwhich the female picks up the eggs and incubates them in her mouth (CABI, 2020). The conditions of the RA meets the required conditions for maturation and reproduction of this taxon, which will enable it to produce a viable gametes (CABI, 2020). This taxon can hybridize with its congeners and produces hybrids that are morphologically difficult to identify such as the Oreochromis niloticus x 0. aureus (USGS, 2020; CABI, 2020). There are no documented evidence of hermaphroditism/asexual reproduction of this species. | High |
| 28 29 30 31 | 6.01 6.02 6.03 6.04 | Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction? | Yes Yes No | eggs in a nest prepared by the male. Then the male fertilizes the eggs, afterwhich the female picks up the eggs and incubates them in her mouth (CABI, 2020). The conditions of the RA meets the required conditions for maturation and reproduction of this taxon, which will enable it to produce a viable gametes (CABI, 2020). This taxon can hybridize with its congeners and produces hybrids that are morphologically difficult to identify such as the Oreochromis niloticus x O. aureus (USGS, 2020; CABI, 2020). There are no documented evidence of hermaphroditism/asexual | High High |
| 28 29 30 31 32 | 6.01 6.02 6.03 6.04 6.05 | Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? | Yes Yes No | eggs in a nest prepared by the male. Then the male fertilizes the eggs, afterwhich the female picks up the eggs and incubates them in her mouth (CABI, 2020). The conditions of the RA meets the required conditions for maturation and reproduction of this taxon, which will enable it to produce a viable gametes (CABI, 2020). This taxon can hybridize with its congeners and produces hybrids that are morphologically difficult to identify such as the Oreochromis niloticus x O. aureus (USGS, 2020; CABI, 2020). There are no documented evidence of hermaphroditism/asexual reproduction of this species. This taxon requires nesting sites in order for the egss to be fertilized before the female can incubate them in their mouth (CABI, 2020). | High High High High |
| 28 29 30 31 32 | 6.01 6.02 6.03 6.04 | Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a | Yes Yes No | eggs in a nest prepared by the male. Then the male fertilizes the eggs, afterwhich the female picks up the eggs and incubates them in her mouth (CABI, 2020). The conditions of the RA meets the required conditions for maturation and reproduction of this taxon, which will enable it to produce a viable gametes (CABI, 2020). This taxon can hybridize with its congeners and produces hybrids that are morphologically difficult to identify such as the Oreochromis niloticus x O. aureus (USGS, 2020; CABI, 2020). There are no documented evidence of hermaphroditism/asexual reproduction of this species. This taxon requires nesting sites in order for the egss to be fertilized before the female can incubate them in their mouth (CABI, 2020). This taxon have a huge reproductive capacity with a female | High High |
| 28 29 30 31 32 | 6.01 6.02 6.03 6.04 6.05 | Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring | Yes No Yes | eggs in a nest prepared by the male. Then the male fertilizes the eggs, afterwhich the female picks up the eggs and incubates them in her mouth (CABI, 2020). The conditions of the RA meets the required conditions for maturation and reproduction of this taxon, which will enable it to produce a viable gametes (CABI, 2020). This taxon can hybridize with its congeners and produces hybrids that are morphologically difficult to identify such as the Oreochromis niloticus x O. aureus (USGS, 2020; CABI, 2020). There are no documented evidence of hermaphroditism/asexual reproduction of this species. This taxon requires nesting sites in order for the eggs to be fertilized before the female can incubate them in their mouth (CABI, 2020). This taxon have a huge reproductive capacity with a female producing about 1 000 to 1 500 eggs per spawn (IUCNGSID, | High High High High |
| 28 29 30 31 32 33 | 6.01 6.02 6.04 6.05 6.06 | Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? | Yes No Yes Yes | eggs in a nest prepared by the male. Then the male fertilizes the eggs, afterwhich the female picks up the eggs and incubates them in her mouth (CABI, 2020). The conditions of the RA meets the required conditions for maturation and reproduction of this taxon, which will enable it to produce a viable gametes (CABI, 2020). This taxon can hybridize with its congeners and produces hybrids that are morphologically difficult to identify such as the Oreochromis niloticus x 0. aureus (USGS, 2020; CABI, 2020). There are no documented evidence of hermaphroditism/asexual reproduction of this species. This taxon requires nesting sites in order for the eggs to be fertilized before the female can incubate them in their mouth (CABI, 2020). This taxon have a huge reproductive capacity with a female producing about 1 000 to 1 500 eggs per spawn (IUCNGSID, 2019). | High High High High |
| 28 29 30 31 32 33 | 6.01 6.02 6.03 6.04 6.05 | Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? How many time units (days, months, years) | Yes No Yes | eggs in a nest prepared by the male. Then the male fertilizes the eggs, afterwhich the female picks up the eggs and incubates them in her mouth (CABI, 2020). The conditions of the RA meets the required conditions for maturation and reproduction of this taxon, which will enable it to produce a viable gametes (CABI, 2020). This taxon can hybridize with its congeners and produces hybrids that are morphologically difficult to identify such as the Oreochromis niloticus x O. aureus (USGS, 2020; CABI, 2020). There are no documented evidence of hermaphroditism/asexual reproduction of this species. This taxon requires nesting sites in order for the egss to be fertilized before the female can incubate them in their mouth (CABI, 2020). This taxon have a huge reproductive capacity with a female producing about 1 000 to 1 500 eggs per spawn (IUCNGSID, 2019). This taxon reaches the age of maturity at 5-6 months (IUCNGSID, | High High High |
| 28 29 30 31 32 33 | 6.01 6.02 6.04 6.05 6.06 | Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? | Yes No Yes Yes | eggs in a nest prepared by the male. Then the male fertilizes the eggs, afterwhich the female picks up the eggs and incubates them in her mouth (CABI, 2020). The conditions of the RA meets the required conditions for maturation and reproduction of this taxon, which will enable it to produce a viable gametes (CABI, 2020). This taxon can hybridize with its congeners and produces hybrids that are morphologically difficult to identify such as the Oreochromis niloticus x 0. aureus (USGS, 2020; CABI, 2020). There are no documented evidence of hermaphroditism/asexual reproduction of this species. This taxon requires nesting sites in order for the eggs to be fertilized before the female can incubate them in their mouth (CABI, 2020). This taxon have a huge reproductive capacity with a female producing about 1 000 to 1 500 eggs per spawn (IUCNGSID, 2019). | High High High High |

| 35 | | | | | |
|---|---|---|-----------------------------|--|----------------------|
| | 7.01 | How many potential internal | One | Accidental introduction from aquaculture activities and intentional | High |
| | | vectors/pathways could the taxon use to | | introduction with human intervention (USGS, 2020). | |
| | | disperse within the RA area (with suitable | | | |
| 36 | 7.02 | Will any of these vectors/pathways bring the | Yes | Because of the taxons commercial importance, the aquaculture/ | High |
| | | taxon in close proximity to one or more | | fish farming pathway could bring this taxon in close proximity to | |
| | | protected areas (e.g. MCZ, MPA, SSSI)? | | one or more protected areas. | |
| 37 | 7.03 | Does the taxon have a means of actively | No | Their physical characteristics does not allow attachment to any | High |
| | | attaching itself to hard substrata (e.g. ship | | substrata (FishBase, 2020) | |
| | | hulls, pilings, buoys) such that it enhances | | | |
| | | the likelihood of dispersal? | | | |
| 38 | 7.04 | Is natural dispersal of the taxon likely to | No | Since the eggs are protected by the mother until it hatches | High |
| | | occur as eggs (for animals) or as propagules | | (CABI,2020) | |
| | | (for plants: seeds, spores) in the RA area? | | | |
| 39 | 7.05 | Is natural dispersal of the taxon likely to | No | Since the eggs are protected by the mother until it hatches and | High |
| | | occur as larvae/juveniles (for animals) or as | | even when the fry are free-swimming they will return to the | |
| | | fragments/seedlings (for plants) in the RA | | mouth of the female for protection (CABI,2020). | |
| | | area? | | | |
| 40 | 7.06 | Are older life stages of the taxon likely to | No | There are no records about this taxon's migratory behaviour. | High |
| | | migrate in the RA area for reproduction? | | | - |
| 41 | 7.07 | Are propagules or eggs of the taxon likely to | Yes | As this taxon lives in shallow waters in which can easily be | High |
| | | be dispersed in the RA area by other animals? | | targeted and in return they can be predated by birds (CABI, 2020). | 5 |
| 42 | 7.08 | Is dispersal of the taxon along any of the | Yes | This taxon which is readily available in commercial markets | High |
| - | | vectors/pathways mentioned in the previous | | (alive) and in aquaculture farms can be rapidly disperesed, | |
| | | seven questions (35–41; i.e. either | | knowing also the fact that the RA area is highly susceptable to | |
| | | unintentional or intentional) likely to be | | flooding and natural calamities which could rapidly dispersed this | |
| 43 | 7.09 | Is dispersal of the taxon density dependent? | Not applicable | There are no records about this taxon's density dependence. | High |
| | | ce attributes | appricable | | |
| | | Is the taxon able to withstand being out of | Not applicable | There are no records about this taxon's density dependence. | High |
| | | water for extended periods (e.g. minimum of | | | |
| | | one or more hours) at some stage of its life | | | |
| | | cycle? | | | |
| 45 | 8.02 | Is the taxon tolerant of a wide range of | Yes | This taxon is tolerant of a range of conditions such as amonia | Very high |
| | 5.52 | water quality conditions relevant to that | | (mg/l) < 0.1, temperature of 25°C to 30°C, Carbon Dioxide | , |
| | | taxon? [In the Justification field, indicate the | | (mg/l): <20 tollerated and salinity (ppm): <1 preferred, <8 | |
| | | relevant water quality variable(s) being | | tolerated (CABI, 2019). | |
| 46 | 8.03 | Can the taxon be controlled or eradicated in | Yes | In Palau a programme to remove tilapia from the country was | Very high |
| . 0 | 5.05 | the wild with chemical, biological, or other | | succesful using a chemical called Rotenone, which was applied | , mgn |
| | | agents/means? | | directly to 5 infested sites (IUCNGSID, 2020). | |
| 47 | 8.04 | Is the taxon likely to tolerate or benefit from | Yes | Due to their ability to survive in a wide range of environmental | Very high |
| т/ | 0.04 | environmental/human disturbance? | 103 | conditions specially in tropical countries (RA area) it can benefit | very mgn |
| | 1 | cristion nentaly numan disturbance: | 1 | conditions speciary in copical countries (NA died) it can belletit | 1 |
| | | | | from environmental/human distrubances (CART 2020) | |
| 48 | 8 05 | Is the taxon able to tolerate calinity levels | No | from environmental/human distrubances (CABI, 2020). | High |
| 48 | 8.05 | Is the taxon able to tolerate salinity levels | No | This taxon is the least salt tolerant among the other Oreochromis | High |
| 48 | 8.05 | that are higher or lower than those found in | No | | High |
| | | that are higher or lower than those found in its usual environment? | | This taxon is the least salt tolerant among the other Oreochromis species (Md, 2008). | |
| | 8.05 8.06 | that are higher or lower than those found in its usual environment? Are there effective natural enemies | No Yes | This taxon is the least salt tolerant among the other Oreochromis species (Md, 2008). Clarias gariepinus can be a predator if this taxon which is present | High High |
| 49 | 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 | | This taxon is the least salt tolerant among the other Oreochromis species (Md, 2008). | |
| 49 C. (| 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 e change | | This taxon is the least salt tolerant among the other Oreochromis species (Md, 2008). Clarias gariepinus can be a predator if this taxon which is present | |
| 49 C. (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 | Yes | This taxon is the least salt tolerant among the other Oreochromis species (Md, 2008). Clarias gariepinus can be a predator if this taxon which is present in the RA area (CABI, 2020). | High |
| 49 C. (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 Under the predicted future climatic | | This taxon is the least salt tolerant among the other Oreochromis species (Md, 2008). Clarias gariepinus can be a predator if this taxon which is present in the RA area (CABI, 2020). Together with the fact that the RA area is prone to natural | |
| 49 C. (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 conditions, are the risks of entry into the RA | Yes | This taxon is the least salt tolerant among the other Oreochromis species (Md, 2008). Clarias gariepinus can be a predator if this taxon which is present in the RA area (CABI, 2020). Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, | High |
| 49 C. (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 Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, | Yes | This taxon is the least salt tolerant among the other Oreochromis species (Md, 2008). Clarias gariepinus can be a predator if this taxon which is present in the RA area (CABI, 2020). Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to survive the cilamatic conditions of a | High |
| 49 C. (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 conditions, are the risks of entry into the RA | Yes | This taxon is the least salt tolerant among the other Oreochromis species (Md, 2008). Clarias gariepinus can be a predator if this taxon which is present in the RA area (CABI, 2020). Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to survive the cilamatic conditions of a tropical environtment waters, the risk of entry through accidental | High |
| 49 C. (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 Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, | Yes | This taxon is the least salt tolerant among the other Oreochromis species (Md, 2008). Clarias gariepinus can be a predator if this taxon which is present in the RA area (CABI, 2020). Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to survive the cilamatic conditions of a tropical environtment waters, the risk of entry through accidental introduction from aquaculture activities, intentional introduction | High |
| 49 C. (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 Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, | Yes | This taxon is the least salt tolerant among the other Oreochromis species (Md, 2008). Clarias gariepinus can be a predator if this taxon which is present in the RA area (CABI, 2020). Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to survive the cilamatic conditions of a tropical environtment waters, the risk of entry through accidental introduction from aquaculture activities, intentional introduction with human intervention and aquarium escape would most likely | High |
| 49 <u>C. (</u> 9. (50 | 8.06 Climate 9.01 | that are higher or lower than those found in its usual environment? Are there effective natural enemies (predators) of the taxon present in the RA e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? | Yes | This taxon is the least salt tolerant among the other Oreochromis species (Md, 2008). Clarias gariepinus can be a predator if this taxon which is present in the RA area (CABI, 2020). Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to survive the cilamatic conditions of a tropical environtment waters, the risk of entry through accidental introduction from aquaculture activities, intentional introduction with human intervention and aquarium escape would most likely increase the risk of entry of this taxon. | High |
| 49 <u>C. (</u> 9. (50 | 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 conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic | Yes | This taxon is the least salt tolerant among the other Oreochromis species (Md, 2008). Clarias gariepinus can be a predator if this taxon which is present in the RA area (CABI, 2020). Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to survive the cilamatic conditions of a tropical environtment waters, the risk of entry through accidental introduction from aquaculture activities, intentional introduction with human intervention and aquarium escape would most likely increase the risk of entry of this taxon. Together with the fact that the RA area is prone to natural | High |
| 49 <u>C. (</u> 9. (50 | 8.06 Climate 9.01 | that are higher or lower than those found in its usual environment? Are there effective natural enemies (predators) of the taxon present in the RA e change change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment | Yes | This taxon is the least salt tolerant among the other Oreochromis species (Md, 2008). Clarias gariepinus can be a predator if this taxon which is present in the RA area (CABI, 2020). Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to survive the cilamatic conditions of a tropical environtment waters, the risk of entry through accidental introduction from aquaculture activities, intentional introduction with human intervention and aquarium escape would most likely increase the risk of entry of this taxon. Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, | High |
| 49 <u>C. (</u> 9. (50 | 8.06 Climate 9.01 | that are higher or lower than those found in its usual environment? Are there effective natural enemies (predators) of the taxon present in the RA e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, | Yes | This taxon is the least salt tolerant among the other Oreochromis species (Md, 2008). Clarias gariepinus can be a predator if this taxon which is present in the RA area (CABI, 2020). Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to survive the cilamatic conditions of a tropical environtment waters, the risk of entry through accidental introduction from aquaculture activities, intentional introduction with human intervention and aquarium escape would most likely increase the risk of entry of this taxon. Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to survive the cilamatic conditions of a | High |
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| 49 C. (9. (50 51 52 | 8.06 Climate 9.01 9.02 9.03 | 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 change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic | Yes Increase Increase | This taxon is the least salt tolerant among the other Oreochromis species (Md, 2008). Clarias gariepinus can be a predator if this taxon which is present in the RA area (CABI, 2020). Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to survive the cilamatic conditions of a tropical environtment waters, the risk of entry through accidental introduction from aquaculture activities, intentional introduction with human intervention and aquarium escape would most likely increase the risk of entry of this taxon. Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to survive the cilamatic conditions of a tropical environtment waters, the risk of entry through accidental introduction from aquaculture activities, intentional introduction with human intervention and aquarium escape would most likely increase the risk of entry of this taxon. Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to survive the cilamatic conditions of a tropical environtment waters, the risk of entry through accidental introduction from aquaculture activities, intentional introduction with human intervention and aquarium escape would most likely increase the risk of entry of this taxon. Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to survive the cilamatic conditions of a tropical environtment waters, the risk of entry through accidental introduction from aquaculture activities, intentional introduction with human intervention and aquarium escape would most likely increase the risk of entry of this taxon. | High High High |
| 49 C. (9. (50 51 52 | 8.06 Climate 9.01 9.02 9.03 | that are higher or lower than those found in its usual environment? Are there effective natural enemies (predators) of the taxon present in the RA e change change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, 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 | Yes Increase Increase | This taxon is the least salt tolerant among the other Oreochromis species (Md, 2008). Clarias gariepinus can be a predator if this taxon which is present in the RA area (CABI, 2020). Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to survive the cilamatic conditions of a tropical environtment waters, the risk of entry through accidental introduction from aquaculture activities, intentional introduction flow and quarium escape would most likely increase the risk of entry of this taxon. Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to survive the cilamatic conditions of a tropical environtment waters, the risk of entry through accidental introduction from aquaculture activities, intentional introduction gather with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to survive the cilamatic conditions of a tropical environtment waters, the risk of entry through accidental introduction from aquaculture activities, intentional introduction with human intervention and aquarium escape would most likely increase the risk of entry of this taxon. Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to survive the cilamatic conditions of a tropical environtment waters, the risk of entry through accidental introduction from aquaculture activities, intentional introduction so f a tropical environtment waters, the risk of entry through accidental introduction from aquaculture activities, intentional introduction with human intervention and aquarium escape would most likely increase the risk of entry of this taxon. Since this taxon is known to reproduce at a rapid rate, which in return overcrowds and causes competition pressures on native | High High High |
| 49 C. (9. (50 51 52 | 8.06 Climate 9.01 9.02 9.03 | that are higher or lower than those found in its usual environment? Are there effective natural enemies (predators) of the taxon present in the RA e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? | Yes Increase Increase | This taxon is the least salt tolerant among the other Oreochromis species (Md, 2008). Clarias gariepinus can be a predator if this taxon which is present in the RA area (CABI, 2020). Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to survive the cilamatic conditions of a tropical environtment waters, the risk of entry through accidental introduction from aquaculture activities, intentional introduction flow and aquarium escape would most likely increase the risk of entry of this taxon. Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to survive the cilamatic conditions of a tropical environtment waters, the risk of entry through accidental introduction from aquaculture activities, intentional introduction a tropical environtment waters, the risk of entry through accidental introduction from aquaculture activities, intentional introduction with human intervention and aquarium escape would most likely increase the risk of entry of this taxon. Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to survive the cilamatic conditions of a tropical environtment waters, the risk of entry through accidental introduction from aquaculture activities, intentional introduction with human intervention and floods (Brändlin & Wingard, 2013) and their ability to survive the cilamatic conditions of a tropical environtment waters, the risk of entry through accidental introduction from aquaculture activities, intentional introduction with human intervention and aquarium escape would most likely increase the risk of entry of this taxon. | High High High |
| 49 C. (9. (50 51 52 | 8.06 Climate 9.01 9.02 9.03 | that are higher or lower than those found in its usual environment? Are there effective natural enemies (predators) of the taxon present in the RA e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? | Yes Increase Increase | This taxon is the least salt tolerant among the other Oreochromis species (Md, 2008). Clarias gariepinus can be a predator if this taxon which is present in the RA area (CABI, 2020). Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to survive the cilamatic conditions of a tropical environtment waters, the risk of entry through accidental introduction from aquaculture activities, intentional introduction with human intervention and aquarium escape would most likely increase the risk of entry of this taxon. Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to survive the cilamatic conditions of a tropical environtment waters, the risk of entry through accidental introduction from aquaculture activities, intentional introduction with human intervention and aquarium escape would most likely increase the risk of entry of this taxon. Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to survive the cilamatic conditions of a tropical environtment waters, the risk of entry through accidental introduction from aquaculture activities, intentional introduction with human intervention and aquarium escape would most likely increase the risk of entry of this taxon. Songether with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to survive the cilamatic conditions of a tropical environtment waters, the risk of entry through accidental introduction from aquaculture activities, intentional introduction function aquaculture activities, intentional introduction with human intervention and aquarium escape would most likely increase the risk of entry of this taxon. Since this taxon is known to reproduce at a rapid rate, which in return overcrowds and causes competition | High High High |
| 49 C. (9. (50 51 52 | 8.06 Climate 9.01 9.02 9.03 | that are higher or lower than those found in its usual environment? Are there effective natural enemies (predators) of the taxon present in the RA e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? | Yes Increase Increase | This taxon is the least salt tolerant among the other Oreochromis species (Md, 2008). Clarias gariepinus can be a predator if this taxon which is present in the RA area (CABI, 2020). Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to survive the cilamatic conditions of a tropical environtment waters, the risk of entry through accidental introduction from aquaculture activities, intentional introduction with human intervention and aquarium escape would most likely increase the risk of entry of this taxon. Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to survive the cilamatic conditions of a tropical environtment waters, the risk of entry through accidental introduction from aquaculture activities, intentional introduction with human intervention and aquarium escape would most likely increase the risk of entry of this taxon. Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to survive the cilamatic conditions of a tropical environtment waters, the risk of entry through accidental introduction from aquaculture activities, intentional introduction with human intervention and aquarium escape would most likely increase the risk of entry of this taxon. Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to survive the cilamatic conditions of a tropical environtment waters, the risk of entry through accidental introduction from aquaculture activities, intentional introduction with human intervention and aquarium escape would most likely increase the risk of entry of this taxon. Since this taxon is known to reproduce at a rapid rate, which in return overcrowds and causes competition pressures on native fishes. Also, they are known to prey on | High High High |
| 49 C. (9. (50 51 52 | 8.06 Climate 9.01 9.02 9.03 | that are higher or lower than those found in its usual environment? Are there effective natural enemies (predators) of the taxon present in the RA e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? | Yes Increase Increase | This taxon is the least salt tolerant among the other Oreochromis species (Md, 2008). Clarias gariepinus can be a predator if this taxon which is present in the RA area (CABI, 2020). Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to survive the cilamatic conditions of a tropical environtment waters, the risk of entry through accidental introduction from aquaculture activities, intentional introduction with human intervention and aquarium escape would most likely increase the risk of entry of this taxon. Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to survive the cilamatic conditions of a tropical environtment waters, the risk of entry through accidental introduction from aquaculture activities, intentional introduction with human intervention and aquarium escape would most likely increase the risk of entry of this taxon. Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to survive the cilamatic conditions of a tropical environtment waters, the risk of entry through accidental introduction from aquaculture activities, intentional introduction with human intervention and aquarium escape would most likely increase the risk of entry of this taxon. Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to survive the cilamatic conditions of a tropical environtment waters, the risk of entry through accidental introduction from aquaculture activities, intentional introduction with human intervention and aquarium escape would most likely increase the risk of entry of this taxon. Since this taxon is known to reproduce at a rapid rate, which in return overcrowds and causes competition pressures on native fishes. Also, they are known to prey on | High High High |

| 54 | 9.05 | Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? | Higher | Since this taxon is known to reproduce at a rapid rate, which in return overcrowds and causes competition pressures on native fishes. Also, they are known to prey on amphibians and juveniles of other fish species which leads to species dispalcement and eventually to the loss of biodiversity, genetic erosion and greater susceptibility to disease for native species. Moreover, they can stir up bottom sediments as they create nesting areas which causes siltation and bioturbidity reducing water quality and degrading | Very high |
|----|------|---|--------|---|-----------|
| 55 | 9.06 | Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors? | Higher | anuatic habitats (CABI. 2020: IUCNGSID.2020: USGS. 2020). Since this taxon is known to reproduce at a rapid rate, which in return overcrowds and causes competition pressures on native fishes. Also, they are known to prey on amphibians and juveniles of other fish species which leads to species dispalcement and eventually to the loss of biodiversity, genetic erosion and greater susceptibility to disease for native species. Moreover, they can stir up bottom sediments as they create nesting areas which causes siltation and bioturbidity reducing water quality and degrading aquatic habitats (CABI. 2020; IUCNGSID.2020; USGS. 2020). | Very high |

| Scores | |
|---|---|
| BRA | 37.0 |
| BRA Outcome | High |
| BRA+CCA | 49.0 |
| BRA+CCA Outcome | High |
| Score partition | |
| A. Biogeography/Historical | 21.0 |
| 1. Domestication/Cultivation | 4.0 |
| 2. Climate, distribution and introduction risk | 3.0 |
| 3. Invasive elsewhere | 14.0 |
| B. Biology/Ecology | 16.0 |
| 4. Undesirable (or persistence) traits | 10.0 |
| 5. Resource exploitation | 5.0 |
| 6. Reproduction | 1.0 |
| 7. Dispersal mechanisms | -1.0 |
| 8. Tolerance attributes | 1.0 |
| C. Climate change | 12.0 |
| 9. Climate change | 12.0 |
| Answered Questions | |
| Total | 55 13 |
| A. Biogeography/Historical | _ |
| 1. Domestication/Cultivation | 3 |
| 2. Climate, distribution and introduction risk 3. Invasive elsewhere | 5 |
| | 5 |
| | 26 |
| B. Biology/Ecology | 36 |
| B. Biology/Ecology 4. Undesirable (or persistence) traits | 36 12 |
| B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation | 36 12 |
| B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction | 36 12 2 7 |
| B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms | 36 12 2 7 9 |
| B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes | 36 12 2 7 9 6 |
| B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change | 36 12 2 7 9 6 6 |
| B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change | 36 12 2 7 9 6 |
| B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change 9. Sectors affected | 36 12 2 7 9 6 6 6 6 |
| B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial | 36 12 2 7 9 6 6 6 6 7 7 7 9 9 6 6 7 7 7 7 7 7 7 |
| 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. Sectors affected | 36 12 2 7 9 6 6 6 6 |

| Thresholds | |
|---------------|--------------|
| BRA | 34.5 |
| BRA+CCA | 34.5 |
| Confidence | |
| BRA+CCA | 0.87 |
| BRA | 0.87 |
| CCA | 0.88 |
| | |
| Date and Time | |
| 05/07/20 | 020 23:15:02 |

| axon and Assessor details | | | | | |
|------------------------------------|--|--|--|--|--|
| Category | Fishes and Lampreys (freshwater) | | | | |
| Taxon name | Oreochromis niloticus x O. urolepis | | | | |
| Common name | Nila tilapia x wami tilapia | | | | |
| Assessor | Gilles, To | | | | |
| Risk screening context | | | | | |
| Reason and socio-economic benefits | Aquaculture | | | | |
| Risk assessment area | Lake Taal | | | | |
| Taxonomy | Actinopteri (ray-finned fishes) > Cichliformes (Cichlids, convict blennies) > Cichlidae (Cichlids) > | | | | |
| Native range | | | | | |
| Introduced range | | | | | |
| URL | | | | | |

| | | | Response | Justification (references and/or other information) | Confidence |
|------|---------|---|----------|---|------------------------|
| | | graphy/Historical | | | |
| 1. C | | ication/Cultivation | | | |
| 1 | 1.01 | Has the taxon been the subject of | Yes | This taxon is considered to be the second most intensively farmed | Very high |
| | | domestication (or cultivation) for at least 20 | | species in the world. In China, it produces almost half of the | |
| | | generations? | | worlds' tilapia supply (IUCNGSID, 2020; CABI,2020) | |
| 2 | 1.02 | Is the taxon harvested in the wild and likely | Yes | This taxon is a very important fish in aquaculture, it harvested for | Very high |
| | | to be sold or used in its live form? | | its protein source which in return gives income to people. It is | |
| | | | | also used as a laboratory model and for sport fishing (IUCNGSID, | |
| | | | | 2020; CABI,2020). | |
| 3 | 1.03 | Does the taxon have invasive races, | Yes | The following subspecies of the taxon were reported to cause | Very high |
| | | varieties, sub-taxa or congeners? | | adverse ecological impacts after introduction: Oreochromis | |
| | | | | niloticus baringoensis, Oreochromis niloticus cancellatus, | |
| | | | | Oreochromis niloticus eduardianus, Oreochromis niloticus filoa, | |
| | | | | Oreochromis niloticus niloticus, Oreochromis niloticus sugutae, | |
| | | | | Oreohromis niloticus tana and Oreohromis niloticus vulcani | |
| 2. C | Climate | , distribution and introduction risk | | | |
| 1 | 2.01 | How similar are the climatic conditions of the | High | The RA area and the taxon's native range has both tropical | High |
| | | Risk Assessment (RA) area and the taxon's | - | climate (CABI,2020; FishBAse, 2019) | - |
| | | native range? | | | |
| 5 | 2.02 | What is the quality of the climate matching | High | The RA area and the taxon's native range has both tropical | Very high |
| | | data? | - | climate (CABI,2020; FishBAse, 2019) | |
| 5 | 2.03 | Is the taxon already present outside of | Yes | The taxon has been introduced in the country for farming and | Very high |
| | - | captivity in the RA area? | | breeding to be used as a food source (Guerrero, 2019). | |
| 7 | 2.04 | How many potential vectors could the taxon | One | Accidental introduction from aquaculture activities and intentional | Very high |
| | | use to enter in the RA area? | | introduction with human intervention (CABI, 2020). | |
| 3 | 2.05 | Is the taxon currently found in close | Yes | This taxon is the third most farmed fish in the world after carps | Very high |
| - | | proximity to, and likely to enter into, the RA | | and salmonids and it accounts for 4% of global aquaculture | · • · / · · · j · · |
| | | area in the near future (e.g. unintentional | | production. It is currently mass produced in Asia (China, Thailand | |
| | | and intentional introductions)? | | and etc.) and it has already established populations in many | |
| | | | | tropical to subtropical countries. In United States this taxon is | |
| | | | | already established in the lakes and rivers of Mississippi, Florida | |
| | | | | and Georgia (FAO.2020: CABI.2020). | |
| 3 I | nvasiv | e elsewhere | | Tallu Georgia (FAO.2020), CADI.2020). | |
|) | 3.01 | Has the taxon become naturalised | Yes | This taxon is known to reproduce at a rapid rate, which in return | Very high |
| - | | (established viable populations) outside its | | overcrowds and causes competition pressures on native fishes. | · • · / · · · j · · |
| | | native range? | | Also, they are known to prey on amphibians and juveniles of other | |
| | | hauve runge. | | fish species which leads to species dispalcement and eventually to | |
| | | | | the loss of biodiversity, genetic erosion and greater susceptibility | |
| | | | | | |
| | | | | | |
| | | | | to disease for native species. In Nevada and Arizona, the | |
| | | | | introduction of this taxon has casued the decline and dispalcemet | |
| | | | | introduction of this taxon has casued the decline and dispalcemet of endangered Moapa Dace, Moapa White and the Redspotted | |
| 10 | 3 0 2 | In the taxon's introduced range, are there | Vec | introduction of this taxon has casued the decline and dispalcemet of endangered Moapa Dace, Moapa White and the Redspotted Sunfish (IUCNGSID.2020: USGS. 2020). | Veny high |
| 10 | 3.02 | In the taxon's introduced range, are there | Yes | introduction of this taxon has casued the decline and dispalcemet of endangered Moapa Dace, Moapa White and the Redspotted Sunfish (IUCNGSID.2020: USGS. 2020). This taxon is known to reproduce at a rapid rate, which in return | Very high |
| 10 | 3.02 | known adverse impacts to wild stocks or | Yes | introduction of this taxon has casued the decline and dispalcemet of endangered Moapa Dace, Moapa White and the Redspotted Sunfish (IUCNGSID.2020: USGS. 2020). This taxon is known to reproduce at a rapid rate, which in return overcrowds and causes competition pressures on native fishes. | Very high |
| 10 | 3.02 | | Yes | introduction of this taxon has casued the decline and dispalcemet of endangered Moapa Dace, Moapa White and the Redspotted <u>Sunfish (IUCNGSID.2020: USGS. 2020)</u> . This taxon is known to reproduce at a rapid rate, which in return overcrowds and causes competition pressures on native fishes. Also, they are known to prey on amphibians and juveniles of other | Very high |
| LO | 3.02 | known adverse impacts to wild stocks or | Yes | introduction of this taxon has casued the decline and dispalcemet of endangered Moapa Dace, Moapa White and the Redspotted <u>Sunfish (IUCNGSID.2020: USGS. 2020)</u> . This taxon is known to reproduce at a rapid rate, which in return overcrowds and causes competition pressures on native fishes. Also, they are known to prey on amphibians and juveniles of other fish species which leads to species dispalcement and eventually to | Very high |
| 10 | 3.02 | known adverse impacts to wild stocks or | Yes | introduction of this taxon has casued the decline and dispalcemet of endangered Moapa Dace, Moapa White and the Redspotted <u>Sunfish (IUCNGSID.2020: USGS. 2020)</u> . This taxon is known to reproduce at a rapid rate, which in return overcrowds and causes competition pressures on native fishes. Also, they are known to prey on amphibians and juveniles of other fish species which leads to species dispalcement and eventually to the loss of biodiversity, genetic erosion and greater susceptibility | Very high |
| 10 | 3.02 | known adverse impacts to wild stocks or | Yes | introduction of this taxon has casued the decline and dispalcemet of endangered Moapa Dace, Moapa White and the Redspotted <u>Sunfish (IUCNGSID.2020: USGS. 2020)</u> . This taxon is known to reproduce at a rapid rate, which in return overcrowds and causes competition pressures on native fishes. Also, they are known to prey on amphibians and juveniles of other fish species which leads to species dispalcement and eventually to the loss of biodiversity, genetic erosion and greater susceptibility to disease for native species. In Nevada and Arizona, the | Very high |
| LO | 3.02 | known adverse impacts to wild stocks or | Yes | introduction of this taxon has casued the decline and dispalcemet of endangered Moapa Dace, Moapa White and the Redspotted Sunfish (IUCNGSID.2020: USGS. 2020). This taxon is known to reproduce at a rapid rate, which in return overcrowds and causes competition pressures on native fishes. Also, they are known to prey on amphibians and juveniles of other fish species which leads to species dispalcement and eventually to the loss of biodiversity, genetic erosion and greater susceptibility to disease for native species. In Nevada and Arizona, the introduction of this taxon has casued the decline and dispalcemet | Very high |
| LO | 3.02 | known adverse impacts to wild stocks or | Yes | introduction of this taxon has casued the decline and dispalcemet of endangered Moapa Dace, Moapa White and the Redspotted <u>Sunfish (IUCNGSID.2020: USGS. 2020)</u> . This taxon is known to reproduce at a rapid rate, which in return overcrowds and causes competition pressures on native fishes. Also, they are known to prey on amphibians and juveniles of other fish species which leads to species dispalcement and eventually to the loss of biodiversity, genetic erosion and greater susceptibility to disease for native species. In Nevada and Arizona, the introduction of this taxon has casued the decline and dispalcemet of endangered Moapa Dace, Moapa White and the Redspotted | Very high |
| | | known adverse impacts to wild stocks or commercial taxa? | | introduction of this taxon has casued the decline and dispalcemet of endangered Moapa Dace, Moapa White and the Redspotted <u>Sunfish (IUCNGSID.2020: USGS. 2020)</u> . This taxon is known to reproduce at a rapid rate, which in return overcrowds and causes competition pressures on native fishes. Also, they are known to prey on amphibians and juveniles of other fish species which leads to species dispalcement and eventually to the loss of biodiversity, genetic erosion and greater susceptibility to disease for native species. In Nevada and Arizona, the introduction of this taxon has casued the decline and dispalcemet of endangered Moapa Dace, Moapa White and the Redspotted Sunfish (IUCNGSID.2020: USGS. 2020). | |
| | 3.02 | known adverse impacts to wild stocks or commercial taxa? In the taxon's introduced range, are there | Yes | introduction of this taxon has casued the decline and dispalcemet of endangered Moapa Dace, Moapa White and the Redspotted Sunfish (IUCNGSID.2020: USGS. 2020). This taxon is known to reproduce at a rapid rate, which in return overcrowds and causes competition pressures on native fishes. Also, they are known to prey on amphibians and juveniles of other fish species which leads to species dispalcement and eventually to the loss of biodiversity, genetic erosion and greater susceptibility to disease for native species. In Nevada and Arizona, the introduction of this taxon has casued the decline and dispalcemet of endangered Moapa Dace, Moapa White and the Redspotted Sunfish (IUCNGSID.2020: USGS. 2020). This taxon is known to reproduce at a rapid rate, which in return | Very high Very high |
| | | known adverse impacts to wild stocks or commercial taxa? | | introduction of this taxon has casued the decline and dispalcemet of endangered Moapa Dace, Moapa White and the Redspotted Sunfish (IUCNGSID.2020: USGS. 2020). This taxon is known to reproduce at a rapid rate, which in return overcrowds and causes competition pressures on native fishes. Also, they are known to prey on amphibians and juveniles of other fish species which leads to species dispalcement and eventually to the loss of biodiversity, genetic erosion and greater susceptibility to disease for native species. In Nevada and Arizona, the introduction of this taxon has casued the decline and dispalcemet of endangered Moapa Dace, Moapa White and the Redspotted Sunfish (IUCNGSID.2020: USGS. 2020). This taxon is known to reproduce at a rapid rate, which in return overcrowds and causes competition pressures on native fishes. | |
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| 1 | 3.03 | known adverse impacts to wild stocks or commercial taxa? In the taxon's introduced range, are there known adverse impacts to aquaculture? In the taxon's introduced range, are there known adverse impacts to ecosystem services? In the taxon's introduced range, are there | Yes | introduction of this taxon has casued the decline and dispalcemet of endangered Moapa Dace, Moapa White and the Redspotted Sunfish (IUCNGSID.2020: USGS. 2020). This taxon is known to reproduce at a rapid rate, which in return overcrowds and causes competition pressures on native fishes. Also, they are known to prey on amphibians and juveniles of other fish species which leads to species dispalcement and eventually to the loss of biodiversity, genetic erosion and greater susceptibility to disease for native species. In Nevada and Arizona, the introduction of this taxon has casued the decline and dispalcemet of endangered Moapa Dace, Moapa White and the Redspotted Sunfish (IUCNGSID.2020: USGS. 2020). This taxon is known to reproduce at a rapid rate, which in return overcrowds and causes competition pressures on native fishes. Also, they are known to prey on amphibians and juveniles of other fish species which leads to species dispalcement and eventually to the loss of biodiversity, genetic erosion and greater susceptibility to disease for native species. In Nevada and Arizona, the introduction of this taxon has casued the decline and dispalcemet of endangered Moapa Dace, Moapa White and the Redspotted Sunfish (IUCNGSID.2020: USGS. 2020). The introduction of this taxon has resulted in a significant development of aquaculture which improved the economic status of the introduced range (CABI,2019). Records in Malaysia shows that the cancer risk calculations due to consumption of Tilapia exceeded the USEPA's acceptable risk level | Very high Very high |

| | | //Ecology | | | |
|----|---------|---|----------------|---|-----------|
| | | able (or persistence) traits | Vac | This taxon has a record of proving on amphibian and investig | Vonubish |
| 14 | 4.01 | Is it likely that the taxon will be poisonous or pose other risks to human health? | Yes | This taxon has a record of preying on amphibians and juveniles of other fish species which leads to species dispalcement and eventually to the loss of biodiversity, genetic erosion and greater susceptibility to disease for native species (USGS, 2020). | Very high |
| 15 | 4.02 | Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? | Yes | This taxon has a record of preying on amphibians and juveniles of other fish species which leads to species dispalcement and eventually to the loss of biodiversity, genetic erosion and greater susceptibility to disease for native species (USGS, 2020). | Very high |
| 16 | 4.03 | Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? | Yes | This taxon has a record of preying on amphibians and juveniles of other fish species which leads to species dispalcement and eventually to the loss of biodiversity, genetic erosion and greater susceptibility to disease for native species (USGS, 2020). | Very high |
| 17 | 4.04 | Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? | Yes | This taxon is known to reproduce at a rapid rate, which in return overcrowds and causes competition pressures on native fishes. Also, they are known to prey on amphibians and juveniles of other fish species which leads to species dispalcement and eventually to the loss of biodiversity, genetic erosion and greater susceptibility to disease for native species. In Nevada and Arizona, the introduction of this taxon has casued the decline and dispalcemet of endangered Moapa Dace, Moapa White and the Redspotted Sunfish (IUCNGSID.2020; USGS, 2020). | Very high |
| 18 | 4.05 | Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA area? | Yes | This taxon is known to reproduce at a rapid rate, which in return overcrowds and causes competition pressures on native fishes. Also, they are known to prey on amphibians and juveniles of other fish species which leads to species dispalcement and eventually to the loss of biodiversity, genetic erosion and greater susceptibility to disease for native species. In Nevada and Arizona, the introduction of this taxon has casued the decline and dispalcemet of endangered Moapa Dace, Moapa White and the Redspotted Sunfish (IUCNGSID.2020; USGS, 2020). | Very high |
| 19 | 4.06 | Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? | Yes | This taxon is known to reproduce at a rapid rate, which in return overcrowds and causes competition pressures on native fishes. Also, they are known to prey on amphibians and juveniles of other fish species which leads to species dispalcement and eventually to the loss of biodiversity, genetic erosion and greater susceptibility to disease for native species. In Nevada and Arizona, the introduction of this taxon has casued the decline and dispalcemet of endangered Moapa Dace, Moapa White and the Redspotted Sunfish (TUCNGSID.2020: USGS. 2020). | 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 | There are no reports that the taxon may carry pests or infectious agents that are endemic in Lake Taal. | High |
| 21 | 4.08 | Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area? | Yes | There are many viruses that are associated with this taxa, examples are: betanodavirus, tilapia larvae encephalitis virus (TELV) and tilapia lake virus disease (TiLV) (Jansen et al., 2018). | Very high |
| 22 | 4.09 | Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity? | Yes | This taxon can reach a large body size, having a maximum length of 60 cm (Fish Base,2019). | Very high |
| 23 | 4.10 | Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)? | Yes | This taxon can live in a wide range of water velocity (Tsadik & Bart 2007). | Very high |
| 24 | 4.11 | Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa? | Yes | This taxon can stir up bottom sediments as they create nesting areas which causes siltation and bioturbidity reducing water quality and degrading aquatic habitats (CABI, 2020). | 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)? e exploitation | Not applicable | There are no reports of etablished population of this taxon persisting at low density. | High |
| 26 | 5.01 | Is the taxon likely to consume threatened or protected native taxa in the RA area? | Yes | Knowing that this taxon has a record of preying on amphibians and juveniles of other fish species which leads to species dispalcement and eventually to the loss of biodiversity, genetic erosion and greater susceptibility to disease for native species | 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 | Since this taxon is omnivorous it feeds on phytoplankton, periphyton, aquatic plants, small invertebrates, benthic fauna, and detritus materials (IUCNGSID,2020) | High |
| | Reprodu | | | | |
| 28 | 6.01 | Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? | Yes | This taxon are maternal mouthbrooders. When a female lays her eggs in a nest prepared by the male. Then the male fertilizes the eggs, afterwhich the female picks up the eggs and incubates them in her mouth (CABI, 2020). | Very high |
| 29 | 6.02 | Is the taxon likely to produce viable gametes or propagules (in the RA area)? | Yes | The conditions of the RA meets the required conditions for maturation and reproduction of this taxon, which will enable it to produce a viable gametes (CABI, 2020). | High |
| 30 | 6.03 | Is the taxon likely to hybridise naturally with native taxa? | Yes | This taxon can hybridize with its congeners and produces hybrids that are morphologically difficult to identify such as the Oreochromis niloticus x O. aureus (USGS, 2020; CABI, 2020). | High |
| 31 | 6.04 | Is the taxon likely to be hermaphroditic or to display asexual reproduction? | No | There are no documented evidence of hermaphroditism/asexual reproduction of this species. | Medium |

| 32 | 6.05 | Is the taxon dependent on the presence of | Yes | This taxon requires nesting sites in order for the egss to be | High |
|--|---|--|------------------------------------|---|--|
| | | another taxon (or specific habitat features) | | fertilized before the female can incubate them in their mouth | |
| | | to complete its life cycle? | | (CABI, 2020). | |
| 33 | 6.06 | Is the taxon known (or likely) to produce a | Yes | This taxon have a huge reproductive capacity with a female | High |
| | | large number of propagules or offspring | | producing about 1 000 to 1 500 eggs per spawn (IUCNGSID, | - |
| | | within a short time span (e.g. < 1 year)? | | 2019). | |
| 34 | 6.07 | How many time units (days, months, years) | 5 | This taxon reaches the age of maturity at 5-6 months (IUCNGSID, | Very high |
| | | does the taxon require to reach the age-at- | | 2020). | , 5 |
| | | first-reproduction? | | , | |
| 7. L | Dispersa | al mechanisms | | | |
| 35 | 7.01 | How many potential internal | >1 | Accidental introduction from aquaculture activities and intentional | Very high |
| | | vectors/pathways could the taxon use to | | introduction with human intervention (USGS, 2020). | |
| | | disperse within the RA area (with suitable | | | |
| 36 | 7.02 | Will any of these vectors/pathways bring the | Yes | Because of the taxons commercial importance, the aquaculture/ | High |
| | | taxon in close proximity to one or more | | fish farming pathway could bring this taxon in close proximity to | - |
| | | protected areas (e.g. MCZ, MPA, SSSI)? | | one or more protected areas. | |
| 37 | 7.03 | Does the taxon have a means of actively | No | Their physical characteristics does not allow attachment to any | High |
| | | attaching itself to hard substrata (e.g. ship | | substrata (FishBase, 2020) | - |
| | | hulls, pilings, buoys) such that it enhances | | | |
| | | the likelihood of dispersal? | | | |
| 38 | 7.04 | Is natural dispersal of the taxon likely to | No | Since the eggs are protected by the mother until it hatches | High |
| Ĩ | | occur as eggs (for animals) or as propagules | | (CABI,2020) | |
| L | | (for plants: seeds, spores) in the RA area? | | | |
| 39 | 7.05 | Is natural dispersal of the taxon likely to | No | Since the eggs are protected by the mother until it hatches and | High |
| Í | | occur as larvae/juveniles (for animals) or as | | even when the fry are free-swimming they will return to the | |
| | | fragments/seedlings (for plants) in the RA | | mouth of the female for protection (CABI,2020). | |
| | | area? | | · · · | |
| 40 | 7.06 | Are older life stages of the taxon likely to | No | There are no records about this taxon's migratory behaviour. | Medium |
| | | migrate in the RA area for reproduction? | | | |
| 41 | 7.07 | Are propagules or eggs of the taxon likely to | Yes | As this taxon lives in shallow waters in which can easily be | Very high |
| | | be dispersed in the RA area by other animals? | | targeted and in return they can be predated by birds (CABI, 2020). | |
| 42 | 7.08 | Is dispersal of the taxon along any of the | Yes | This taxon which is readily available in commercial markets | High |
| | | vectors/pathways mentioned in the previous | | (alive) and in aquaculture farms can be rapidly disperesed, | |
| | | seven questions (35-41; i.e. either | | knowing also the fact that the RA area is highly susceptable to | |
| | | unintentional or intentional) likely to be | | flooding and natural calamities which could rapidly disperesed this | |
| | 7.09 | Is dispersal of the taxon density dependent? | Not applicable | no record | High |
| | | ce attributes | | | I |
| 44 | 8.01 | Is the taxon able to withstand being out of | | | |
| | | | Not applicable | no record | High |
| | | water for extended periods (e.g. minimum of | мот аррисаріе | no record | High |
| | | water for extended periods (e.g. minimum of one or more hours) at some stage of its life | пот аррисаріе | no record | High |
| 45 | 8.02 | water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? | | | |
| 45 | 8.02 | water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of | Yes | This taxon is tolerant of a range of conditions such as amonia | High Very high |
| 45 | 8.02 | water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that | | This taxon is tolerant of a range of conditions such as amonia (mg/l) <0.1, temperature of 25°C to 30°C, Carbon Dioxide | |
| 45 | 8.02 | water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the | | This taxon is tolerant of a range of conditions such as amonia (mg/l) <0.1, temperature of 25°C to 30°C, Carbon Dioxide (mg/l): <20 tollerated and salinity (ppm): <1 preferred, <8 | |
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| 46 47 48 <u>9. (</u> 50 | 8.03 8.04 8.05 8.06 Climate 9.01 9.02 | 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 water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Is the taxon likely to tolerate or benefit from environmental/human disturbance? Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment? Are there effective natural enemies (predators) of the taxon present in the RA a change 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? | Yes Yes No No Increase | This taxon is tolerant of a range of conditions such as amonia (mg/l) <0.1, temperature of 25°C to 30°C, Carbon Dioxide (mg/l): <20 tollerated and salinity (ppm): <1 preferred, <8 tolerated (CABI, 2019). In Palau a programme to remove tilapia from the country was succesful using a chemical called Rotenone, which was applied directly to 5 infested sites (IUCNGSID, 2020). Due to their ability to survive in a wide range of environmental conditions specialy in tropical countries (RA area) it can benefit from environmental/human distrubances (CABI, 2020). This taxon is the least salt tolerant among the other Oreochromis species (Md, 2008). Clarias gariepinus can be a predator if this taxon which is present in the RA area (CABI, 2020). Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to survive the cilamatic conditions of a tropical environtment waters, the risk of entry through accidental introduction from aquaculture activities, intentional introduction with human intervention and aquarium escape would most likely increase the risk of entry of this taxon. Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to survive the cilamatic conditions of a tropical environtment waters, the risk of entry through accidental introduction from aquaculture activities, intentional introduction with human intervention and aquarium escape would most likely increase the risk of entry of this taxon. Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to survive the cilamatic conditions of a tropical environtment waters, the risk of entry through accidental introduction from aquaculture activities, intentional introduction with human intervention and aquarium escape would most likely increase the risk of entry of this taxon. Together with the fact that the RA ar | Very high Very high Very high High Very high |
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| 53 | 9.04 | Under the predicted future climatic conditions, what is the likely magnitude of | Higher | Since this taxon is known to reproduce at a rapid rate, which in return overcrowds and causes competition pressures on native | Very high |
|-----|------|---|----------|--|-----------|
| | | future potential impacts on biodiversity | | fishes. Also, they are known to prey on amphibians and juveniles | |
| | | and/or ecological integrity/status? | | | |
| | | and/or ecological integrity/status? | | of other fish species which leads to species dispalcement and | |
| | | | | eventually to the loss of biodiversity, genetic erosion and greater | |
| | | | | susceptibility to disease for native species. Moreover, they can stir | |
| | | | | up bottom sediments as they create nesting areas which causes | |
| | | | | siltation and bioturbidity reducing water quality and degrading | |
| E / | 9.05 | Under the predicted future climatic | Higher | aguatic habitats (CABI. 2020: IUCNGSID.2020: USGS. 2020). Since this taxon is known to reproduce at a rapid rate, which in | Very high |
| 54 | 9.05 | | riigilei | | very nigh |
| | | conditions, what is the likely magnitude of | | return overcrowds and causes competition pressures on native | |
| | | future potential impacts on ecosystem | | fishes. Also, they are known to prey on amphibians and juveniles | |
| | | structure and/or function? | | of other fish species which leads to species dispalcement and | |
| | | | | eventually to the loss of biodiversity, genetic erosion and greater | |
| | | | | susceptibility to disease for native species. Moreover, they can stir | |
| | | | | up bottom sediments as they create nesting areas which causes | |
| | | | | siltation and bioturbidity reducing water quality and degrading | |
| | 0.00 | | | aguatic habitats (CABI, 2020; IUCNGSID, 2020; USGS, 2020). | |
| 55 | 9.06 | Under the predicted future climatic | Higher | Since this taxon is known to reproduce at a rapid rate, which in | Very high |
| | | conditions, what is the likely magnitude of | | return overcrowds and causes competition pressures on native | |
| | | future potential impacts on ecosystem | | fishes. Also, they are known to prey on amphibians and juveniles | |
| | | services/socio-economic factors? | | of other fish species which leads to species dispalcement and | |
| | | | | eventually to the loss of biodiversity, genetic erosion and greater | |
| | 1 | | | susceptibility to disease for native species. Moreover, they can stir | |
| | 1 | | | up bottom sediments as they create nesting areas which causes | |
| | 1 | | | siltation and bioturbidity reducing water quality and degrading | |
| | | | | aquatic habitats (CABI, 2020; IUCNGSID, 2020; USGS, 2020). | |

| Statistics | |
|--|--------------------------|
| Scores | |
| BRA | 40.0 |
| BRA Outcome | High |
| BRA+CCA | 52.0 |
| BRA+CCA Outcome | High |
| Score partition | |
| A. Biogeography/Historical | 21.0 |
| 1. Domestication/Cultivation | 4.0 |
| 2. Climate, distribution and introduction risk | 3.0 |
| 3. Invasive elsewhere | 14.0 |
| B. Biology/Ecology | 19.0 |
| 4. Undesirable (or persistence) traits | 10.0 |
| 5. Resource exploitation | 5.0 |
| 6. Reproduction | 1.0 |
| 7. Dispersal mechanisms | 0.0 |
| 8. Tolerance attributes | 3.0 |
| C. Climate change | 12.0 |
| 9. Climate change | 12.0 |
| Answered Questions | |
| Total | 55 |
| A. Biogeography/Historical | 13 |
| 1. Domestication/Cultivation | 3 5 5 36 |
| 2. Climate, distribution and introduction risk | 5 |
| 3. Invasive elsewhere | 5 |
| B. Biology/Ecology | |
| 4. Undesirable (or persistence) traits | 12 |
| 5. Resource exploitation | 2 |
| 6. Reproduction | |
| 7. Dispersal mechanisms | 9 |
| 8. Tolerance attributes | 6 |
| C. Climate change | 6 |
| 9. Climate change | 6 |
| Sectors affected | |
| Commercial | 22 |
| Environmental | 13 |
| Species or population nuisance traits | 23 |
| | |
| Thresholds | |
| BRA | 34.5 |
| BRA+CCA | 34.5 |
| Confidence | 0.00 |
| BRA+CCA | 0.89 |
| BRA | 0.89 |
| CCA | 0.88 |

Date and Time 05/07/2020 22:58:33

| Taxon and Assessor details | | | | | |
|------------------------------------|--|--|--|--|--|
| Category | Fishes and Lampreys (freshwater) | | | | |
| Taxon name | Oreochromis urolepis | | | | |
| Common name | wami tilapia | | | | |
| Assessor | Gilles, To | | | | |
| Risk screening context | | | | | |
| Reason and socio-economic benefits | Aquaculture | | | | |
| Risk assessment area | Lake Taal | | | | |
| Taxonomy | Actinopteri (ray-finned fishes) > Cichliformes (Cichlids, convict blennies) > Cichlidae (Cichlids) > | | | | |
| Native range | Africa | | | | |
| Introduced range | Elswhere including the Philippines | | | | |
| | | | | | |

| | | | Response | Justification (references and/or other information) | Confidence |
|-----------|----------|---|----------|--|------------|
| A. | Biogeo | graphy/Historical | | | |
| 1. l | Domesti | ication/Cultivation | | | |
| 1 | 1.01 | Has the taxon been the subject of domestication (or cultivation) for at least 20 generations? | Yes | "This taxon is the second most important farmed fish in the Philippines produced in ponds, cages, and pens (Guerrero, 2019)." | Very high |
| 2 | 1.02 | Is the taxon harvested in the wild and likely to be sold or used in its live form? | Yes | This taxon has been introduced worldwide for aquaculture/farming, food source, angling, and control agent for insects and aquatic vegetation (U.S. Fish and Wildlife Service, | Very high |
| 3 | 1.03 | Does the taxon have invasive races, varieties, sub-taxa or congeners? | Yes | The following subspecies of the taxon were reported to cause adverse ecological impacts after introduction: Oreochromis niloticus baringoensis, Oreochromis niloticus cancellatus, Oreochromis niloticus eduardianus, Oreochromis niloticus filoa, Oreochromis niloticus niloticus, Oreochromis niloticus sugutae, Oreohromis niloticus tana and Oreohromis niloticus vulcani | Very high |
| | | distribution and introduction risk | | | |
| 4 | 2.01 | How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range? | High | The taxon's native range has the same tropical climate with the RA area (U.S. Fish and Wildlife Service, 2011). | Very high |
| 5 | 2.02 | What is the quality of the climate matching data? | High | The taxon's native range has the same tropical climate with the RA area (U.S. Fish and Wildlife Service, 2011). | High |
| 6 | 2.03 | Is the taxon already present outside of captivity in the RA area? | Yes | The taxon has been introduced in the country for farming and breeding to be used as a food source (Guerrero, 2019). | High |
| 7 | 2.04 | How many potential vectors could the taxon use to enter in the RA area? | One | Accidental introduction from aquaculture activities and intentional introduction with human intervention (CABI, 2020). | 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 | The taxon has been introduced in the country for farming and breeding to be used as a food source (Guerrero, 2019). | Very high |
| 3. j | nvasive | e elsewhere | | | |
| 9 | | Has the taxon become naturalised | Yes | "This taxon is the second most important farmed fish in the | 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 | Philippines produced in ponds, cages, and pens (Guerrero, 2019)." This taxon is known to reproduce at a rapid rate, which in return overcrowds and causes competition pressures on native fishes. Also, they are known to prey on amphibians and juveniles of other fish species which leads to species dispalcement and eventually to the loss of biodiversity, genetic erosion and greater susceptibility to disease for native species. In Nevada and Arizona, the introduction of this taxon has casued the decline and dispalcemet of endangered Moapa Dace, Moapa White and the Redspotted Sunfish (IUCNGSID.2020: USGS. 2020). | High |
| | | In the taxon's introduced range, are there known adverse impacts to aquaculture? | Yes | This taxon is known to reproduce at a rapid rate, which in return overcrowds and causes competition pressures on native fishes. Also, they are known to prey on amphibians and juveniles of other fish species which leads to species dispalcement and eventually to the loss of biodiversity, genetic erosion and greater susceptibility to disease for native species. In Nevada and Arizona, the introduction of this taxon has casued the decline and dispalcemet of endangered Moapa Dace, Moapa White and the Redspotted Sunfish (IUCNGSID.2020: USGS. 2020). | Very high |
| | 3.04 | In the taxon's introduced range, are there known adverse impacts to ecosystem services? | Yes | This taxon is known to reproduce at a rapid rate, which in return overcrowds and causes competition pressures on native fishes. Also, they are known to prey on amphibians and juveniles of other fish species which leads to species dispalcement and eventually to the loss of biodiversity, genetic erosion and greater susceptibility to disease for native species. In Nevada and Arizona, the introduction of this taxon has casued the decline and dispalcemet of endangered Moapa Dace, Moapa White and the Redspotted Sunfish (IUCNGSID.2020: USGS. 2020). | Very high |
| 13 | 3.05 | In the taxon's introduced range, are there known adverse socio-economic impacts? | No | The introduction of this taxon has resulted in a significant development of aquaculture because of its commercial importance, which improved the economic status of the introduced range (CABI,2020). | High |
| | | /Ecology | | | |
| 4. (| Indesira | able (or persistence) traits | | | |

| 14 | 4.01 | Is it likely that the taxon will be poisonous or pose other risks to human health? | Yes | This taxon has records of being infected by a wide range of diseases and parasites, such as, Flexibacter columnaris (Bacteria), Apiosoma piscicolum, Epistylis colisarum, Trichodina sp., Trypanoplasma sp. (Protozoa), Cichildogyrus tilapiae, Gyrodactylus cichlidarum and Neobedenia melleni (Monogenea) which could pose threaths to human (CABI, 2020). | Very high |
|----|-----------------------|---|----------------|---|---------------------|
| 15 | 4.02 | Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? | Yes | This taxon is known to reproduce at a rapid rate, which in return overcrowds and causes competition pressures on native fishes. Also, they are known to prey on amphibians and juveniles of other fish species which leads to species dispalcement and eventually to the loss of biodiversity, genetic erosion and greater susceptibility to disease for native species. In Nevada and Arizona, the introduction of this taxon has casued the decline and dispalcemet of endangered Moapa Dace, Moapa White and the Redspotted Sunfish (IUCNGSID.2020: USGS. 2020). | High |
| 16 | 4.03 | Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? | Yes | This taxon is known to reproduce at a rapid rate, which in return overcrowds and causes competition pressures on native fishes. Also, they are known to prey on amphibians and juveniles of other fish species which leads to species dispalcement and eventually to the loss of biodiversity, genetic erosion and greater susceptibility to disease for native species. In Nevada and Arizona, the introduction of this taxon has casued the decline and dispalcemet of endangered Moapa Dace, Moapa White and the Redspotted Sunfish (IUCNGSID.2020; USGS, 2020). | Very high |
| 17 | 4.04 | Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? | Yes | This taxon has a hardy nature and has a wide range of trophic and ecological adaptations. Its adaptive life history characteristics enabled this taxon to occupy many different tropical and sub- tropical freshwater niches (CABI, 2020). | High |
| 18 | 4.05 | Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA area? | Yes | This taxon is known to reproduce at a rapid rate, which in return overcrowds and causes competition pressures on native fishes. Also, they are known to prey on amphibians and juveniles of other fish species which leads to species dispalcement and eventually to the loss of biodiversity, genetic erosion and greater susceptibility to disease for native species. In Nevada and Arizona, the introduction of this taxon has casued the decline and dispalcemet of endangered Moapa Dace, Moapa White and the Redspotted Sunfish (IUCNGSID.2020; USGS, 2020). | High |
| 19 | 4.06 | Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? | Yes | This taxon is known to reproduce at a rapid rate, which in return overcrowds and causes competition pressures on native fishes. Also, they are known to prey on amphibians and juveniles of other fish species which leads to species dispalcement and eventually to the loss of biodiversity, genetic erosion and greater susceptibility to disease for native species. In Nevada and Arizona, the introduction of this taxon has casued the decline and dispalcemet of endangered Moapa Dace, Moapa White and the Redspotted Sunfish (IUCNGSID.2020: USGS. 2020). | Very high |
| | 4.07 | Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA Is it likely that the taxon will host, and/or | No Yes | There are no reports that the taxon may carry pests or infectious agents that are endemic in Lake Taal. | Medium Very high |
| 22 | 4.09 | act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area? Is it likely that the taxon will achieve a body | Yes | examples are: betanodavirus, tilapia larvae encephalitis virus (TELV) and tilapia lake virus disease (TiLV) (Jansen et al., 2018). This taxon can reach a large body size, having a maximum length | Very high |
| | | size that will make it more likely to be released from captivity? | | of 44 cm (IUCNGSID,2020). | |
| 23 | 4.10 | Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)? | Yes | This taxon is considered hardy species, tolerant of a wide range of habitat conditions and water quality, specially it tolerates the high salinities waters and it is considered as a 'pioneer' species, which means that they can thrive in disturbed habitats, opportunistically migrating and reproducing (CABL 2020; IUCNGSID, 2020). | 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 | This taxon can stir up bottom sediments as they create nesting areas which causes siltation and bioturbidity reducing water quality and degrading aquatic habitats (CABI, 2020). | 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)? | Not applicable | There are no reports of etablished population of this taxon persisting at low density. | High |
| | | e exploitation | | | |
| | 5.01 | Is the taxon likely to consume threatened or protected native taxa in the RA area? | Yes | Knowing that this taxon has a record of preying on amphibians and juveniles of other fish species which leads to species dispalcement and eventually to the loss of biodiversity, genetic erosion and greater susceptibility to disease for native species | High |
| | 5.02 | Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area? | Yes | As this taxon feeds primarily on phytoplankton and epiphytic algae, insects, zooplankton, vascular plants, and larval and juvenile fishes (IUCNGSID, 2020). | High |
| | <i>eprodu</i> 6.01 | | Voc | This taxon are maternal mouthbreaders When a family law | Vonubish |
| | | Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? | Yes | This taxon are maternal mouthbrooders. When a female lays her eggs in a nest prepared by the male. Then the male fertilizes the eggs, afterwhich the female picks up the eggs and incubates them in her mouth (CABI, 2020). | Very high |
| 29 | 6.02 | Is the taxon likely to produce viable gametes or propagules (in the RA area)? | Yes | The conditions of the RA meets the required conditions for maturation and reproduction of this taxon, which will enable it to produce a viable gametes (CABI, 2020). | Very high |

| 30 | 6.03 | Is the taxon likely to hybridise naturally with | Yes | This taxon can hybridize with its congeners and produces hybrids | High |
|--|---|---|--|--|---|
| | | native taxa? | | that are morphologically difficult to identify such as the Oreochromis niloticus x O. aureus (USGS, 2020; CABI, 2020). | |
| 31 | 6.04 | Is the taxon likely to be hermaphroditic or to display asexual reproduction? | No | There are no documented evidence of hermaphroditism/asexual reproduction of this species. | Medium |
| 32 | 6.05 | Is the taxon dependent on the presence of | Yes | This taxon requires nesting sites in order for the egss to be | Very high |
| | | another taxon (or specific habitat features) | | fertilized before the female can incubate them in their mouth | |
| 22 | 6.06 | to complete its life cycle? Is the taxon known (or likely) to produce a | Yes | (CABI, 2020). This taxon have a huge reproductive capacity with a female | High |
| 55 | 0.00 | large number of propagules or offspring | 165 | producing of upto 1,780 eggs which hatches 3 days after | riigii |
| | | within a short time span (e.g. < 1 year)? | | fertilization (CABI, 2020). | |
| 34 | 6.07 | How many time units (days, months, years) | 5 | This taxon reaches the age of maturity at 5-6 months (IUCNGSID, | High |
| | | does the taxon require to reach the age-at- | | 2020). | |
| 7 1 | <u>.</u> . | first-reproduction? | | | |
| | 7.01 | al mechanisms How many potential internal | One | Accidental introduction from aquaculture activities and intentional | Very high |
| ,,, | 7.01 | vectors/pathways could the taxon use to | one | introduction with human intervention (USGS, 2020). | very night |
| | | disperse within the RA area (with suitable | | | |
| 36 | 7.02 | Will any of these vectors/pathways bring the | Yes | Because of the taxons commercial importance, the aquaculture/ | High |
| | | taxon in close proximity to one or more | | fish farming pathway could bring this taxon in close proximity to | |
| 27 | 7.02 | protected areas (e.g. MCZ, MPA, SSSI)? | NI- | one or more protected areas. |) (and birds |
| 37 | 7.03 | Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship | No | Their physical characteristics does not allow attachment to any substrata (FishBase, 2020) | Very high |
| | | hulls, pilings, buoys) such that it enhances | | Substrata (Fishbase, 2020) | |
| | | the likelihood of dispersal? | | | |
| 38 | 7.04 | Is natural dispersal of the taxon likely to | No | Since the eggs are protected by the mother until it hatches | High |
| | | occur as eggs (for animals) or as propagules | | (CABI,2020) | |
| 30 | 7.05 | (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to | No | Since the ergs are protected by the methor until it batches and | Very high |
| פנ | 1.05 | occur as larvae/juveniles (for animals) or as | NU | Since the eggs are protected by the mother until it hatches and even when the fry are free-swimming they will return to the | Very high |
| | | fragments/seedlings (for plants) in the RA | | mouth of the female for protection (CABI,2020). | |
| | | area? | | · · · · · · · · · · · · · · · · · · · | |
| 40 | 7.06 | Are older life stages of the taxon likely to | No | There are no records about the migration of this taxon. | Medium |
| | 7 07 | 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? | Yes | As this taxon lives in shallow waters in which can easily be targeted and in return they can be predated by birds with their | Very high |
| | | be dispersed in the KA area by other animals? | | eggs being dispersed (CABI, 2020). | |
| 42 | 7.08 | Is dispersal of the taxon along any of the | Yes | This taxon which is readily available in commercial markets | High |
| | | vectors/pathways mentioned in the previous | | (alive) and in aquaculture farms can be rapidly disperesed, | - |
| | | seven questions (35-41; i.e. either | | knowing also the fact that the RA area is highly susceptable to | |
| | | unintentional or intentional) likely to be | | | |
| 12 | 7 00 | | Not applicable | flooding and natural calamities which could rapidly dispersed this | High |
| | 7.09 Toleran | Is dispersal of the taxon density dependent? | Not applicable | There are no records about this taxon's density dependence. | High |
| 8. 1 | | | | | High High |
| 8. 1 | Foleran | Is dispersal of the taxon density dependent? ace attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of | | There are no records about this taxon's density dependence. | |
| 8. 1 | Foleran | Is dispersal of the taxon density dependent? ice 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 | | There are no records about this taxon's density dependence. | |
| <u>8. 1</u> 44 | <i>Toleran</i> 8.01 | Is dispersal of the taxon density dependent? ice 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? | Not applicable | There are no records about this taxon's density dependence. There are no records about this taxon's density dependence. | High |
| <u>8. 1</u> 44 | Foleran | Is dispersal of the taxon density dependent? <i>ice attributes</i> Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of | | There are no records about this taxon's density dependence. There are no records about this taxon's density dependence. This taxon is tolerant of a range of conditions such as Ammonium | |
| 8. 1 44 | <i>Toleran</i> 8.01 | Is dispersal of the taxon density dependent? ice 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? | Not applicable | There are no records about this taxon's density dependence. There are no records about this taxon's density dependence. | High |
| <u>8.</u> 44 45 | 8.01 | Is dispersal of the taxon density dependent? ice 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 | Not applicable Yes | There are no records about this taxon's density dependence. There are no records about this taxon's density dependence. This taxon is tolerant of a range of conditions such as Ammonium (mg/l): <0.01, Dissolved oxygen (mg/l): 4-7 optimum, Salinity (part per thousand) 35-40, Water pH (pH): 6-8 and Temperature: 8-42°C (FAO, 2020; CABI, 2020). | High Very high |
| <u>8.</u> 44 45 | <i>Toleran</i> 8.01 | Is dispersal of the taxon density dependent? ice 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 | Not applicable | There are no records about this taxon's density dependence. There are no records about this taxon's density dependence. This taxon is tolerant of a range of conditions such as Ammonium (mg/l): <0.01, Dissolved oxygen (mg/l): 4-7 optimum, Salinity (part per thousand) 35-40, Water pH (pH): 6-8 and Temperature: 8-42°C (FAO, 2020; CABI, 2020). They can be eradicated through intensive fishing to prevent | High |
| <u>8.</u> 44 45 | 8.01 | Is dispersal of the taxon density dependent? ice attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other | Not applicable Yes | There are no records about this taxon's density dependence. There are no records about this taxon's density dependence. This taxon is tolerant of a range of conditions such as Ammonium (mg/l): <0.01, Dissolved oxygen (mg/l): 4-7 optimum, Salinity (part per thousand) 35-40, Water pH (pH): 6-8 and Temperature: 8-42°C (FAO, 2020; CABI, 2020). They can be eradicated through intensive fishing to prevent overpopulations from affecting native populations (IUCNGSID, | High Very high |
| <u>8. 1</u> 44 45 | 8.02 8.03 | Is dispersal of the taxon density dependent? ice attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? | Not applicable Yes Yes | There are no records about this taxon's density dependence. There are no records about this taxon's density dependence. This taxon is tolerant of a range of conditions such as Ammonium (mg/l): <0.01, Dissolved oxygen (mg/l): 4-7 optimum, Salinity (part per thousand) 35-40, Water pH (pH): 6-8 and Temperature: 8-42°C (FAO, 2020; CABI, 2020). They can be eradicated through intensive fishing to prevent overpopulations from affecting native populations (IUCNGSID, 2020). | High Very high Very high |
| <u>8. 1</u> 44 45 | 8.02 8.03 | Is dispersal of the taxon density dependent? ice attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? | Not applicable Yes | There are no records about this taxon's density dependence. There are no records about this taxon's density dependence. This taxon is tolerant of a range of conditions such as Ammonium (mg/l): <0.01, Dissolved oxygen (mg/l): 4-7 optimum, Salinity (part per thousand) 35-40, Water pH (pH): 6-8 and Temperature: 8-42°C (FAO, 2020; CABI, 2020). They can be eradicated through intensive fishing to prevent overpopulations from affecting native populations (IUCNGSID, | High Very high |
| <u>8. 1</u> 44 45 | 8.02 8.03 | Is dispersal of the taxon density dependent? ice attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Is the taxon likely to tolerate or benefit from | Not applicable Yes Yes | There are no records about this taxon's density dependence. There are no records about this taxon's density dependence. This taxon is tolerant of a range of conditions such as Ammonium (mg/l): <0.01, Dissolved oxygen (mg/l): 4-7 optimum, Salinity (part per thousand) 35-40, Water pH (pH): 6-8 and Temperature: 8-42°C (FAO, 2020; CABI, 2020). They can be eradicated through intensive fishing to prevent overpopulations from affecting native populations (IUCNGSID, 2020). In Palau a programme to remove tilapia from the country was succesful using a chemical called Rotenone, which was applied directly to 5 infested sites (IUCNGSID, 2020). | High Very high Very high High |
| 8. 7 44 45 46 47 | 8.02 8.03 | Is dispersal of the taxon density dependent? ice attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Is the taxon likely to tolerate or benefit from environmental/human disturbance? Is the taxon able to tolerate salinity levels | Not applicable Yes Yes | There are no records about this taxon's density dependence. There are no records about this taxon's density dependence. This taxon is tolerant of a range of conditions such as Ammonium (mg/l): <0.01, Dissolved oxygen (mg/l): 4-7 optimum, Salinity (part per thousand) 35-40, Water pH (pH): 6-8 and Temperature: 8-42°C (FAO, 2020; CABI, 2020). They can be eradicated through intensive fishing to prevent overpopulations from affecting native populations (IUCNGSID, 2020). In Palau a programme to remove tilapia from the country was succesful using a chemical called Rotenone, which was applied directly to 5 infested sites (IUCNGSID, 2020). This taxon can tolerate a wide range of salinity from 35 to 40 ppt | High Very high Very high |
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| 3. 1 14 1 15 1 16 1 17 1 18 1 19 0 50 51 | 8.02 8.03 8.04 8.05 8.06 Climate 9.01 | Is dispersal of the taxon density dependent? ice attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Is the taxon able to tolerate or benefit from environmental/human disturbance? Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment? Are there effective natural enemies (predators) of the taxon present in the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? | Not applicable Yes Yes Yes Yes Increase | There are no records about this taxon's density dependence. There are no records about this taxon's density dependence. This taxon is tolerant of a range of conditions such as Ammonium (mg/l): <0.01, Dissolved oxygen (mg/l): 4-7 optimum, Salinity (part per thousand) 35-40, Water pH (pH): 6-8 and Temperature: 8-42°C (FAO, 2020; CABI, 2020). They can be eradicated through intensive fishing to prevent overpopulations from affecting native populations (IUCNGSID, 2020). In Palau a programme to remove tilapia from the country was succesful using a chemical called Rotenone, which was applied directly to 5 infested sites (IUCNGSID, 2020). This taxon can tolerate a wide range of salinity from 35 to 40 ppt (CABI, 2020). Channa striata can be a predator of this taxon which is present in the RA area (CABI, 2020). Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to survive the cilamatic conditions of a tropical waters, the risk of entry through accidental introduction from aquaculture activities, intentional introduction with human intervention and aquarium escape would most likely increase the Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to survive the cilamatic conditions of a tropical waters, the risk of entry through accidental introduction from aquaculture activities, intentional introduction with human intervention and aquarium escape would most likely increase the Together with the fact that the RA area is prone to natural | High Very high Very high High High |
| 8. 1 44 45 46 47 48 49 50 51 | olerann 8.01 8.02 8.03 8.04 8.05 8.06 0.01 9.01 9.02 | Is dispersal of the taxon density dependent? ice attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Is the taxon able to tolerate or benefit from environmental/human disturbance? Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment? Are there effective natural enemies (predators) of the taxon present in the RA are a posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? | Not applicable Yes Yes Yes Yes Increase | There are no records about this taxon's density dependence. There are no records about this taxon's density dependence. This taxon is tolerant of a range of conditions such as Ammonium (mg/l): <0.01, Dissolved oxygen (mg/l): 4-7 optimum, Salinity (part per thousand) 35-40, Water pH (pH): 6-8 and Temperature: 8-42°C (FAO, 2020; CABI, 2020). They can be eradicated through intensive fishing to prevent overpopulations from affecting native populations (IUCNGSID, 2020). In Palau a programme to remove tilapia from the country was succesful using a chemical called Rotenone, which was applied directly to 5 infested sites (IUCNGSID, 2020). This taxon can tolerate a wide range of salinity from 35 to 40 ppt (CABI, 2020). Channa striata can be a predator of this taxon which is present in the RA area (CABI, 2020). Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to survive the cilamatic conditions of a tropical waters, the risk of entry through accidental introduction from aquaculture activities, intentional introduction with human intervention and aquarium escape would most likely increase the Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to survive the cilamatic conditions of a tropical waters, the risk of entry through accidental introduction from aquaculture activities, intentional introduction with human intervention and aquarium escape would most likely increase the Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to survive the cilamatic conditions of a tropical waters, the risk of entry through accidental introduction from aquaculture activities, intentional introduction with human intervention and aquarium escape would most likely increase the Together with the fact that the RA area is prone to natural calamities such as typhoons an | High Very high Very high High Very high High High |
| 8. 2 44 45 46 47 48 49 50 51 | olerann 8.01 8.02 8.03 8.04 8.05 8.06 0.01 9.01 9.02 | Is dispersal of the taxon density dependent? ice attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Is the taxon likely to tolerate or benefit from 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 ee change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? | Not applicable Yes Yes Yes Yes Increase | There are no records about this taxon's density dependence. There are no records about this taxon's density dependence. This taxon is tolerant of a range of conditions such as Ammonium (mg/l): <0.01, Dissolved oxygen (mg/l): 4-7 optimum, Salinity (part per thousand) 35-40, Water pH (pH): 6-8 and Temperature: 8-42°C (FAO, 2020; CABI, 2020). They can be eradicated through intensive fishing to prevent overpopulations from affecting native populations (IUCNGSID, 2020). In Palau a programme to remove tilapia from the country was succesful using a chemical called Rotenone, which was applied directly to 5 infested sites (IUCNGSID, 2020). This taxon can tolerate a wide range of salinity from 35 to 40 ppt (CABI, 2020). Channa striata can be a predator of this taxon which is present in the RA area (CABI, 2020). Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to survive the cilamatic conditions of a tropical waters, the risk of entry through accidental introduction from aquaculture activities, intentional introduction with human intervention and aquarium escape would most likely increase the Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to survive the cilamatic conditions of a tropical waters, the risk of entry through accidental introduction from aquaculture activities, intentional introduction with human intervention and aquarium escape would most likely increase the Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to survive the cilamatic conditions of a tropical waters, the risk of entry through accidental introduction from aquaculture activities, intentional introduction with human intervention and aquarium escape would most likely increase the Together with the fact that the RA area is prone to natural calamities such as typhoons an | High Very high Very high High Very high High High |
| 8. 1 44 45 46 47 48 49 50 51 | olerann 8.01 8.02 8.03 8.04 8.05 8.06 0.01 9.01 9.02 | Is dispersal of the taxon density dependent? ice attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Is the taxon able to tolerate or benefit from environmental/human disturbance? Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment? Are there effective natural enemies (predators) of the taxon present in the RA are a posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? | Not applicable Yes Yes Yes Yes Increase | There are no records about this taxon's density dependence. There are no records about this taxon's density dependence. This taxon is tolerant of a range of conditions such as Ammonium (mg/l): <0.01, Dissolved oxygen (mg/l): 4-7 optimum, Salinity (part per thousand) 35-40, Water pH (pH): 6-8 and Temperature: 8-42°C (FAO, 2020; CABI, 2020). They can be eradicated through intensive fishing to prevent overpopulations from affecting native populations (IUCNGSID, 2020). In Palau a programme to remove tilapia from the country was succesful using a chemical called Rotenone, which was applied directly to 5 infested sites (IUCNGSID, 2020). This taxon can tolerate a wide range of salinity from 35 to 40 ppt (CABI, 2020). Channa striata can be a predator of this taxon which is present in the RA area (CABI, 2020). Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to survive the cilamatic conditions of a tropical waters, the risk of entry through accidental introduction from aquaculture activities, intentional introduction with human intervention and aquarium escape would most likely increase the Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to survive the cilamatic conditions of a tropical waters, the risk of entry through accidental introduction from aquaculture activities, intentional introduction with human intervention and aquarium escape would most likely increase the Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to survive the cilamatic conditions of a tropical waters, the risk of entry through accidental introduction from aquaculture activities, intentional introduction with human intervention and aquarium escape would most likely increase the Together with the fact that the RA area is prone to natural calamities such as typhoons an | High Very high Very high High Very high High High |

| 53 | 9.04 | Under the predicted future climatic | Higher | Since this taxon is known to reproduce at a rapid rate, which in | Very high |
|----|------|---|----------------|---|-----------|
| | | conditions, what is the likely magnitude of | | return overcrowds and causes competition pressures on native | |
| | | future potential impacts on biodiversity | | fishes. Also, they are known to prey on amphibians and juveniles | |
| | | and/or ecological integrity/status? | | of other fish species which leads to species dispalcement and | |
| | | | | eventually to the loss of biodiversity, genetic erosion and greater | |
| | | | | susceptibility to disease for native species. Moreover, they can stir | |
| | | | | up bottom sediments as they create nesting areas which causes | |
| | | | | siltation and bioturbidity reducing water quality and degrading | |
| | | | | aquatic habitats (CABL 2020: IUCNGSID.2020: USGS. 2020). | |
| 54 | 9.05 | Under the predicted future climatic | Not applicable | Since this taxon is known to reproduce at a rapid rate, which in | Very high |
| | | conditions, what is the likely magnitude of | | return overcrowds and causes competition pressures on native | |
| | | future potential impacts on ecosystem | | fishes. Also, they are known to prey on amphibians and juveniles | |
| | | structure and/or function? | | of other fish species which leads to species dispalcement and | |
| | | | | eventually to the loss of biodiversity, genetic erosion and greater | |
| | | | | susceptibility to disease for native species. Moreover, they can stir | |
| | | | | up bottom sediments as they create nesting areas which causes | |
| | | | | siltation and bioturbidity reducing water quality and degrading | |
| | | | | aquatic habitats (CABI, 2020; IUCNGSID,2020; USGS, 2020). | |
| 55 | 9.06 | Under the predicted future climatic | Not applicable | Since this taxon is known to reproduce at a rapid rate, which in | Very high |
| | | conditions, what is the likely magnitude of | | return overcrowds and causes competition pressures on native | |
| | | future potential impacts on ecosystem | | fishes. Also, they are known to prey on amphibians and juveniles | |
| | | services/socio-economic factors? | | of other fish species which leads to species dispalcement and | |
| | | | | eventually to the loss of biodiversity, genetic erosion and greater | |
| | | | | susceptibility to disease for native species. Moreover, they can stir | |
| | | | | up bottom sediments as they create nesting areas which causes | |
| | | | | siltation and bioturbidity reducing water quality and degrading | |
| | | | | aquatic habitats (CABI, 2020; IUCNGSID, 2020; USGS, 2020). | |

| Statistics | |
|--|--------------------------|
| Scores | |
| BRA | 42.0 |
| BRA Outcome | High |
| BRA+CCA | 50.0 |
| BRA+CCA Outcome | High |
| Score partition | |
| A. Biogeography/Historical | 21.0 |
| 1. Domestication/Cultivation | 4.0 |
| 2. Climate, distribution and introduction risk | 3.0 |
| 3. Invasive elsewhere | 14.0 |
| B. Biology/Ecology | 21.0 |
| 4. Undesirable (or persistence) traits | 10.0 |
| 5. Resource exploitation | 7.0 |
| 6. Reproduction | 1.0 |
| 7. Dispersal mechanisms | -1.0 |
| 8. Tolerance attributes | 4.0 |
| C. Climate change | 8.0 |
| 9. Climate change | 8.0 |
| Answered Questions | = = |
| Total | 55 |
| A. Biogeography/Historical | 13 |
| 1. Domestication/Cultivation | 3 5 5 36 |
| 2. Climate, distribution and introduction risk | 5 |
| 3. Invasive elsewhere | 5 |
| B. Biology/Ecology | 36 |
| 4. Undesirable (or persistence) traits | 12 |
| 5. Resource exploitation | 2 |
| 6. Reproduction | / |
| 7. Dispersal mechanisms | 9 |
| 8. Tolerance attributes | 6 |
| C. Climate change | 6 |
| 9. Climate change | 6 |
| Sectors affected | |
| Commercial | 15 |
| Environmental | 15 25 |
| Species or population nuisance traits | 25 |
| | |
| Thresholds | 245 |
| BRA | 34.5 |
| BRA+CCA | 34.5 |
| Confidence BRA+CCA | 0.86 |
| BRA+CCA BRA | 0.86 |
| | |
| CCA | 0.88 |

Date and Time 05/07/2020 23:37:12

| Taxon and Assessor details | |
|------------------------------------|--|
| Category | Fishes and Lampreys (freshwater) |
| Taxon name | Osphronemus goramy |
| Common name | giant gourami |
| Assessor | Gilles |
| Risk screening context | |
| Reason and socio-economic benefits | Fisheries: commercial; aquaculture |
| Risk assessment area | Lake Taal |
| Taxonomy | Actinopteri (ray-finned fishes) > Anabantiformes (Gouramies, snakeheads) > Osphronemidae |
| Native range | Asia: probably limited to Sumatra, Borneo, Java, the Malay Peninsula, Thailand and Indochina |
| Introduced range | China, Ca,bodia, Philippines, ialy, Colombia, india, etc |
| URL | https://www.fishbase.se/summary/Osphronemus-goramy.html |

| | | | Response | Justification (references and/or other information) | Confidence |
|----------------|----------------------|---|-----------------|--|------------------------|
| | | graphy/Historical | | | |
| | | <i>ication/Cultivation</i> Has the taxon been the subject of | N | |) (am think |
| T | 1.01 | 3 | Yes | http://www.fao.org/fishery/culturedspecies/Osphronemus_goramy/ | Very high |
| | | domestication (or cultivation) for at least 20 | | en | |
| 2 | 1.02 | generations? Is the taxon harvested in the wild and likely | Yes | http://www.fao.org/fishery/culturedspecies/Osphronemus_goramy/ | Vony high |
| 2 | 1.02 | to be sold or used in its live form? | 165 | | very nigh |
| 3 | 1.03 | Does the taxon have invasive races, | Yes | en http://www.fao.org/fishery/culturedspecies/Osphronemus_goramy/ | Vony high |
| 2 | 1.05 | | res | | very nigh |
| 2 0 | 1: | varieties, sub-taxa or congeners? , distribution and introduction risk | | en | |
| | | | High | Freehuster, bredich, beetherelagie, pH renge, 6 F , 9 O, dH | Vorthigh |
| 4 | 2.01 | How similar are the climatic conditions of the | High | Freshwater; brackish; benthopelagic; pH range: 6.5 - 8.0; dH range: ? - 25; depth range 10 - ? m. Tropical; 20°C - 30°C. | Very high |
| | | Risk Assessment (RA) area and the taxon's native range? | | 5 , 1 5 1 1 | |
| F | 2.02 | | Lich | https://www.fishbase.se/summary/Osphronemus-goramy.html Freshwater; brackish; benthopelagic; pH range: 6.5 - 8.0; dH | Vorschigh |
| 5 | 2.02 | What is the quality of the climate matching | High | | Very high |
| | | data? | | range: ? - 25; depth range 10 - ? m. Tropical; 20°C - 30°C. | |
| <i>c</i> | 2.02 | To the tayon already present outside of | No | https://www.fishbase.se/summary/Osphronemus-goramy.html | Lliab |
| 6 | 2.03 | Is the taxon already present outside of | NO | History of the biodiversity and limno-ecological studies on Lake | High |
| | | captivity in the RA area? | | Taal with notes on the current state of Philippine limnology Rey | |
| 7 | 2.04 | How many notantial vesters could the target | N 1 | Donne S. Papa1*and Augustus C. Mamaril Sr. | Von hich |
| ' | 2.04 | How many potential vectors could the taxon | >1 | History of the biodiversity and limno-ecological studies on Lake | Very high |
| | | use to enter in the RA area? | | Taal with notes on the current state of Philippine limnology Rey | |
| 0 | 2.05 | Is the taxon surrently found in class | No | Donne S. Papa1*and Augustus C. Mamaril Sr. | High |
| 8 | 2.05 | Is the taxon currently found in close | No | History of the biodiversity and limno-ecological studies on Lake | High |
| | | proximity to, and likely to enter into, the RA | | Taal with notes on the current state of Philippine limnology Rey | |
| | | area in the near future (e.g. unintentional | | Donne S. Papa1*and Augustus C. Mamaril Sr. | |
| 2 7 | | and intentional introductions)? | | | |
| <u>3. I</u> | | e elsewhere | | Asian auchable limited to Constant Dennes Jacob the Melan |) (augus la i a la |
| 9 | 3.01 | Has the taxon become naturalised | Yes | Asia: probably limited to Sumatra, Borneo, Java, the Malay | Very high |
| | | (established viable populations) outside its | | Peninsula, Thailand and Indochina (Mekong basin). Has been | |
| | | native range? | | introduced to several countries for aquaculture purposes. | |
| | | | | Apparently absent in Sarawak and presence in Sabah may be due | |
| | | | | to relatively late introductions. | |
| 10 | 3.02 | In the taxon's introduced range, are there | Yes | http://www.fao.org/fishery/culturedspecies/Osphronemus_goramy/ | High |
| | | known adverse impacts to wild stocks or | | en | |
| | | commercial taxa? | | | |
| 11 | 3.03 | In the taxon's introduced range, are there | Yes | http://www.fao.org/fishery/culturedspecies/Osphronemus_goramy/ | Very high |
| | | known adverse impacts to aquaculture? | | en | |
| 12 | 3.04 | In the taxon's introduced range, are there | Yes | http://www.fao.org/fishery/culturedspecies/Osphronemus_goramy/ | Very high |
| | | known adverse impacts to ecosystem | | en | |
| 13 | 3.05 | In the taxon's introduced range, are there | Yes | http://www.fao.org/fishery/culturedspecies/Osphronemus_goramy/ | High |
| _ | | known adverse socio-economic impacts? | | en | |
| | | y/Ecology | _ | | _ |
| | | able (or persistence) traits | 1 | | |
| 14 | 4.01 | Is it likely that the taxon will be poisonous or | No | http://www.fao.org/fishery/culturedspecies/Osphronemus_goramy/ | High |
| 1 5 | 4.02 | pose other risks to human health? | | en | L li ala |
| 12 | 4.02 | Is it likely that the taxon will smother one or | Yes | http://www.fao.org/fishery/culturedspecies/Osphronemus_goramy/ | High |
| | | more native taxa (that are not threatened or | | en | |
| | 4.65 | protected)? | | | |
| 16 | 4.03 | Are there any threatened or protected taxa | Yes | http://www.fao.org/fishery/culturedspecies/Osphronemus_goramy/ | High |
| | [| that the non-native taxon would parasitise in | | en | |
| | | | | | |
| 1- | 4.6.1 | the RA area? | | | |
| 17 | 4.04 | Is the taxon adaptable in terms of climatic | Yes | Freshwater; brackish; benthopelagic; pH range: 6.5 - 8.0; dH | High |
| 17 | 4.04 | Is the taxon adaptable in terms of climatic and other environmental conditions, thus | Yes | range: ? - 25; depth range 10 - ? m. Tropical; 20°C - 30°C. | High |
| 17 | 4.04 | Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has | Yes | | High |
| | | Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? | | range: ? - 25; depth range 10 - ? m. Tropical; 20°C - 30°C. https://www.fishbase.se/summary/Osphronemus-goramy.html | |
| | 4.04 4.05 | Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web | Yes | range: ? - 25; depth range 10 - ? m. Tropical; 20°C - 30°C. https://www.fishbase.se/summary/Osphronemus-goramy.html http://www.fao.org/fishery/culturedspecies/Osphronemus_goramy/ | |
| | | Is the taxon 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 | | range: ? - 25; depth range 10 - ? m. Tropical; 20°C - 30°C. https://www.fishbase.se/summary/Osphronemus-goramy.html | |
| 18 | 4.05 | Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA | No | range: ? - 25; depth range 10 - ? m. Tropical; 20°C - 30°C. https://www.fishbase.se/summary/Osphronemus-goramy.html http://www.fao.org/fishery/culturedspecies/Osphronemus_goramy/ en | High |
| 18 | | Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts | | range: ? - 25; depth range 10 - ? m. Tropical; 20°C - 30°C. https://www.fishbase.se/summary/Osphronemus-goramy.html http://www.fao.org/fishery/culturedspecies/Osphronemus_goramy/ | High |
| 18 19 | 4.05 4.06 | Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? | No | <pre>range: ? - 25; depth range 10 - ? m. Tropical; 20°C - 30°C. https://www.fishbase.se/summary/Osphronemus-goramy.html http://www.fao.org/fishery/culturedspecies/Osphronemus_goramy/ en http://www.fao.org/fishery/culturedspecies/Osphronemus_goramy/ en</pre> | High Medium |
| 18 19 | 4.05 | Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or | No | <pre>range: ? - 25; depth range 10 - ? m. Tropical; 20°C - 30°C. https://www.fishbase.se/summary/Osphronemus-goramy.html http://www.fao.org/fishery/culturedspecies/Osphronemus_goramy/ en http://www.fao.org/fishery/culturedspecies/Osphronemus_goramy/ en</pre> | High |
| 18 19 | 4.05 4.06 | Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and | No | <pre>range: ? - 25; depth range 10 - ? m. Tropical; 20°C - 30°C. https://www.fishbase.se/summary/Osphronemus-goramy.html http://www.fao.org/fishery/culturedspecies/Osphronemus_goramy/ en http://www.fao.org/fishery/culturedspecies/Osphronemus_goramy/ en</pre> | High Medium |
| 18 19 20 | 4.05 4.06 4.07 | Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA | No No Yes | <pre>range: ? - 25; depth range 10 - ? m. Tropical; 20°C - 30°C. https://www.fishbase.se/summary/Osphronemus-goramy.html http://www.fao.org/fishery/culturedspecies/Osphronemus_goramy/ en http://www.fao.org/fishery/culturedspecies/Osphronemus_goramy/ en</pre> | High Medium High |
| 18 19 20 | 4.05 4.06 | Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and | No | <pre>range: ? - 25; depth range 10 - ? m. Tropical; 20°C - 30°C. https://www.fishbase.se/summary/Osphronemus-goramy.html http://www.fao.org/fishery/culturedspecies/Osphronemus_goramy/ en http://www.fao.org/fishery/culturedspecies/Osphronemus_goramy/ en</pre> | High Medium |
| 18 19 20 | 4.05 4.06 4.07 | Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA | No No Yes | <pre>range: ? - 25; depth range 10 - ? m. Tropical; 20°C - 30°C. https://www.fishbase.se/summary/Osphronemus-goramy.html http://www.fao.org/fishery/culturedspecies/Osphronemus_goramy/ en http://www.fao.org/fishery/culturedspecies/Osphronemus_goramy/ en</pre> | High Medium High |
| 18 19 20 | 4.05 4.06 4.07 | Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and linfectious agents that are endemic in the RA Is it likely that the taxon will host, and/or | No No Yes | <pre>range: ? - 25; depth range 10 - ? m. Tropical; 20°C - 30°C. https://www.fishbase.se/summary/Osphronemus-goramy.html http://www.fao.org/fishery/culturedspecies/Osphronemus_goramy/ en http://www.fao.org/fishery/culturedspecies/Osphronemus_goramy/ en http://www.fao.org/fishery/culturedspecies/Osphronemus_goramy/ en</pre> | High Medium High |

| | 4.09 | Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity? | Yes | Max length : 70.0 cm SL male/unsexed; fishbase.se/summary/Osphronemus-goramy.html | High |
|--|---|--|---|--|--|
| 23 | 4.10 | Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)? | Yes | https://www.fishbase.se/summary/Osphronemus-goramy.html | High |
| 24 | 4.11 | Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for | No | http://www.fao.org/fishery/culturedspecies/Osphronemus_goramy/ en | High |
| 25 | 4.12 | native taxa? Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)? | Yes | https://www.fishbase.se/summary/Osphronemus-goramy.html | High |
| 5. R | Resourc | ce exploitation | | | |
| 26 | 5.01 | Is the taxon likely to consume threatened or | Yes | https://www.fishbase.se/summary/Osphronemus-goramy.html | High |
| 27 | 5.02 | protected native taxa in the RA area? Is the taxon likely to sequester food resources (including nutrients) to the | No | http://www.fao.org/fishery/culturedspecies/Osphronemus_goramy/ http://www.fao.org/fishery/culturedspecies/Osphronemus_goramy/ en | High |
| 6 8 | | detriment of native taxa in the RA area? | | | |
| | <u>eprodu</u> 6.01 | Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response | Yes | https://www.fishbase.se/summary/Osphronemus-goramy.html | High |
| 29 | 6.02 | to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? | Yes | https://www.fishbase.se/summary/Osphronemus-goramy.html | High |
| 30 | 6.03 | Is the taxon likely to hybridise naturally with | No | https://www.fishbase.se/summary/Osphronemus-goramy.html | High |
| 31 | 6.04 | native taxa? Is the taxon likely to be hermaphroditic or to | No | https://www.fishbase.se/summary/Osphronemus-goramy.html | High |
| 32 | 6.05 | display asexual reproduction? Is the taxon dependent on the presence of | No | https://www.fishbase.se/summary/Osphronemus-goramy.html | High |
| | | 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)? | No | https://www.fishbase.se/summary/Osphronemus-goramy.html | High |
| 34 | 6.07 | How many time units (days, months, years) does the taxon require to reach the age-at- | 3 | =498&GenusName=Osphronemus&SpeciesName=goramy&fc=429 | High |
| 7 5 | lionara | first-reproduction? al mechanisms | | &StockCode=514 | |
| | 7.01 | How many potential internal | >1 | History of the biodiversity and limno-ecological studies on Lake | High |
| | | vectors/pathways could the taxon use to disperse within the RA area (with suitable | | Taal with notes on the current state of Philippine limnology Rey Donne S. Papa1*and Augustus C. Mamaril Sr. | - |
| 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 | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Rey Donne S. Papa1*and Augustus C. Mamaril Sr. | High |
| 37 | 7 0 2 | protected dreds (e.g. ricz, rirr, 5551). | | | |
| | 7.05 | Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances | Not applicable | no data | High |
| 38 | 7.03 | attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules | Not applicable | | High High |
| | | attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA | | | - |
| 39 | 7.04 | attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur 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 | no data | High |
| 39 40 | 7.04 | attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? | Not applicable | no data https://www.fishbase.se/summary/Osphronemus-goramy.html https://www.fishbase.se/summary/Osphronemus-goramy.html | High |
| 39 40 41 | 7.04 7.05 7.06 | attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to | Not applicable No Yes | no data https://www.fishbase.se/summary/Osphronemus-goramy.html https://www.fishbase.se/summary/Osphronemus-goramy.html | High High |
| 39 40 41 42 43 | 7.04 7.05 7.06 7.07 7.08 7.09 | attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. either unintentional or intentional) likely to be Is dispersal of the taxon density dependent? | Not applicable No Yes Not applicable | no data https://www.fishbase.se/summary/Osphronemus-goramy.html https://www.fishbase.se/summary/Osphronemus-goramy.html no data https://www.fishbase.se/summary/Osphronemus-goramy.html | High High High Low |
| 39 40 41 42 <u>43</u> <i>8. 7</i> | 7.04 7.05 7.06 7.07 7.08 7.09 | attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. either unintentional or intentional) likely to be Is dispersal of the taxon density dependent? <i>ce attributes</i> | Not applicable No Yes Not applicable Yes | no data https://www.fishbase.se/summary/Osphronemus-goramy.html https://www.fishbase.se/summary/Osphronemus-goramy.html https://www.fishbase.se/summary/Osphronemus-goramy.html | High High Low High |
| 39 40 41 42 <u>43</u> <i>8. 7</i> | 7.04 7.05 7.06 7.07 7.08 7.09 | attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. either unintentional or intentional) likely to be Is dispersal of the taxon density dependent? | Not applicable No Yes Not applicable Yes | no data https://www.fishbase.se/summary/Osphronemus-goramy.html https://www.fishbase.se/summary/Osphronemus-goramy.html no data https://www.fishbase.se/summary/Osphronemus-goramy.html | High High High Low High |
| 39 40 41 42 <u>43</u> <u>8. 7</u> 44 | 7.04 7.05 7.06 7.07 7.08 7.09 | attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. either 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 | Not applicable No Yes Not applicable Yes | no data https://www.fishbase.se/summary/Osphronemus-goramy.html https://www.fishbase.se/summary/Osphronemus-goramy.html https://www.fishbase.se/summary/Osphronemus-goramy.html | High High Low High |
| 39 40 41 42 43 8. 7 44 | 7.04 7.05 7.06 7.07 7.08 7.09 <i>Folerano</i> 8.01 | attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. either 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 | Not applicable No Yes Not applicable Yes Yes | no data https://www.fishbase.se/summary/Osphronemus-goramy.html https://www.fishbase.se/summary/Osphronemus-goramy.html https://www.fishbase.se/summary/Osphronemus-goramy.html https://www.fishbase.se/summary/Osphronemus-goramy.html https://www.fishbase.se/summary/Osphronemus-goramy.html | High High Low High High |
| 39 40 41 42 43 8.7 44 45 46 | 7.04 7.05 7.06 7.07 7.08 7.09 60erano 8.01 8.02 | attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. either 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 | Not applicable No Yes Not applicable Yes Yes No | no data https://www.fishbase.se/summary/Osphronemus-goramy.html https://www.fishbase.se/summary/Osphronemus-goramy.html no data https://www.fishbase.se/summary/Osphronemus-goramy.html https://www.fishbase.se/summary/Osphronemus-goramy.html https://www.fishbase.se/summary/Osphronemus-goramy.html Freshwater; brackish; benthopelagic; pH range: 6.5 - 8.0; dH range: ? - 25; depth range 10 - ? m. Tropical; 20°C - 30°C do data http://www.fao.org/fishery/culturedspecies/Osphronemus_goramy/ | High High Low High High Very high Medium |
| 39 40 41 42 43 8.7 44 45 46 47 | 7.04 7.05 7.06 7.07 7.08 7.09 8.01 8.02 8.03 | attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. either 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 salinity levels that are higher or lower than those found in | Not applicable No Yes Not applicable Yes Yes No Yes No | no data https://www.fishbase.se/summary/Osphronemus-goramy.html https://www.fishbase.se/summary/Osphronemus-goramy.html https://www.fishbase.se/summary/Osphronemus-goramy.html https://www.fishbase.se/summary/Osphronemus-goramy.html https://www.fishbase.se/summary/Osphronemus-goramy.html Freshwater; brackish; benthopelagic; pH range: 6.5 - 8.0; dH range: ? - 25; depth range 10 - ? m. Tropical; 20°C - 30°C do data | High High Low High High Very high Medium |
| 39 40 41 42 43 8. 7 44 45 46 47 48 | 7.04 7.05 7.06 7.07 7.08 7.09 0lerano 8.01 8.02 8.03 8.04 | attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. either 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 likely to tolerate or benefit from environmental/human disturbance? Is the taxon likely to tolerate or benefit from environmental/human disturbance? | Not applicable No Yes Not applicable Yes Yes No Yes No Yes | no data https://www.fishbase.se/summary/Osphronemus-goramy.html https://www.fishbase.se/summary/Osphronemus-goramy.html no data https://www.fishbase.se/summary/Osphronemus-goramy.html https://www.fishbase.se/summary/Osphronemus-goramy.html https://www.fishbase.se/summary/Osphronemus-goramy.html Freshwater; brackish; benthopelagic; pH range: 6.5 - 8.0; dH range: ? - 25; depth range 10 - ? m. Tropical; 20°C - 30°C do data http://www.fao.org/fishery/culturedspecies/Osphronemus_goramy/ en | High High Low High High Very high Medium High |

| C . | Climate | e change | | | |
|------------|---------|---|-----------|--|------|
| 9. (| Climate | change | | | |
| 50 | 9.01 | Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? | Increase | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Rey Donne S. Papa1*and Augustus C. Mamaril Sr. | 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 | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Rey Donne S. Papa1*and Augustus C. Mamaril Sr. | 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 | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Rey Donne S. Papa1*and Augustus C. Mamaril Sr. | 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 | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Rey Donne S. Papa1*and Augustus C. Mamaril Sr. | 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 | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Rey Donne S. Papa1*and Augustus C. Mamaril Sr. | 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 | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Rey Donne S. Papa1*and Augustus C. Mamaril Sr. | High |

| Statistics | |
|--|--------------------------|
| Scores | |
| BRA | 47.0 |
| BRA Outcome | High |
| BRA+CCA | 53.0 |
| 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 | 24.0 |
| 4. Undesirable (or persistence) traits | 8.0 |
| 5. Resource exploitation | 5.0 |
| 6. Reproduction | 1.0 |
| 7. Dispersal mechanisms | 4.0 |
| 8. Tolerance attributes | 6.0 |
| C. Climate change | 6.0 |
| 9. Climate change | 6.0 |
| Answered Questions | |
| Total | 55 |
| A. Biogeography/Historical | 13 |
| 1. Domestication/Cultivation | 3 |
| 2. Climate, distribution and introduction risk | 5 |
| 3. Invasive elsewhere | 5 |
| B. Biology/Ecology | 3 5 5 36 |
| 4. Undesirable (or persistence) traits | 12 |
| 5. Resource exploitation | 2 |
| 6. Reproduction | 7 |
| 7. Dispersal mechanisms | 12 2 7 9 |
| 8. Tolerance attributes | 6 |
| C. Climate change | 6 |
| 9. Climate change | 6 |
| Sectors affected | |
| Commercial | 18 |
| Environmental | 10 |
| Species or population nuisance traits | 29 |
| | |
| Thresholds | |
| BRA | 34.5 |
| BRA+CCA | 34.5 |
| Confidence | |

| | •• |
|----------|----------------------------------|
| BRA+CCA | 34.5 |
| | |
| BRA+CCA | 0.77 |
| BRA | 0.78 |
| CCA | 0.75 |
| | |
| | |
| 02/04/20 | 20 07:58:06 |
| | BRA+CCA BRA+CCA BRA CCA |

| Taxon and Assessor details | |
|------------------------------------|--|
| Category | Fishes and Lampreys (freshwater) |
| Taxon name | Pangasianodon hypophthalmus |
| Common name | striped catfish |
| Assessor | Gilles |
| Risk screening context | |
| Reason and socio-economic benefits | Fisheries: commercial; aquaculture |
| Risk assessment area | Lake Taal |
| Taxonomy | Actinopteri (ray-finned fishes) > Siluriformes (Catfish) > Pangasiidae (Shark catfishes) |
| Native range | Asia: Mekong, Chao Phraya, and Maeklong basins |
| Introduced range | Introduced into additional river basins for aquaculture. Philippines, Thailand, Singapore etc. |
| URL | https://www.fishbase.se/summary/Pangasianodon-hypophthalmus.html |

| | | | Response | Justification (references and/or other information) | Confidence |
|------|---------|---|----------|--|------------|
| | | graphy/Historical | | | |
| | | ication/Cultivation | | | |
| - | 1.01 | Has the taxon been the subject of domestication (or cultivation) for at least 20 generations? | Yes | Justification: This species was reported in 1988 from a Florida creek that drains into the Hillsborough River near Tampa (Shafland et al. 2008, as Platytropius siamensis), and from a non- specific location circa 1999 (P. Shafland, personal communication). | Very high |
| 2 | 1.02 | Is the taxon harvested in the wild and likely to be sold or used in its live form? | Yes | Justification: All life stages of P. hypophthalmus are intensively harvested with legal (hooks and lines, trawls, seines, gill nets, set nets, and traps), and illegal and unsustainable (poisons, explosives, electro-shocking and barrages) fishing techniques. (So, et al., 2006) Farming of the striped catfish, Pangasianodon hypophthalmus, is a major aquaculture activity in Bangladesh, particularly in the district of Mymensingh. (Ali, et al., 2012) | Very high |
| ; | 1.03 | Does the taxon have invasive races, varieties, sub-taxa or congeners? | Yes | The taxon have insavie races, varieties, subtaxa or congeners like the Pangasianodon gigas (Mekong Giant Catfish), whic is considere a problematic invasive species. (Hogan, Z. 2011) | Very high |
| ?. C | Climate | , distribution and introduction risk | | | |
| ł | 2.01 | How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range? | High | the climatic range (tropical) and temperature (22°C - 26°C) of the taxon match the Tropical climate of the RA area. (FishBase , n.d.) | High |
| 5 | 2.02 | What is the quality of the climate matching data? | High | The climatic range (tropical) and temperature (22°C - 26°C) of the taxon match the Tropical climate of the RA area. (FishBase, | High |
| 5 | 2.03 | Is the taxon already present outside of captivity in the RA area? | Yes | Pangasius have not been introduced for aquaculture outside tropical regions of Asia, although they are available as an ornamental species for the aquarium trade in many countries. | High |
| , | 2.04 | How many potential vectors could the taxon use to enter in the RA area? | >1 | The Asian catfish, Pangasianodon hypophthalmus, commonly known as pangasius, has achieved impressive success as a commercial aquaculture species. Its production levels and distribution in global markets are now similar to that of other established top-tier aquaculture species such as tilapia, shrimp and salmon. While global markets for the latter species matured over the past 20 years, pangasius aquaculture has developed impressively within the last decade. (The Fish Site. 2010) | Very high |
| 1 | 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 | flooding (accidental) and ornamental reasons (intentional) (Fishbase, n.d.) | High |
| ?. I | | e elsewhere | | | |
|) | | Has the taxon become naturalised (established viable populations) outside its native range? | Yes | Aquaculture introductions have taken place to several other Asian countries including Bangladesh, China, India, Indonesia, Malaysia and Myanmar. (Food and Agriculture Organization, 2010) | Very high |
| - | 3.02 | In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? | Yes | Pangas farming with the rapid expansation and intesification, have raised environmental problems as a great concern in recent years. The mitigation of all the negative aspects is also essential for ensuring the better culture practices. (Anka, I.Z. 2013) | Very high |
| 1 | 3.03 | In the taxon's introduced range, are there known adverse impacts to aquaculture? | Yes | Overexploitation, habitat degradation, and changes in water quality and flow are the major threats to the species. (Vidthayanon, C. & Hogan, Z. 2011). | Very high |
| 2 | 3.04 | In the taxon's introduced range, are there known adverse impacts to ecosystem services? | Yes | It has potential to mature and breed naturally in wild and hence escapee fish may colonise and form feral populations in different agro-climatic conditions impacting the ecosystem and in turn affecting the biodiversity. (Lakra and Singh, 2010) | Very high |
| 3 | 3.05 | In the taxon's introduced range, are there known adverse socio-economic impacts? | Yes | In India, the breeding of local P. pangasius, which has a similar spawning period which will be overlapped by P. hypophthalmus in case of its establishment in the wild. The presence of similar numbers of chromosomes in both the species (2n=60) may facilitate hybridisation leading to genetic pollution which in turn could dilute the gene pool of local P. pangasius whose population has declined critically (Sarkar et al. 2006). | Very high |
| | | | | Thas declined critically (Sarkar et al. 2006). | |

| 14 | - | | 1 | | |
|--|--|---|--|---|---|
| | 4.01 | Is it likely that the taxon will be poisonous or pose other risks to human health? | No | An adult could safely eat between 3.4 and 166 kg of rejected pangasius fillet each day for his or her entire life without having any adverse effects from contamination with pesticides. With regard to preservatives and antibiotics, an adult could eat | Very high |
| | | | | between 0.6 and 303 kg of pangasius fillet each day before reaching the critical toxic level. These amounts are so absurdly | |
| | | | | high that it can be safely assumed that nobody would ever come | |
| | | | | near to reaching the critical toxic level. It can therefore be | |
| | | | | concluded that the pangasius actually on sale on the European market is totally safe for human consumption. (Murk et al., 2018) | |
| 15 | 4.02 | Is it likely that the taxon will smother one or | Yes | In Cambodia, mature fish populations are in decline. Future plans | Very high |
| | | more native taxa (that are not threatened or | | to dam the Mekong could disrupt the species life cycle because | |
| | | protected)? | | the species is migratory and appears to rely on flow or water quality to facilitate migrations, cue spawning, and aid in the | |
| | | | | dispersal of young fish. (Vidthayanon, C. & Hogan, Z. 2011). | |
| 16 | 4.03 | Are there any threatened or protected taxa | No | There are no reports that the taxa would parasitise threatend or protected taxa in the RA area. | High |
| | | that the non-native taxon would parasitise in the RA area? | | protected taxa in the KA area. | |
| 17 | 4.04 | Is the taxon adaptable in terms of climatic | No | The climate match was medium in southern Florida and southern | Very high |
| | | and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? | | Texas. The rest of the contiguous U.S. showed low climate match. (Sanders et al. 2014; 16 climate variables; Euclidean Distance) | |
| 18 | 4.05 | Is the taxon likely to disrupt food-web | No | There are no reports that the taxon is likely to disrupt food-web | Medium |
| | | structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA | | structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA area. | |
| 19 | 4.06 | Is the taxon likely to exert adverse impacts | No | There no reports that the taxon is likely to exert adverse impacts | Medium |
| 20 | 4.07 | on ecosystem services in the RA area? | No | on ecosystem services in the RA area. | Madium |
| ∠U | 4.07 | Is it likely that the taxon will host, and/or act as a vector for, recognised pests and | No | There are no reports that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are | Medium |
| | | infectious agents that are endemic in the RA | | endemic in the RA area. | |
| 21 | 4.08 | Is it likely that the taxon will host, and/or act as a vector for, recognised pests and | No | There are no reports that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent | High |
| | | infectious agents that are absent from (novel | | from (novel to) the RA area. | |
| 22 | 4 00 | to) the RA area? | Vac | | Vonchish |
| ۷۷ | 4.09 | Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity? | Yes | This taxon can grow up to 130 cm (4.3 ft) in length and 44 Kg body weight (U.S. Fish and Wildlife Service, 2011) | Very high |
| 23 | 4.10 | Is the taxon capable of sustaining itself in a | No | There are no reports that the taxon is capable of sustaining itself | High |
| | | range of water velocity conditions (e.g. | | in a range of water velocity conditions. | - |
| 24 | 4.11 | versatile in habitat use)? Is it likely that the taxon's mode of existence | Yes | In Cambodia, mature fish populations are in decline. Future plans | Very high |
| | _ | (e.g. excretion of by-products) or behaviours | | to dam the Mekong could disrupt the species life cycle because | |
| | | (e.g. feeding) will reduce habitat quality for native taxa? | | the species is migratory and appears to rely on flow or water quality to facilitate migrations, cue spawning, and aid in the | |
| | | | | dispersal of young fish. (Vidthayanon, C. & Hogan, Z. 2011). | |
| 25 | 4.12 | Is the taxon likely to maintain a viable population even when present in low | No | There are no reports that the taxon is likely to maintain a viable | High |
| | | | | population even when present in low densities. | 1 |
| | | densities (or persisting in adverse conditions | | | |
| | | densities (or persisting in adverse conditions by way of a dormant form)? | | | |
| | | densities (or persisting in adverse conditions by way of a dormant form)? ce exploitation | No | There are no reports that taxon is likely to consume threatened or | High |
| 26 | 5.01 | densities (or persisting in adverse conditions by way of a dormant form)? ee exploitation Is the taxon likely to consume threatened or protected native taxa in the RA area? | | protected native taxa in the RA area. | 5 |
| 26 | | densities (or persisting in adverse conditions by way of a dormant form)? <i>ce exploitation</i> Is the taxon likely to consume threatened or protected native taxa in the RA area? Is the taxon likely to sequester food | No Yes | protected native taxa in the RA area. The species is a large, fecund, relatively slow growing catfish. It is | High Very high |
| 26 | 5.01 | densities (or persisting in adverse conditions by way of a dormant form)? ee exploitation Is the taxon likely to consume threatened or protected native taxa in the RA area? | | protected native taxa in the RA area. | 5 |
| 26 27 6. R | 5.01 5.02 | densities (or persisting in adverse conditions by way of a dormant form)? ee exploitation Is the taxon likely to consume threatened or protected native taxa in the RA area? Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area? uction | Yes | protected native taxa in the RA area. The species is a large, fecund, relatively slow growing catfish. It is an omnivore, feeding primarily on algae, plants, zooplankton, insects, fruits, crustaceans, and fish. (Vidthayanon, C. & Hogan, | Very high |
| 26 27 6. R | 5.01 5.02 | densities (or persisting in adverse conditions by way of a dormant form)? ce exploitation Is the taxon likely to consume threatened or protected native taxa in the RA area? Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area? <i>uction</i> Is the taxon likely to exhibit parental care | | protected native taxa in the RA area. The species is a large, fecund, relatively slow growing catfish. It is an omnivore, feeding primarily on algae, plants, zooplankton, insects, fruits, crustaceans, and fish. (Vidthayanon, C. & Hogan, The taxon does not exhibit parental care, after hatching, the | 5 |
| 26 27 <u>6. R</u> 28 | 5.01 5.02 6.01 | densities (or persisting in adverse conditions by way of a dormant form)? ce exploitation Is the taxon likely to consume threatened or protected native taxa in the RA area? Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area? <i>uction</i> Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? | Yes | protected native taxa in the RA area. The species is a large, fecund, relatively slow growing catfish. It is an omnivore, feeding primarily on algae, plants, zooplankton, insects, fruits, crustaceans, and fish. (Vidthayanon, C. & Hogan, The taxon does not exhibit parental care, after hatching, the larvae are dispersed by river currents making them vulnerable to predation and natural mortality ("Pangasius Aquaculture", 2010) | Very high |
| 26 27 <u>6. R</u> 28 | 5.01 5.02 | densities (or persisting in adverse conditions by way of a dormant form)? <i>ce exploitation</i> Is the taxon likely to consume threatened or protected native taxa in the RA area? Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area? <i>uction</i> Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes | Yes | protected native taxa in the RA area. The species is a large, fecund, relatively slow growing catfish. It is an omnivore, feeding primarily on algae, plants, zooplankton, insects, fruits, crustaceans, and fish. (Vidthayanon, C. & Hogan, The taxon does not exhibit parental care, after hatching, the larvae are dispersed by river currents making them vulnerable to predation and natural mortality ("Pangasius Aquaculture", 2010) This taxon has records of being breed in lakes or rivers producing | Very high |
| 26 27 <u>6. R</u> 28 29 | 5.01 5.02 6.01 | densities (or persisting in adverse conditions by way of a dormant form)? ce exploitation Is the taxon likely to consume threatened or protected native taxa in the RA area? Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area? <i>uction</i> Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? | Yes | protected native taxa in the RA area. The species is a large, fecund, relatively slow growing catfish. It is an omnivore, feeding primarily on algae, plants, zooplankton, insects, fruits, crustaceans, and fish. (Vidthayanon, C. & Hogan, The taxon does not exhibit parental care, after hatching, the larvae are dispersed by river currents making them vulnerable to predation and natural mortality ("Pangasius Aquaculture", 2010) | Very high |
| 26 27 <u>6. <i>R</i></u> 28 29 30 | 5.01 5.02 6.01 6.02 6.03 | densities (or persisting in adverse conditions by way of a dormant form)? exexploitation Is the taxon likely to consume threatened or protected native taxa in the RA area? Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area? action Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa? | Yes No Yes | protected native taxa in the RA area. The species is a large, fecund, relatively slow growing catfish. It is an omnivore, feeding primarily on algae, plants, zooplankton, insects, fruits, crustaceans, and fish. (Vidthayanon, C. & Hogan, The taxon does not exhibit parental care, after hatching, the larvae are dispersed by river currents making them vulnerable to predation and natural mortality ("Pangasius Aquaculture", 2010) This taxon has records of being breed in lakes or rivers producing viable gametes ("Pangasius Farming", 2015) Pangasius djambal and Pangasianodon hypophthalmus has a record of being hybridize or crossbred mainly to increase their reproduction (Gustiano, 2004) | Very high Very high Very high |
| 26 27 <u>6. <i>R</i></u> 28 29 30 | 5.01 5.02 6.01 6.02 | densities (or persisting in adverse conditions by way of a dormant form)? exexploitation Is the taxon likely to consume threatened or protected native taxa in the RA area? Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area? uction Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to | Yes No Yes | protected native taxa in the RA area. The species is a large, fecund, relatively slow growing catfish. It is an omnivore, feeding primarily on algae, plants, zooplankton, insects, fruits, crustaceans, and fish. (Vidthayanon, C. & Hogan, The taxon does not exhibit parental care, after hatching, the larvae are dispersed by river currents making them vulnerable to predation and natural mortality ("Pangasius Aquaculture", 2010) This taxon has records of being breed in lakes or rivers producing viable gametes ("Pangasius Farming", 2015) Pangasius djambal and Pangasianodon hypophthalmus has a record of being hybridize or crossbred mainly to increase their reproduction (Gustiano, 2004) Pangasius nasutus is the first record of an hermaphroditic catfish | Very high Very high Very high |
| 26 27 <u>6. <i>R</i></u> 28 29 30 | 5.01 5.02 6.01 6.02 6.03 | densities (or persisting in adverse conditions by way of a dormant form)? exexploitation Is the taxon likely to consume threatened or protected native taxa in the RA area? Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area? action Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa? | Yes No Yes Yes | protected native taxa in the RA area. The species is a large, fecund, relatively slow growing catfish. It is an omnivore, feeding primarily on algae, plants, zooplankton, insects, fruits, crustaceans, and fish. (Vidthayanon, C. & Hogan, The taxon does not exhibit parental care, after hatching, the larvae are dispersed by river currents making them vulnerable to predation and natural mortality ("Pangasius Aquaculture", 2010) This taxon has records of being breed in lakes or rivers producing viable gametes ("Pangasius Farming", 2015) Pangasius djambal and Pangasianodon hypophthalmus has a record of being hybridize or crossbred mainly to increase their reproduction (Gustiano, 2004) Pangasius nasutus is the first record of an hermaphroditic catfish wherein a testicular zone producing spermatozoa was found in a | Very high Very high Very high Very high |
| 26 27 6. <i>R</i> 28 29 30 31 | 5.01 5.02 6.01 6.02 6.03 | densities (or persisting in adverse conditions by way of a dormant form)? <i>exexploitation</i> Is the taxon likely to consume threatened or protected native taxa in the RA area? Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area? <i>uction</i> Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of | Yes No Yes Yes | protected native taxa in the RA area. The species is a large, fecund, relatively slow growing catfish. It is an omnivore, feeding primarily on algae, plants, zooplankton, insects, fruits, crustaceans, and fish. (Vidthayanon, C. & Hogan, The taxon does not exhibit parental care, after hatching, the larvae are dispersed by river currents making them vulnerable to predation and natural mortality ("Pangasius Aquaculture", 2010) This taxon has records of being breed in lakes or rivers producing viable gametes ("Pangasius Farming", 2015) Pangasius djambal and Pangasianodon hypophthalmus has a record of being hybridize or crossbred mainly to increase their reproduction (Gustiano, 2004) Pangasius nasutus is the first record of an hermaphroditic catfish wherein a testicular zone producing spermatozoa was found in a paired ovary-appearing qonad (Rodriguez et al., 2011) This taxon is migratory, they migrate upstream to spawn during | Very high Very high Very high Very high |
| 26 27 6. <i>R</i> 28 29 30 31 | 5.01 5.02 <u>eprodu</u> 6.01 6.02 6.03 6.04 | densities (or persisting in adverse conditions by way of a dormant form)? exexploitation Is the taxon likely to consume threatened or protected native taxa in the RA area? Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area? uction Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) | Yes No Yes Yes Yes | protected native taxa in the RA area. The species is a large, fecund, relatively slow growing catfish. It is an omnivore, feeding primarily on algae, plants, zooplankton, insects, fruits, crustaceans, and fish. (Vidthayanon, C. & Hogan, The taxon does not exhibit parental care, after hatching, the larvae are dispersed by river currents making them vulnerable to predation and natural mortality ("Pangasius Aquaculture", 2010) This taxon has records of being breed in lakes or rivers producing viable gametes ("Pangasius Farming", 2015) Pangasius djambal and Pangasianodon hypophthalmus has a record of being hybridize or crossbred mainly to increase their reproduction (Gustiano, 2004) Pangasius nasutus is the first record of an hermaphroditic catfish wherein a testicular zone producing spermatozoa was found in a paired ovary-appearing gonad (Rodriguez et al., 2011) This taxon is migratory, they migrate upstream to spawn during late spring and summer months ("Pangasius sanitwongsei", n.d.; | Very high Very high Very high Very high Very high |
| 26 27 6. <i>R</i> 28 29 30 31 32 | 5.01 5.02 <u>eprodu</u> 6.01 6.02 6.03 6.04 | densities (or persisting in adverse conditions by way of a dormant form)? <i>exexploitation</i> Is the taxon likely to consume threatened or protected native taxa in the RA area? Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area? <i>uction</i> Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of | Yes No Yes Yes Yes | protected native taxa in the RA area. The species is a large, fecund, relatively slow growing catfish. It is an omnivore, feeding primarily on algae, plants, zooplankton, insects, fruits, crustaceans, and fish. (Vidthayanon, C. & Hogan, The taxon does not exhibit parental care, after hatching, the larvae are dispersed by river currents making them vulnerable to predation and natural mortality ("Pangasius Aquaculture", 2010) This taxon has records of being breed in lakes or rivers producing viable gametes ("Pangasius Farming", 2015) Pangasius djambal and Pangasianodon hypophthalmus has a record of being hybridize or crossbred mainly to increase their reproduction (Gustiano, 2004) Pangasius nasutus is the first record of an hermaphroditic catfish wherein a testicular zone producing spermatozoa was found in a paired ovary-appearing qonad (Rodriguez et al., 2011) This taxon is migratory, they migrate upstream to spawn during | Very high Very high Very high Very high Very high |
| 26 27 6. <i>R</i> 28 29 30 31 32 | 5.01 5.02 6.01 6.02 6.03 6.04 6.05 | densities (or persisting in adverse conditions by way of a dormant form)? e exploitation Is the taxon likely to consume threatened or protected native taxa in the RA area? Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area? uction Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring | Yes No Yes Yes Yes | protected native taxa in the RA area. The species is a large, fecund, relatively slow growing catfish. It is an omnivore, feeding primarily on algae, plants, zooplankton, insects, fruits, crustaceans, and fish. (Vidthayanon, C. & Hoqan, The taxon does not exhibit parental care, after hatching, the larvae are dispersed by river currents making them vulnerable to predation and natural mortality ("Pangasius Aquaculture", 2010) This taxon has records of being breed in lakes or rivers producing viable gametes ("Pangasius Farming", 2015) Pangasius djambal and Pangasianodon hypophthalmus has a record of being hybridize or crossbred mainly to increase their reproduction (Gustiano, 2004) Pangasius nasutus is the first record of an hermaphroditic catfish wherein a testicular zone producing spermatozoa was found in a paired ovary-appearing qonad (Rodriguez et al., 2011) This taxon is migratory, they migrate upstream to spawn during late spring and summer months ("Pangasius sanitwongsei", n.d.; FishBase, n.d.) | Very high Very high Very high Very high Very high High |
| 26 27 6. <i>R</i> 28 29 30 31 32 33 | 5.01 5.02 6.01 6.02 6.03 6.04 6.05 6.06 | densities (or persisting in adverse conditions by way of a dormant form)? exexploitation Is the taxon likely to consume threatened or protected native taxa in the RA area? Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area? <i>uction</i> Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? | Yes No Yes Yes Yes Yes Yes | protected native taxa in the RA area. The species is a large, fecund, relatively slow growing catfish. It is an omnivore, feeding primarily on algae, plants, zooplankton, insects, fruits, crustaceans, and fish. (Vidthayanon, C. & Hogan, The taxon does not exhibit parental care, after hatching, the larvae are dispersed by river currents making them vulnerable to predation and natural mortality ("Pangasius Aquaculture", 2010) This taxon has records of being breed in lakes or rivers producing viable gametes ("Pangasius Farming", 2015) Pangasius djambal and Pangasianodon hypophthalmus has a record of being hybridize or crossbred mainly to increase their reproduction (Gustiano, 2004) Pangasius nasutus is the first record of an hermaphroditic catfish wherein a testicular zone producing spermatozoa was found in a paired ovary-appearing gonad (Rodriguez et al., 2011) This taxon is migratory, they migrate upstream to spawn during late spring and summer months ("Pangasius sanitwongsei", n.d.; FishBase, n.d.) Females of this taxon can produce up to 80,000 eggs/kg and can spawn several times ("Pangasius Farming", 2015) | Very high Very high Very high Very high Very high High Very high |
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| 17 | | | | | |
|---|--|--|--|--|---|
| | 7.03 | Does the taxon have a means of actively | No | They have no morphological structure that can facilitate their | High |
| | | attaching itself to hard substrata (e.g. ship | | attaching to hard substrata (FishBase , n.d.) | |
| | | hulls, pilings, buoys) such that it enhances | Í Í | | |
| | | the likelihood of dispersal? | | | |
| 8 | 7.04 | Is natural dispersal of the taxon likely to | Yes | This taxon is migratory, they migrate upstream to spawn during | Very high |
| | | occur as eggs (for animals) or as propagules | | late spring and summer months ("Pangasius sanitwongsei", n.d.; | |
| | | (for plants: seeds, spores) in the RA area? | Í I | FishBase, n.d.) In china there is a recorded migration of this taxon | |
| | | | | towards the upper Mekong-Lancangjiang River during breeding | |
| | | | | season (Yang, et al. 2019) Also, Pangasius krempfi is capable of | |
| | | | | long distances migration from mekong river passing through | |
| | | | | vietnam and cambodia until they reach southern Laos (Hogan et | |
| 9 | 7.05 | Is natural dispersal of the taxon likely to | Yes | This taxon is migratory, they migrate upstream to spawn during | Very high |
| | | occur as larvae/juveniles (for animals) or as | | late spring and summer months ("Pangasius sanitwongsei", n.d.; | |
| | | fragments/seedlings (for plants) in the RA | | FishBase, n.d.) In china there is a recorded migration of this taxon | |
| | | area? | | towards the upper Mekong-Lancangjiang River during breeding | |
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| | | | | long distances migration from mekong river passing through | |
| | | | | vietnam and cambodia until they reach southern Laos (Hogan et | |
| 0 | 7.06 | Are older life stages of the taxon likely to | Yes | This taxon is migratory, they migrate upstream to spawn during | Very high |
| | | migrate in the RA area for reproduction? | | late spring and summer months ("Pangasius sanitwongsei", n.d.; | |
| | | | | FishBase, n.d.) In china there is a recorded migration of this taxon | |
| | | | | towards the upper Mekong-Lancangjiang River during breeding | |
| | | | | season (Yang, et al. 2019). Also, Pangasius krempfi is capable of | |
| | | | | long distances migration from mekong river passing through | |
| | | | | vietnam and cambodia until they reach southern Laos (Hogan et | |
| 1 | 7.07 | Are propagules or eggs of the taxon likely to | Yes | Because of the taxon's migratory behavior and having no parental | Very high |
| | | be dispersed in the RA area by other animals? | [| care, after hatching, the larvae are dispersed by river currents | |
| | | | [| making them vulnerable to predation and dispersion of other | |
| | | | I | animals ("Pangasius Aquaculture", 2010) | |
| 2 | 7.08 | Is dispersal of the taxon along any of the | No | There are no available data or records of their rapid dispersal. | Medium |
| | | vectors/pathways mentioned in the previous | | | |
| | | seven questions (35-41; i.e. either | Í Í | | |
| | | unintentional or intentional) likely to be | | | |
| 3 | 7.09 | Is dispersal of the taxon density dependent? | Not applicable | There are no documented evidence of the organism spreading out | High |
| | | | <u> </u> | or dispersing when its population density increases. | |
| | | ce attributes | | | I M I |
| 4 8 | 8.01 | Is the taxon able to withstand being out of | Not applicable | There are no data or recorded evidence that this taxon is able to | Medium |
| | | water for extended periods (e.g. minimum of | | withstand being out of water for extended periods | |
| | | one or more hours) at some stage of its life | Í Í | | |
| + | 0.02 | cycle? | | | |
| -5 8 | 8.02 | Is the taxon tolerant of a wide range of | Yes | This taxon can live in salt concentrations of around 0.7% - 1% | Very high |
| | | water quality conditions relevant to that | | and alum water (PH >5) which can be tolerated at temperatures | |
| | | taxon? [In the Justification field, indicate the | Í Í | of around 30°C ("Pangasius Farming", 2015). | |
| _ | | relevant water quality variable(s) being | | | |
| 8 | 8.03 | Can the taxon be controlled or eradicated in | Not applicable | There are no documented evidence of susceptibility of the | Very high |
| | | the wild with chemical, biological, or other | | organism. | |
| + | 0.04 | agents/means? | Vaa | | lliab |
| ·/ 8 | 8.04 | Is the taxon likely to tolerate or benefit from | Yes | In case of natural disasters like flood and unintentionally released | High |
| | | environmental/human disturbance? | Í Í | into the wild, this taxon can grow upto their maximum length and | |
| | | | Í Í | weight which is restricted if they are confined in aquariums | |
| + | 0.05 | Is the taxon able to tolerate salinity levels | N- | "Pangasius sanitwongsei", n.d.) | 1 |
| | 8.05 | | | The taxon can only tolerate salinities up to 15 ppt, exceeding this | |
| 8 | | | No | | Very high |
| 8 | | that are higher or lower than those found in | NO | level (20 ppt) and (25 ppt) would cause 100% mortality (Ajay et | Very high |
| | | that are higher or lower than those found in its usual environment? | | level (20 ppt) and (25 ppt) would cause 100% mortality (Ajay et al., 2017) | |
| | 8.06 | that are higher or lower than those found in its usual environment? Are there effective natural enemies | No | level (20 ppt) and (25 ppt) would cause 100% mortality (Ajay et al., 2017) Based on the list of fish species present in lake Taal (Papa and | Very high Very high |
| | 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 | | level (20 ppt) and (25 ppt) would cause 100% mortality (Ajay et al., 2017) Based on the list of fish species present in lake Taal (Papa and Mamaril, 2011), there is none that could possibly prey on the | |
| 19 8 | | that are higher or lower than those found in its usual environment? Are there effective natural enemies (predators) of the taxon present in the RA area? | | level (20 ppt) and (25 ppt) would cause 100% mortality (Ajay et al., 2017) Based on the list of fish species present in lake Taal (Papa and | |
| 19 8 C. CI | limat | that are higher or lower than those found in its usual environment? Are there effective natural enemies (predators) of the taxon present in the RA area? a change | | level (20 ppt) and (25 ppt) would cause 100% mortality (Ajay et al., 2017) Based on the list of fish species present in lake Taal (Papa and Mamaril, 2011), there is none that could possibly prey on the | |
| 19 8 C. C | limate | that are higher or lower than those found in its usual environment? Are there effective natural enemies (predators) of the taxon present in the RA area? e change <i>change</i> | No | level (20 ppt) and (25 ppt) would cause 100% mortality (Ajay et al., 2017) Based on the list of fish species present in lake Taal (Papa and Mamaril, 2011), there is none that could possibly prey on the taxon being assessed. | Very high |
| 19 8 C. C | limate | that are higher or lower than those found in its usual environment? Are there effective natural enemies (predators) of the taxon present in the RA area? e change Under the predicted future climatic | | level (20 ppt) and (25 ppt) would cause 100% mortality (Ajay et al., 2017) Based on the list of fish species present in lake Taal (Papa and Mamaril, 2011), there is none that could possibly prey on the taxon being assessed. Together with the fact that the RA area is prone to natural | |
| 19 8 C. C | limate | that are higher or lower than those found in its usual environment? Are there effective natural enemies (predators) of the taxon present in the RA area? e change change Under the predicted future climatic conditions, are the risks of entry into the RA | No | level (20 ppt) and (25 ppt) would cause 100% mortality (Ajay et al., 2017) Based on the list of fish species present in lake Taal (Papa and Mamaril, 2011), there is none that could possibly prey on the taxon being assessed. Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, | Very high |
| 19 8 C. C | limate | that are higher or lower than those found in its usual environment? Are there effective natural enemies (predators) of the taxon present in the RA area? e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, | No | level (20 ppt) and (25 ppt) would cause 100% mortality (Ajay et al., 2017) Based on the list of fish species present in lake Taal (Papa and Mamaril, 2011), there is none that could possibly prey on the taxon being assessed. Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) the risk of entry through accidental release from aquarium | Very high |
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| 19 8 CL CL CL CL <td< td=""><td>limate 9.01 9.02 9.03 9.04</td><td>that are higher or lower than those found in its usual environment? Are there effective natural enemies (predators) of the taxon present in the RA area? e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem</td><td>No Increase Increase Higher</td><td>level (20 ppt) and (25 ppt) would cause 100% mortality (Ajay et al., 2017) Based on the list of fish species present in lake Taal (Papa and Mamaril, 2011), there is none that could possibly prey on the taxon being assessed. Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) the risk of entry through accidental release from aquarium would most likely increase the entry of this taxon. Since the RA area and the taxon's native range has both tropical climate (FishBase, n.d.) the risk of establishment of this taxon would most likely increase. Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their migration ability the risk of dispersal would most likely increase the entry of this taxon. As this taxon can survive the future climatic conditions of the RA area and can establish viable population on it, it can pose a huge impact on the biodiversity and ecological status of the RA area by competing on food and nutrients of the local species in the area. As this taxon can survive the future climatic conditions of the RA area and can establish viable population on it, it can pose a huge impact on the ecosystem services and socio-economic factors of</td><td>Very high Very high High Very high</td></td<> | limate 9.01 9.02 9.03 9.04 | that are higher or lower than those found in its usual environment? Are there effective natural enemies (predators) of the taxon present in the RA area? e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem | No Increase Increase Higher | level (20 ppt) and (25 ppt) would cause 100% mortality (Ajay et al., 2017) Based on the list of fish species present in lake Taal (Papa and Mamaril, 2011), there is none that could possibly prey on the taxon being assessed. Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) the risk of entry through accidental release from aquarium would most likely increase the entry of this taxon. Since the RA area and the taxon's native range has both tropical climate (FishBase, n.d.) the risk of establishment of this taxon would most likely increase. Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their migration ability the risk of dispersal would most likely increase the entry of this taxon. As this taxon can survive the future climatic conditions of the RA area and can establish viable population on it, it can pose a huge impact on the biodiversity and ecological status of the RA area by competing on food and nutrients of the local species in the area. As this taxon can survive the future climatic conditions of the RA area and can establish viable population on it, it can pose a huge impact on the ecosystem services and socio-economic factors of | Very high Very high High Very high |
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| 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 | As this taxon can survive the future climatic conditions of the RA area and can establish viable population on it, it can pose a huge impact on the ecosystem services and socio-economic factors of the RA area by competing on the existence of the local species which would eventually replace their existence in the RA area, | High |
|---------|---|--------|--|------|
| | | | thus affecting the livelihood services and the genetic diversity of the ecosystem in the area. | |

| Statistics | |
|--|------|
| Scores | |
| BRA | 42.0 |
| BRA Outcome | High |
| BRA+CCA | 54.0 |
| BRA+CCA Outcome | High |
| Score partition | |
| A. Biogeography/Historical | 26.0 |
| 1. Domestication/Cultivation | 4.0 |
| 2. Climate, distribution and introduction risk | 4.0 |
| 3. Invasive elsewhere | 18.0 |
| B. Biology/Ecology | 16.0 |
| 4. Undesirable (or persistence) traits | 2.0 |
| 5. Resource exploitation | 2.0 |
| 6. Reproduction | 3.0 |
| 7. Dispersal mechanisms | 5.0 |
| 8. Tolerance attributes | 4.0 |
| C. Climate change | 12.0 |
| 9. Climate change | 12.0 |
| Answered Questions | |
| Total | 55 |
| A. Biogeography/Historical | 13 |
| 1. Domestication/Cultivation | 3 |
| 2. Climate, distribution and introduction risk | 5 |
| 3. Invasive elsewhere | 5 |
| B. Biology/Ecology | 36 |
| 4. Undesirable (or persistence) traits | 12 |
| 5. Resource exploitation | 2 |
| 6. Reproduction | |
| 7. Dispersal mechanisms | 9 |
| 8. Tolerance attributes | 6 |
| C. Climate change | 6 |
| 9. Climate change | 6 |
| Sectors affected | |
| Commercial | 22 |
| Environmental | 10 |
| Species or population nuisance traits | 28 |
| | |
| Thresholds | |
| BRA | 34.5 |
| BRA+CCA | 34.5 |
| Confidence | |
| BRA+CCA | 0.88 |
| BRA | 0.88 |
| CCA | 0.88 |

Date and Time

06/04/2020 12:52:36

| Taxon and Assessor details | |
|------------------------------------|--|
| Category | Fishes and Lampreys (freshwater) |
| Taxon name | Pangasius sanitwongsei |
| Common name | giant pangasius |
| Assessor | Gilles |
| Risk screening context | |
| Reason and socio-economic benefits | Fisheries: commercial; aquaculture |
| Risk assessment area | Lake Taal |
| Taxonomy | Actinopteri (ray-finned fishes) > Siluriformes (Catfish) > Pangasiidae (Shark catfishes) |
| Native range | Asia: Chao Phraya and Mekong basins. |
| Introduced range | |
| URL | https://www.fishbase.se/summary/Pangasius-sanitwongsei.html |

| | | | Response | Justification (references and/or other information) | Confidence |
|------|----------|--|----------------|--|------------|
| | | graphy/Historical | | | |
| 1. L | Domest | ication/Cultivation | | | |
| 1 | 1.01 | Has the taxon been the subject of | Yes | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk | High |
| | | domestication (or cultivation) for at least 20 | | Screening Summary U.S. Fish & Wildlife Service, April 2012 | |
| | | generations? | | Revised, September 2018 Web Version, 9/14/2020 | |
| 2 | 1.02 | Is the taxon harvested in the wild and likely | Yes | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk | High |
| | | to be sold or used in its live form? | | Screening Summary U.S. Fish & Wildlife Service, April 2012 | - |
| | | | | Revised, September 2018 Web Version, 9/14/2020 | |
| 3 | 1.03 | Does the taxon have invasive races, | Yes | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk | High |
| 5 | 1.05 | | 165 | Screening Summary U.S. Fish & Wildlife Service, April 2012 | riigii |
| | | varieties, sub-taxa or congeners? | | - , | |
| | | | | Revised, September 2018 Web Version, 9/14/2020 | |
| | | , distribution and introduction risk | | | |
| 4 | 2.01 | How similar are the climatic conditions of the | High | Tropical; 25°N - 9°N | High |
| | | Risk Assessment (RA) area and the taxon's | | https://www.fishbase.se/summary/Pangasius-sanitwongsei.html | |
| | | native range? | | | |
| 5 | 2.02 | What is the quality of the climate matching | High | Tropical; 25°N - 9°N | High |
| | | data? | - | https://www.fishbase.se/summary/Pangasius-sanitwongsei.html | - |
| 6 | 2.03 | Is the taxon already present outside of | Yes | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk | Very high |
| č | 2.00 | captivity in the RA area? | | Screening Summary U.S. Fish & Wildlife Service, April 2012 | • c. , |
| | | copurity in the IVA area? | | | |
| 7 | 2.04 | How many notontial vestors sould that | L 1 | Revised, September 2018 Web Version, 9/14/2020 | High |
| / | 2.04 | How many potential vectors could the taxon | >1 | History of the biodiversity and limno-ecological studies on Lake | High |
| | | use to enter in the RA area? | | Taal with notes on the current state of Philippine limnology Rey | |
| | | | | Donne S. Papa1*and Augustus C. Mamaril Sr. | |
| 8 | 2.05 | Is the taxon currently found in close | Yes | History of the biodiversity and limno-ecological studies on Lake | High |
| | | proximity to, and likely to enter into, the RA | | Taal with notes on the current state of Philippine limnology Rey | |
| | | area in the near future (e.g. unintentional | | Donne S. Papa1*and Augustus C. Mamaril Sr. | |
| | | and intentional introductions)? | | | |
| 3 I | invasive | e elsewhere | | | |
| | 3.01 | Has the taxon become naturalised | Yes | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk | High |
| 9 | 5.01 | | 165 | | ingn |
| | | (established viable populations) outside its | | Screening Summary U.S. Fish & Wildlife Service, April 2012 | |
| | | native range? | | Revised, September 2018 Web Version, 9/14/2020 | |
| 10 | 3.02 | In the taxon's introduced range, are there | Yes | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk | High |
| | | known adverse impacts to wild stocks or | | Screening Summary U.S. Fish & Wildlife Service, April 2012 | |
| | | commercial taxa? | | Revised, September 2018 Web Version, 9/14/2020 | |
| 11 | 3.03 | In the taxon's introduced range, are there | Yes | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk | High |
| | | known adverse impacts to aquaculture? | | Screening Summary U.S. Fish & Wildlife Service, April 2012 | - |
| | | | | Revised, September 2018 Web Version, 9/14/2020 | |
| 12 | 3.04 | In the taxon's introduced range, are there | Yes | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk | High |
| | 5.0 . | known adverse impacts to ecosystem | | Screening Summary U.S. Fish & Wildlife Service, April 2012 | |
| | | services? | | Revised, September 2018 Web Version, 9/14/2020 | |
| 1 2 | 2.05 | | No | | UB -b |
| 13 | 3.05 | In the taxon's introduced range, are there | INO | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk | High |
| | | known adverse socio-economic impacts? | | Screening Summary U.S. Fish & Wildlife Service, April 2012 | |
| _ | | | <u> </u> | Revised, September 2018 Web Version, 9/14/2020 | |
| | | //Ecology | | | |
| | | able (or persistence) traits | | | |
| 14 | 4.01 | Is it likely that the taxon will be poisonous or | No | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk | Very high |
| | | pose other risks to human health? | | Screening Summary U.S. Fish & Wildlife Service, April 2012 | - |
| | | | | Revised, September 2018 Web Version, 9/14/2020 | |
| 15 | 4.02 | Is it likely that the taxon will smother one or | Yes | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk | High |
| | | more native taxa (that are not threatened or | | Screening Summary U.S. Fish & Wildlife Service, April 2012 | |
| | | protected)? | | Revised, September 2018 Web Version, 9/14/2020 | |
| 16 | 4.03 | | Vac | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk | Very high |
| 10 | 4.03 | Are there any threatened or protected taxa | Yes | 5 (5) 5) 5 | very nigh |
| | | that the non-native taxon would parasitise in | | Screening Summary U.S. Fish & Wildlife Service, April 2012 | |
| | | the RA area? | | Revised, September 2018 Web Version, 9/14/2020 | |
| 17 | 4.04 | Is the taxon adaptable in terms of climatic | Yes | https://www.fishbase.se/summary/Pangasius-sanitwongsei.html | High |
| | | and other environmental conditions, thus | | Freshwater; benthopelagic; potamodromous | |
| | | 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 | Not applicable | no data | 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 | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk | High |
| | | on ecosystem services in the RA area? | | Screening Summary U.S. Fish & Wildlife Service, April 2012 | |
| | | | | Revised, September 2018 Web Version, 9/14/2020 | |
| | | | | | |
| 20 | 4.07 | Is it likely that the taxon will host, and/or | No | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk | High |
| 20 | 4.07 | | No | | High |
| 20 | 4.07 | Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA | No | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 | High |

| 21 | | | | | |
|---|--------------------------------------|--|------------------|--|------------------------------|
| 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 | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 | High |
| 22 | 4.09 | Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity? | Yes | Max length : 300 cm SL male/unsexed; https://www.fishbase.se/summary/Pangasius-sanitwongsei.html | High |
| 23 | 4.10 | Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)? | Yes | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 | High |
| 24 | 4.11 | Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa? | Yes | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 | 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 | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 | High |
| | | ce exploitation | r | | T |
| 26 | 5.01 | Is the taxon likely to consume threatened or protected native taxa in the RA area? | Yes | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 | High |
| 27 | 5.02 | Is the taxon likely to sequester food resources (including nutrients) to the | Not applicable | | Medium |
| _ | | detriment of native taxa in the RA area? | | | |
| | Reprod | | | | |
| 28 | 6.01 | Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? | Yes | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 | High |
| 29 | 6.02 | Is the taxon likely to produce viable gametes or propagules (in the RA area)? | Yes | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 | High |
| 30 | 6.03 | Is the taxon likely to hybridise naturally with native taxa? | No | Revised, September 2018 Web Version, 9/14/2020 Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 | High |
| 31 | 6.04 | Is the taxon likely to be hermaphroditic or to display asexual reproduction? | No | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 | 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 | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 | High |
| 33 | 6.06 | Is the taxon known (or likely) to produce a large number of propagules or offspring | Yes | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 | High |
| 34 | 6.07 | within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- | 3 | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 | High |
| 7 / | Dianara | first-reproduction? al mechanisms | | Revised, September 2018 Web Version, 9/14/2020 | |
| | 7.01 | How many potential internal | >1 | History of the biodiversity and limno-ecological studies on Lake | High |
| ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, | 7.01 | vectors/pathways could the taxon use to disperse within the RA area (with suitable | ~1 | Taal with notes on the current state of Philippine limology Rey Donne S. Papa1*and Augustus C. Mamaril Sr. | Tigh |
| 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 | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology Rey Donne S. Papa1*and Augustus C. Mamaril Sr. | 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? | Not applicable | | Very high |
| 38 | 1 | ILLE UKELLOOD OT DISDERSAL? | 1 | | |
| | 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 | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 | 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 occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA | Yes | Screening Summary U.S. Fish & Wildlife Service, April 2012 | High High |
| 39 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? | No Yes | Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 | High |
| 39 40 | 7.05 | Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to | No | Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 | High |
| 39 40 41 | 7.05 | Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. either | No Yes | Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 | High |
| 39 40 41 42 43 | 7.05 7.06 7.07 7.08 7.09 | Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. either unintentional or intentional) likely to be Is dispersal of the taxon density dependent? | No Yes No | Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 | High High High |
| 39 40 41 42 43 | 7.05 7.06 7.07 7.08 7.09 | Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Are older life stages of the taxon likely to migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. either unintentional or intentional) likely to be | No Yes Yes | Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 | High High High High |

| 45 | 8.02 | Is the taxon tolerant of a wide range of | Yes | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk | High |
|------|--------|--|----------------|--|------|
| | | water quality conditions relevant to that | | Screening Summary U.S. Fish & Wildlife Service, April 2012 | |
| | | taxon? [In the Justification field, indicate the | | Revised, September 2018 Web Version, 9/14/2020 | |
| | | relevant water quality variable(s) being | | | |
| 46 | 8.03 | Can the taxon be controlled or eradicated in | Not applicable | no data | High |
| | | the wild with chemical, biological, or other | | | |
| | | agents/means? | | | |
| 47 | 8.04 | Is the taxon likely to tolerate or benefit from | Yes | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk | High |
| | | environmental/human disturbance? | | Screening Summary U.S. Fish & Wildlife Service, April 2012 | |
| | | | | Revised, September 2018 Web Version, 9/14/2020 | |
| 48 | 8.05 | Is the taxon able to tolerate salinity levels | Yes | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk | High |
| | | that are higher or lower than those found in | | Screening Summary U.S. Fish & Wildlife Service, April 2012 | |
| | | its usual environment? | | Revised, September 2018 Web Version, 9/14/2020 | |
| 49 | 8.06 | Are there effective natural enemies | No | History of the biodiversity and limno-ecological studies on Lake | High |
| | | (predators) of the taxon present in the RA | | Taal with notes on the current state of Philippine limnology Rey | |
| | | area? | | Donne S. Papa1*and Augustus C. Mamaril Sr. | |
| С. (| Climat | e change | | | |
| | | change | | | |
| 50 | 9.01 | Under the predicted future climatic | Increase | History of the biodiversity and limno-ecological studies on Lake | High |
| | | conditions, are the risks of entry into the RA | | Taal with notes on the current state of Philippine limnology Rey | |
| | | area posed by the taxon likely to increase, | | Donne S. Papa1*and Augustus C. Mamaril Sr. | |
| | | decrease or not change? | | | |
| 51 | 9.02 | Under the predicted future climatic | Increase | History of the biodiversity and limno-ecological studies on Lake | High |
| | | conditions, are the risks of establishment | | Taal with notes on the current state of Philippine limnology Rey | |
| | | posed by the taxon likely to increase, | | Donne S. Papa1*and Augustus C. Mamaril Sr. | |
| | | decrease or not change? | | | |
| 52 | 9.03 | Under the predicted future climatic | Increase | History of the biodiversity and limno-ecological studies on Lake | High |
| | | conditions, are the risks of dispersal within | | Taal with notes on the current state of Philippine limnology Rey | |
| | | the RA area posed by the taxon likely to | | Donne S. Papa1*and Augustus C. Mamaril Sr. | |
| | | increase, decrease or not change? | | | - |
| 53 | 9.04 | Under the predicted future climatic | Higher | History of the biodiversity and limno-ecological studies on Lake | High |
| | | conditions, what is the likely magnitude of | | Taal with notes on the current state of Philippine limnology Rey | |
| | | future potential impacts on biodiversity | | Donne S. Papa1*and Augustus C. Mamaril Sr. | |
| | | and/or ecological integrity/status? | | | |
| 54 | 9.05 | Under the predicted future climatic | Higher | History of the biodiversity and limno-ecological studies on Lake | High |
| | | conditions, what is the likely magnitude of | | Taal with notes on the current state of Philippine limnology Rey | |
| | | future potential impacts on ecosystem | | Donne S. Papa1*and Augustus C. Mamaril Sr. | |
| | | structure and/or function? | | | |
| 55 | 9.06 | Under the predicted future climatic | Higher | History of the biodiversity and limno-ecological studies on Lake | High |
| | | conditions, what is the likely magnitude of | | Taal with notes on the current state of Philippine limnology Rey | |
| | | future potential impacts on ecosystem | | Donne S. Papa1*and Augustus C. Mamaril Sr. | |
| | 1 | services/socio-economic factors? | | | |

| Statistics | |
|--|--|
| Scores | |
| BRA | 46.0 |
| BRA Outcome | High |
| BRA+CCA | 58.0 |
| BRA+CCA Outcome | High |
| Score partition | |
| A. Biogeography/Historical | 22.0 |
| 1. Domestication/Cultivation | 4.0 |
| 2. Climate, distribution and introduction risk | 4.0 |
| 3. Invasive elsewhere | 14.0 |
| B. Biology/Ecology | 24.0 |
| 4. Undesirable (or persistence) traits | 8.0 |
| 5. Resource exploitation | 5.0 |
| 6. Reproduction | 2.0 |
| 7. Dispersal mechanisms | 3.0 |
| 8. Tolerance attributes | 6.0 |
| C. Climate change | 12.0 |
| 9. Climate change | 12.0 |
| Answered Questions | |
| Total | 55 |
| A. Biogeography/Historical | 13 |
| 1. Domestication/Cultivation | 3 |
| 2. Climate, distribution and introduction risk | 5 |
| 3. Invasive elsewhere | 5 |
| B. Biology/Ecology | 3 5 5 36 12 2 7 7 9 6 |
| 4. Undesirable (or persistence) traits | 12 |
| 5. Resource exploitation | 2 |
| 6. Reproduction | 7 |
| 7. Dispersal mechanisms | 9 |
| 8. Tolerance attributes | |
| C. Climate change | 6 |
| 9. Climate change | 6 |
| Sectors affected | |
| Commercial | 19 |
| Environmental | 16 |
| Species or population nuisance traits | 30 |
| | |
| Thresholds | |
| BRA | 34.5 |
| BRA+CCA | 34.5 |
| Confidence | |

| | BRA+CCA | 0.76 |
|---------------|-----------|------------|
| | BRA | 0.77 |
| | CCA | 0.75 |
| | | |
| Date and Time | | |
| | 02/04/202 | 0 07:58:23 |

| Taxon and Assessor details | | | | | | |
|------------------------------------|----------------------------------|--|--|--|--|--|
| Category | Fishes and Lampreys (freshwater) | | | | | |
| Taxon name | Parachromis managuensis | | | | | |
| Common name | jaguar guapote | | | | | |
| Assessor | Gilles, Pavia | | | | | |
| Risk screening context | | | | | | |
| Reason and socio-economic benefits | Ornamental and Aquaculture | | | | | |
| Risk assessment area | Lake Taal | | | | | |
| Taxonomy | | | | | | |
| Native range | | | | | | |
| Introduced range | | | | | | |
| URL | | | | | | |

| | | | Response | Justification (references and/or other information) | Confidence |
|------|----------|--|----------------|--|---------------------------------------|
| | | graphy/Historical | | | |
| 1.1 | | ication/Cultivation | | | |
| 1 | 1.01 | Has the taxon been the subject of | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf | Very high |
| | | domestication (or cultivation) for at least 20 | | | |
| 2 | 1.02 | generations? Is the taxon harvested in the wild and likely | Vac | file:///C:/Users/User/Desktop/Thesis%20Ref/Mutia%20et%20al% | Varyhigh |
| 2 | 1.02 | to be sold or used in its live form? | Yes | 202018.pdf | Very high |
| 3 | 1.03 | Does the taxon have invasive races, | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/Mutia%20et%20al% | High |
| Ŭ | 1.00 | varieties, sub-taxa or congeners? | | 202018.pdf | |
| 2. (| Climate, | , distribution and introduction risk | | | |
| 4 | 2.01 | How similar are the climatic conditions of the | Medium | https://www.britannica.com/science/Koppen-climate- | High |
| | | Risk Assessment (RA) area and the taxon's | | classification#ref284655 | |
| | | native range? | | | |
| 5 | 2.02 | What is the quality of the climate matching | High | https://www.britannica.com/science/Koppen-climate- | Very high |
| c | 2.02 | data? | Vac | classification#ref284655 | Lliab |
| 6 | 2.03 | Is the taxon already present outside of captivity in the RA area? | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf | High |
| 7 | 2.04 | How many potential vectors could the taxon | >1 | file:///C:/Users/User/Desktop/Thesis%20Ref/Guerrero%20III%202 | Very high |
| ľ | 2.04 | use to enter in the RA area? | - 1 | 014.pdf | very mgn |
| 8 | 2.05 | Is the taxon currently found in close | Not applicable | Answer in Q6 is YES | Very high |
| | | proximity to, and likely to enter into, the RA | | - | |
| 1 | | area in the near future (e.g. unintentional | | | |
| | | and intentional introductions)? | | | |
| | | e elsewhere | 1 | | |
| 9 | 3.01 | Has the taxon become naturalised | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/Mutia%20et%20al% | Very high |
| 10 | 3.02 | (established viable populations) outside its In the taxon's introduced range, are there | Yes | 202018.pdf file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf | High |
| 10 | 3.02 | known adverse impacts to wild stocks or | res | file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf | High |
| | | commercial taxa? | | | |
| 11 | 3.03 | In the taxon's introduced range, are there | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf | Very high |
| | | known adverse impacts to aquaculture? | | ······································ | , |
| 12 | 3.04 | In the taxon's introduced range, are there | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf | Very high |
| | | known adverse impacts to ecosystem | | | , - |
| 13 | 3.05 | In the taxon's introduced range, are there | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf | Very high |
| | | known adverse socio-economic impacts? | | | |
| | | //Ecology able (or persistence) traits | | | |
| | | Is it likely that the taxon will be poisonous or | Yes | potential pest to human | High |
| 14 | 4.01 | pose other risks to human health? | 103 | https://www.fishbase.de/summary/Parachromis-managuensis.html | ingn |
| 15 | 4.02 | Is it likely that the taxon will smother one or | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf | Very high |
| Ē | | more native taxa (that are not threatened or | | ······································ | ., 5 |
| | | protected)? | | | |
| 16 | 4.03 | Are there any threatened or protected taxa | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/Mutia%20et%20al% | Very high |
| 1 | | that the non-native taxon would parasitise in | | 202018.pdf | |
| | | the RA area? | | | |
| 17 | 4.04 | Is the taxon adaptable in terms of climatic | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/mendoza2015.pdf | Very high |
| | | 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 | file:///C:/Users/User/Desktop/Thesis%20Ref/Mutia%20et%20al% | Very high |
| 10 | 1.55 | structure/function in aquatic ecosystems if it | | 202018.pdf | · · · · · · · · · · · · · · · · · · · |
| | | has invaded or is likely to invade the RA | | | |
| 19 | 4.06 | Is the taxon likely to exert adverse impacts | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf | Very high |
| | | on ecosystem services in the RA area? | | | |
| 20 | 4.07 | Is it likely that the taxon will host, and/or | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/mendoza2015.pdf | High |
| | | act as a vector for, recognised pests and | | | |
| 24 | 4.00 | infectious agents that are endemic in the RA | ¥ | | L li ala |
| 21 | 4.08 | Is it likely that the taxon will host, and/or | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/mendoza2015.pdf | High |
| | | 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 | https://www.fishbase.de/popdyn/PopCharList.php?ID=4684&Genus | Verv hiah |
| | | size that will make it more likely to be | | Name=Parachromis&SpeciesName=managuensis&fc=349 | |
| | | released from captivity? | | ······································ | |
| 23 | 4.10 | Is the taxon capable of sustaining itself in a | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/mendoza2015.pdf | High |
| | | range of water velocity conditions (e.g. | | | |
| | 1 | versatile in habitat use)? | 1 | | 1 |

| 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 | file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf | High |
|----------|--------|--|----------------|--|-----------|
| :5 | 4.12 | Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)? | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/mendoza2015.pdf | High |
| | | e exploitation | I | | 1 |
| 6 | 5.01 | Is the taxon likely to consume threatened or | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf | Very high |
| 7 | 5.02 | protected native taxa in the RA area? Is the taxon likely to sequester food resources (including nutrients) to the | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/mendoza2015.pdf | High |
| | | detriment of native taxa in the RA area? | | | |
| | eprodu | | N | | |
| 8 | 6.01 | Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/mendoza2015.pdf | Very high |
| | 6.02 | Is the taxon likely to produce viable gametes or propagules (in the RA area)? | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/mendoza2015.pdf | Very high |
| 0 | 6.03 | Is the taxon likely to hybridise naturally with native taxa? | Not applicable | No evidence | Low |
| 1 | 6.04 | Is the taxon likely to be hermaphroditic or to display asexual reproduction? | No | file:///C:/Users/User/Desktop/Thesis%20Ref/mendoza2015.pdf | 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 | file:///C:/Users/User/Desktop/Thesis%20Ref/mendoza2015.pdf | High |
| 3 | 6.06 | Is the taxon known (or likely) to produce a large number of propagules or offspring | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/mendoza2015.pdf | High |
| 4 | 6.07 | within a short time span (e.g. < 1 year)? How many time units (days, months, years) | 2 | https://www.fishbase.de/Reproduction/FishReproSummary.php?ID | High |
| 7 | 5.07 | does the taxon require to reach the age-at- | - | =4684&GenusName=Parachromis&SpeciesName=managuensis&fc | . iigii |
| | | first-reproduction? | | = 349&StockCode=4902 | |
| | | al mechanisms | I | | 1 |
| 5 | 7.01 | How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable | >1 | file:///C:/Users/User/Desktop/Thesis%20Ref/mendoza2015.pdf | Very high |
| 5 | 7.02 | Will any of these vectors/pathways bring the taxon in close proximity to one or more | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf | High |
| 7 | 7.03 | protected areas (e.g. MCZ, MPA, SSSI)? Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship | Not applicable | No evidence | Low |
| 8 | 7.04 | hulls, pilings, buoys) such that it enhances the likelihood of dispersal? Is natural dispersal of the taxon likely to | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/mendoza2015.pdf | High |
| 9 | 7.05 | occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to | No | file:///C:/Users/User/Desktop/Thesis%20Ref/mendoza2015.pdf | High |
| , | 7.05 | occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? | NO | me./// e./ osers/ oser/ Deskep/ mesis //zoker/ mendozi/zors.pdi | ingn |
| | 7.06 | Are older life stages of the taxon likely to migrate in the RA area for reproduction? | Not applicable | | Low |
| T | 7.07 | Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? | No | file:///C:/Users/User/Desktop/Thesis%20Ref/mendoza2015.pdf | 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. either | Yes | Based on the previous questions | Very high |
| | | unintentional or intentional) likely to be | | | |
| | | Is dispersal of the taxon density dependent? | Not applicable | No evidence | Low |
| | | <i>ce attributes</i> Is the taxon able to withstand being out of | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/mendoza2015.pdf | Very high |
| Ŧ | 8.01 | water for extended periods (e.g. minimum of one or more hours) at some stage of its life | Yes | The:///C:/Users/User/Desktop/Thesis%20ker/mendoza2015.pdf | very nign |
| 5 | 8.02 | cvcle? Is the taxon tolerant of a wide range of | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/mendoza2015.pdf | High |
| - | | water quality conditions relevant to that taxon? [In the Justification field, indicate the | | | |
| 6 | 8.03 | relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/mendoza2015.pdf | High |
| 7 | 8.04 | agents/means? Is the taxon likely to tolerate or benefit from | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/Mutia%20et%20al% | High |
| 8 | 8.05 | environmental/human disturbance? Is the taxon able to tolerate salinity levels that are higher or lower than those found in | Yes | 202018.pdf file:///C:/Users/User/Desktop/Thesis%20Ref/mendoza2015.pdf | Very high |
| a | 8.06 | its usual environment? Are there effective natural enemies (predators) of the taxon present in the RA | No | file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf | Very high |
| <i>_</i> | limate | (predators) of the taxon present in the RA change | l | | l |
| | | | | | |
| :. C | | change | | | |
| . C | limate | change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, | Increase | file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf | 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 | file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf | Very high |
|----|------|---|----------|--|-----------|
| 52 | 9.03 | Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? | Increase | file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf | Very high |
| 53 | 9.04 | Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? | Higher | file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf | Very high |
| 54 | 9.05 | Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? | Higher | file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf | 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 | file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf | High |

Statistics

| Statistics | |
|--|---------------|
| BRA | 46.0 |
| BRA Outcome | High |
| BRA+CCA | 58.0 |
| 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 | 31.0 |
| 4. Undesirable (or persistence) traits | 12.0 |
| 5. Resource exploitation | 7.0 |
| 6. Reproduction | 3.0 |
| 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 |
| 2. Climate, distribution and introduction risk | 5 |
| 3. Invasive elsewhere | |
| B. Biology/Ecology | 36 |
| 4. Undesirable (or persistence) traits | 12 |
| 5. Resource exploitation | 2 |
| 6. Reproduction | / |
| 7. Dispersal mechanisms | 9 |
| 8. Tolerance attributes | 6 |
| C. Climate change | 6 6 |
| 9. Climate change Sectors affected | 0 |
| Sectors affected Commercial | 15 |
| Environmental | - |
| Species or population nuisance traits | 15 33 |
| Species of population nuisance traits | 33 |
| Thursday | |
| Thresholds | 24.5 |
| BRA | 34.5 |

| | BRA | 34.5 |
|---------------|----------|--------------|
| | BRA+CCA | 34.5 |
| Confidence | | |
| | BRA+CCA | 0.84 |
| | BRA | 0.84 |
| | CCA | 0.88 |
| | | |
| Date and Time | | |
| | 18/04/20 | 019 01:44:38 |

| axon and Assessor details | | | | | | |
|------------------------------------|---|--|--|--|--|--|
| Category | Fishes and Lampreys (freshwater) | | | | | |
| Taxon name | Pethia conchonius | | | | | |
| Common name | rosy barb | | | | | |
| Assessor | Gilles | | | | | |
| Risk screening context | | | | | | |
| Reason and socio-economic benefits | aquarium: highly commercial | | | | | |
| Risk assessment area | Lake Taal | | | | | |
| Taxonomy | Actinopteri (ray-finned fishes) > Cypriniformes (Carps) > Cyprinidae (Minnows or carps) > | | | | | |
| Native range | Asia: Afghanistan, Pakistan, India, Nepal, and Bangladesh | | | | | |
| Introduced range | Introduced worldwide and now very popular with aquarists. | | | | | |
| URL | https://www.fishbase.se/summary/Pethia-conchonius.html | | | | | |

| | | | Response | Justification (references and/or other information) | Confidence |
|------|------|--|----------|--|------------|
| | | graphy/Historical | | | |
| 1. L | | ication/Cultivation | | | |
| 1 | | Has the taxon been the subject of domestication (or cultivation) for at least 20 generations? | Yes | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 | High |
| 2 | 1.02 | Is the taxon harvested in the wild and likely to be sold or used in its live form? | Yes | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 | High |
| 3 | 1.03 | Does the taxon have invasive races, varieties, sub-taxa or congeners? | Yes | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 | Very high |
| | | , distribution and introduction risk | 1 | | - |
| 4 | 2.01 | Risk Assessment (RA) area and the taxon's native range? | Medium | Subtropical; 18°C - 22°C https://www.fishbase.se/summary/Pethia-conchonius.html | High |
| 5 | 2.02 | What is the quality of the climate matching data? | Medium | Subtropical; 18°C - 22°C https://www.fishbase.se/summary/Pethia-conchonius.html | High |
| 6 | 2.03 | Is the taxon already present outside of captivity in the RA area? | Yes | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology | High |
| 7 | 2.04 | How many potential vectors could the taxon use to enter in the RA area? | >1 | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology | 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 | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology | High |
| 3. I | 7 | e elsewhere | | | |
| 9 | 3.01 | Has the taxon become naturalised (established viable populations) outside its | No | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology | High |
| 10 | 3.02 | In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? | Yes | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 | Very high |
| 11 | 3.03 | In the taxon's introduced range, are there known adverse impacts to aquaculture? | Yes | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 | High |
| | 3.04 | In the taxon's introduced range, are there known adverse impacts to ecosystem services? | No | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 | Very high |
| | 3.05 | In the taxon's introduced range, are there known adverse socio-economic impacts? | No | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 | High |
| | | y/Ecology | | | |
| | | able (or persistence) traits | | | 1 1 1 1 |
| | | Is it likely that the taxon will be poisonous or pose other risks to human health? | | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 | High |
| 15 | 4.02 | Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? | No | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 | High |
| 16 | 4.03 | Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? | No | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 | High |
| 17 | 4.04 | Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? | Yes | https://www.fishbase.se/summary/Pethia-conchonius.html | High |
| 18 | 4.05 | Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA | No | https://www.fishbase.se/summary/Pethia-conchonius.html | High |
| 19 | 4.06 | Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? | No | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 | 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 | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 | 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 | No | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 | High |

| 22 | 4.00 | To it likely that the target will be a set | No | May length + 14.0 cm TL | High |
|-----|---------|--|----------------|--|-----------|
| | 4.09 | Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity? | No | Max length : 14.0 cm TL male/unsexed; https://www.fishbase.se/summary/Pethia-conchonius.html | High |
| 23 | 4.10 | Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)? | Yes | Freshwater; benthopelagic; pH range: 6.0 - 8.0; dH range: 5 - 19. Subtropical; 18°C - 22°C | 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 | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 | High |
| 5 | 4.12 | Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions | Yes | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 | High |
| . R | esourc | by way of a dormant form)? | | | |
| | | Is the taxon likely to consume threatened or protected native taxa in the RA area? | Yes | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 | High |
| 7 | 5.02 | Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area? | Not applicable | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 | Medium |
| | Reprodu | | 1 | | T |
| 8 | 6.01 | Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? | Yes | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 | High |
| 9 | 6.02 | Is the taxon likely to produce viable gametes or propagules (in the RA area)? | Yes | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 | High |
| | 6.03 | Is the taxon likely to hybridise naturally with native taxa? | No | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 | High |
| | 6.04 | Is the taxon likely to be hermaphroditic or to display asexual reproduction? | No | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 | Very high |
| | 6.05 | Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? | No | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 | 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 | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 | High |
| 4 | 6.07 | How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? | 3 | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 | High |
| | | al mechanisms | | | |
| 5 | 7.01 | How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable | >1 | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology | 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)? | Yes | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology | High |
| 7 | 7.03 | Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? | Not applicable | no data | 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 | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 | 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? | No | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 | Very high |
| 0 | 7.06 | Are older life stages of the taxon likely to migrate in the RA area for reproduction? | No | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 | High |
| 1 | 7.07 | Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? | No | Giant Pangasius (Pangasius sanitwonges) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 | 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. either unintentional or intentional) likely to be | No | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 | High |
| | 7.09 | Is dispersal of the taxon density dependent? | No | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 | High |
| | | ce attributes | No | Ciant Depending (Depending appliture and) Early similarly | High |
| 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 | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 | High |
| | 8.02 | cycle? Is the taxon tolerant of a wide range of | Yes | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk | High |

| 46 | 8.03 | Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? | Not applicable | no data | Medium |
|----|------|---|----------------|--|-----------|
| 47 | 8.04 | Is the taxon likely to tolerate or benefit from environmental/human disturbance? | Yes | Giant Pangasius (Pangasius sanitwongsei) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, April 2012 Revised, September 2018 Web Version, 9/14/2020 | High |
| 48 | 8.05 | Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment? | Yes | https://www.fishbase.se/summary/Pethia-conchonius.html | High |
| 49 | 8.06 | Are there effective natural enemies | No | History of the biodiversity and limno-ecological studies on Lake | Very high |
| | | (predators) of the taxon present in the RA | | Taal with notes on the current state of Philippine limnology | |
| | | e change | | | |
| | | change | 1- | | |
| 50 | 9.01 | Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? | Increase | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology | 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 | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology | 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 | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology | Very high |
| 53 | 9.04 | Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? | No change | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology | High |
| 54 | 9.05 | Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? | Higher | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology | Very high |
| 55 | 9.06 | Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors? | Higher | History of the biodiversity and limno-ecological studies on Lake Taal with notes on the current state of Philippine limnology | High |

| Statistics | |
|--|--------------------------|
| Scores | |
| BRA | 29.0 |
| BRA Outcome | Medium |
| BRA+CCA | 39.0 |
| BRA+CCA Outcome | High |
| Score partition | |
| A. Biogeography/Historical | 12.0 |
| 1. Domestication/Cultivation | 4.0 |
| 2. Climate, distribution and introduction risk | 2.0 |
| 3. Invasive elsewhere | 6.0 |
| B. Biology/Ecology | 17.0 |
| 4. Undesirable (or persistence) traits | 4.0 |
| 5. Resource exploitation | 5.0 |
| 6. Reproduction | 2.0 |
| 7. Dispersal mechanisms | 0.0 |
| 8. Tolerance attributes | 6.0 |
| C. Climate change | 10.0 |
| 9. Climate change | 10.0 |
| Answered Questions | |
| Total | 55 |
| A. Biogeography/Historical | 13 |
| 1. Domestication/Cultivation | 3 |
| 2. Climate, distribution and introduction risk | 5 |
| 3. Invasive elsewhere | 3 5 5 36 |
| B. Biology/Ecology | 36 |
| 4. Undesirable (or persistence) traits | 12 |
| 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 | 14 |
| Environmental | 9 |
| Species or population nuisance traits | 20 |
| | |
| | |
| Thresholds BRA | 34.5 |

| BRA | 34.5 |
|------------|------|
| BRA+CCA | 34.5 |
| Confidence | |
| BRA+CCA | 0.79 |
| BRA | 0.78 |
| CCA | 0.88 |
| | |

Date and Time

02/04/2020 07:58:42

| Faxon and Assessor details | | | | | | |
|------------------------------------|--|--|--|--|--|--|
| Category | Fishes and Lampreys (freshwater) | | | | | |
| Taxon name | Piaractus brachypomus | | | | | |
| Common name | pirapitinga | | | | | |
| Assessor | Gilles, Pavia | | | | | |
| Risk screening context | | | | | | |
| Reason and socio-economic benefits | Oranamental | | | | | |
| Risk assessment area | Lake Taal | | | | | |
| Taxonomy | Order - Cypriniformes Family - Serrasalmidae | | | | | |
| Native range | Amazon and Orinoco River | | | | | |
| Introduced range | Philippines, Papua New Guinea, China, Taiwan, Peru, Malaysia, Indonesia, Myanmar, Cambodia | | | | | |
| URL | https://www.fishbase.se/summary/Piaractus-brachypomus.html | | | | | |

| | | | Response | Justification (references and/or other information) | Confidence |
|------|---------|--|----------------|--|-------------------|
| Α. Ι | Biogeo | graphy/Historical | | | |
| 1. L | Domest | ication/Cultivation | | | |
| 1 | 1.01 | Has the taxon been the subject of | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/Valladao%202016.pd | High |
| | | domestication (or cultivation) for at least 20 | | f | |
| | | generations? | | | |
| 2 | 1.02 | Is the taxon harvested in the wild and likely | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/Valladao%202016.pd | High |
| - | 1.00 | to be sold or used in its live form? | | | |
| 3 | 1.03 | Does the taxon have invasive races, | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/Valladao%202016.pd | High |
| 2 | | varieties, sub-taxa or congeners? | | f | |
| 2. (| | distribution and introduction risk How similar are the climatic conditions of the | High | files ///Cs /llease/Dealsten/Theasia%/20Def/kettek2006 adf | Medium |
| 4 | 2.01 | Risk Assessment (RA) area and the taxon's | High | file:///C:/Users/User/Desktop/Thesis%20Ref/kottek2006.pdf | Medium |
| | | native range? | | | |
| 5 | 2.02 | What is the quality of the climate matching | High | file:///C:/Users/User/Desktop/Thesis%20Ref/kottek2006.pdf | Medium |
| 5 | 2.02 | data? | ingn | | nearann |
| 6 | 2.03 | Is the taxon already present outside of | Yes | https://www.fishbase.de/Introductions/IntroductionsList.php?ID=5 | Very high |
| - | | captivity in the RA area? | | 808&GenusName=Piaractus&SpeciesName=brachypomus&fc=686& | · • · / · · · j.· |
| | | | | StockCode=6104 | |
| 7 | 2.04 | How many potential vectors could the taxon | >1 | file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf | High |
| 1 | | use to enter in the RA area? | | | - |
| 8 | 2.05 | Is the taxon currently found in close | Not applicable | answer to Q6 was yes | High |
| 1 | | proximity to, and likely to enter into, the RA | | | - |
| 1 | | area in the near future (e.g. unintentional | | | |
| | | and intentional introductions)? | | | |
| | T | elsewhere | 1 | | 1 |
| 9 | 3.01 | Has the taxon become naturalised | Yes | https://www.fishbase.de/Introductions/IntroductionsList.php?ID=5 | |
| | | (established viable populations) outside its | | 808&GenusName=Piaractus&SpeciesName=brachypomus&fc=686& | |
| | | native range? | | StockCode=6104 | |
| 10 | 3.02 | In the taxon's introduced range, are there | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/Valladao%202016.pd | High |
| | | known adverse impacts to wild stocks or | | f | |
| 1.4 | 2.02 | commercial taxa? | ¥ | | 115-6 |
| 11 | 3.03 | In the taxon's introduced range, are there | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/Valladao%202016.pd | nign |
| 12 | 3.04 | known adverse impacts to aquaculture? In the taxon's introduced range, are there | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/Valladao%202016.pd | Modium |
| 12 | 3.04 | | res | file:///C:/Users/User/Desktop/Thesis%20Ref/Vallada0%202016.pd | Mealum |
| 13 | 3.05 | known adverse impacts to ecosystem In the taxon's introduced range, are there | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/Valladao%202016.pd | High |
| 13 | 5.05 | known adverse socio-economic impacts? | 165 | f | nign |
| B. I | Biology | //Ecology | | <u>_1</u> | |
| | | able (or persistence) traits | | | |
| | | Is it likely that the taxon will be poisonous or | Yes | https://www.fishbase.de/summary/Piaractus-brachypomus.html | High |
| | | pose other risks to human health? | | | |
| 15 | 4.02 | Is it likely that the taxon will smother one or | Yes | https://www.fishbase.de/summary/Piaractus-brachypomus.html | High |
| | | more native taxa (that are not threatened or | | | |
| I | | protected)? | | | |
| 16 | 4.03 | Are there any threatened or protected taxa | Yes | https://www.fishbase.de/Diseases/DiseasesList.php?ID=5808&Stoc | Medium |
| | | that the non-native taxon would parasitise in | | kCode=6104 | |
| I | | the RA area? | | | |
| 17 | 4.04 | Is the taxon adaptable in terms of climatic | Yes | https://www.fishbase.de/summary/Piaractus-brachypomus.html | High |
| 1 | | and other environmental conditions, thus | | | |
| Í | | enhancing its potential persistence if it has | | | |
| 10 | 4.05 | invaded or could invade the RA area? | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf | High |
| 10 | 4.05 | Is the taxon likely to disrupt food-web | 105 | me.///c./oseis/osei/Desklop/mesis%20kei/josiii.pui | High |
| Í | | 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 | file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf | High |
| 1.7 | 1.00 | on ecosystem services in the RA area? | 100 | | · ··g·· |
| 20 | 4.07 | Is it likely that the taxon will host, and/or | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/franceschini2013.pdf | High |
| Ē | | act as a vector for, recognised pests and | | ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, | 5 |
| Í | | infectious agents that are endemic in the RA | | | |
| 21 | 4.08 | Is it likely that the taxon will host, and/or | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/franceschini2013.pdf | Medium |
| Í | _ | act as a vector for, recognised pests and | | | |
| Í | | infectious agents that are absent from (novel | | | |
| 1 | | to) the RA area? | | | |
| 22 | 4.09 | Is it likely that the taxon will achieve a body | Yes | https://www.fishbase.de/summary/Piaractus-brachypomus.html | Very high |
| Í | | size that will make it more likely to be | | | |
| | | released from captivity? | | | |
| 23 | 4.10 | Is the taxon capable of sustaining itself in a | Yes | https://www.fishbase.de/summary/Piaractus-brachypomus.html | High |
| | | lange of weben wells site and this we do a | 1 | | 1 |
| | | range of water velocity conditions (e.g. | | | |
| | | versatile in habitat use)? | | | |

| 24 | | Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa? | Yes | https://www.fishbase.de/summary/Piaractus-brachypomus.html | Medium |
|------|---------|--|----------------|---|--------|
| 25 | 4.12 | Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions | Yes | https://www.fishbase.de/summary/Piaractus-brachypomus.html | Medium |
| | | by way of a dormant form)? | | | |
| 5. R | | e exploitation | | | |
| 26 | | Is the taxon likely to consume threatened or | Yes | https://www.fishbase.de/summary/Piaractus-brachypomus.html | Medium |
| 27 | | protected native taxa in the RA area? Is the taxon likely to sequester food | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf | High |
| | | resources (including nutrients) to the detriment of native taxa in the RA area? | | | |
| 6 R | eprodu | | | | |
| | | Is the taxon likely to exhibit parental care | Yes | https://www.fishbase.de/Reproduction/FishReproSummary.php?ID | High |
| | | and/or to reduce age-at-maturity in response to environmental conditions? | | =5808&GenusName=Piaractus&SpeciesName=brachypomus&fc=68 6&StockCode=6104 | |
| 29 | 6.02 | Is the taxon likely to produce viable gametes or propagules (in the RA area)? | Yes | https://www.fishbase.de/Reproduction/FishReproSummary.php?ID =5808&GenusName=Piaractus&SpeciesName=brachypomus&fc=68 6&StockCode=6104 | Medium |
| 30 | | Is the taxon likely to hybridise naturally with native taxa? | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/franceschini2013.pdf | High |
| 31 | | Is the taxon likely to be hermaphroditic or to | No | https://www.fishbase.de/Reproduction/FishReproSummary.php?ID | High |
| | | display asexual reproduction? | | =5808&GenusName=Piaractus&SpeciesName=brachypomus&fc=68 6&StockCode=6104 | - |
| 32 | 6.05 | Is the taxon dependent on the presence of | No | https://www.fishbase.de/Reproduction/FishReproSummary.php?ID | High |
| | | another taxon (or specific habitat features) | | =5808&GenusName=Piaractus&SpeciesName=brachypomus&fc=68 | |
| 22 | | to complete its life cycle? | × | 6&StockCode=6104 | 14 P |
| 33 | | Is the taxon known (or likely) to produce a large number of propagules or offspring | Yes | https://www.fishbase.de/Reproduction/FishReproSummary.php?ID =5808&GenusName=Piaractus&SpeciesName=brachypomus&fc=68 | Medium |
| 34 | | within a short time span (e.g. < 1 year)? How many time units (days, months, years) | 2 | 6&StockCode=6104 https://www.fishbase.de/Reproduction/FishReproSummary.php?ID | Medium |
| 54 | | does the taxon require to reach the age-at- | 2 | =5808&GenusName=Piaractus&SpeciesName=brachypomus&fc=68 | |
| | | first-reproduction? | | 6&StockCode=6104 | |
| 7. D | ispersa | l mechanisms | | | |
| 35 | | How many potential internal | >1 | file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf | High |
| | | vectors/pathways could the taxon use to | | | |
| 36 | | disperse within the RA area (with suitable Will any of these vectors/pathways bring the | Not applicable | No data for this question | High |
| | | taxon in close proximity to one or more | not applicable | | |
| | | protected areas (e.g. MCZ, MPA, SSSI)? | | | |
| 37 | | Does the taxon have a means of actively | No | file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf | High |
| | | attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? | | | |
| 38 | 7.04 | Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? | No | file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf | High |
| 39 | 7.05 | Is natural dispersal of the taxon likely to | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf | 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 migrate in the RA area for reproduction? | Not applicable | no data for this question | Medium |
| 41 | 7.07 | | No | file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf | High |
| 42 | 7.08 | Is dispersal of the taxon along any of the | Yes | base on previous questions | High |
| | | vectors/pathways mentioned in the previous | | | |
| | | seven questions (35-41; i.e. either unintentional or intentional) likely to be | | | |
| 43 | 7.09 | Is dispersal of the taxon density dependent? | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf | High |
| | oleranc | e attributes | | | |
| | 8.01 | Is the taxon able to withstand being out of | Yes | https://www.fishbase.de/summary/Piaractus-brachypomus.html | High |
| | | water for extended periods (e.g. minimum of | | | |
| | | one or more hours) at some stage of its life | | | |
| 45 | | cycle? Is the taxon tolerant of a wide range of | Yes | https://www.fishbase.de/summary/Piaractus-brachypomus.html | High |
| | | water quality conditions relevant to that | | | |
| | | taxon? [In the Justification field, indicate the | | | |
| | | relevant water quality variable(s) being | | | |
| 46 | | Can the taxon be controlled or eradicated in the wild with chemical, biological, or other | Not applicable | no data for this question | High |
| | | agents/means? | | | |
| 47 | 8.04 | Is the taxon likely to tolerate or benefit from | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf | High |
| 40 | | environmental/human disturbance? | NI- | | 11:-6 |
| 48 | | Is the taxon able to tolerate salinity levels | No | file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf | High |
| | | that are higher or lower than those found in its usual environment? | | | |
| 49 | | Are there effective natural enemies | No | file:///C:/Users/User/Desktop/Thesis%20Ref/Mutia%20et%20al% | High |
| 0.0 | limate | (predators) of the taxon present in the RA e change | | 202018.pdf | 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? | Increase | file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf | 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 | file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf | 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 | file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf | 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 | file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf | High |
| 54 | 9.05 | Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? | Higher | file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf | 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 | file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf | Very high |

Statistics

| Scores | |
|--|---|
| BRA | 53.0 |
| BRA Outcome | High |
| BRA+CCA | 65.0 |
| 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 | 29.0 |
| 4. Undesirable (or persistence) traits | 12.0 |
| 5. Resource exploitation | 7.0 |
| 6. Reproduction | 4.0 |
| 7. Dispersal mechanisms | 1.0 |
| 8. Tolerance attributes | 5.0 |
| C. Climate change | 12.0 |
| 9. Climate change | 12.0 |
| Answered Questions | |
| | |
| Total | 55 |
| A. Biogeography/Historical | 13 |
| A. Biogeography/Historical 1. Domestication/Cultivation | 13 |
| A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk | 13 |
| A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere | 13 3 5 5 |
| A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology | 13 3 5 5 36 |
| A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits | 13 3 5 5 36 |
| A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation | 13 3 5 5 36 |
| A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction | 13 3 5 5 36 12 2 7 |
| A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms | 13 3 5 5 36 2 2 7 9 |
| A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes | 13 3 5 36 12 2 7 9 6 |
| A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change | 13 3 5 36 12 2 7 9 9 6 6 |
| A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change | 13 3 5 36 12 2 7 9 6 |
| A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected | 13 3 5 36 12 2 7 9 6 6 6 |
| A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change 9. Climate change Commercial | 13 3 5 5 36 12 2 7 9 6 6 6 6 6 21 |
| A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Environmental | 13 3 5 5 36 12 2 7 9 6 6 6 6 6 6 6 21 16 |
| A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change 9. Climate change Commercial | 13 3 5 5 36 12 2 7 7 9 6 6 6 6 6 6 21 |
| A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Environmental | 13 3 5 5 36 12 2 7 9 6 6 6 6 6 6 21 16 |

| Inresnolas | |
|---------------|--------------|
| BRA | 34.5 |
| BRA+CCA | 34.5 |
| Confidence | |
| BRA+CCA | 0.71 |
| BRA | 0.70 |
| CCA | 0.75 |
| | |
| Date and Time | |
| 20/04/2 | 019 18-57-13 |

| Taxon and Assessor details | |
|------------------------------------|---|
| Category | Fishes and Lampreys (freshwater) |
| Taxon name | Poecilia latipinna |
| Common name | sailfin molly |
| Assessor | Gilles, To |
| Risk screening context | |
| Reason and socio-economic benefits | Aquarium: highly commercial |
| Risk assessment area | Lake Taal |
| Taxonomy | Actinopteri (ray-finned fishes) > Cyprinodontiformes (Rivulines, killifishes and live bearers) > |
| Native range | North America |
| Introduced range | Introduced to many countries. Several countries report adverse ecological impact after introduction |
| URL | https://www.fishbase.se/summary/Poecilia-latipinna.html |

| | | | Response | Justification (references and/or other information) | Confidence |
|------|---------|--|----------|--|------------|
| | | graphy/Historical | | | |
| 1. L | | ication/Cultivation | | | |
| 1 | 1.01 | Has the taxon been the subject of | Yes | In Australia, this taxon has been domisticated as a commercial | Very high |
| | | domestication (or cultivation) for at least 20 | | aquarium ornamental fish species. Annually, the volume of fish | |
| | | generations? | | sold in Australlia is between 500,000 and 1,000,000 fish (CABI, | |
| 2 | 1.02 | Is the taxon harvested in the wild and likely | Yes | The taxon has been harvested in the wild for ornamental purposes | High |
| | | to be sold or used in its live form? | | as pets and aquarium species (CABI, 2020) | |
| 3 | 1.03 | Does the taxon have invasive races, | Yes | This taxon has already been interbreed with many ornamental | Very high |
| | | varieties, sub-taxa or congeners? | | species creating hybrids, such as hybrids of P. latipinna X P. | |
| - | | | | velifera, which are commonly available in the ornamental trade | |
| 2. (| | , distribution and introduction risk | | | T |
| 4 | 2.01 | How similar are the climatic conditions of the | High | The RA area and the taxon's native range has both tropical | High |
| | | Risk Assessment (RA) area and the taxon's | | climate. | |
| - | 2.02 | native range? | | | |
| 5 | 2.02 | What is the quality of the climate matching | High | Data from Climatch were used to facilitate the climate analysis. | High |
| ~ | 2.02 | data? | | | |
| 6 | 2.03 | Is the taxon already present outside of | Yes | The taxon is now present in pet stores for ornamental use, such | High |
| | | captivity in the RA area? | | as in Cartimar Market where importation and sale of this taxon is | |
| _ | 2.01 | | . 1 | highly abundant. | 11: |
| 7 | 2.04 | How many potential vectors could the taxon | >1 | The taxon could be introduced through intentional introduction | High |
| 0 | 2.05 | use to enter in the RA area? | Vac | with human intervention and aquarium escape. | High |
| 8 | 2.05 | Is the taxon currently found in close | Yes | The taxon is now present in pet stores for ornamental use, such | High |
| | | proximity to, and likely to enter into, the RA | | as in Cartimar Market where importation and sale of this taxon is | |
| | | area in the near future (e.g. unintentional | | highly abundant. | |
| 2 - | | and intentional introductions)? | | | 1 |
| 3. l | | e elsewhere | N | | Manukit |
| 9 | 3.01 | Has the taxon become naturalised | Yes | This taxon has been established in the Al-Hammar Marsh in Iraq, | Very high |
| | | (established viable populations) outside its | | in the estuaries in the Gulf of Oman and in Wadi Haneefah | |
| | | native range? | | stream, Riyadh, Saudi Arabia since 2003 (CABI, 2020). | |
| 10 | 3.02 | In the taxon's introduced range, are there | Yes | According to Juliano et al. (1989), in the Philippines, this taxon | Very high |
| | | known adverse impacts to wild stocks or | | competes with the native milkfish or Chanos chanos, for food. On | |
| | | commercial taxa? | | the other hand Englund (1999) implicated that this taxon and | |
| | | | | other introduced Poeciliids (Xiphophorus hellerii and Gambusia | |
| | | | | species) is responsible for the decline of native damselflies or | |
| | | | | Megalagrion species on Oahu, Hawaii. Morover in California, this | |
| | | | | taxon caused the the decline of the desert pupfish, Cyprinodon | |
| | | · · · · · · · · · · · · | | macularius (U.S. Fish and Wildlife Service, 1983: Robins, 2014: | |
| 11 | 3.03 | In the taxon's introduced range, are there | Yes | According to Juliano et al. (1989), in the Philippines, this taxon | Very high |
| | | known adverse impacts to aquaculture? | | competes with the native milkfish or Chanos chanos, for food. On | |
| | | | | the other hand Englund (1999) implicated that this taxon and | |
| | | | | other introduced Poeciliids (Xiphophorus hellerii and Gambusia | |
| | | | | species) is responsible for the decline of native damselflies or | |
| | | | | Megalagrion species on Oahu, Hawaii. Morover in California, this | |
| | | | | taxon caused the the decline of the desert pupfish, Cyprinodon | |
| | | | | macularius (U.S. Fish and Wildlife Service, 1983; Robins, 2014; | |
| 12 | 3.04 | In the taxon's introduced range, are there | Yes | According to Juliano et al. (1989), in the Philippines, this taxon | Very high |
| | | known adverse impacts to ecosystem | | competes with the native milkfish or Chanos chanos, for food. On | |
| | | services? | | the other hand Englund (1999) implicated that this taxon and | |
| | | | | other introduced Poeciliids (Xiphophorus hellerii and Gambusia | |
| | | | | species) is responsible for the decline of native damselflies or | |
| | | | | Megalagrion species on Oahu, Hawaii. Morover in California, this | |
| | | | | taxon caused the the decline of the desert pupfish, Cyprinodon | |
| | | | | macularius (U.S. Fish and Wildlife Service, 1983: Robins, 2014: | |
| 13 | 3.05 | In the taxon's introduced range, are there | No | This taxon is a very popular ornamental fish which gave fish pet | Very high |
| | | known adverse socio-economic impacts? | | treaders income (CABI, 2020). | L |
| | | y/Ecology | | | |
| | | able (or persistence) traits | | | b |
| 14 | 4.01 | Is it likely that the taxon will be poisonous or | res | There are records that this taxon was infected by the following: | Very high |
| | | pose other risks to human health? | | haploplorid trematode, Saccocoelioides sogandaresi, Iridovirus, | |
| | | | | Chloriridovirus, Lymphocystivirus and and Ranavirus which could | |
| | 4.65 | | | post threat to human health (U.S. Fish & Wildlife Service, 2011). | |
| | 1 1 1 2 | Is it likely that the taxon will smother one or | Yes | According to Juliano et al. (1989), in the Philippines, this taxon | Very high |
| 15 | 4.02 | | 1 | competes with the native milkfish or Chanos chanos, for food. On | |
| 15 | 4.02 | more native taxa (that are not threatened or | | | |
| 15 | 4.02 | more native taxa (that are not threatened or protected)? | | the other hand Englund (1999) implicated that this taxon and | |
| 15 | 4.02 | | | the other hand Englund (1999) implicated that this taxon and other introduced Poeciliids (Xiphophorus hellerii and Gambusia | |
| 15 | 4.02 | | | the other hand Englund (1999) implicated that this taxon and other introduced Poeciliids (Xiphophorus hellerii and Gambusia species) is responsible for the decline of native damselflies or | |
| 15 | 4.02 | | | the other hand Englund (1999) implicated that this taxon and other introduced Poeciliids (Xiphophorus hellerii and Gambusia species) is responsible for the decline of native damselflies or Megalagrion species on Oahu, Hawaii. Morover in California, this | |
| 15 | 4.02 | | | the other hand Englund (1999) implicated that this taxon and other introduced Poeciliids (Xiphophorus hellerii and Gambusia species) is responsible for the decline of native damselflies or | |

| | | | | | [|
|----|------|--|-----|---|-----------|
| 16 | 4.03 | Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? | No | There are no records of protected taxa that this taxon can predate or parasite. | 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 | This taxon has wide range of environmental tolerances, they can tolerate high ranges of temperature, salinity and oxygen levels, they have the ability to colonize anthropogenically disturbed habitats, to give birth to live offspring, they can do trophic opportunism, and they grow in fast rates (CABI, 2020). | 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 | According to Juliano et al. (1989), in the Philippines, this taxon competes with the native milkfish or Chanos chanos, for food. On the other hand Englund (1999) implicated that this taxon and other introduced Poeciliids (Xiphophorus hellerii and Gambusia species) is responsible for the decline of native damselflies or Megalagrion species on Oahu, Hawaii. Morover in California, this taxon caused the the decline of the desert pupfish, Cyprinodon macularius (U.S. Fish and Wildlife Service, 1983; Robins, 2014; | Very high |
| | 4.06 | Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? | Yes | According to Juliano et al. (1989), in the Philippines, this taxon competes with the native milkfish or Chanos chanos, for food. On the other hand Englund (1999) implicated that this taxon and other introduced Poeciliids (Xiphophorus hellerii and Gambusia species) is responsible for the decline of native damselflies or Megalagrion species on Oahu, Hawaii. Morover in California, this taxon caused the the decline of the desert pupfish, Cyprinodon macularius (U.S. Fish and Wildlife Service. 1983: Robins. 2014: | Very high |
| | 4.07 | Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA | No | There are no reports that the taxon may carry pests or infectious agents that are endemic in Lake Taal. | 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 | There are records that this taxon was infected by the following: haploplorid trematode, Saccocoelioides sogandaresi, Iridovirus, Chloriridovirus, Lymphocystivirus and and Ranavirus which could post threat to human health (U.S. Fish & Wildlife Service. 2011). | Very high |
| 22 | 4.09 | Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity? | No | The taxon can only reach a large body size, having a maximum length of 15 cm (Fish Base, 2019). | 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 | This taxon can only inhabits lentic or slow flowing lotic environments (CABI, 2020). | High |
| 24 | 4.11 | Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa? | No | There are no records that the organism's mode of existence results in habitat degredation. | Medium |
| 25 | 4.12 | Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)? | No | There are no records of established populations of the organism persisting at low density. | Medium |
| | | e exploitation | | | |
| | 5.01 | Is the taxon likely to consume threatened or protected native taxa in the RA area? | No | This organism is predominantly herbivorous, they only consume plants and algal matter and also periphyton. But it also consume aquatic invertebrates including mosquito larvae/pupae (CABI, | High |
| | 5.02 | Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area? | Yes | This organism can compete with food source of native species as they consume plants and algal matter, periphyton, aquatic invertebrates and mosquito larvae/pupae (CABI, 2020). | Very high |
| | 6.01 | intromultation 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 exhibit any parental care, they are live bearing fishes (CABI, 2020). | Very high |
| 29 | 6.02 | Is the taxon likely to produce viable gametes or propagules (in the RA area)? | Yes | The conditions of the RA meets the required conditions for maturation and reproduction of this taxon, which will enable them to produce a viable gametes (Fish Base, 2019) | High |
| | 6.03 | Is the taxon likely to hybridise naturally with native taxa? | Yes | This taxon has already been interbreed with many ornamental species creating hybrids, such as hybrids of P. latipinna X P. velifera, which are commonly available in the ornamental trade | Very high |
| | 6.04 | Is the taxon likely to be hermaphroditic or to display asexual reproduction? | No | There are no documented evidence of hermaphroditism/asexual reproduction of this species. | Medium |
| | 6.05 | Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? | No | There are no requirments for this taxon being dependent on the other taxon (CABI, 2020). | 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 | This taxon produces broods of 10 to between 100-300 young, females may give birth on multiple occasions throughout the year, approximately eight to 10 weeks apart, depending upon environmental conditions (CABI, 2020). | Very high |
| | 6.07 | How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms | 1 | This taxon reaches the age of maturity within 1 year (CABI, 2020). | High |
| | 7.01 | How many potential internal | >1 | The taxon can enter the RA area through natural dispersal and its | Very high |
| | | vectors/pathways could the taxon use to disperse within the RA area (with suitable habitats nearby)? | | succes is increased because of its broad environmental tollerences. Also, it can be dispersed intentionally because of its abundant ornamental use and unintentionally through aquarium escape during natural calamities (flooding) which the RA area is prone to (CABI, 2019) | |

| 36 | | | | | |
|---|---|---|--------------------------------|--|--------------------------------|
| | 7.02 | Will any of these vectors/pathways bring the | Yes | The taxon can enter the RA area through natural dispersal and its | Very high |
| | | taxon in close proximity to one or more | Í Í | succes is increased because of its broad environmental | |
| | | protected areas (e.g. MCZ, MPA, SSSI)? | l l | tollerences. Also, it can be dispersed intentionally because of its | |
| | | | l l | abundant ornamental use and unintentionally through aquarium | |
| | | | l I | escape during natural calamities (flooding) which the RA area is prone to (CABI, 2019) | |
| 37 | 7.03 | Does the taxon have a means of actively | No | Their physical characteristics does not allow attachment to any | High |
| 57 | 1.05 | attaching itself to hard substrata (e.g. ship | | substrata (Fish Base, 2019) | ingn |
| | | hulls, pilings, buoys) such that it enhances | l l | | |
| | | the likelihood of dispersal? | | | |
| 38 | 7.04 | Is natural dispersal of the taxon likely to | No | Since this taxon is a livebearer and it only inhabits lentic or slow | Very high |
| | | occur as eggs (for animals) or as propagules | l l | flowing lotic environments; which means that if they are | |
| | | (for plants: seeds, spores) in the RA area? | l l | dispersed in a rapidly flowing or highly variable lotic | |
| 20 | 7.05 | Is natural dispersal of the taxon likely to | Yes | environments, it may inhibit the species establishment or | Von/ high |
| 29 | 7.05 | occur as larvae/juveniles (for animals) or as | res | The taxon can enter the RA area through natural dispersal and its succes is increased because of its broad environmental | Very high |
| | | fragments/seedlings (for plants) in the RA | l l | tollerences. Also, it can be dispersed intentionally because of its | |
| | | area? | l l | abundant ornamental use and unintentionally through aquarium | |
| | | | l l | escape during natural calamities (flooding) which the RA area is | |
| | | | | prone to (CABI, 2020). | |
| 40 | 7.06 | Are older life stages of the taxon likely to | No | This taxon does not have migratory characteristics (U.S. Fish & | Very high |
| | 7.07 | migrate in the RA area for reproduction? | | Wildlife Service, 2011). | |
| 41 | 7.07 | Are propagules or eggs of the taxon likely to | Yes | Since this taxon does not exhibit parental care, making the broods | Very high |
| | | be dispersed in the RA area by other animals? | Í Í | available for preadation and dispersion of other animals (CABI, 2020). | |
| 47 | 7.08 | Is dispersal of the taxon along any of the | Yes | This taxon which is readily available in the market for aquaculture | Very high |
| 12 | / .00 | vectors/pathways mentioned in the previous | | and as pets together with the fact that the RA area are prone to | , |
| | | seven questions (35–41; i.e. either | l l | natural calamities such as typhoons (Brändlin & Wingard, 2013) | |
| | | unintentional or intentional) likely to be | l l | and its high adaptability to different environmental conditions | |
| | | rapid? | | making them a habitat generalist makes their dispersal rapid | |
| 43 | 7.09 | Is dispersal of the taxon density dependent? | Not applicable | There are no records of that this taxon is density dependent in | High |
| | _ <i>i</i> | | L | terms of dispersal. | |
| | | ce attributes Is the taxon able to withstand being out of | Not applicable | There are no records of that this taxon is density dependent in | High |
| 44 | 0.01 | water for extended periods (e.g. minimum of | Not applicable | There are no records of that this taxon is density dependent in terms of dispersal. | High |
| | | one or more hours) at some stage of its life | l l | | |
| | | cycle? | Í Í | | |
| 45 | 8.02 | Is the taxon tolerant of a wide range of | Yes | Water pH: 7-8.5, Temperature: 6°C - 40°C, Dissolved oxygen | Very high |
| | | water quality conditions relevant to that | l l | (mg/l) >1, and Salinity: >95 (CABI, 2020). | |
| | | taxon? [In the Justification field, indicate the | l l | | |
| | | relevant water quality variable(s) being | | | |
| 46 | 8.03 | Can the taxon be controlled or eradicated in | Not applicable | There are no records of this taxa being eradicated in the wilds | Medium |
| | | the wild with chemical, biological, or other | l l | using chemical, biological, or other agents/means. | |
| 47 | 8.04 | agents/means? Is the taxon likely to tolerate or benefit from | Yes | As this taxon has wide range of environmental tolerances, they can | Very high |
| ., | 0.01 | environmental/human disturbance? | 105 | tolerate high ranges of temperature, salinity and oxygen levels, | very night |
| | | , | l l | they have the ability to colonize anthropogenically disturbed | |
| | | | l l | habitats and to give birth to live offspring, they can do trophic | |
| | | | l l | opportunism, and they grow in fast rates, it is mostlikely, that | |
| | | 1 | | | |
| | 1 | | | they will benefit from environmental disturbances specially | |
| 40 | 0.05 | | | flooding which is prone in the RA area (CABI, 2020). | Vous biel |
| 48 | 8.05 | Is the taxon able to tolerate salinity levels | Yes | | Very high |
| 48 | 8.05 | that are higher or lower than those found in | Yes | flooding which is prone in the RA area (CABI, 2020). | Very high |
| | | that are higher or lower than those found in its usual environment? | | flooding which is prone in the RA area (CABI, 2020). This taxon can survive is 90 ppt (CABI, 2020). | |
| | 8.05 8.06 | that are higher or lower than those found in | | flooding which is prone in the RA area (CABI, 2020). | Very high Very high |
| 49 | 8.06 | that are higher or lower than those found in its usual environment? Are there effective natural enemies | | flooding which is prone in the RA area (CABI, 2020). This taxon can survive is 90 ppt (CABI, 2020). Micropterus salmoides can predate this taxon in the RA area | |
| 49 C. (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 | Yes | flooding which is prone in the RA area (CABI. 2020). This taxon can survive is 90 ppt (CABI, 2020). Micropterus salmoides can predate this taxon in the RA area (Guerrero, 2014). | Very high |
| 49 C. (9. (| 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 e change change Under the predicted future climatic | | flooding which is prone in the RA area (CABI. 2020). This taxon can survive is 90 ppt (CABI, 2020). Micropterus salmoides can predate this taxon in the RA area (Guerrero, 2014). Together with the fact that the RA area is prone to natural | |
| 49 C. (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 conditions, are the risks of entry into the RA | Yes | flooding which is prone in the RA area (CABI. 2020). This taxon can survive is 90 ppt (CABI, 2020). Micropterus salmoides can predate this taxon in the RA area (Guerrero, 2014). Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, | Very high |
| 49 C. (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 Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, | Yes | flooding which is prone in the RA area (CABI. 2020). This taxon can survive is 90 ppt (CABI, 2020). Micropterus salmoides can predate this taxon in the RA area (Guerrero, 2014). Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) the risk of entry through accidental release from aquarium | Very high |
| 49 <u>C.</u> <u>9.</u> (50 | 8.06 Climate 9.01 | that are higher or lower than those found in its usual environment? Are there effective natural enemies (predators) of the taxon present in the RA e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? | Yes | flooding which is prone in the RA area (CABI. 2020). This taxon can survive is 90 ppt (CABI, 2020). Micropterus salmoides can predate this taxon in the RA area (Guerrero, 2014). Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) the risk of entry through accidental release from aquarium would most likely increase the entry of this taxon. | Very high High |
| 49 <u>C.</u> <u>9.</u> (50 | 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 Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic | Yes | flooding which is prone in the RA area (CABI. 2020). This taxon can survive is 90 ppt (CABI, 2020). Micropterus salmoides can predate this taxon in the RA area (Guerrero, 2014). Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) the risk of entry through accidental release from aquarium would most likely increase the entry of this taxon. Based on their different morphological characteristics, together | Very high |
| 49 <u>C.</u> <u>9.</u> (50 | 8.06 Climate 9.01 | that are higher or lower than those found in its usual environment? Are there effective natural enemies (predators) of the taxon present in the RA e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment | Yes | flooding which is prone in the RA area (CABI. 2020). This taxon can survive is 90 ppt (CABI, 2020). Micropterus salmoides can predate this taxon in the RA area (Guerrero, 2014). Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) the risk of entry through accidental release from aquarium would most likely increase the entry of this taxon. Based on their different morphological characteristics, together with the fact that this taxon can survive a wide range of | Very high High |
| 49 <u>C.</u> <u>9.</u> (50 | 8.06 Climate 9.01 | that are higher or lower than those found in its usual environment? Are there effective natural enemies (predators) of the taxon present in the RA e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic | Yes | flooding which is prone in the RA area (CABI. 2020). This taxon can survive is 90 ppt (CABI, 2020). Micropterus salmoides can predate this taxon in the RA area (Guerrero, 2014). Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) the risk of entry through accidental release from aquarium would most likely increase the entry of this taxon. Based on their different morphological characteristics, together | Very high High |
| 49 <u>C.</u> <u>9.</u> (50 | 8.06 Climate 9.01 | that are higher or lower than those found in its usual environment? Are there effective natural enemies (predators) of the taxon present in the RA e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, | Yes | flooding which is prone in the RA area (CABI. 2020). This taxon can survive is 90 ppt (CABI, 2020). Micropterus salmoides can predate this taxon in the RA area (Guerrero, 2014). Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) the risk of entry through accidental release from aquarium would most likely increase the entry of this taxon. Based on their different morphological characteristics, together with the fact that this taxon can survive a wide range of environmental conditions,(they can tolerate high ranges of | Very high High |
| 49 <u>C.</u> <u>9.</u> (50 | 8.06 Climate 9.01 | that are higher or lower than those found in its usual environment? Are there effective natural enemies (predators) of the taxon present in the RA e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, | Yes | flooding which is prone in the RA area (CABI. 2020). This taxon can survive is 90 ppt (CABI, 2020). Micropterus salmoides can predate this taxon in the RA area (Guerrero, 2014). Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) the risk of entry through accidental release from aquarium would most likely increase the entry of this taxon. Based on their different morphological characteristics, together with the fact that this taxon can survive a wide range of environmental conditions,(they can tolerate high ranges of temperature, salinity and oxygen levels, they have the ability to | Very high High |
| 49 <u>9. (</u> 50 | 8.06 Climate 9.01 9.02 | that are higher or lower than those found in its usual environment? Are there effective natural enemies (predators) of the taxon present in the RA 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? | Yes Increase Increase | flooding which is prone in the RA area (CABI. 2020). This taxon can survive is 90 ppt (CABI, 2020). Micropterus salmoides can predate this taxon in the RA area (Guerrero, 2014). Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) the risk of entry through accidental release from aquarium would most likely increase the entry of this taxon. Based on their different morphological characteristics, together with the fact that this taxon can survive a wide range of environmental conditions,(they can tolerate high ranges of temperature, salinity and oxygen levels, they have the ability to colonize anthropogenically disturbed habitats, to give birth to live offspring, they can do trophic opportunism, and they grow in fast rates). the risk of establishment of the taxon increases (CABI. | Very high High Very high |
| 49 <u>9. (</u> 50 | 8.06 Climate 9.01 | that are higher or lower than those found in its usual environment? Are there effective natural enemies (predators) of the taxon present in the RA e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? | Yes | flooding which is prone in the RA area (CABI. 2020). This taxon can survive is 90 ppt (CABI, 2020). Micropterus salmoides can predate this taxon in the RA area (Guerrero, 2014). Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) the risk of entry through accidental release from aquarium would most likely increase the entry of this taxon. Based on their different morphological characteristics, together with the fact that this taxon can survive a wide range of environmental conditions,(they can tolerate high ranges of temperature, salinity and oxygen levels, they have the ability to colonize anthropogenically disturbed habitats, to give birth to live offspring, they can do trophic opportunism, and they grow in fast rates). the risk of establishment of the taxon increases (CABI . As a fact that the RA area is prone to natural calamities such as | Very high High |
| 49 <u>9. (</u> 50 | 8.06 Climate 9.01 9.02 | that are higher or lower than those found in its usual environment? Are there effective natural enemies (predators) of the taxon present in the RA e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within | Yes Increase Increase | flooding which is prone in the RA area (CABI. 2020). This taxon can survive is 90 ppt (CABI, 2020). Micropterus salmoides can predate this taxon in the RA area (Guerrero, 2014). Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) the risk of entry through accidental release from aquarium would most likely increase the entry of this taxon. Based on their different morphological characteristics, together with the fact that this taxon can survive a wide range of environmental conditions,(they can tolerate high ranges of temperature, salinity and oxygen levels, they have the ability to colonize anthropogenically disturbed habitats, to give birth to live offspring, they can do trophic opportunism, and they grow in fast rates). the risk of establishment of the taxon increases (CABI . As a fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) together with | Very high High Very high |
| 49 <u>9. (</u> 50 | 8.06 Climate 9.01 9.02 | that are higher or lower than those found in its usual environment? Are there effective natural enemies (predators) of the taxon present in the RA e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? | Yes Increase Increase | flooding which is prone in the RA area (CABI. 2020). This taxon can survive is 90 ppt (CABI, 2020). Micropterus salmoides can predate this taxon in the RA area (Guerrero, 2014). Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) the risk of entry through accidental release from aquarium would most likely increase the entry of this taxon. Based on their different morphological characteristics, together with the fact that this taxon can survive a wide range of environmental conditions,(they can tolerate high ranges of temperature, salinity and oxygen levels, they have the ability to colonize anthropogenically disturbed habitats, to give birth to live offspring, they can do trophic opportunism, and they grow in fast rates). the risk of establishment of the taxon increases (CABI . As a fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) together with their ability to survive a wide range of environmental conditions | Very high High Very high |
| 49 <u>9. (</u> 50 | 8.06 Climate 9.01 9.02 | that are higher or lower than those found in its usual environment? Are there effective natural enemies (predators) of the taxon present in the RA e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within | Yes Increase Increase | flooding which is prone in the RA area (CABI. 2020). This taxon can survive is 90 ppt (CABI, 2020). Micropterus salmoides can predate this taxon in the RA area (Guerrero, 2014). Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) the risk of entry through accidental release from aquarium would most likely increase the entry of this taxon. Based on their different morphological characteristics, together with the fact that this taxon can survive a wide range of environmental conditions,(they can tolerate high ranges of temperature, salinity and oxygen levels, they have the ability to colonize anthropogenically disturbed habitats, to give birth to live offspring, they can do trophic opportunism, and they grow in fast rates). the risk of establishment of the taxon increases (CABI . As a fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) together with their ability to survive a wide range of environmental conditions (temperature, salinity,low oxygen level, disturbed habitats and | Very high High Very high |
| 49 <u>9. (</u> 50 | 8.06 Climate 9.01 9.02 | that are higher or lower than those found in its usual environment? Are there effective natural enemies (predators) of the taxon present in the RA e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? | Yes Increase Increase | flooding which is prone in the RA area (CABI. 2020). This taxon can survive is 90 ppt (CABI, 2020). Micropterus salmoides can predate this taxon in the RA area (Guerrero, 2014). Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) the risk of entry through accidental release from aquarium would most likely increase the entry of this taxon. Based on their different morphological characteristics, together with the fact that this taxon can survive a wide range of environmental conditions,(they can tolerate high ranges of temperature, salinity and oxygen levels, they have the ability to colonize anthropogenically disturbed habitats, to give birth to live offspring, they can do trophic opportunism, and they grow in fast rates). the risk of establishment of the taxon increases (CABI . As a fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) together with their ability to survive a wide range of environmental conditions (temperature, salinity,low oxygen level, disturbed habitats and etc.) the risk of entry through accidental release from aquarium | Very high High Very high |
| 49 <u>9. (</u> 50 51 | 8.06 Climate 9.01 9.02 | that are higher or lower than those found in its usual environment? Are there effective natural enemies (predators) of the taxon present in the RA e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? | Yes Increase Increase | flooding which is prone in the RA area (CABI. 2020). This taxon can survive is 90 ppt (CABI, 2020). Micropterus salmoides can predate this taxon in the RA area (Guerrero, 2014). Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) the risk of entry through accidental release from aquarium would most likely increase the entry of this taxon. Based on their different morphological characteristics, together with the fact that this taxon can survive a wide range of environmental conditions,(they can tolerate high ranges of temperature, salinity and oxygen levels, they have the ability to colonize anthropogenically disturbed habitats, to give birth to live offspring, they can do trophic opportunism, and they grow in fast rates). the risk of establishment of the taxon increases (CABI . As a fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) together with their ability to survive a wide range of environmental conditions (temperature, salinity,low oxygen level, disturbed habitats and | Very high High Very high |
| 49 <u>9. (</u> 50 51 | 8.06 Climate 9.01 9.02 9.03 | that are higher or lower than those found in its usual environment? Are there effective natural enemies (predators) of the taxon present in the RA e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? 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? | Yes Increase Increase Increase | flooding which is prone in the RA area (CABI. 2020). This taxon can survive is 90 ppt (CABI, 2020). Micropterus salmoides can predate this taxon in the RA area (Guerrero, 2014). Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) the risk of entry through accidental release from aquarium would most likely increase the entry of this taxon. Based on their different morphological characteristics, together with the fact that this taxon can survive a wide range of environmental conditions,(they can tolerate high ranges of temperature, salinity and oxygen levels, they have the ability to colonize anthropogenically disturbed habitats, to give birth to live offspring, they can do trophic opportunism, and they grow in fast rates). the risk of establishment of the taxon increases (CABI , As a fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) together with their ability to survive a wide range of environmental conditions (temperature, salinity,low oxygen level, disturbed habitats and etc.) the risk of entry through accidental release from aquarium would most likely increase the dispersal of this taxon. | Very high High Very high |
| 49 <u>9. (</u> 50 51 | 8.06 Climate 9.01 9.02 9.03 | that are higher or lower than those found in its usual environment? Are there effective natural enemies (predators) of the taxon present in the RA e change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? 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 | Yes Increase Increase Increase | flooding which is prone in the RA area (CABI. 2020). This taxon can survive is 90 ppt (CABI, 2020). Micropterus salmoides can predate this taxon in the RA area (Guerrero, 2014). Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) the risk of entry through accidental release from aquarium would most likely increase the entry of this taxon. Based on their different morphological characteristics, together with the fact that this taxon can survive a wide range of environmental conditions,(they can tolerate high ranges of temperature, salinity and oxygen levels, they have the ability to colonize anthropogenically disturbed habitats, to give birth to live offspring, they can do trophic opportunism, and they grow in fast rates). the risk of establishment of the taxon increases (CABI . As a fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) together with their ability to survive a wide range of environmental conditions (temperature, salinity,low oxygen level, disturbed habitats and etc.) the risk of entry through accidental release from aquarium would most likely increase the dispersal of this taxon. As this taxon can survive the future climatic conditions of the RA | Very high High Very high |

| 54 | 9.05 | Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? | Higher | As this taxon can survive the future climatic conditions of the RA area and can establish viable population on it, it can pose a huge impact on the ecosystem services and socio-economic factors of the RA area by competing on the existence of the local species which would eventually replace their existence in the RA area, thus affecting the livelihood services and the genetic diversity of the ecosystem in the area. | 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 | As this taxon can survive the future climatic conditions of the RA area and can establish viable population on it, it can pose a huge impact on the ecosystem services and socio-economic factors of the RA area by competing on the existence of the local species which would eventually replace their existence in the RA area, thus affecting the livelihood services and the genetic diversity of the ecosystem in the area. | High |

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

| Thresholds | |
|---------------|-----------|
| | BRA 34.5 |
| BRA+ | -CCA 34.5 |
| Confidence | |
| BRA | -CCA 0.86 |
| | BRA 0.87 |
| | CCA 0.79 |
| | |
| Date and Time | |

05/07/2020 23:59:52

| Taxon and Assessor details | |
|------------------------------------|--|
| Category | Fishes and Lampreys (freshwater) |
| Taxon name | Poecilia reticulata |
| Common name | guppy |
| Assessor | Gilles, Pavia |
| Risk screening context | |
| Reason and socio-economic benefits | Ornamental and Pest control |
| Risk assessment area | Lake Taal |
| Taxonomy | Order - Cyprinodontiformes Family - Poeciliidae |
| Native range | Brazil, Guyana, Venezuela |
| Introduced range | Philippines, Zambia, Malaysia, Japan, Guam, Jamaica, Spain |
| URL | https://www.fishbase.se/summary/Poecilia-reticulata.html |

Response Justification (references and/or other information) Confidence

| A. 1 | Biogeo | graphy/Historical | Response | | |
|---|--|--|--|---|--|
| | | ication/Cultivation | | | |
| | | Has the taxon been the subject of | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/Guerrero%20III%202 | Hiah |
| | | domestication (or cultivation) for at least 20 | | 014.pdf | 5 |
| | | generations? | | | |
| 2 | 1.02 | Is the taxon harvested in the wild and likely | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/Guerrero%20III%202 | High |
| | | to be sold or used in its live form? | | 014.pdf | |
| 3 | 1.03 | Does the taxon have invasive races, | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/perdikaris2016.pdf | High |
| | | varieties, sub-taxa or congeners? | | | - |
| 2. (| Climate, | , distribution and introduction risk | | | |
| | | How similar are the climatic conditions of the | Medium | https://bigladdersoftware.com/epx/docs/8-3/auxiliary- | High |
| | | Risk Assessment (RA) area and the taxon's | | programs/koppen-climate-classification.html | |
| | | native range? | | | |
| 5 | 2.02 | What is the quality of the climate matching | High | https://bigladdersoftware.com/epx/docs/8-3/auxiliary- | Medium |
| _ | 0.6- | data? | | programs/koppen-climate-classification.html | |
| 6 | 2.03 | Is the taxon already present outside of | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/Guerrero%20III%202 | High |
| _ | | captivity in the RA area? | | 014.pdf | |
| 7 | 2.04 | How many potential vectors could the taxon | >1 | file:///C:/Users/User/Desktop/Thesis%20Ref/Guerrero%20III%202 | нigh |
| 0 | 2.05 | use to enter in the RA area? | Not applies - I- | 014.pdf | High |
| 8 | 2.05 | Is the taxon currently found in close | NOT applicable | Based on Q6 answer | High |
| | | proximity to, and likely to enter into, the RA | | | |
| | | area in the near future (e.g. unintentional and intentional introductions)? | | | |
| 3 1 | nyaciya | e elsewhere | | | |
| | | Has the taxon become naturalised | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/lindholm2005.pdf | High |
| ĺ | 3.51 | (established viable populations) outside its | | | |
| 10 | 3.02 | In the taxon's introduced range, are there | Yes | https://www.fishbase.de/summary/Poecilia-reticulata.html | Medium |
| | | known adverse impacts to wild stocks or | | | |
| | | commercial taxa? | | | |
| 11 | 3.03 | In the taxon's introduced range, are there | Yes | https://www.fishbase.de/summary/Poecilia-reticulata.html | Medium |
| L | | known adverse impacts to aquaculture? | | | |
| 12 | 3.04 | In the taxon's introduced range, are there | Yes | https://www.fishbase.de/summary/Poecilia-reticulata.html | Medium |
| | | known adverse impacts to ecosystem | | | |
| 13 | 3.05 | In the taxon's introduced range, are there | Yes | https://www.fishbase.de/summary/Poecilia-reticulata.html | Medium |
| | I | known adverse socio-economic impacts? | 1 | | 1 |
| | | | | | |
| | | y/Ecology | | | |
| 4. L | Indesir | y/Ecology able (or persistence) traits | NI- | | 11:-6 |
| 4. L | Indesir | y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or | No | Listed as harmless in FishBase (2015). No evidence of risks to | High |
| <u>4. L</u> 14 | <i>Indesir.</i> 4.01 | y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? | | human health | - |
| <u>4. L</u> 14 | Indesir | y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or | No Yes | . , | High High |
| <u>4. L</u> 14 | <i>Indesir.</i> 4.01 | y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or | | human health | - |
| <u>4. U</u> 14 15 | <i>Indesira</i> 4.01 4.02 | y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? | Yes | human health https://www.fishbase.de/summary/Poecilia-reticulata.html | High |
| <u>4. l</u> 14 15 | <i>Indesir.</i> 4.01 | y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa | | human health | - |
| <u>4. l</u> 14 15 | <i>Indesira</i> 4.01 4.02 | y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in | Yes | human health https://www.fishbase.de/summary/Poecilia-reticulata.html | High |
| <u>4. U</u> 14 15 16 | <i>Indesira</i> 4.01 4.02 | y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? | Yes | human health https://www.fishbase.de/summary/Poecilia-reticulata.html https://www.fishbase.de/summary/Poecilia-reticulata.html | High |
| <u>4. U</u> 14 15 16 | 4.01 4.02 4.03 | y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in | Yes | human health https://www.fishbase.de/summary/Poecilia-reticulata.html | High |
| <u>4. U</u> 14 15 16 | 4.01 4.02 4.03 | y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic | Yes | human health https://www.fishbase.de/summary/Poecilia-reticulata.html https://www.fishbase.de/summary/Poecilia-reticulata.html Riehl, R. and H.A. Baensch, 1991. Aquarien Atlas. Band. 1. Melle: | High |
| <u>4. U</u> 14 15 16 | 4.01 4.02 4.03 | y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus | Yes | human health https://www.fishbase.de/summary/Poecilia-reticulata.html https://www.fishbase.de/summary/Poecilia-reticulata.html Riehl, R. and H.A. Baensch, 1991. Aquarien Atlas. Band. 1. Melle: Mergus, Verlag für Natur-und Heimtierkunde, Germany. 992 p | High |
| <u>4. (</u> 14 15 16 17 | 4.01 4.02 4.03 | y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has | Yes | human health https://www.fishbase.de/summary/Poecilia-reticulata.html https://www.fishbase.de/summary/Poecilia-reticulata.html Riehl, R. and H.A. Baensch, 1991. Aquarien Atlas. Band. 1. Melle: Mergus, Verlag für Natur-und Heimtierkunde, Germany. 992 p https://www.fishbase.de/Ecology/FishEcologySummary.php?Stock | High |
| <u>4. (</u> 14 15 16 17 | 4.01 4.02 4.03 4.04 | y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it | Yes Yes Yes | human health https://www.fishbase.de/summary/Poecilia-reticulata.html https://www.fishbase.de/summary/Poecilia-reticulata.html Riehl, R. and H.A. Baensch, 1991. Aquarien Atlas. Band. 1. Melle: Mergus, Verlag für Natur-und Heimtierkunde, Germany. 992 p | High High Medium |
| <u>4. (</u> 14 15 16 17 18 | 4.01 4.02 4.03 4.04 4.05 | y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA | Yes Yes Yes Yes | human health https://www.fishbase.de/summary/Poecilia-reticulata.html https://www.fishbase.de/summary/Poecilia-reticulata.html Riehl, R. and H.A. Baensch, 1991. Aquarien Atlas. Band. 1. Melle: Mergus, Verlag für Natur-und Heimtierkunde, Germany. 992 p https://www.fishbase.de/Ecology/FishEcologySummary.php?Stock Code=3424&GenusName=Poecilia&SpeciesName=reticulata | High High Medium Medium |
| <u>4. (</u> 14 15 16 17 18 | 4.01 4.02 4.03 4.04 | y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts | Yes Yes Yes | human health https://www.fishbase.de/summary/Poecilia-reticulata.html https://www.fishbase.de/summary/Poecilia-reticulata.html Riehl, R. and H.A. Baensch, 1991. Aquarien Atlas. Band. 1. Melle: Mergus, Verlag für Natur-und Heimtierkunde, Germany. 992 p https://www.fishbase.de/Ecology/FishEcologySummary.php?Stock Code=3424&GenusName=Poecilia&SpeciesName=reticulata https://www.fishbase.de/Ecology/FishEcologySummary.php?Stock | High High Medium |
| <u>4. (</u> 14 15 16 17 18 18 | 4.01 4.02 4.03 4.04 4.05 4.06 | y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? | Yes Yes Yes Yes | human health https://www.fishbase.de/summary/Poecilia-reticulata.html https://www.fishbase.de/summary/Poecilia-reticulata.html Riehl, R. and H.A. Baensch, 1991. Aquarien Atlas. Band. 1. Melle: Mergus, Verlag für Natur-und Heimtierkunde, Germany. 992 p https://www.fishbase.de/Ecology/FishEcologySummary.php?Stock Code=3424&GenusName=Poecilia&SpeciesName=reticulata https://www.fishbase.de/Ecology/FishEcologySummary.php?Stock Code=3424&GenusName=Poecilia&SpeciesName=reticulata | High High Medium Medium High |
| <u>4. (</u> 14 15 16 17 18 19 | 4.01 4.02 4.03 4.04 4.05 | y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or | Yes Yes Yes Yes | human health https://www.fishbase.de/summary/Poecilia-reticulata.html https://www.fishbase.de/summary/Poecilia-reticulata.html Riehl, R. and H.A. Baensch, 1991. Aquarien Atlas. Band. 1. Melle: Mergus, Verlag für Natur-und Heimtierkunde, Germany. 992 p https://www.fishbase.de/Ecology/FishEcologySummary.php?Stock Code=3424&GenusName=Poecilia&SpeciesName=reticulata https://www.fishbase.de/Ecology/FishEcologySummary.php?Stock Code=3424&GenusName=Poecilia&SpeciesName=reticulata https://www.fishbase.de/Ecology/FishEcologySummary.php?Stock | High High Medium Medium High |
| <u>4. (</u> 14 15 16 17 18 19 | 4.01 4.02 4.03 4.04 4.05 4.06 | y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and | Yes Yes Yes Yes | human health https://www.fishbase.de/summary/Poecilia-reticulata.html https://www.fishbase.de/summary/Poecilia-reticulata.html Riehl, R. and H.A. Baensch, 1991. Aquarien Atlas. Band. 1. Melle: Mergus, Verlag für Natur-und Heimtierkunde, Germany. 992 p https://www.fishbase.de/Ecology/FishEcologySummary.php?Stock Code=3424&GenusName=Poecilia&SpeciesName=reticulata https://www.fishbase.de/Ecology/FishEcologySummary.php?Stock Code=3424&GenusName=Poecilia&SpeciesName=reticulata | High High Medium Medium High |
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| <u>4. (</u> 14 15 16 17 18 19 20 21 | <u>Indesir.</u> 4.01 4.02 4.03 4.04 4.05 4.06 4.07 | y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area? Is it likely that the taxon will achieve a body | Yes Yes Yes Yes Yes | human health https://www.fishbase.de/summary/Poecilia-reticulata.html https://www.fishbase.de/summary/Poecilia-reticulata.html Riehl, R. and H.A. Baensch, 1991. Aquarien Atlas. Band. 1. Melle: Mergus, Verlag für Natur-und Heimtierkunde, Germany. 992 p https://www.fishbase.de/Ecology/FishEcologySummary.php?Stock Code=3424&GenusName=Poecilia&SpeciesName=reticulata https://www.fishbase.de/Ecology/FishEcologySummary.php?Stock Code=3424&GenusName=Poecilia&SpeciesName=reticulata https://www.fishbase.de/Diseases/DiseasesList.php?ID=3228&Stoc kCode=3424 | High High Medium Medium High Medium |
| <u>4. (</u> 14 15 16 17 18 19 20 21 | Indesiri 4.01 4.02 4.03 4.04 4.04 4.05 4.06 4.07 4.08 | y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area? Is it likely that the taxon will nost, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area? | Yes Yes Yes Yes Yes No | human health https://www.fishbase.de/summary/Poecilia-reticulata.html https://www.fishbase.de/summary/Poecilia-reticulata.html Riehl, R. and H.A. Baensch, 1991. Aquarien Atlas. Band. 1. Melle: Mergus, Verlag für Natur-und Heimtierkunde, Germany. 992 p https://www.fishbase.de/Ecology/FishEcologySummary.php?Stock Code=3424&GenusName=Poecilia&SpeciesName=reticulata https://www.fishbase.de/Ecology/FishEcologySummary.php?Stock Code=3424&GenusName=Poecilia&SpeciesName=reticulata https://www.fishbase.de/Diseases/DiseasesList.php?ID=3228&Stoc kCode=3424 | High High Medium Medium High Medium |
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| 4. <i>U</i> 14 15 16 17 17 18 20 21 22 | Indesiri 4.01 4.02 4.03 4.04 4.04 4.05 4.06 4.07 4.08 | y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area? Is it likely that the taxon will nost, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area? | Yes Yes Yes Yes Yes No | human health https://www.fishbase.de/summary/Poecilia-reticulata.html https://www.fishbase.de/summary/Poecilia-reticulata.html Riehl, R. and H.A. Baensch, 1991. Aquarien Atlas. Band. 1. Melle: Mergus, Verlag für Natur-und Heimtierkunde, Germany. 992 p https://www.fishbase.de/Ecology/FishEcologySummary.php?Stock Code=3424&GenusName=Poecilia&SpeciesName=reticulata https://www.fishbase.de/Ecology/FishEcologySummary.php?Stock Code=3424&GenusName=Poecilia&SpeciesName=reticulata https://www.fishbase.de/Diseases/DiseasesList.php?ID=3228&Stoc kCode=3424 | High High Medium Medium High Medium |
| <u>4. (</u> 14 15 16 17 18 20 21 22 | Indesiri 4.01 4.02 4.03 4.04 4.04 4.05 4.06 4.07 4.08 4.09 | y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus 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 | Yes Yes Yes Yes Yes No Yes | human health https://www.fishbase.de/summary/Poecilia-reticulata.html https://www.fishbase.de/summary/Poecilia-reticulata.html Riehl, R. and H.A. Baensch, 1991. Aquarien Atlas. Band. 1. Melle: Mergus, Verlag für Natur-und Heimtierkunde, Germany. 992 p https://www.fishbase.de/Ecology/FishEcologySummary.php?Stock Code=3424&GenusName=Poecilia&SpeciesName=reticulata https://www.fishbase.de/Ecology/FishEcologySummary.php?Stock Code=3424&GenusName=Poecilia&SpeciesName=reticulata https://www.fishbase.de/Diseases/DiseasesList.php?ID=3228&Stoc kCode=3424 Listed as harmless in FishBase (2015). https://www.fishbase.de/summary/Poecilia-reticulata.html https://www.fishbase.de/Ecology/FishEcologySummary.php?Stock | High High Medium Medium High Medium High |

| migrate in the RA area for reproduction? No The taxon are produce juveniles in there reproduction High 41 7.07 Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? No The taxon are produce juveniles in there reproduction 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. either unintentional or intentional) likely to be Yes based on the previous questions High 43 7.09 Is dispersal of the taxon density dependent? Yes file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf High 44 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) being Yes file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf Medium 45 8.03 Can the taxon tolerant of a wide range of wide range of the widwith chemical, biological, or other agents/means? Yes file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf High | | | | | | |
|---|------|---------|---|----------------|---|--------|
| 55 4.7 The structure maintain a value of the constructure of the cons | 24 | 4.11 | (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for | Yes | 228&Genus Name = Poecilia & Species Name = reticulata & fc = 216 & Stock | Medium |
| 6. Seconce resploylation Low 6. 2010 Entities in large tax in the RA area? Not applicable Not a | 25 | 4.12 | Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/onikura2011.pdf | Medium |
| 55 15 she taxon likely to consume threatened or protected failure taxon in the A area? Low 7 16 15 she taxon likely to consume threatened or protected failure taxon in the A area? Yes Light Acceluation Light Acceluation <td>5. R</td> <td>esource</td> <td></td> <td></td> <td></td> <td></td> | 5. R | esource | | | | |
| 27 50.2 [5] Is the taxon likely to sequester food resources (includien patients) to the Code-342466enus/Newne-medical820ec/set/set/mame-metical84 Medium 5. 60.0 [5] Is the taxon likely to continue (IA area) Medium 6. 60.1 [5] Is the taxon likely to continue value generation Medium 6. 60.1 [5] Is the taxon likely to continue value generation Medium 6. 60.1 [5] Is the taxon likely to produce value generation Medium 6. 60.3 [5] Is the taxon likely to produce value generation Medium 6 | | | | Not applicable | No evidence | Low |
| resources (including nutrients) to the deciment of nave toos in the A area? Code=324&GenusName=Peerfilia&SpeciesName=retixulation 5. Record column Mo Mo Mo 5. Record column Mo Mo Mo 6.01 multity to exhible parvaid cont Mo Mo Mo 6.01 multity to exhible parvaid cont Mo Mo Mo 6.01 multity to exhible parvaid cont Mo Mo Mo 6.01 multity to exhible parvaid cont Mo Mo Mo 6.01 multity to be hermaphrodice to to 'representies' for some here to be contained and the parvaid containe there are to be contained and the parvaid containe to be contained and the parvaid containe to be contained and the parvaid containe to be contained and the presence of the parvaid contained and the presencontained and the presence of the parvaid contained a | | | | | | |
| 6 6 Constraint < | 27 | 5.02 | resources (including nutrients) to the | Yes | | High |
| 88 50.0 Is the taxon like/to exhibit parents care and/or for orduce age-4-maturity in response to environmental conditions? Medium 96 6.02 for parents and the taxon is live/transferred conditions? Medium 97 30 5.3 Is the taxon like/to to hybridien naturally with indipely accular syndrotice are parents and international syndrometers Medium Medium 97 5.6 Is the taxon like/to to hybridien naturally with indipely accular syndrotice are parents and international syndrometers Medium Medium 97 5.6 Is the taxon (like) to hybridien naturally with indipely accular syndrotice) Yes https://www.fishbase.de/Reproduction/FishleproSummary.php?10 Medium 97 5.6 Is the taxon (like) to hybridien attraining another taxon (are specific habit features) Yes https://www.fishbase.de/Reproduction/FishleproSummary.php?10 Medium 97 6.6 Is the taxon (like) to nymotice another taxon (are specific habit features) Yes https://www.fishbase.de/Introductions/Intretaxon are produce juveniles in there reproduction | 6. R | eprodu | | | | |
| 29 6.02 15: the taxon likely to produce value gametes values of the second sec | | | Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response | No | the type of reproduction of the taxon is llivebrearing | Medium |
| Institue Lasa? Institu | | | Is the taxon likely to produce viable gametes | | 014.pdf | |
| 31 6.04 Is the taxon likely to be hermaphrodic or to display sexual reproduction? Ves https://www.fishbase.de/inproduction/Fishbapts.mamary.php?ID Medium 32 6.05 Is the taxon dependent on the presence of another taxon (expecific habitat features) No The taxon are livebrearing High 32 6.05 Is the taxon fox nown (if help's) to produce a large number of propagules or offspring within a short time span (e.g. < 1 yes)? | 30 | 6.03 | | Not applicable | No evidence | Medium |
| 22 64.05 Is the taxon dependent on the presence of another taxon (or specific habitst features) to complete its life cycle? No The taxon are livebrearing High 3 6.05 Is the taxon (now (nikely) to produce a large number of propaguies or offspring within a short time spin (e.g., -1 year)? Able, K.W., 1984, Cyprinodontiformes: development. p. 362-368. In American Society of Ethilyalogists and Heppedolgists. In American Society of Ethilyalogists. Medium 4 6.07 How many time units (days, months, years) does the taxon require to reach the age-at- first: required to the memory of Eth. Albitson. US-18 Medium 7 7.00 Food Many potential internal segment within the AA area (uff) suitable does the taxon have a means of attribuilable taxon in close proximity to one or more protected areas (e.g., RVAP, SSS12) -1 https://www.fishbase.de/inforductions/Introductions/Introductions/Interple | 31 | 6.04 | Is the taxon likely to be hermaphroditic or to | Yes | =3228&GenusName=Poecilia&SpeciesName=reticulata&fc=216&St | Medium |
| 33 6.05 Is the taxon known (or likely) to produce a large number of programs/uses or dispins) within a short time span (e.g. < 1 year)? | 32 | 6.05 | another taxon (or specific habitat features) | No | | High |
| 46 6.07 How many time units (days, months, years) of dest the taxon require to reach the age-at- inst-reproduction? 1 https://www.fishbase.de/Reproduction/RuburtyList.php?ID=3228& High 70.0266788 Medium 228&CenusName=Poecilia&SpeciesName=reticulata&fc=216 Medium 25 7.01 How many potential internal vectors/pathways could the taxon use to disperse within the RA area (wth suitable taxon in close proximity to one or more 228&CenusName=Poecilia&SpeciesName=reticulata&fc=216&Stock Medium 27 7.02 Will any of these vectors/pathways bring the taxon in close proximity to one or more 228&CenusName=Poecilia&SpeciesName=reticulata&fc=216&Stock Low 27 7.03 Does the taxon have a means of activeth units, burys burys burys burys burys that it enhances (for plants; seeds, spores) in the RA area? No The taxon are produce juveniles in there reproduction High 28 7.04 Is natural dispersal of the taxon likely to noccur as egos (for animals) or as propaquies (for plants; seeds, spores) in the RA area? No The taxon are produce juveniles in there reproduction High 29 7.05 Is adspersal of the taxon likely to minits; the RA area of the reaxon likely to minits; the RA area of the re | 33 | 6.06 | Is the taxon known (or likely) to produce a large number of propagules or offspring | Yes | In American Society of Ichthyologists and Herpetologists. Ontogeny and systematics of fishes, based on an international symposium dedicated to the memory of E.H. Ahlstrom, 15-18 | Medium |
| 7. Obspensal mechanisms 7. Obspensal mechanisms 52 2.0.1 How many potential internal vectors/pathways could the taxon use to dispense within the RA area (with suitable Code=3424 Intps://www.fishbase.de/IntroductionsList.php7ID=3 Medium 2288.GenusName=Poeclia&SpeciesName=reticulat&fr=216&Stock Code=3424 Intps://www.fishbase.de/IntroductionsList.php7ID=3 High 7. 0.3 Does the taxon have a means of actively tataching itself to hard substrate (e.g. ship hulks, plings, buoys) such that it enhances the likelihood of dispersal? No The taxon are produce juveniles in there reproduction High 87. 7.04 Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants) in the RA area? No The taxon are produce juveniles in there reproduction High 97. 0.5 Is natural dispersal of the taxon likely to occur as lavae/iventiles (for animals) or as propagules (for plants) in the RA area? No The taxon are produce juveniles in there reproduction High 17. 0.7 Are propagules or eggs of the taxon likely to mervious fareading of the taxon likely to nervious (section?) No The taxon are produce juveniles in there reproduction High 18. 7.0 Are propagules or eggs of the taxon likely to nervious (sections) No The taxon are produce juveniles in there reproduction High 19. 6. dispersal of the taxon alike | 34 | 6.07 | does the taxon require to reach the age-at- | 1 | | High |
| vectors/pathways could the taxon use to disperse within the Aa raa (with suitable 2288.GenusName=Poecilia&SpeciesName=reticulata&fc=216&Stock 27 2.0 Will any of these vectors/pathways bring the atxon in close provinity to one or more protected areas (e.g., MCZ, MPA, SSSI)? Yes https://www.fishbase.de/Introductions/IntroductionsList.php?ID=3 High 27 7.0 Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, plings, buoys) such that it enances the likelihood of disoeraal? Yes https://www.fishbase.de/summary/Poecilia-reticulata.html Low 38 7.04 Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagues (for plants: seeds, spores) in the RA area? No The taxon are produce juveniles in there reproduction High 39 7.05 Is natural dispersal of the taxon likely to occur as eggs (for animals) or as fragments/seedings (for plants) in the RA area? Yes https://www.fishbase.de/summary/Poecilia-reticulata.html High 41 7.04 Are older life stages of the taxon likely to more a larvae/juventiles (for animals) or as fragments/seedings of the taxon likely to be dispersal of the taxon likely to be dispersal of the taxon animals? No tapplicable No evidence for this question Low 41 7.0.0 Is dispersal of the taxon likely to more a grow questions (35-41; i.e. either | | | | | | |
| 6 7.02 Will any of these vectors/pathways bring the taxon in close provingly to one or more protected areas (e.a. MCZ, MPA, SSS1) https://www.fishbase.de/inforductions/Introducti | 35 | 7.01 | vectors/pathways could the taxon use to | >1 | 228&Genus Name = Poecilia & Species Name = reticulata & fc = 216 & Stock | Medium |
| 37 7.0.3 Does the taxon have a means of actively hulls, pilings, buoys) such that it enhances the likelihood of dispersal? https://www.fishbase.de/summary/Poecilia-reticulata.html 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 The taxon are produce juveniles in there reproduction High 39 7.05 Is natural dispersal of the taxon likely to occur as eggs (for animals) or as frazeg/inveniles (for the taxon anige of the taxon likely to No Not applicable No evidence for this question Low 41 7.07 Are propagules or eggs of the taxon likely to No The taxon are produce juveniles in there reproduction High 42 7.08 Is dispersal of the taxon density dependent? Yes file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf High 5.70erance attributes .00 file:///C:/Us | 36 | 7.02 | Will any of these vectors/pathways bring the taxon in close proximity to one or more | Yes | https://www.fishbase.de/Introductions/IntroductionsList.php?ID=3 228&GenusName=Poecilia&SpeciesName=reticulata&fc=216&Stock | High |
| hulls, pilings, buoys) such that it enhances hulks, pilings, buoys) such that it enhances the likelihood of dispersal of the taxon likely to No The taxon are produce juveniles in there reproduction High 38 7.04 Is natural dispersal of the taxon likely to occur as days (for plants) seeds, spores) in the RA area? No The taxon are produce juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? Yes https://www.fishbase.de/summary/Poecilia-reticulata.html High 07.04 C. Are older life stages of the taxon likely to Not applicable No evidence for this question Low 11 7.07 Are propagules or eggs of the taxon likely to Not applicable No evidence for this question Low 12 7.04 Are propagules or eggs of the taxon likely to No The taxon are produce juveniles in there reproduction High 12 7.04 Bis dispersal of the RA area by other animals? No The taxon are produce juveniles in there reproduction High 13 7.09 Is dispersal of the taxon density dependent? Yes file:///C./Users/User/Desktop/Thesis%20Ref/joshi.pdf High 14 8.01 Is the taxon able to withstand being out of one or more horel | 37 | 7.03 | | Yes | | Low |
| 38 7.04 Is natural dispersal of the taxon likely to for plants: seeds, spores) in the RA area? No The taxon are produce juveniles in there reproduction High 39 7.05 Is natural dispersal of the taxon likely to occur as larve?/uveniles (for plants) in the RA area? Yes https://www.fishbase.de/summary/Poecilia-reticulata.html High 40 7.05 Are older life stages of the taxon likely to metamals) or as area? No applicable No evidence for this question Low 41 7.07 Are propagules or eggs of the taxon likely to be dispersed in the RA area for reproduction? No The taxon are produce juveniles in there reproduction High 42 7.08 Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous guestions Yes based on the previous questions High 43 7.09 Is dispersal of the taxon density dependent? Yes file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf Medium 44 6.01 Is the taxon bale to withstand being out of one or more hours) at some stage of the radia of maine of mained or reproducate the relevant water quality conditions relevant to that taxon? In the Justification field, indicate the relevant water quality conditions relevant to that taxon? Yes file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf High 45 8.0 | | | hulls, pilings, buoys) such that it enhances | | | |
| 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? Not applicable https://www.fishbase.de/summary/Poecilia-reticulata.html High 2 7.06 Are older life stages of the taxon likely to migrate in the RA area for reproduction? Not applicable No evidence for this question Low 1 7.07 Are propagues or eggs of the taxon likely to be dispersed in the RA area by other animals? Not applicable No evidence for this question High 20 7.07 Are propagues or eggs of the taxon likely to be dispersed in the Area area by other animals? Yes based on the previous questions High 21 7.09 Is dispersal of the taxon density dependent? Yes based on the previous questions High 32 7.09 Is dispersal of the taxon density dependent? Yes file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf High 37 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 cyccle area? No file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf Medium 45 8.02 Is the taxon lolerant of a wide range of water are upility conditions relevant to that taxon? [In the Justiffication field, indicate | 38 | 7.04 | Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules | No | The taxon are produce juveniles in there reproduction | High |
| 40 7.06 Are older life stages of the taxon likely to migrate in the RA area for reproduction? Not applicable Noe evidence for this question Low 41 7.07 Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? No The taxon are produce juveniles in there reproduction 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. either unintentional or intentional) likely to be based on the previous questions High 43 7.09 Is dispersal of the taxon 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 file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf Medium 44 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) being Yes file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf Medium 47 8.03 Is the taxon likely to tolerate or benefit from environmental/human disturbance? Yes file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf High 48 8.05 Is the taxon likely to tolerate or benefit from environmental/human disturbance? Yes file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf High | 39 | 7.05 | occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA | Yes | https://www.fishbase.de/summary/Poecilia-reticulata.html | High |
| 41 7.07 Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? No The taxon are produce juveniles in there reproduction High 22 7.08 Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. either unintentional) or intentional) likely to be Yes based on the previous questions High 33 7.09 Is dispersal of the taxon density dependent? Yes file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf High 44 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 cyccle? No file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf Medium 45 8.02 Is the taxon tolerant of a wide range of water quality voribilos relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Yes file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf Medium 46 8.03 Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Yes file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf High 47 8.05 Is the taxon ble to tolerate salinity levels that are higher or lower than those found in its usual environment? Yes file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf | 40 | 7.06 | Are older life stages of the taxon likely to | Not applicable | No evidence for this question | 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. either unintentional or intentional) likely to be Yes based on the previous questions High 43 7.09 Is dispersal of the taxon density dependent? Yes file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf High 8. Tolerance attributes ************************************ | 41 | 7.07 | Are propagules or eggs of the taxon likely to | No | The taxon are produce juveniles in there reproduction | High |
| 43 7.09 Is dispersal of the taxon density dependent? Yes file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf High 8. Tolerance attributes 8. 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 file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf 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 file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf Medium 46 8.03 Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Yes file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf High 47 8.04 Is the taxon blic to tolerate or benefit from environmental/human disturbance? Yes file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf High 48 8.05 Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment? Yes https://www.fishbase.de/Ecology/FishEcologySummary.php?Stock (OrdeatorS) of the taxon present in the RA area? High 49 8.06 Are there effective natural enemies (predators) of the taxon present in the RA area? No No reported predators in the R | 42 | 7.08 | Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. either | Yes | based on the previous questions | High |
| 8. Tolerance attributes No File:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf Medium 44 8.01 Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life No file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf 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 file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf Medium 46 8.03 Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Yes file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf High 47 8.04 Is the taxon likely to tolerate or benefit from environmental/human disturbance? Yes file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf High 48 8.05 Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment? Yes https://www.fishbase.de/Ecology/FishEcologySummary.php?Stock (Ode=3424&GenusName=Poecilia&SpeciesName=reticulata High 49 8.06 Are there effective natural enemies (predators) of the taxon present in the RA area? No No reported predators in the RA area (https://www.fishbase.de/TrophicEco/PredatorList.php?ID=3228&G enusName=Poecilia&SpeciesName= | 43 | 7.09 | | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf | High |
| water for extended periods (e.g. minimum of one or more hours) at some stage of its life cvcle? 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 file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf Medium 46 8.03 Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Yes file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf High 47 8.04 Is the taxon likely to tolerate or benefit from environmental/human disturbance? Yes file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf High 48 8.05 Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment? Yes https://www.fishbase.de/Ecology/FishEcologySummary.php?Stock Code=3424&GenusName=Poecilia&SpeciesName=reticulata High 49 8.06 Are there effective natural enemies (predators) of the taxon present in the RA area? No No reported predators in the RA area (https://www.fishbase.de/TrophicEco/PredatorList.php?ID=3228&G enusName=Poecilia&SpeciesName=reticulata) High | 8. T | oleranc | ce attributes | | | |
| 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 file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf Medium 46 8.03 Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Yes file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf High 47 8.04 Is the taxon likely to tolerate or benefit from environmental/human disturbance? Yes file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf High 48 8.05 Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment? Yes https://www.fishbase.de/Ecology/FishEcologySummary.php?Stock Code=3424&GenusName=Poecilia&SpeciesName=reticulata High 49 8.06 Are there effective natural enemies (predators) of the taxon present in the RA area (https://www.fishbase.de/TrophicEco/PredatorList.php?ID=3228&G enusName=Poecilia&SpeciesName=reticulata) High C. Climate change Kes Kes No No No reported predators in the RA area (https://www.fishbase.de/TrophicEco/PredatorList.php?ID=3228&G enusName=Poecilia&SpeciesName=reticulata) High | 44 | 8.01 | water for extended periods (e.g. minimum of one or more hours) at some stage of its life | No | file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf | Medium |
| water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Yes file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf 46 8.03 Can the taxon bic controlled or eradicated in the wild with chemical, biological, or other agents/means? Yes file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf High 47 8.04 Is the taxon likely to tolerate or benefit from environmental/human disturbance? Yes file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf High 48 8.05 Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment? Yes https://www.fishbase.de/Ecology/FishEcologySummary.php?Stock Code=3424&GenusName=Poecilia&SpeciesName=reticulata High 49 8.06 Are there effective natural enemies (predators) of the taxon present in the RA area? No No reported predators in the RA area (https://www.fishbase.de/TrophicEco/PredatorList.php?ID=3228&G enusName=Poecilia&SpeciesName=reticulata) High | 45 | 8.02 | | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/ioshi.pdf | Medium |
| 46 8.03 Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Yes file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf High 47 8.04 Is the taxon likely to tolerate or benefit from environmental/human disturbance? Yes file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf High 48 8.05 Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment? Yes https://www.fishbase.de/Ecology/FishEcologySummary.php?Stock Code=3424&GenusName=Poecilia&SpeciesName=reticulata High 49 8.06 Are there effective natural enemies (predators) of the taxon present in the RA area (https://www.fishbase.de/TrophicEco/PredatorList.php?ID=3228&G enusName=Poecilia&SpeciesName=reticulata) High C. Climate change C. Example Example High | - | | water quality conditions relevant to that taxon? [In the Justification field, indicate the | | , , , | |
| 47 8.04 Is the taxon likely to tolerate or benefit from environmental/human disturbance? Yes file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf High 48 8.05 Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment? Yes https://www.fishbase.de/Ecology/FishEcologySummary.php?Stock Code=3424&GenusName=Poecilia&SpeciesName=reticulata High 49 8.06 Are there effective natural enemies (predators) of the taxon present in the RA area (https://www.fishbase.de/TrophicEco/PredatorList.php?ID=322&G High C. Climate change C. C. C. | 46 | 8.03 | Can the taxon be controlled or eradicated in the wild with chemical, biological, or other | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf | High |
| 48 8.05 Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment? Yes https://www.fishbase.de/Ecology/FishEcologySummary.php?Stock Code=3424&GenusName=Poecilia&SpeciesName=reticulata High 49 8.06 Are there effective natural enemies (predators) of the taxon present in the RA area (https://www.fishbase.de/TrophicEco/PredatorList.php?ID=3228&G enusName=Poecilia&SpeciesName=reticulata) High C. Climate change C. C. C. | 47 | 8.04 | Is the taxon likely to tolerate or benefit from | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf | High |
| 49 8.06 Are there effective natural enemies (predators) of the taxon present in the RA area? No No reported predators in the RA area (https://www.fishbase.de/TrophicEco/PredatorList.php?ID=3228&G enusName=Poecilia&SpeciesName=reticulata) High C. Climate change C. Climate change C. Climate change C. Climate change | 48 | 8.05 | Is the taxon able to tolerate salinity levels that are higher or lower than those found in | Yes | | High |
| area? enusName=Poecilia&SpeciesName=reticulata) C. Climate change | 49 | 8.06 | Are there effective natural enemies | No | | High |
| C. Climate change | | | | | | |
| | с. с | limate | | | | |
| | | | | | | |

| 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 | file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf | 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 | file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf | 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 | file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf | 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 | file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf | High |
| 54 | 9.05 | Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? | Higher | file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf | 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 | file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf | High |

Statistics

| Scores | |
|--|--|
| BRA | 41.0 |
| BRA Outcome | High |
| BRA+CCA | 53.0 |
| BRA+CCA Outcome | High |
| Score partition | |
| A. Biogeography/Historical | 15.0 |
| 1. Domestication/Cultivation | 4.0 |
| 2. Climate, distribution and introduction risk | 2.0 |
| <i>3. Invasive elsewhere</i> | 9.0 |
| B. Biology/Ecology | 26.0 |
| 4. Undesirable (or persistence) traits | 10.0 |
| 5. Resource exploitation | 2.0 |
| 6. Reproduction | 5.0 |
| 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 | |
| A. Biogeography/Historical 1. Domestication/Cultivation | |
| A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk | |
| A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere | 13 3 5 5 |
| A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology | 13 3 5 5 36 |
| A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits | 13 3 5 5 36 |
| A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation | 13 3 5 5 36 |
| A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction | 13 3 5 5 36 |
| A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms | 13 3 5 5 36 12 2 7 7 9 |
| A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction | 13 3 5 5 36 |
| A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes | 13 3 5 5 36 12 2 7 9 6 |
| A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change | 13 3 5 36 12 2 7 9 6 6 6 |
| A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change | 13 3 5 36 12 2 7 9 6 6 6 |
| A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected | 13 3 5 5 36 12 2 2 7 7 9 6 6 6 6 |
| A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Commercial | 13 3 5 5 36 12 2 7 7 9 6 6 6 6 6 6 15 |
| A. Biogeography/Historical 1. Domestication/Cultivation 2. Climate, distribution and introduction risk 3. Invasive elsewhere B. Biology/Ecology 4. Undesirable (or persistence) traits 5. Resource exploitation 6. Reproduction 7. Dispersal mechanisms 8. Tolerance attributes C. Climate change 9. Climate change Sectors affected Environmental | 13 3 5 5 36 12 2 7 9 6 6 6 6 6 6 15 10 |

| Thresholds | |
|---------------|--------------|
| BRA | 34.5 |
| BRA+CCA | 34.5 |
| Confidence | |
| BRA+CCA | 0.62 |
| BRA | 0.62 |
| CCA | 0.63 |
| | |
| Date and Time | |
| 17/04/2 | 019 01:54:55 |

| axon and Assessor details | | | | | | |
|------------------------------------|--|--|--|--|--|--|
| Category | Fishes and Lampreys (freshwater) | | | | | |
| Taxon name | Poecilia sphenops | | | | | |
| Common name | molly | | | | | |
| Assessor | Gilles, To | | | | | |
| Risk screening context | | | | | | |
| Reason and socio-economic benefits | Aquarium: highly commercial | | | | | |
| Risk assessment area | Lake Taal | | | | | |
| Taxonomy | Actinopteri (ray-finned fishes) > Cyprinodontiformes (Rivulines, killifishes and live bearers) > | | | | | |
| Native range | Central and South America | | | | | |
| Introduced range | Japan, Indonesia, Malaysia, Philippines atc. | | | | | |
| URL | https://www.fishbase.se/summary/Poecilia-sphenops.html | | | | | |

| | | | Response | Justification (references and/or other information) | Confidence |
|------|---------|---|----------|--|------------|
| | | graphy/Historical | | | |
| 1. 1 | Domest | ication/Cultivation | | | |
| 1 | 1.01 | Has the taxon been the subject of domestication (or cultivation) for at least 20 generations? | Yes | This taxon is already locally established in the warm waters of Montana, Nevada, Puerto Rico and it is being mass-produced in the Far East and Eastern Europe. However, most of the mollies available that are available in the aquarium trade today are selectively bred and are often hybrids, they usually came from the three original species (P. latipinna, P. sphenops, P. velifera) | Very high |
| 2 | 1.02 | Is the taxon harvested in the wild and likely to be sold or used in its live form? | Yes | (CABI, 2020; U.S. Fish and Wildlife Service, 2019). The taxon has been harvested in the wild for ornamental purposes as pets and aquarium species (CABI, 2020). | High |
| 3 | 1.03 | Does the taxon have invasive races, varieties, sub-taxa or congeners? | Yes | Once concerete example is the Poecilia latipinna which already have records of invasion and its associated negative impacts. According to Juliano et al. (1989), in the Philippines, this taxon competes with the native milkfish or Chanos chanos, for food. On the other hand Englund (1999) implicated that this taxon and other introduced Poeciliids (Xiphophorus hellerii and Gambusia species) is responsible for the decline of native damselflies or Megalagrion species on Oahu, Hawaii. Morover in California, this taxon caused the the decline of the desert pupfish, Cyprinodon macularius (ULS. Fish and Wildlife Service, 1983: Robins, 2014: | Very high |
| 2. | Climate | , distribution and introduction risk | | macualus (0.3, 1 Si and Widne Service, 1903, Robits, 2014. | |
| 4 | 2.01 | How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range? | High | The RA area and the taxon's native range has both tropical climate. | Very high |
| 5 | 2.02 | What is the quality of the climate matching data? | High | Data from Climatch were used to facilitate the climate analysis. | Very high |
| 6 | 2.03 | Is the taxon already present outside of captivity in the RA area? | Yes | The taxon is now present in pet stores for ornamental use, such as in Cartimar Market where importation and sale of this taxon is highly abundant. | High |
| 7 | 2.04 | How many potential vectors could the taxon use to enter in the RA area? | >1 | The taxon could be introduced through intentional introduction with human intervention and aquarium escape. | 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 is now present in pet stores for ornamental use, such as in Cartimar Market where importation and sale of this taxon is highly abundant. | High |
| 3 | | e elsewhere | T | | г. |
| 9 | 3.01 | Has the taxon become naturalised (established viable populations) outside its native range? | Yes | This taxon is already locally established in the warm waters of Montana, Nevada, Puerto Rico and it is being mass-produced in the Far East and Eastern Europe. However, most of the mollies available that are available in the aquarium trade today are selectively bred and are often hybrids, they usually came from the three original species (P. latipinna, P. sphenops, P. velifera) (CABI, 2020; U.S. Fish and Wildlife Service, 2019). | High |
| 10 | 3.02 | In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? | Yes | This taxon is considered as a threath to Moapa dace (Moapa coriacea) and the White River springfish (Crenichthys baileyi) which are both endangered species and also a potential threat to other native fishes in the Pahranagat Valley, Nevada. It east the eggs of native fish species and It is also a known carrier of trematode parasites, nematode (Camallanus cotti), and the Asian tapeworm (Bothriocephalus acheilognathi) in Hawaii , which may affect native fish species population (IUCNGSID, 2020; U.S. Fish and Wildlife Service, 2019). | Very high |
| 11 | 3.03 | In the taxon's introduced range, are there known adverse impacts to aquaculture? | Yes | This taxon is considered as a threath to Moapa dace (Moapa coriacea) and the White River springfish (Crenichthys baileyi) which are both endangered species and also a potential threat to other native fishes in the Pahranagat Valley, Nevada. It eats the eggs of native fish species and It is also a known carrier of trematode parasites, nematode (Camallanus cotti), and the Asian tapeworm (Bothriocephalus acheilognathi) in Hawaii , which may affect native fish species population (IUCNGSID, 2020; U.S. Fish and Wildlife Service, 2019). | Very high |

| | 3.04 | In the taxon's introduced range, are there | Yes | This taxon is considered as a threath to Moapa dace (Moapa | Very high |
|--|---|---|------------------------|--|---|
| | | known adverse impacts to ecosystem services? | | coriacea) and the White River springfish (Crenichthys baileyi) | |
| | | Services? | | which are both endangered species and also a potential threat to other native fishes in the Pahranagat Valley, Nevada. It eats the | |
| | | | | eggs of native fish species and It is also a known carrier of | |
| | | | | trematode parasites, nematode (Camallanus cotti), and the Asian | |
| | | | | tapeworm (Bothriocephalus acheilognathi) in Hawaii , which may | |
| | | | | affect native fish species population (IUCNGSID, 2020; U.S. Fish | |
| | | | | and Wildlife Service, 2019). | |
| 13 | 3.05 | In the taxon's introduced range, are there | No | This taxon is a very popular ornamental fish which gave fish pet | Very high |
| | | known adverse socio-economic impacts? | | treaders income (CABI, 2020). | |
| | | y/Ecology | | | |
| | | rable (or persistence) traits | 1 | | |
| 4 | 4.01 | Is it likely that the taxon will be poisonous or | Yes | This taxon is a known carrier of trematode parasites, nematode | High |
| | | pose other risks to human health? | | (Camallanus cotti), and the Asian tapeworm (Bothriocephalus | |
| | | | | acheilognathi) in Hawaii, which may affect native fish species | |
| | | | | population (IUCNGSID, 2020). | |
| .5 | 4.02 | Is it likely that the taxon will smother one or | Yes | This taxon is considered as a threath to Moapa dace (Moapa | Very high |
| | | more native taxa (that are not threatened or | | coriacea) and the White River springfish (Crenichthys baileyi) | |
| | | protected)? | | which are both endangered species and also a potential threat to | |
| | | | | other native fishes in the Pahranagat Valley, Nevada. It eats the | |
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| | | | | trematode parasites, nematode (Camallanus cotti), and the Asian | |
| | | | | tapeworm (Bothriocephalus acheilognathi) in Hawaii , which may | |
| | | | | affect native fish species population (IUCNGSID, 2020; U.S. Fish | |
| 6 | 4.03 | Are there any threatened or protected taxa | No | and Wildlife Service, 2019). This organism feeds on worms, crustaceans, insects, plant matter. | High |
| .0 | 4.05 | that the non-native taxon would parasitise in | 140 | (FishBase, 2019). | ingit |
| | | the RA area? | | (1510656, 2013). | |
| 7 | 4.04 | Is the taxon adaptable in terms of climatic | Yes | This taxon has wide range of environmental tolerances, they can | Very high |
| . / | 4.04 | and other environmental conditions, thus | 105 | tolerate high ranges of temperature, salinity and oxygen levels, | very mgn |
| | | enhancing its potential persistence if it has | | they have the ability to colonize anthropogenically disturbed | |
| | | invaded or could invade the RA area? | | habitats, to give birth to live offspring, they can do trophic | |
| | | invadeu or could invade the KA died? | | opportunism, and they grow in fast rates (CABI , 2020). | |
| 8 | 4.05 | Is the taxon likely to disrupt food-web | Yes | This taxon is considered as a threath to Moapa dace (Moapa | Very high |
| 0 | 4.05 | structure/function in aquatic ecosystems if it | 165 | coriacea) and the White River springfish (Crenichthys baileyi) | very mgn |
| | | has invaded or is likely to invade the RA | | which are both endangered species and also a potential threat to | |
| | | area? | | other native fishes in the Pahranagat Valley, Nevada. It eats the | |
| | | alear | | - · · · · · · · · · · · · · · · · · · · | |
| | | | | eggs of native fish species and It is also a known carrier of trematode parasites, nematode (Camallanus cotti), and the Asian | |
| | | | | tapeworm (Bothriocephalus acheilognathi) in Hawaii , which may | |
| | | | | | |
| | | | | affect native fish species population (IUCNGSID, 2020; U.S. Fish | |
| 9 | 4.06 | Is the taxon likely to exert adverse impacts | Yes | and Wildlife Service. 2019). This taxon is considered as a threath to Moapa dace (Moapa | Very high |
| | 1.00 | on ecosystem services in the RA area? | 105 | coriacea) and the White River springfish (Crenichthys baileyi) | very mgn |
| | | on ecosystem services in the ror area. | | which are both endangered species and also a potential threat to | |
| | | | | other native fishes in the Pahranagat Valley, Nevada. It eats the | |
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| | | | | trematode parasites, nematode (Camallanus cotti), and the Asian | |
| | | | | tapeworm (Bothriocephalus acheilognathi) in Hawaii , which may | |
| | | | | | |
| | 1 | | | affect native fish species population (IUCNGSID, 2020; U.S. Fish | |
| _ | | | | affect native fish species population (IUCNGSID, 2020; U.S. Fish and Wildlife Service, 2019). | |
| 20 | 4.07 | Is it likely that the taxon will host, and/or | No | | High |
| 0 | 4.07 | Is it likely that the taxon will host, and/or act as a vector for, recognised pests and | No | and Wildlife Service, 2019). | High |
| 20 | 4.07 | | No | and Wildlife Service. 2019). There are no reports that the taxon may carry pests or infectious agents that are endemic in Lake Taal. | High |
| | 4.07 | act as a vector for, recognised pests and | No Yes | and Wildlife Service, 2019). There are no reports that the taxon may carry pests or infectious | High Very high |
| | | act as a vector for, recognised pests and infectious agents that are endemic in the RA | | and Wildlife Service. 2019). There are no reports that the taxon may carry pests or infectious agents that are endemic in Lake Taal. | |
| | | 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 | | and Wildlife Service. 2019). There are no reports that the taxon may carry pests or infectious agents that are endemic in Lake Taal. This taxon is a known carrier of trematode parasites, nematode | |
| 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 | | and Wildlife Service. 2019). There are no reports that the taxon may carry pests or infectious agents that are endemic in Lake Taal. This taxon is a known carrier of trematode parasites, nematode (Camallanus cotti), and the Asian tapeworm (Bothriocephalus | |
| 1 | | 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 | | and Wildlife Service. 2019). There are no reports that the taxon may carry pests or infectious agents that are endemic in Lake Taal. This taxon is a known carrier of trematode parasites, nematode (Camallanus cotti), and the Asian tapeworm (Bothriocephalus acheilognathi) in Hawaii , which may affect native fish species | |
| 1 | 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? | Yes | and Wildlife Service. 2019). There are no reports that the taxon may carry pests or infectious agents that are endemic in Lake Taal. This taxon is a known carrier of trematode parasites, nematode (Camallanus cotti), and the Asian tapeworm (Bothriocephalus acheilognathi) in Hawaii , which may affect native fish species population (IUCNGSID, 2020). | Very high |
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| 22 | 4.08 4.09 4.10 | 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)? | Yes No | and Wildlife Service. 2019). There are no reports that the taxon may carry pests or infectious agents that are endemic in Lake Taal. This taxon is a known carrier of trematode parasites, nematode (Camallanus cotti), and the Asian tapeworm (Bothriocephalus acheilognathi) in Hawaii , which may affect native fish species population (IUCNGSID, 2020). Ths taxon can only reach a large body size, having a maximum length of 7.5 cm (Fish Base, 2019). This taxon inhabits in a wide range of habitats, from clear mountain streams to turbid slow moving water bodies at low elevations, commonly without significant aquatic vegetation | Very high High Very high |
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| 1 2 3 4 | 4.08 4.09 4.10 4.11 4.12 | act as a vector for, recognised pests and infectious agents that are endemic in the RA Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area? Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity? Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)? Is 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? Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)? | Yes No No | and Wildlife Service. 2019). There are no reports that the taxon may carry pests or infectious agents that are endemic in Lake Taal. This taxon is a known carrier of trematode parasites, nematode (Camallanus cotti), and the Asian tapeworm (Bothriocephalus acheilognathi) in Hawaii , which may affect native fish species population (IUCNGSID, 2020). Ths taxon can only reach a large body size, having a maximum length of 7.5 cm (Fish Base, 2019). This taxon inhabits in a wide range of habitats, from clear mountain streams to turbid slow moving water bodies at low elevations, commonly without significant aquatic vegetation There are no records that the organism's mode of existence results in habitat degredation. The huge reproductive rate of this taxon can lead to rapid expansion of small founder populations with a doubling time of | Very high High Very high Medium |
| 1 2 3 4 | 4.08 4.09 4.10 4.11 4.12 Resource | act as a vector for, recognised pests and infectious agents that are endemic in the RA Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area? Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity? Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)? Is the likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa? Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)? ce exploitation | Yes No No Yes | and Wildlife Service. 2019). There are no reports that the taxon may carry pests or infectious agents that are endemic in Lake Taal. This taxon is a known carrier of trematode parasites, nematode (Camallanus cotti), and the Asian tapeworm (Bothriocephalus acheilognathi) in Hawaii , which may affect native fish species population (IUCNGSID, 2020). Ths taxon can only reach a large body size, having a maximum length of 7.5 cm (Fish Base, 2019). This taxon inhabits in a wide range of habitats, from clear mountain streams to turbid slow moving water bodies at low elevations, commonly without significant aquatic vegetation There are no records that the organism's mode of existence results in habitat degredation. The huge reproductive rate of this taxon can lead to rapid expansion of small founder populations with a doubling time of less than 15 months and then expand into surrounding areas (CABI, 2020). | Very high High Very high Medium High |
| 1 2 3 4 | 4.08 4.09 4.10 4.11 4.12 Resource | act as a vector for, recognised pests and infectious agents that are endemic in the RA Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area? Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity? Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)? Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa? Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)? ce exploitation Is the taxon likely to consume threatened or | Yes No No | and Wildlife Service. 2019). There are no reports that the taxon may carry pests or infectious agents that are endemic in Lake Taal. This taxon is a known carrier of trematode parasites, nematode (Camallanus cotti), and the Asian tapeworm (Bothriocephalus acheilognathi) in Hawaii , which may affect native fish species population (IUCNGSID, 2020). Ths taxon can only reach a large body size, having a maximum length of 7.5 cm (Fish Base, 2019). This taxon inhabits in a wide range of habitats, from clear mountain streams to turbid slow moving water bodies at low elevations, commonly without significant aquatic vegetation There are no records that the organism's mode of existence results in habitat degredation. The huge reproductive rate of this taxon can lead to rapid expansion of small founder populations with a doubling time of less than 15 months and then expand into surrounding areas (CABI, 2020). | Very high High Very high Medium High |
| 1 2 3 4 5 | 4.08 4.09 4.10 4.11 4.12 Eesourd 5.01 | act as a vector for, recognised pests and infectious agents that are endemic in the RA Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area? Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity? Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)? Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa? Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)? ce exploitation Is the taxon likely to consume threatened or protected native taxa in the RA area? | Yes No No Yes | and Wildlife Service. 2019). There are no reports that the taxon may carry pests or infectious agents that are endemic in Lake Taal. This taxon is a known carrier of trematode parasites, nematode (Camallanus cotti), and the Asian tapeworm (Bothriocephalus acheilognathi) in Hawaii , which may affect native fish species population (IUCNGSID, 2020). Ths taxon can only reach a large body size, having a maximum length of 7.5 cm (Fish Base, 2019). This taxon inhabits in a wide range of habitats, from clear mountain streams to turbid slow moving water bodies at low elevations, commonly without significant aquatic vegetation There are no records that the organism's mode of existence results in habitat degredation. The huge reproductive rate of this taxon can lead to rapid expansion of small founder populations with a doubling time of less than 15 months and then expand into surrounding areas (CABI, 2020). This organism feeds on worms, crustaceans, insects, plant matter. (FishBase, 2019). | Very high High Very high Medium High |
| 1 2 3 4 5 | 4.08 4.09 4.10 4.11 4.12 Resource | act as a vector for, recognised pests and infectious agents that are endemic in the RA Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area? Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity? Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)? Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa? Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)? ce exploitation Is the taxon likely to consume threatened or protected native taxa in the RA area? Is the taxon likely to sequester food | Yes No No Yes | and Wildlife Service. 2019). There are no reports that the taxon may carry pests or infectious agents that are endemic in Lake Taal. This taxon is a known carrier of trematode parasites, nematode (Camallanus cotti), and the Asian tapeworm (Bothriocephalus acheilognathi) in Hawaii , which may affect native fish species population (IUCNGSID, 2020). Ths taxon can only reach a large body size, having a maximum length of 7.5 cm (Fish Base, 2019). This taxon inhabits in a wide range of habitats, from clear mountain streams to turbid slow moving water bodies at low elevations, commonly without significant aquatic vegetation There are no records that the organism's mode of existence results in habitat degredation. The huge reproductive rate of this taxon can lead to rapid expansion of small founder populations with a doubling time of less than 15 months and then expand into surrounding areas (CABI, 2020). This organism feeds on worms, crustaceans, insects, plant matter. (FishBase, 2019). This organism can compete with food source of native species as | Very high High Very high Medium High |
| 1 2 3 4 | 4.08 4.09 4.10 4.11 4.12 Eesourd 5.01 | act as a vector for, recognised pests and infectious agents that are endemic in the RA Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area? Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity? Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)? Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa? Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)? ce exploitation Is the taxon likely to consume threatened or protected native taxa in the RA area? Is the taxon likely to sequester food resources (including nutrients) to the | Yes No No Yes | and Wildlife Service. 2019). There are no reports that the taxon may carry pests or infectious agents that are endemic in Lake Taal. This taxon is a known carrier of trematode parasites, nematode (Camallanus cotti), and the Asian tapeworm (Bothriocephalus acheilognathi) in Hawaii , which may affect native fish species population (IUCNGSID, 2020). Ths taxon can only reach a large body size, having a maximum length of 7.5 cm (Fish Base, 2019). This taxon inhabits in a wide range of habitats, from clear mountain streams to turbid slow moving water bodies at low elevations, commonly without significant aquatic vegetation There are no records that the organism's mode of existence results in habitat degredation. The huge reproductive rate of this taxon can lead to rapid expansion of small founder populations with a doubling time of less than 15 months and then expand into surrounding areas (CABI, 2020). This organism feeds on worms, crustaceans, insects, plant matter. (FishBase, 2019). This organism can compete with food source of native species as they consume plants and algal matter, periphyton, aquatic | Very high High Very high Medium High |
| 1 2 3 4 5 5 | 4.08 4.09 4.10 4.11 4.12 8esourc 5.01 5.02 | act as a vector for, recognised pests and infectious agents that are endemic in the RA Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area? Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity? Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)? Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa? Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)? <i>ce exploitation</i> Is the taxon likely to consume threatened or protected native taxa in the RA area? Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area? | Yes No No Yes | and Wildlife Service. 2019). There are no reports that the taxon may carry pests or infectious agents that are endemic in Lake Taal. This taxon is a known carrier of trematode parasites, nematode (Camallanus cotti), and the Asian tapeworm (Bothriocephalus acheilognathi) in Hawaii , which may affect native fish species population (IUCNGSID, 2020). Ths taxon can only reach a large body size, having a maximum length of 7.5 cm (Fish Base, 2019). This taxon inhabits in a wide range of habitats, from clear mountain streams to turbid slow moving water bodies at low elevations, commonly without significant aquatic vegetation There are no records that the organism's mode of existence results in habitat degredation. The huge reproductive rate of this taxon can lead to rapid expansion of small founder populations with a doubling time of less than 15 months and then expand into surrounding areas (CABI, 2020). This organism feeds on worms, crustaceans, insects, plant matter. (FishBase, 2019). This organism can compete with food source of native species as | Very high High Very high Medium High |
| L 2 3 3 4 7 7 | 4.09 4.10 4.11 4.12 8esource 5.01 5.02 | act as a vector for, recognised pests and infectious agents that are endemic in the RA Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area? Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity? Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)? Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa? Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)? ce exploitation Is the taxon likely to consume threatened or protected native taxa in the RA area? Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area? uction | Yes No Yes No Yes | and Wildlife Service. 2019). There are no reports that the taxon may carry pests or infectious agents that are endemic in Lake Taal. This taxon is a known carrier of trematode parasites, nematode (Camallanus cotti), and the Asian tapeworm (Bothriocephalus acheilognathi) in Hawaii , which may affect native fish species population (IUCNGSID, 2020). Ths taxon can only reach a large body size, having a maximum length of 7.5 cm (Fish Base, 2019). This taxon inhabits in a wide range of habitats, from clear mountain streams to turbid slow moving water bodies at low elevations, commonly without significant aquatic vegetation There are no records that the organism's mode of existence results in habitat degredation. The huge reproductive rate of this taxon can lead to rapid expansion of small founder populations with a doubling time of less than 15 months and then expand into surrounding areas (CABI, 2020). This organism feeds on worms, crustaceans, insects, plant matter. (FishBase, 2019). This organism can compete with food source of native species as they consume plants and algal matter, periphyton, aquatic invertebrates (CABI, 2020). | Very high High Very high Medium High Very high |
| 1 2 3 4 5 7 . <i>F</i> | 4.08 4.09 4.10 4.11 4.12 8esourc 5.01 5.02 | act as a vector for, recognised pests and infectious agents that are endemic in the RA Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area? Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity? Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)? Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa? Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)? <i>ce exploitation</i> Is the taxon likely to consume threatened or protected native taxa in the RA area? Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area? | Yes No No Yes | and Wildlife Service. 2019). There are no reports that the taxon may carry pests or infectious agents that are endemic in Lake Taal. This taxon is a known carrier of trematode parasites, nematode (Camallanus cotti), and the Asian tapeworm (Bothriocephalus acheilognathi) in Hawaii , which may affect native fish species population (IUCNGSID, 2020). Ths taxon can only reach a large body size, having a maximum length of 7.5 cm (Fish Base, 2019). This taxon inhabits in a wide range of habitats, from clear mountain streams to turbid slow moving water bodies at low elevations, commonly without significant aquatic vegetation There are no records that the organism's mode of existence results in habitat degredation. The huge reproductive rate of this taxon can lead to rapid expansion of small founder populations with a doubling time of less than 15 months and then expand into surrounding areas (CABI, 2020). This organism feeds on worms, crustaceans, insects, plant matter. (FishBase, 2019). This organism can compete with food source of native species as they consume plants and algal matter, periphyton, aquatic | Very high High Very high Medium High |

| - | | 1 | | | 1 |
|-------------|------|---|----------------|---|-----------|
| 29 | | Is the taxon likely to produce viable gametes or propagules (in the RA area)? | Yes | The conditions of the RA meets the required conditions for maturation and reproduction of this taxon, which will enable them to produce a viable gametes (Fish Base, 2019) | Very high |
| 30 | | Is the taxon likely to hybridise naturally with native taxa? | Yes | This taxon has already been interbreed with many ornamental species creating hybrids, such as hybrids of P. latipinna X P. velifera, which are commonly available in the ornamental trade | Very high |
| 31 | | Is the taxon likely to be hermaphroditic or to display asexual reproduction? | No | There are no documented evidence of hermaphroditism/asexual reproduction of this species. | High |
| 32 | 6.05 | Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? | No | There are no requirments for this taxon being dependent on the other taxon since they are livebearers (CABI, 2020). | High |
| 33 | 6.06 | Is the taxon known (or likely) to produce a large number of propagules or offspring | Yes | This taxon produces broods of 10-140 youngs, females produce 2- 3 generations per year, depending upon the environmental conditions (CABI, 2020). | High |
| 34 | 6.07 | within a short time span (e.g. < 1 year)? How many time units (days, months, years) does the taxon require to reach the age-at- | 1 | This taxon reaches the age of maturity within 10-20 weeks (CABI, 2020). | High |
| 7. Γ | | first-reproduction? al mechanisms | | | |
| | 7.01 | How many potential internal | One | The taxon can enter the RA area through natural dispersal and its | High |
| | | vectors/pathways could the taxon use to disperse within the RA area (with suitable habitats nearby)? | | succes is increased because of its broad environmental tollerences. Also, it can be dispersed intentionally because of its abundant ornamental use and unintentionally through aquarium escape during natural calamities (flooding) which the RA area is prone to (CABI, 2020). | |
| 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 | The taxon can enter the RA area through natural dispersal and its succes is increased because of its broad environmental tollerences. Also, it can be dispersed intentionally because of its abundant ornamental use and unintentionally through aquarium escape during natural calamities (flooding) which the RA area is prone to (CABI, 2020). | Very high |
| 37 | | Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? | No | Their physical characteristics does not allow attachment to any substrata (Fish Base, 2019) | 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 | Since this taxon is a livebearer and it only inhabits lentic or slow flowing lotic environments; which means that if they are dispersed in a rapidly flowing or highly variable lotic environments, it may inhibit the species establishment or | High |
| 39 | | Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA area? | Yes | The taxon can enter the RA area through natural dispersal and its succes is increased because of its broad environmental tollerences. Also, it can be dispersed intentionally because of its abundant ornamental use and unintentionally through aquarium escape during natural calamities (flooding) which the RA area is prone to (CABI, 2020). | Very high |
| 40 | | Are older life stages of the taxon likely to migrate in the RA area for reproduction? | No | This taxon does not have migratory characteristics (FishBase, 2019). | High |
| 41 | | Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? | Yes | Since this taxon does not exhibit parental care, it makes the broods available for preadation and dispersion by other animals (CABI, 2020). | High |
| 42 | | Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35–41; i.e. either unintentional or intentional) likely to be rapid? | Yes | This taxon which is readily available in the market for aquaculture and as pets together with the fact that the RA area is prone to natural calamities such as typhoons (Brändlin & Wingard, 2013) and its high adaptability to different environmental conditions making them a habitat generalist makes their dispersal rapid | High |
| 43 | | | Not applicable | There are no records that this taxon is density dependent in terms of dispersal. | High |
| <u>8.</u> 7 | | ce attributes | | | |
| 44 | | Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life | Not applicable | There are no records. | 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 | Water pH: 7-8.5, Temperature: 18°C - 28°C (FishBase, 2019). | Very high |
| 46 | 8.03 | Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? | Yes | The biological control of this taxa includes the introduction of larger predatory species, however, it is only possible in small, contained water bodies and it opens the possibility of introducing further problem species (CABI, 2020). | Very high |
| | | Is the taxon likely to tolerate or benefit from environmental/human disturbance? | Yes | As this taxon has wide range of environmental tolerances, they can tolerate high ranges of temperature, salinity and oxygen levels, they have the ability to colonize anthropogenically disturbed habitats and to give birth to live offspring, they can do trophic opportunism, and they grow in fast rates, it is mostlikely, that they will benefit from environmental disturbances specially flooding which is prone in the RA area (CABI, 2020). | High |
| 48 | | Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment? | Yes | This taxon can survive is 45 ppt (CABI, 2020). | High |
| | | Are there effective natural enemies (predators) of the taxon present in the RA | Yes | Micropterus salmoides can predate this taxon in the RA area (Guerrero, 2014). | Very high |
| | | change | | | |
| | | · · · /- | | | |

| 50 | 9.01 | Under the predicted future climatic | Increase | Together with the fact that the RA area is prone to natural | High |
|----|------|--|----------|--|-----------|
| | | conditions, are the risks of entry into the RA | | calamities such as typhoons and floods (Brändlin & Wingard, | |
| | | area posed by the taxon likely to increase, | | 2013) the risk of entry through accidental release from aquarium | |
| | | decrease or not change? | | would most likely increase the entry of this taxon. | |
| 51 | 9.02 | Under the predicted future climatic | Increase | Based on their different morphological characteristics, together | Very high |
| | | conditions, are the risks of establishment | | with the fact that this taxon can survive a wide range of | |
| | | posed by the taxon likely to increase, | | environmental conditions, (they can tolerate high ranges of | |
| | | decrease or not change? | | temperature, salinity and oxygen levels, they have the ability to | |
| | | | | colonize anthropogenically disturbed habitats, to give birth to live | |
| | | | | offspring, they can do trophic opportunism, and they grow in fast | |
| | | | | rates), the risk of establishment of the taxon increases (CABI, | |
| 52 | 9.03 | Under the predicted future climatic | Increase | As a fact that the RA area is prone to natural calamities such as | High |
| | | conditions, are the risks of dispersal within | | typhoons and floods (Brändlin & Wingard, 2013) together with | |
| | | the RA area posed by the taxon likely to | | their ability to survive a wide range of environmental conditions | |
| | | increase, decrease or not change? | | (temperature, salinity, low oxygen level, disturbed habitats and | |
| | | | | etc.) the risk of entry through accidental release from aquarium | |
| | | | | would most likely increase the dispersal of this taxon. | |
| 53 | 9.04 | Under the predicted future climatic | Higher | As this taxon can survive the future climatic conditions of the RA | High |
| | | conditions, what is the likely magnitude of | | area and can establish viable population on it, it can pose a huge | |
| | | future potential impacts on biodiversity | | impact on the biodiversity and ecological status of the RA area by | |
| | | and/or ecological integrity/status? | | competing on food and nutrients of the local species and by | |
| | | | | introducing new diseases. | |
| 54 | 9.05 | Under the predicted future climatic | Higher | As this taxon can survive the future climatic conditions of the RA | High |
| | | conditions, what is the likely magnitude of | | area and can establish viable population on it, it can pose a huge | |
| | | future potential impacts on ecosystem | | impact on the biodiversity and ecological status of the RA area by | |
| | | structure and/or function? | | competing on food and nutrients of the local species and by | |
| | | | | introducing new diseases. | |
| 55 | 9.06 | Under the predicted future climatic | Higher | As this taxon can survive the future climatic conditions of the RA | High |
| | | conditions, what is the likely magnitude of | | area and can establish viable population on it, it can pose a huge | |
| | | future potential impacts on ecosystem | | impact on the biodiversity and ecological status of the RA area by | |
| | | services/socio-economic factors? | | competing on food and nutrients of the local species and by | |
| | 1 | | | introducing new diseases. | |

| Statistics | |
|--|--------------------------|
| Scores | |
| BRA | 40.0 |
| BRA Outcome | High |
| BRA+CCA | 52.0 |
| BRA+CCA Outcome | High |
| Score partition | |
| A. Biogeography/Historical | 22.0 |
| 1. Domestication/Cultivation | 4.0 |
| 2. Climate, distribution and introduction risk | 4.0 |
| 3. Invasive elsewhere | 14.0 |
| B. Biology/Ecology | 18.0 |
| 4. Undesirable (or persistence) traits | 7.0 |
| 5. Resource exploitation | 2.0 |
| 6. Reproduction | 4.0 |
| 7. Dispersal mechanisms | 1.0 |
| 8. Tolerance attributes | 4.0 |
| C. Climate change | 12.0 |
| 9. Climate change | 12.0 |
| Answered Questions | |
| Total | 55 |
| A. Biogeography/Historical | 13 |
| 1. Domestication/Cultivation | 3 5 5 36 |
| 2. Climate, distribution and introduction risk | 5 |
| 3. Invasive elsewhere | 5 |
| B. Biology/Ecology | 36 |
| 4. Undesirable (or persistence) traits | 12 |
| 5. Resource exploitation | 2 |
| 6. Reproduction | 7 |
| 7. Dispersal mechanisms | 12 2 7 9 6 |
| 8. Tolerance attributes | 6 |
| C. Climate change | 6 |
| 9. Climate change | 6 |
| Sectors affected | |
| Commercial | 18 |
| Environmental | 11 |
| Species or population nuisance traits | 29 |
| | |
| | |
| Thresholds | |
| | <u>34.5</u> 34.5 |

| BRA | 34.5 |
|---------------|--------------|
| BRA+CCA | 34.5 |
| Confidence | |
| BRA+CCA | 0.85 |
| BRA | 0.86 |
| CCA | 0.79 |
| | |
| Date and Time | |
| 06/04/2 | 020 12:26:29 |

| axon and Assessor details | | | | | | |
|------------------------------------|--|--|--|--|--|--|
| Category | Fishes and Lampreys (freshwater) | | | | | |
| Taxon name | Pterygoplichthys disjunctivus | | | | | |
| Common name | vermiculated sailfin catfish | | | | | |
| Assessor | Gilles, Pavia | | | | | |
| Risk screening context | | | | | | |
| Reason and socio-economic benefits | Ornamental and Aquaculture | | | | | |
| Risk assessment area | Lake Taal | | | | | |
| Taxonomy | Order - Siluriformes Family - Loricariidae | | | | | |
| Native range | South America | | | | | |
| Introduced range | Philippines | | | | | |
| URL | https://www.fishbase.se/summary/Pterygoplichthys-disjunctivus.html | | | | | |

| | | | Response | Justification (references and/or other information) | Confidence |
|------|---------|--|----------|--|----------------|
| | | ography/Historical | | | |
| 1. l | Domest | tication/Cultivation | | | |
| 1 | 1.01 | Has the taxon been the subject of | Yes | The taxon was introduced in 1970-1979 as an ornamental species | High |
| | | domestication (or cultivation) for at least 20 | | in at least 17 countries in Americas, Asia and Europe. This taxon | |
| | | generations? | | became a successful invaders because of their survival traits and | |
| | | | | had caused different socio-economic impacts (Cagauna, 2007; | |
| 2 | 1.02 | Is the taxon harvested in the wild and likely | Yes | The taxon is the major component of fish catch in the Philippine | High |
| - | 1.02 | to be sold or used in its live form? | | waters but the fish has very little value as food fish since the flesh | |
| | | | | tastes bitter. It may be used, however, as a source of fish meal | |
| | | | | | |
| _ | 4.00 | | | and for ornamental industry (Cagauan, 2007). | |
| 3 | 1.03 | Does the taxon have invasive races, | Yes | This taxon already has the invasive history, since species P. | Very high |
| | | varieties, sub-taxa or congeners? | | multiradiatus, P. pardalis and P. disjunctivus have been so far | |
| | | | | recorded as exotic in Mesoamerica – Puerto Rico and Mexico (8, | |
| | | | | 12); in North America: southern United States – Florida, Texas, | |
| | | | | Washington and North Carolina, as well as at Hawaii islands (10, | |
| | | | | 11, 19, 18, 20); in Philippines and south-eastern Asia: peninsular | |
| | | | | Malaysia, Singapore, Taiwan, Java and Sumatra (22). In all those | |
| | | | | recipient areas recorded so far, the aquarists were assigned | |
| | | | | | |
| | 1 | | | responsible for their releasing into natural ecosystems and | |
| 2 | | distribution and interest of the | L | subsequent establishment (Simonović, Nikolić, and Gruiić, 2014). | L |
| | | e, distribution and introduction risk | Lue 1 | | h |
| 4 | 2.01 | How similar are the climatic conditions of the | High | The taxon's native range (Amazon) falls under the same climatic | Very high |
| | 1 | Risk Assessment (RA) area and the taxon's | | conditions in the Philippines which is a tropical climate (Peel et | |
| | | native range? | | al., 2007 | |
| 5 | 2.02 | What is the quality of the climate matching | High | The taxon's native range (Amazon) falls under the same climatic | High |
| | 1 | data? | | conditions in the Philippines which is a tropical climate (Peel et | |
| | 1 | | | al., 2007) | |
| 6 | 2.03 | Is the taxon already present outside of | Yes | The taxon was found and collected from five sites in and around | High |
| Ŭ | 2.05 | captivity in the RA area? | 105 | the Laguna de Bay basin: Marikina River in Marikina and Pasig | ingn |
| | | captivity in the KA area? | | | |
| | | | | Cities; Pasig River in the City of Manila; Catmon Creek in Bay, | |
| | | | | Laguna; Banilad Creek in Siniloan, Laguna; and Laguna de Bay in | |
| | | | | San Pedro, Laguna (Chavez et al., 2006) | |
| 7 | 2.04 | How many potential vectors could the taxon | >1 | They were probably introduced through an intentional release and | Very high |
| | | use to enter in the RA area? | | possibly fish farm escapes upstream (near Davao) between the | |
| | | | | 2002 and 2005 (Hubilla et al, 2007). Moreover, local aquarium | |
| | | | | dealers have used its local moniker that a janitor fish cleans up | |
| | | | | - as a selling point, wherein anecdotal reports say that the | |
| | | | | misconception might have also be a reason for the high incidence | |
| | | | | | |
| 0 | 2.05 | To the target summation forward in place | Ma a | of these specimens particularly in the Marikina and Pasig rivers | Marris Interla |
| 8 | 2.05 | Is the taxon currently found in close | Yes | The taxon can enter the RA intentionally because of its abundant | Very high |
| | | proximity to, and likely to enter into, the RA | | ornamental use and unintentionally through aquarium escape | |
| | | area in the near future (e.g. unintentional | | during natural calamities like flooding which the RA area is prone | |
| | | and intentional introductions)? | | (Brändlin & Wingard 2013; CABI, 2015) | |
| 3. 1 | Invasiv | e elsewhere | | | |
| 9 | 3.01 | Has the taxon become naturalised | Yes | Besides in the Philippines, P. disjunctivus and P. pardalis are also | High |
| | 1 | (established viable populations) outside its | | seen in Singapore waterways, with the former also found in | - |
| | | native range? | | Taiwan and the latter found as well in the canals and sewer | |
| | 1 | indere funge. | | system of Indonesia and the Red River of Northern Vietnam (Levin | |
| | 1 | | | | |
| | 1 | | | et al., 2008). In addition, "they have established populations and | |
| | 1 | | | displaced indigenous fish and invertebrate communities" in | |
| 1.5 | | | | Mexico. Puerto Rico and the United States (Soriano & Valleio, Jr., | |
| 10 | 3.02 | In the taxon's introduced range, are there | Yes | The rapid increase of this species (Pterygloplchthys) has affected | Very high |
| | 1 | known adverse impacts to wild stocks or | | the livelihood and fishing operation of the fisherfolk which led to a | |
| | 1 | commercial taxa? | | decrease in marketable catch of endemic and commercial fish | |
| | | | | species due to its predominance in gill net and fish corral catch. | |
| | 1 | | | (Chaves et al., 2006) | |
| 11 | 3.03 | In the taxon's introduced range, are there | Yes | Based on the findings of the study, the taxon in the Agusan Marsh | High |
| ** | 5.05 | | | are considered threat to freshwater biodiversity (Hubilla et al., | |
| | 1 | known adverse impacts to aquaculture? | | | |
| | 1 | | | 2006). Also, there are records that this taxon caused scarcity of | |
| | 1 | | | nutrient resources, alter food webs, increase turbidity and cause | |
| | 1 | | | bank erosion due to their nest building activity, and physically | |
| | 1 | | | inhibit other aquatic organisms specially local fishes (CABI, 2015). | |
| 12 | 3.04 | In the taxon's introduced range, are there | Yes | Based on the findings of the study, the taxon in the Agusan Marsh | Very high |
| - | 1 | known adverse impacts to ecosystem | | are considered threat to freshwater biodiversity (Hubilla et al., | -, 5. |
| | 1 | services? | | 2006). Also, there are records that this taxon caused scarcity of | |
| | 1 | SCI VICES! | | | |
| | 1 | | | nutrient resources, alter food webs, increase turbidity and cause | |
| | | | 1 | bank erosion due to their nest building activity, and physically | 1 |
| | | | | inhibit other aquatic organisms specially local fishes (CABI, 2015). | |

| | 3.05 | In the taxon's introduced range, are there known adverse socio-economic impacts? | Yes | Based on the findings of the study, the taxon in the Agusan Marsh are considered threat to freshwater biodiversity (Hubilla et al., 2006). Also, there are records that this taxon caused scarcity of nutrient resources, alter food webs, increase turbidity and cause bank erosion due to their nest building activity, and physically inhibit other aquatic organisms specially local fishes (CABI, 2015). | High |
|----|-----------------|--|-----|--|-----------|
| | | //Ecology | | | |
| | | able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? | No | Bioaccumulation of coliform bacteria and heavy metals, as well as vector of parasites, has been recorded on these species. In which if eaten will lead to potential contamination and infection | 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 | (Orfinger & Goodding, 2018). This taxon shows impacts on displacement of local species through resource competition such as indirect food competition which reduces the food resources like aquatic insects and vegetation and direct habitat competition because of high biomass of their populations (Orfinger & Goodding, 2018). | High |
| 16 | 4.03 | Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? | No | This is very unlikely to happen considering the feeding guild and morphology of the taxon (Hubilla et al., 2007; Levin et al., 2008). | 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 | These fish are protected by modified scales and by strong spines on the fins and because they show a high tolerance to low oxygen concentrations or desiccation (up to 20 hours). The latter ability can be attributed to an enlarged and vascularized stomach, which functions as an accessory respiratory organ (Jasso et al., 2013). Also, they are commonly found in shallow freshwater environments, but some members of the Family Loricariidae: Pterygoplichthys which are considered to be strictly freshwater, have already established invasive populations in inland waters with mesohaline conditions, such as in North and Central America, Asia, Caribbean islands, Pacific and Indian oceans and in South- Fastern Mexico due to their high salinity tolerance (Canns et al. | 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 | Their burrowing behavior in river banks may contribute to water turbidity and soil erosion. High water turbidity alters the amount of light that can pass down through the water column, and thus, slows down photosynthesis and primary productivity. (Hubilla et | Very high |
| 19 | 4.06 | Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? | Yes | There are records that this taxon caused scarcity of nutrient resources, alter food webs, increase turbidity and cause bank erosion due to their nest building activity, and physically inhibit other aquatic organisms specially local fishes (CABI, 2015). | 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 area? | No | There are no reports that the taxon may carry pests or infectious agents that are endemic in Lake Taal (Nitta and Nagasawa, 2013; Nitta and Nagasawa, 2016; Rodríguez-Santiago et al., 2016; Cardoso et al., 2017). | High |
| | 4.08 | Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area? Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity? | Yes | There are reports that the taxon can be a host for several parasites which are not yet recorded in Lake Taal (Nitta and Nagasawa, 2013; Nitta and Nagasawa, 2016; Rodríguez-Santiago et al., 2015; Cardoso et al., 2017). The size range for most of the adult species in the Loricariid family is 30–50 cm, but individuals have been observed to reach 70 cm (IUCN, 2010). While the max published weight: 310.00 g (Jumawan and Seronay, 2017). Accidental release of Pterygoplichthys spp. has been documented, such as when typhoon Rosing struck the Philippines resulting in escape of the fish from commercial farms. Also, they are very common aquarium fish around the world. Nearly all of their introduced populations are caused by pet release or aquaculture escape | High |
| 23 | 4.10 | Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)? | Yes | The taxon was collected from medium-velocity rivers no more than two meters deep near the river banks (Chavez, et al., 2006) | High |
| 24 | 4.11 | (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa? | Yes | The foraging activities of different-sized Pterygoplichthys had potentially strong negative effects on the number of catfish eggs and first-feeding fry. Therefore, these invasive alien fish pose a risk to the native aquatic resources [of Thailand] (Chaichana et al., 2013) Pterygoplichthys species are also generally herbivores, and large populations can significantly alter the energy budget of a water body by reducing the amount of energy available to other herbivores, such as aquatic insects and other arthropods (Kottelat et al 1993); Fuller 1998; Nico and Martin 2001). Reductions in the population of the arthropods will lead to reduced populations of other animals that feed on arthropods (Inger and Chin 2002: Page | Very 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 | The taxon can mainteen of anticology time and cam 2002, rade The taxon can maintein viable population under low density condition which is reported in the Chacamax River, Chiapas, Mexico (Capps and Flecker, 2015) | High |
| | S.01 | e exploitation Is the taxon likely to consume threatened or protected native taxa in the RA area? | Yes | This taxon feeds primarily on benthic algae, detritus, various plant matter, worms, insect larvae, fish eggs and other bottom-dwellers which do not fall under threatened or protected status in the RA area. (IUCN, 2010) | High |
| 27 | 5.02 Reprodu | Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area? | Yes | Food competition by the said taxa, in which it reduces the food resources such as aquatic insects and vegetation in the area, can be detrimental to the native taxa (Orfinger & Goodding, 2018). | High |

| 28 | 6.01 | Is the taxon likely to exhibit parental care | Yes | This species exhibits parental care through building nests, given | High |
|------|----------------|---|----------------|--|-------------------|
| | | and/or to reduce age-at-maturity in response to environmental conditions? | | that their found habitat lacks predator and exploitation (Jasso et | |
| 29 | 6.02 | Is the taxon likely to produce viable gametes | Yes | al., 2013). Due to their parental care ability this taxon can likely produce | High |
| 25 | 0.02 | or propagules (in the RA area)? | 103 | viable gametes in the RA area (Jasso et al., 2013; CABI, 2015) | ingn |
| 30 | 6.03 | Is the taxon likely to hybridise naturally with | No | There is no native taxa present in the RA area where the taxon | High |
| | | native taxa? | | can hybridise (Papa and Mamaril, 2011). | |
| 31 | 6.04 | Is the taxon likely to be hermaphroditic or to | No | The taxon mates through external fertilization, where the female | High |
| | | display asexual reproduction? | | deposits eggs on smooth rocks, depressions or burrows in the | |
| | | | | river bank. The eggs are then fertilized by the male. Afterwards, the eggs are guarded by one or both parents. In captivity, the | |
| | | | | most successful breedings have occurred in ponds with steep clay | |
| | | | | or mud banks. The fish dig tunnels close to the water level and | |
| | | | | the males guard the eggs until they hatch. (Jumawan et al. 2014) | |
| 32 | 6.05 | Is the taxon dependent on the presence of | No | The taxon does not depend on other taxa and or other means to | High |
| | | another taxon (or specific habitat features) to complete its life cycle? | | complete lifecycle (Power, 2003). | |
| 33 | 6.06 | Is the taxon known (or likely) to produce a | Yes | The taxon spawn multiple times throughout the spawning season | High |
| | | large number of propagules or offspring | | which happens from March to September. Also, they exhibit | |
| | | within a short time span (e.g. < 1 year)? | | extended spawning season which extends for more than 5 months | |
| | | | | during the warm rainy season (CABI, 2015) | |
| 34 | 6.07 | How many time units (days, months, years) | 2 | This taxon reaches sexual maturity at the age of 2 (Gibbs et al., | High |
| | | does the taxon require to reach the age-at- first-reproduction? | | 2017) | |
| 7. L | Dispers | al mechanisms | 1 | | 1 |
| | 7.01 | How many potential internal | >1 | The taxon can enter the RA through natural dispersal and its | High |
| | | vectors/pathways could the taxon use to | | succes is increased because of its environmental tolerances. Also, | |
| | | disperse within the RA area (with suitable | | it can be dispersed intentionally because of its abundant | |
| | | habitats nearby)? | | ornamental use and unintentionally through aquarium escape | |
| | | | | during natural calamities like flooding which the RA area is prone (Brändlin & Wingard 2013: CABL 2015) | |
| 36 | 7.02 | Will any of these vectors/pathways bring the | Yes | The taxon can enter the RA through natural dispersal and its | High |
| | | taxon in close proximity to one or more | | success is increased because of its environmental tolerances. Also, | 5 |
| | | protected areas (e.g. MCZ, MPA, SSSI)? | | it can be dispersed intentionally because of its abundant | |
| | | | | ornamental use and unintentionally through aquarium escape | |
| | | | | during natural calamities like flooding which the RA area is prone | |
| 37 | 7.03 | Does the taxon have a means of actively | Yes | (Brändlin & Wingard 2013; CABI, 2015) The modified mouth allows the taxon to feed, breathe, and attach | High |
| 57 | 7.05 | attaching itself to hard substrata (e.g. ship | 105 | to the substrate through suction (CABI,2015). | i iigii |
| | | hulls, pilings, buoys) such that it enhances | | | |
| | | the likelihood of dispersal? | | | |
| 38 | 7.04 | Is natural dispersal of the taxon likely to | Yes | In the case of an invasive species such as P. pardalis, accidental | High |
| | | occur as eggs (for animals) or as propagules | | release of eggs and juveniles may result in assured higher | |
| 39 | 7.05 | (for plants: seeds, spores) in the RA area? Is natural dispersal of the taxon likely to | Not applicable | survival rates in the wild (Jumawan et al., 2014) There are no recorded evidence that larvae/fragments/seedlings | High |
| | | occur as larvae/juveniles (for animals) or as | | enter, or are taken by, water currents. | |
| | | fragments/seedlings (for plants) in the RA | | | |
| | | area? | | | |
| 40 | 7.06 | Are older life stages of the taxon likely to | No | This taxon are generally nocturnal and non-migratory (CABI, 2015) | High |
| 41 | 7.07 | migrate in the RA area for reproduction? Are propagules or eggs of the taxon likely to | No | Because this taxon exhibits parental care through building nests, | High |
| | /.0/ | be dispersed in the RA area by other animals? | | given that their found habitat lacks predator and exploitation | i iigii |
| | | | | (Jasso et al., 2013). | |
| 42 | 7.08 | Is dispersal of the taxon along any of the | Yes | This taxon can quickly migrate to reach new bodies of water, this | High |
| | | vectors/pathways mentioned in the previous | | is enabled by their ability to hold into solid substrates using their | |
| | | seven questions (35–41; i.e. either | | sucker mouth, beating of pelvic fins, and hooking and bracing | |
| 43 | 7.09 | unintentional or intentional) likely to be Is dispersal of the taxon density dependent? | Not annlicable | using their studded spines of the pectoral fins (CABI, 2015) There are no documented evidence of the organism spreading out | Medium |
| | | | | or dispersing when its population density increases. | |
| 8. 7 | <i>Foleran</i> | ce attributes | · | | |
| 44 | 8.01 | Is the taxon able to withstand being out of | Yes | Members of this taxon also have the ability to breathe air and are | High |
| | 1 | | 1 | able to survive up to 30 h out of water (Val and De Almeida-Val, | |
| | | water for extended periods (e.g. minimum of | | | |
| | | one or more hours) at some stage of its life | | 1995). Pterygoplichthys and many other loricariids are facultative | |
| | | | | 1995). Pterygoplichthys and many other loricariids are facultative air-breathers, able to persist indefinitely in hypoxic conditions and | |
| 45 | 8.02 | one or more hours) at some stage of its life | Yes | 1995). Pterygoplichthys and many other loricariids are facultative | High |
| 45 | 8.02 | 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 | 1995). Pterygoplichthys and many other loricariids are facultative air-breathers, able to persist indefinitely in hypoxic conditions and even able to survive out of water for many hours (Graham, 1997) | High |
| 45 | 8.02 | 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 | 1995). Pterygoplichthys and many other loricariids are facultative air-breathers, able to persist indefinitely in hypoxic conditions and even able to survive out of water for many hours (Graham, 1997) Taxon can tolerate water pollution, low oxygen levels, and | High |
| | | one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being | | 1995). Pterygoplichthys and many other loricariids are facultative air-breathers, able to persist indefinitely in hypoxic conditions and even able to survive out of water for many hours (Graham, 1997) Taxon can tolerate water pollution, low oxygen levels, and elevated salinity (Capps et al., 2011; Özgür et al., 2016) | - |
| | 8.02 | one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in | Yes | 1995). Pterygoplichthys and many other loricariids are facultative air-breathers, able to persist indefinitely in hypoxic conditions and even able to survive out of water for many hours (Graham, 1997) Taxon can tolerate water pollution, low oxygen levels, and elevated salinity (Capps et al., 2011; Özgür et al., 2016) A successful eradication through human intervention was done in | High Very high |
| | | one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other | | 1995). Pterygoplichthys and many other loricariids are facultative air-breathers, able to persist indefinitely in hypoxic conditions and even able to survive out of water for many hours (Graham, 1997) Taxon can tolerate water pollution, low oxygen levels, and elevated salinity (Capps et al., 2011; Özgür et al., 2016) A successful eradication through human intervention was done in the Rainbow River, Florida USA (Hill and Sowards, 2015). Also, a | - |
| | | 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 | | 1995). Pterygoplichthys and many other loricariids are facultative air-breathers, able to persist indefinitely in hypoxic conditions and even able to survive out of water for many hours (Graham, 1997) Taxon can tolerate water pollution, low oxygen levels, and elevated salinity (Capps et al., 2011; Özgür et al., 2016) A successful eradication through human intervention was done in the Rainbow River, Florida USA (Hill and Sowards, 2015). Also, a preliminary study of the potential eradication of P. pardalis by | |
| | | 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 | | 1995). Pterygoplichthys and many other loricariids are facultative air-breathers, able to persist indefinitely in hypoxic conditions and even able to survive out of water for many hours (Graham, 1997) Taxon can tolerate water pollution, low oxygen levels, and elevated salinity (Capps et al., 2011; Özgür et al., 2016) A successful eradication through human intervention was done in the Rainbow River, Florida USA (Hill and Sowards, 2015). Also, a | |
| | | 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 | | 1995). Pterygoplichthys and many other loricariids are facultative air-breathers, able to persist indefinitely in hypoxic conditions and even able to survive out of water for many hours (Graham, 1997) Taxon can tolerate water pollution, low oxygen levels, and elevated salinity (Capps et al., 2011; Özgür et al., 2016) A successful eradication through human intervention was done in the Rainbow River, Florida USA (Hill and Sowards, 2015). Also, a preliminary study of the potential eradication of P. pardalis by three native Thai piscivorous species yielded interesting results. | - |
| | | 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 | | 1995). Pterygoplichthys and many other loricariids are facultative air-breathers, able to persist indefinitely in hypoxic conditions and even able to survive out of water for many hours (Graham, 1997) Taxon can tolerate water pollution, low oxygen levels, and elevated salinity (Capps et al., 2011; Özgür et al., 2016) A successful eradication through human intervention was done in the Rainbow River, Florida USA (Hill and Sowards, 2015). Also, a preliminary study of the potential eradication of P. pardalis by three native Thai piscivorous species yielded interesting results. Demersal species such as H. wyckioides and O. marmorata could more effectively eliminate P. pardalis than other native species such as P. sanitwongsei. In particular, H. wyckioides was the most | |
| | | 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 | | 1995). Pterygoplichthys and many other loricariids are facultative air-breathers, able to persist indefinitely in hypoxic conditions and even able to survive out of water for many hours (Graham, 1997) Taxon can tolerate water pollution, low oxygen levels, and elevated salinity (Capps et al., 2011; Özgür et al., 2016) A successful eradication through human intervention was done in the Rainbow River, Florida USA (Hill and Sowards, 2015). Also, a preliminary study of the potential eradication of P. pardalis by three native Thai piscivorous species yielded interesting results. Demersal species such as H. wyckioides and O. marmorata could more effectively eliminate P. pardalis than other native species such as P. sanitwongsei. In particular, H. wyckioides was the most effective consumer of P. pardalis, as it could efficiently ingest | - |
| | | 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 | | 1995). Pterygoplichthys and many other loricariids are facultative air-breathers, able to persist indefinitely in hypoxic conditions and even able to survive out of water for many hours (Graham, 1997) Taxon can tolerate water pollution, low oxygen levels, and elevated salinity (Capps et al., 2011; Özgür et al., 2016) A successful eradication through human intervention was done in the Rainbow River, Florida USA (Hill and Sowards, 2015). Also, a preliminary study of the potential eradication of P. pardalis by three native Thai piscivorous species yielded interesting results. Demersal species such as H. wyckioides and O. marmorata could more effectively eliminate P. pardalis than other native species such as P. sanitwongsei. In particular, H. wyckioides was the most effective consumer of P. pardalis, as it could efficiently ingest individuals up to 10 cm in length. Pterygoplichthys pardalis longer | - |
| | | 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 | | 1995). Pterygoplichthys and many other loricariids are facultative air-breathers, able to persist indefinitely in hypoxic conditions and even able to survive out of water for many hours (Graham, 1997) Taxon can tolerate water pollution, low oxygen levels, and elevated salinity (Capps et al., 2011; Özgür et al., 2016) A successful eradication through human intervention was done in the Rainbow River, Florida USA (Hill and Sowards, 2015). Also, a preliminary study of the potential eradication of P. pardalis by three native Thai piscivorous species yielded interesting results. Demersal species such as H. wyckioides and O. marmorata could more effectively eliminate P. pardalis than other native species such as P. sanitwongsei. In particular, H. wyckioides was the most effective consumer of P. pardalis, as it could efficiently ingest | - |

| 47 | 8.04 | Is the taxon likely to tolerate or benefit from environmental/human disturbance? | Yes | Taxon is tolerant of (and likely to benefit from) eutrophication and other forms of aquatic disturbance, as evidenced by their occurrence in nutrient-rich Lake Thonotosassa and Lake Maggiore, Florida and Nong Yai Canal, East Thailand (Hoover et al., 2004; Chaichana et al., 2011). | High |
|------|---------|---|----------|---|-----------|
| 48 | 8.05 | Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment? | Yes | Taxon can tolerate elevated salinity (Capps et al., 2011). | High |
| 49 | 8.06 | Are there effective natural enemies (predators) of the taxon present in the RA area? | No | Based on the list of fish species present in lake Taal (Papa and Mamaril, 2011), there is none that could possibly prey on the taxon being assessed. | Very high |
| С. (| Climate | e change | | | |
| 9. (| Climate | change | | | |
| 50 | 9.01 | Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? | Increase | Lake Taal is close but completely isolated from Laguna de Bay and other rivers in Luzon Island where Pterygoplichthys spp. were recorded and thus may only require accidental and/or intentional vectors of introduction, together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) the risk of entry through accidental release from aquarium would most likely increase the risk of entry of this | 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 | As a fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) the risk of dispersal through accidental release from aquarium together with their fitness to counter act environmental disturbances, this would most likely increase the risk of establishment of this 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? | Increase | As a fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) the risk of dispersal through accidental release from aquarium together with their fitness to counter act environmental disturbances, this would most likely increase the dispersal of this taxon. | 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 they can survive the future climatic conditions of the RA area, this taxon can cause increased scarcity of nutrient resources, alter food webs, increase turbidity and cause bank erosion due to their nest building activity which alters the amount of light that can pass down through the water column, and thus, slows down photosynthesis and primary productivity which physically inhibit other aquatic organisms specially the local fishes | 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 | Since they can survive the future climatic conditions of the RA area, this taxon can cause increased scarcity of nutrient resources, alter food webs, increase turbidity and cause bank erosion due to their nest building activity which alters the amount of light that can pass down through the water column, and thus, slows down photosynthesis and primary productivity which physically inhibit other aquatic organisms specially the local fishes | 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 | As this taxon can survive the future climatic conditions of the RA area and can establish viable population on it, it can pose a huge impact on the ecosystem services and socio-economic factors of the RA area by competing on the existence of the local species which would eventually replace their existence in the RA area, thus affecting the livelihood services and the genetic diversity of the ecosystem in the area. | High |

| Statistics | |
|--|------|
| Scores | |
| BRA | 54.0 |
| BRA Outcome | High |
| BRA+CCA | 66.0 |
| BRA+CCA Outcome | High |
| Score partition | |
| A. Biogeography/Historical | 26.0 |
| 1. Domestication/Cultivation | 4.0 |
| 2. Climate, distribution and introduction risk | 4.0 |
| 3. Invasive elsewhere | 18.0 |
| B. Biology/Ecology | 28.0 |
| 4. Undesirable (or persistence) traits | 9.0 |
| 5. Resource exploitation | 7.0 |
| 6. Reproduction | 2.0 |
| 7. Dispersal mechanisms | 3.0 |
| 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 |
| 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 | 23 | | |
| Environmental | 17 | | |
| Species or population nuisance traits | 33 | | |
| | | | |
| Thresholds | | | |
| BRA | 34.5 | | |
| BRA+CCA | 34.5 | | |
| Confidence | | | |
| BRA+CCA | 0.80 | | |
| BRA | 0.81 | | |
| CCA | 0.75 | | |
| | | | |
| Date and Time | | | |
| 25/02/2019 13:00:52 | | | |

| Taxon and Assessor details | | | | | |
|------------------------------------|---|--|--|--|--|
| Category | Fishes and Lampreys (freshwater) | | | | |
| Taxon name | Pterygoplichthys gibbiceps | | | | |
| Common name | leopard pleco | | | | |
| Assessor | Gilles, To | | | | |
| Risk screening context | | | | | |
| Reason and socio-economic benefits | aquarium: commercial | | | | |
| Risk assessment area | Lake Taal | | | | |
| Taxonomy | Actinopteri (ray-finned fishes) > Siluriformes (Catfish) > Loricariidae (Armored catfishes) > | | | | |
| Native range | South America | | | | |
| Introduced range | Spain | | | | |
| URL | https://www.fishbase.se/summary/Pterygoplichthys-gibbiceps.html | | | | |

| | | | Response | Justification (references and/or other information) | Confidence |
|------|----------|---|----------|---|------------|
| | | graphy/Historical | | | |
| | | ication/Cultivation | 1.4 | | N/ 111 |
| 1 | 1.01 | Has the taxon been the subject of domestication (or cultivation) for at least 20 generations? | Yes | The taxon was introduced in 1970-1979 as an ornamental species in at least 17 countries in Americas, Asia and Europe. This taxon became a successful invaders because of their survival traits and | Very high |
| 2 | 1.02 | Is the taxon harvested in the wild and likely to be sold or used in its live form? | Yes | had caused different socio-economic impacts (Cagauna, 2007; The taxon is the major component of fish catch in the Philippine waters but the fish has very little value as food fish since the flesh tastes bitter. It may be used, however, as a source of fish meal and for ornamental industry (Cagauan, 2007). | Very high |
| 3 | 1.03 | Does the taxon have invasive races, varieties, sub-taxa or congeners? | Yes | This taxon already has the invasive history, since species P. multiradiatus, P. pardalis and P. disjunctivus have been so far recorded as exotic in Mesoamerica – Puerto Rico and Mexico (8, 12); in North America: southern United States – Florida, Texas, Washington and North Carolina, as well as at Hawaii islands (10, 11, 19, 18, 20); in Philippines and south-eastern Asia: peninsular Malaysia, Singapore, Taiwan, Java and Sumatra (22). In all those recipient areas recorded so far, the aquarists were assigned responsible for their releasing into natural ecosystems and subsequent establishment (Simonović, Nikolić, and Gruijć, 2014) | Very high |
| !. C | 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 | The taxon's native range (Amazon) falls under the same climatic conditions in the Philippines which is a tropical climate (Peel et al., 2007) | Very high |
| 5 | 2.02 | What is the quality of the climate matching data? | High | The taxon's native range (Amazon) falls under the same climatic conditions in the Philippines which is a tropical climate (Peel et al., 2007) | Very high |
| 5 | 2.03 | Is the taxon already present outside of captivity in the RA area? | Yes | The taxon was found and collected from five sites in and around the Laguna de Bay basin: Marikina River in Marikina and Pasig Cities; Pasig River in the City of Manila; Catmon Creek in Bay, Laguna; Banilad Creek in Siniloan, Laguna; and Laguna de Bay in San Pedro, Laguna (Chavez et al., 2006) | Very high |
| 7 | 2.04 | How many potential vectors could the taxon use to enter in the RA area? | >1 | They were probably introduced through an intentional release and possibly fish farm escapes upstream (near Davao) between the 2002 and 2005 (Hubilla et al, 2007). Moreover, local aquarium dealers have used its local moniker that a janitor fish cleans up - as a selling point, wherein anecdotal reports say that the misconception might have also be a reason for the high incidence of these specimens particularly in the Marikina and Pasig rivers | Very 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 | The taxon can enter the RA intentionally because of its abundant ornamental use and unintentionally through aquarium escape during natural calamities like flooding which the RA area is prone (Brändlin & Wingard 2013; CABI, 2015) | Very high |
| 3. I | | e elsewhere | r | | |
|) | 3.01 | Has the taxon become naturalised (established viable populations) outside its native range? | Yes | Besides in the Philippines, P. disjunctivus and P. pardalis are also seen in Singapore waterways, with the former also found in Taiwan and the latter found as well in the canals and sewer system of Indonesia and the Red River of Northern Vietnam (Levin et al., 2008). In addition, "they have established populations and displaced indigenous fish and invertebrate communities" in Mexico. Puerto Rico and the United States (Soriano & Valleio. Jr., | Very high |
| 10 | 3.02 | In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? | Yes | The rapid increase of this species (Pterygloplchthys) has affected the livelihood and fishing operation of the fisherfolk which led to a decrease in marketable catch of endemic and commercial fish species due to its predominance in gill net and fish corral catch. (Chaves et al., 2006) | Very high |
| | 3.03 | In the taxon's introduced range, are there known adverse impacts to aquaculture? | Yes | Based on the findings of the study, the taxon in the Agusan Marsh are considered threat to freshwater biodiversity (Hubilla et al., 2006). Also, there are records that this taxon caused scarcity of nutrient resources, alter food webs, increase turbidity and cause bank erosion due to their nest building activity, and physically inhibit other aquatic organisms specially local fishes (CABI, 2015). | Very high |
| 12 | 3.04 | In the taxon's introduced range, are there known adverse impacts to ecosystem services? | Yes | Based on the findings of the study, the taxon in the Agusan Marsh are considered threat to freshwater biodiversity (Hubilla et al., 2006). Also, there are records that this taxon caused scarcity of nutrient resources, alter food webs, increase turbidity and cause bank erosion due to their nest building activity, and physically inhibit other aquatic organisms specially local fishes (CABI, 2015). | Very high |

| | 3.05 | In the taxon's introduced range, are there known adverse socio-economic impacts? | Yes | Based on the findings of the study, the taxon in the Agusan Marsh are considered threat to freshwater biodiversity (Hubilla et al., 2006). Also, there are records that this taxon caused scarcity of nutrient resources, alter food webs, increase turbidity and cause bank erosion due to their nest building activity, and physically inhibit other aquatic organisms specially local fishes (CABI, 2015). | Very high |
|-----|---------|--|-----|--|------------------------|
| | | //Ecology able (or persistence) traits | _ | | _ |
| | | Is it likely that the taxon will be poisonous or | Yes | Bioaccumulation of coliform bacteria and heavy metals, as well as | Very high |
| | | pose other risks to human health? | | vector of parasites, has been recorded on these species. In which if eaten will lead to potential contamination and infection (Orfinger & Goodding, 2018). | (c.,)g. |
| 15 | 4.02 | Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? | Yes | This taxon shows impacts on displacement of local species through resource competition such as indirect food competition which reduces the food resources like aquatic insects and vegetation and direct habitat competition because of high biomass of their populations (Orfinger & Goodding, 2018). | High |
| 16 | 4.03 | Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? | No | This is very unlikely to happen considering the feeding guild and morphology of the taxon (Hubilla et al., 2007; Levin et al., 2008). | 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 | These fish are protected by modified scales and by strong spines on the fins and because they show a high tolerance to low oxygen concentrations or desiccation (up to 20 hours). The latter ability can be attributed to an enlarged and vascularized stomach, which functions as an accessory respiratory organ (Jasso et al., 2013). Also, they are commonly found in shallow freshwater environments, but some members of the Family Loricariidae: Pterygoplichthys which are considered to be strictly freshwater, have already established invasive populations in inland waters with mesohaline conditions, such as in North and Central America, Asia, Caribbean islands, Pacific and Indian oceans and in South- Eastern Mexico due to their high salinity tolerance (Canns et al. | 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 | Their burrowing behavior in river banks may contribute to water turbidity and soil erosion. High water turbidity alters the amount of light that can pass down through the water column, and thus, slows down photosynthesis and primary productivity. (Hubilla et | Very high |
| 19 | 4.06 | Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? | Yes | There are records that this taxon caused scarcity of nutrient resources, alter food webs, increase turbidity and cause bank erosion due to their nest building activity, and physically inhibit other aquatic organisms specially local fishes (CABI, 2015). | 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 area? | No | There are no reports that the taxon may carry pests or infectious agents that are endemic in Lake Taal (Nitta and Nagasawa, 2013; Nitta and Nagasawa, 2016; Rodríguez-Santiago et al., 2016; Cardoso et al., 2017). | Very high |
| | 4.08 | Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area? Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity? | Yes | There are reports that the taxon can be a host for several parasites which are not yet recorded in Lake Taal (Nitta and Nagasawa, 2013; Nitta and Nagasawa, 2016; Rodríguez-Santiago et al., 2016; Cardoso et al., 2017). The size range for most of the adult species in the Loricariid family is 30– 50 cm, but individuals have been observed to reach 70 cm (IUCN, 2010). While the max published weight: 310.00 g (Jumawan and Seronay, 2017). Accidental release of Pterygoplichthys spp. has been documented, such as when typhoon Rosing struck the Philippines resulting in escape of the fish from commercial farms. Also, they are very common aquarium fish around the world. Nearly all of their introduced populations are caused by pet release or aquaculture escape | Very high Very high |
| 23 | 4.10 | Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)? | Yes | The taxon was collected from medium-velocity rivers no more than two meters deep near the river banks (Chavez, et al., 2006) | 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 | The foraging activities of different-sized Pterygoplichthys had potentially strong negative effects on the number of catfish eggs and first-feeding fry. Therefore, these invasive alien fish pose a risk to the native aquatic resources [of Thailand] (Chaichana et al., 2013) Pterygoplichthys species are also generally herbivores, and large populations can significantly alter the energy budget of a water body by reducing the amount of energy available to other herbivores, such as aquatic insects and other arthropods (Kottelat et al 1993); Fuller 1998; Nico and Martin 2001). Reductions in the population of the arthropods will lead to reduced populations of other animals that feed on arthropods (Inger and Chin 2002; Page | 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 | Yes | The taxon can maintain viable population under low density condition which is reported in the Chacamax River, Chiapas, Mexico (Capps and Flecker, 2015) | Very high |
| 5 F | lesourc | by way of a dormant form)? | I | | I |
| | | Is the taxon likely to consume threatened or protected native taxa in the RA area? | Yes | This taxon feeds primarily on benthic algae, detritus, various plant matter, worms, insect larvae, fish eggs and other bottom-dwellers which do not fall under threatened or protected status in the RA area. (IUCN. 2010) | 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? crtion | Yes | Food competition by the said taxa, in which it reduces the food resources such as aquatic insects and vegetation in the area, can be detrimental to the native taxa (Orfinger & Goodding, 2018). | Very high |

| 28 | 6.01 | Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? | Yes | This species exhibits parental care through building nests, given that their found habitat lacks predator and exploitation (Jasso et al., 2013). | Very high |
|----|------|--|----------------|---|------------------------|
| 29 | 6.02 | Is the taxon likely to produce viable gametes or propagules (in the RA area)? | Yes | Due to their parental care ability this taxon can likely produce viable gametes in the RA area (Jasso et al., 2013; CABI, 2015) | Very high |
| 30 | 6.03 | Is the taxon likely to hybridise naturally with native taxa? | No | There is no native taxa present in the RA area where the taxon can hybridise (Papa and Mamaril, 2011). | Very high |
| 31 | 6.04 | Is the taxon likely to be hermaphroditic or to display asexual reproduction? The taxon mates throu deposits eggs on smoo river bank. The eggs a the eggs are guarded t most successful breedi or mud banks. The fish | | The taxon mates through external fertilization, where the female deposits eggs on smooth rocks, depressions or burrows in the river bank. The eggs are then fertilized by the male. Afterwards, the eggs are guarded by one or both parents. In captivity, the most successful breedings have occurred in ponds with steep clay or mud banks. The fish dig tunnels close to the water level and the males guard the eqgs until they hatch. (Jumawan et al. 2014) | 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 does not depend on other taxa and or other means to complete lifecycle (Power, 2003). | 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 | The taxon spawn multiple times throughout the spawning season which happens from March to September. Also, they exhibit extended spawning season which extends for more than 5 months during the warm rainy season (CABI, 2015) | Very high |
| 34 | 6.07 | How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? | 2 | This taxon reaches sexual maturity at the age of 2 (Gibbs et al., 2017) | Very high |
| | | al mechanisms | | | |
| 36 | 7.01 | 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)? | One Yes | The taxon can enter the RA through natural dispersal and its succes is increased because of its environmental tolerances. Also, it can be dispersed intentionally because of its abundant ornamental use and unintentionally through aquarium escape during natural calamities like flooding which the RA area is prone (Brändlin & Winqard 2013; CABI, 2015) The taxon can enter the RA through natural dispersal and its success is increased because of its environmental tolerances. Also, it can be dispersed intentionally because of its abundant ornamental use and unintentionally through aquarium escape during natural calamities like flooding which the RA area is prone (Brändlin & Winqard 2013; CABI, 2015) | Very high Very high |
| 37 | 7.03 | Does the taxon have a means of actively | Yes | The modified mouth allows the taxon to feed, breathe, and attach | Very high |
| 20 | 7.04 | attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? | Vec | to the substrate through suction (CABI,2015). | Vanyhich |
| 20 | 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 the case of an invasive species such as P. pardalis, accidental release of eggs and juveniles may result in assured higher survival rates in the wild (Jumawan et al., 2014). | 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? | Not applicable | There are no recorded evidence that larvae/fragments/seedlings enter, or are taken by, water currents. | Very high |
| 40 | 7.06 | Are older life stages of the taxon likely to migrate in the RA area for reproduction? | No | This taxon are generally nocturnal and non-migratory (CABI, 2015) | High |
| 41 | 7.07 | Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? | No | Because this taxon exhibits parental care through building nests, given that their found habitat lacks predator and exploitation (Jasso et al., 2013). | Very high |
| | 7.08 | Is dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (35-41; i.e. either unintentional or intentional) likely to be | Yes | This taxon can quickly migrate to reach new bodies of water, this is enabled by their ability to hold into solid substrates using their sucker mouth, beating of pelvic fins, and hooking and bracing using their studded spines of the pectoral fins (CABI, 2015) | Very high |
| 43 | 7.09 | Is dispersal of the taxon density dependent? | Not applicable | There are no documented evidence of the organism spreading out or dispersing when its population density increases. | Very high |
| | | 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? | Yes | Members of this taxon also have the ability to breathe air and are able to survive up to 30 h out of water (Val and De Almeida-Val, 1995). Pterygoplichthys and many other loricariids are facultative air-breathers, able to persist indefinitely in hypoxic conditions and even able to survive out of water for many hours (Graham, 1997) | Very high |
| | 8.02 | Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being | Yes | Taxon can tolerate water pollution, low oxygen levels, and elevated salinity (Capps et al., 2011; Özgür et al., 2016) | Very high |
| 46 | 8.03 | Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? | Yes | A successful eradication through human intervention was done in the Rainbow River, Florida USA (Hill and Sowards, 2015). Also, a preliminary study of the potential eradication of P. pardalis by three native Thai piscivorous species yielded interesting results. Demersal species such as H. wyckioides and O. marmorata could more effectively eliminate P. pardalis than other native species such as P. sanitwongsei. In particular, H. wyckioides was the most effective consumer of P. pardalis, as it could efficiently ingest individuals up to 10 cm in length. Pterygoplichthys pardalis longer than 10 cm can stretch out their body fins, preventing H. wyckioides from feeding on them. The potential of native fish to heln control certain invasive fish species was also addressed by | Very high |

| 47 | 8.04 | Is the taxon likely to tolerate or benefit from environmental/human disturbance? | Yes | Taxon is tolerant of (and likely to benefit from) eutrophication and other forms of aquatic disturbance, as evidenced by their occurrence in nutrient-rich Lake Thonotosassa and Lake Maggiore, Florida and Nong Yai Canal, East Thailand (Hoover et al., 2004; Chaiteran et al., 2011) | Very high |
|------|--------|---|----------|---|-----------|
| 48 | 8.05 | Is the taxon able to tolerate salinity levels that are higher or lower than those found in | Yes | Chaichana et al., 2011). Taxon can tolerate elevated salinity (Capps et al., 2011). | Very high |
| 49 | 8.06 | its usual environment? Are there effective natural enemies (predators) of the taxon present in the RA area? | No | Based on the list of fish species present in lake Taal (Papa and Mamaril, 2011), there is none that could possibly prey on the taxon being assessed. | Very high |
| С. (| Climat | e change | | | |
| | | change | | | |
| 50 | 9.01 | Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? | Increase | Lake Taal is close but completely isolated from Laguna de Bay and other rivers in Luzon Island where Pterygoplichthys spp. were recorded and thus may only require accidental and/or intentional vectors of introduction, together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) the risk of entry through accidental release from aquarium would most likely increase the risk of entry of this | 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 | As a fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) the risk of dispersal through accidental release from aquarium together with their fitness to counter act environmental disturbances, this would most likely increase the risk of establishment of this taxon. | Very high |
| 52 | 9.03 | Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? | Increase | As a fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) the risk of dispersal through accidental release from aquarium together with their fitness to counter act environmental disturbances, this would most likely increase the dispersal of this taxon. | Very high |
| 53 | 9.04 | Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? | Higher | Since they can survive the future climatic conditions of the RA area, this taxon can cause increased scarcity of nutrient resources, alter food webs, increase turbidity and cause bank erosion due to their nest building activity which alters the amount of light that can pass down through the water column, and thus, slows down photosynthesis and primary productivity which physically inhibit other aquatic organisms specially the local fishes | Very high |
| 54 | 9.05 | Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? | Higher | Since they can survive the future climatic conditions of the RA area, this taxon can cause increased scarcity of nutrient resources, alter food webs, increase turbidity and cause bank erosion due to their nest building activity which alters the amount of light that can pass down through the water column, and thus, slows down photosynthesis and primary productivity which physically inhibit other aquatic organisms specially the local fishes | 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 | As this taxon can survive the future climatic conditions of the RA area and can establish viable population on it, it can pose a huge impact on the ecosystem services and socio-economic factors of the RA area by competing on the existence of the local species which would eventually replace their existence in the RA area, thus affecting the livelihood services and the genetic diversity of the ecosystem in the area. | Very high |

| Challetting | |
|--|--------------|
| Statistics | |
| Scores BRA | 54.0 |
| BRA Outcome | 54.0 High |
| BRA+CCA | 66.0 |
| BRA+CCA BRA+CCA Outcome | High |
| Score partition | nign |
| A. Biogeography/Historical | 26.0 |
| 1. Domestication/Cultivation | 4.0 |
| 2. Climate, distribution and introduction risk | 4.0 |
| 3. Invasive elsewhere | 18.0 |
| B. Biology/Ecology | 28.0 |
| 4. Undesirable (or persistence) traits | 10.0 |
| 5. Resource exploitation | 7.0 |
| 6. Reproduction | 2.0 |
| 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 |
| 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 | 22 | |
| Environmental | 17 | |
| Species or population nuisance traits | 33 | |
| | | |
| Thresholds | | |
| BRA | 34.5 | |
| BRA+CCA | 34.5 | |
| Confidence | | |
| BRA+CCA | 0.99 | |
| BRA | 0.99 | |
| CCA | 0.96 | |
| | | |
| Date and Time | | |
| 06/04/2020 13:09:14 | | |

| Faxon and Assessor details | | | | | |
|---|--|--|--|--|--|
| Category | Fishes and Lampreys (freshwater) | | | | |
| Taxon name | Pterygoplichthys multiradiatus | | | | |
| Common name | Orinoco sailfin catfish | | | | |
| Assessor | Gilles, Pavia | | | | |
| Risk screening context | | | | | |
| Reason and socio-economic benefits | Ornamental Industry | | | | |
| Risk assessment area | Lake Taal | | | | |
| Taxonomy | Order - Siluriformes Family - Loricariidae | | | | |
| Native range | South America | | | | |
| Introduced range | Philippines | | | | |
| URL https://www.fishbase.se/summary/Pterygoplichthys-multiradiatus.html | | | | | |

Response Justification (references and/or other information)

Confidence

| A. I | Biogeo | graphy/Historical | Response | Justification (references and/or other information) | Confidence |
|------|--------|---|----------|--|------------|
| 1. L | | ication/Cultivation | | | |
| 1 | 1.01 | Has the taxon been the subject of domestication (or cultivation) for at least 20 generations? | Yes | The taxon was introduced in 1970-1979 as an ornamental species (Cagauna, 2007) | High |
| 2 | | Is the taxon harvested in the wild and likely to be sold or used in its live form? | Yes | The taxon is the major component of fish catch in the Philippine waters but the fish has very little value as food fish since the flesh tastes bitter. It may be used, however, as a source of fish meal and for ornamental industry (Cagauan, 2007). | High |
| 3 | 1.03 | Does the taxon have invasive races, varieties, sub-taxa or congeners? | Yes | Pterygoplichthys already has the invasive history, since species P. multiradiatus, P. pardalis and P. disjunctivus have been so far recorded as exotic in Mesoamerica – Puerto Rico and Mexico (8, 12); in North America: southern United States – Florida, Texas, Washington and North Carolina, as well as at Hawaii islands (10, 11, 19, 18, 20); in Philippines and south-eastern Asia: peninsular Malaysia, Singapore, Taiwan, Java and Sumatra (22). In all those recipient areas recorded so far, the aquarists were assigned responsible for their releasing into natural ecosystems and Subsequent establishment (Simonović, Nikolić, and Gruiić, 2014). | High |
| | | distribution and introduction risk | I | | |
| 4 | 2.01 | How similar are the climatic conditions of the Risk Assessment (RA) area and the taxon's native range? | High | The taxon's native range (Amazon) falls under the same climatic conditions in the Philippines which is a tropical climate (Peel et al., 2007) | High |
| 5 | 2.02 | What is the quality of the climate matching data? | High | The taxon's native range (Amazon) falls under the same climatic conditions in the Philippines which is a tropical climate (Peel et al., 2007) | High |
| 6 | 2.03 | Is the taxon already present outside of captivity in the RA area? | Yes | The taxon was found and collected from five sites in and around the Laguna de Bay basin: Marikina River in Marikina and Pasig Cities; Pasig River in the City of Manila; Catmon Creek in Bay, Laguna; Banilad Creek in Siniloan, Laguna; and Laguna de Bay in San Pedro, Laguna (Chavez et al., 2006) | High |
| 7 | 2.04 | How many potential vectors could the taxon use to enter in the RA area? | >1 | They were probably introduced through an intentional release and possibly fish farm escapes upstream (near Davao) between the 2002 and 2005 (Hubilla et al, 2007). Moreover, local aquarium dealers have used its local moniker that a janitor fish cleans up - as a selling point, wherein anecdotal reports say that the misconception might have also be a reason for the high incidence of these specimens particularly in the Marikina and Pasig rivers | 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 can currently be found in close proximity to the RA area due to either flooding due to weather conditions, or ornamental trade. | Medium |
| | 1 | elsewhere | 1 | | |
| 9 | | Has the taxon become naturalised (established viable populations) outside its native range? | Yes | Besides in the Philippines, P. disjunctivus and P. pardalis are also seen in Singapore waterways, with the former also found in Taiwan and the latter found as well in the canals and sewer system of Indonesia and the Red River of Northern Vietnam (Levin et al., 2008). In addition, "they have established populations and displaced indigenous fish and invertebrate communities" in Mexico. Puerto Rico and the United States (Soriano & Vallejo. Tr. | High |
| 10 | | In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? | Yes | The rapid increase of this species (Pterygloplchthys) has affected the livelihood and fishing operation of the fisherfolk which led to a decrease in marketable catch of endemic and commercial fish species due to its predominance in gill net and fish corral catch. (Chaves et al., 2006) | High |
| 11 | | In the taxon's introduced range, are there known adverse impacts to aquaculture? | Yes | Based on the findings of the study, the taxon in the Agusan Marsh are considered threat to freshwater biodiversity. (Hubilla et al., | |
| | | In the taxon's introduced range, are there known adverse impacts to ecosystem | Yes | Their burrowing behavior in river banks may contribute to water turbidity and soil erosion (Hubilla et al., 2006) | High |
| | | In the taxon's introduced range, are there known adverse socio-economic impacts? | Yes | Their burrowing behavior in river banks may contribute to water turbidity and soil erosion (Hubilla et al., 2006) | High |
| | | r/Ecology able (or persistence) traits | | | |
| | | Is it likely that the taxon will be poisonous or pose other risks to human health? | Yes | Bioaccumulation of coliform bacteria and heavy metals, as well as vector of parasites, has been recorded on these species. In which if eaten will lead to potential contamination and infection | High |
| I | I | | I | (Orfinger & Goodding, 2018). | 1 |

| | | | I | | |
|----|-----------------------|--|-----|--|---------|
| 15 | 4.02 | Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? | Yes | This species shows impacts on displacement of local species through resource competition such as indirect food competition which reduces the food resources like aquatic insects and | High |
| | | | | vegetation and direct habitat competition because of high biomass of their populations (Orfinger & Goodding, 2018). | |
| 16 | 4.03 | Are there any threatened or protected taxa | No | This is very unlikely to happen considering the feeding guild and | High |
| | | that the non-native taxon would parasitise in the RA area? | | morphology of the taxon (Hubilla et al., 2007; Levin et al., 2008). | |
| 17 | 4.04 | Is the taxon adaptable in terms of climatic | Yes | These fish are protected by modified scales and by strong spines | High |
| | | and other environmental conditions, thus enhancing its potential persistence if it has | | on the fins and because they show a high tolerance to low oxygen concentrations or desiccation (up to 20 hours). The latter ability | |
| | | invaded or could invade the RA area? | | can be attributed to an enlarged and vascularized stomach, which | |
| | | | | functions as an accessory respiratory organ (Jasso et al., 2013). | |
| | | | | Also, they are commonly found in shallow freshwater | |
| | | | | environments, but some members of the Family Loricariidae: | |
| | | | | Pterygoplichthys which are considered to be strictly freshwater, have already established invasive populations in inland waters | |
| | | | | with mesohaline conditions, such as in North and Central America, | |
| | | | | Asia, Caribbean islands, Pacific and Indian oceans and in South- | |
| 18 | 4.05 | Is the taxon likely to disrupt food-web | Yes | Eastern Mexico due to their high salinity tolerance (Capps et al. Their burrowing behavior in river banks may contribute to water | High |
| 10 | 1.05 | structure/function in aquatic ecosystems if it | 105 | turbidity and soil erosion. High water turbidity alters the amount | ingi |
| | | has invaded or is likely to invade the RA | | of light that can pass down through the water column, and thus, | |
| 10 | 4.06 | area? | Yes | slows down photosynthesis ad primary productivity. (Hubilla et | High |
| 19 | +.00 | Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? | 105 | Their burrowing behavior in river banks may contribute to water turbidity and soil erosion (Hubilla et al., 2006) | High |
| 20 | 4.07 | Is it likely that the taxon will host, and/or | No | There are no reports that the taxon may carry pests or infectious | High |
| | | act as a vector for, recognised pests and | | agents that are endemic in Lake Taal (Nitta and Nagasawa, 2013; | |
| | | infectious agents that are endemic in the RA area? | | Nitta and Nagasawa, 2016; Rodríguez-Santiago et al., 2016; Cardoso et al., 2017). | |
| 21 | 4.08 | Is it likely that the taxon will host, and/or | Yes | There are reports that the taxon can be a host for several | High |
| | | act as a vector for, recognised pests and | | parasites which are not yet recorded in Lake Taal (Nitta and | |
| | | infectious agents that are absent from (novel to) the RA area? | | Nagasawa, 2013; Nitta and Nagasawa, 2016; Rodríguez-Santiago et al., 2016; Cardoso et al., 2017) | |
| 22 | 4.09 | Is it likely that the taxon will achieve a body | Yes | "The size range for most of the adult species in the Loricariid | High |
| | | size that will make it more likely to be | | family is 30–50 cm, but individuals have been observed to reach | |
| | | released from captivity? | | 70 cm (IUCN, 2010). While the max published weight: 310.00 g | |
| | | | | (Jumawan and Seronay, 2017). Accidental release of Pterygoplichthys spp. has been documented, such as when | |
| | | | | typhoon Rosing struck the Philippines resulting in escape of the | |
| | | | | fish from commercial farms. Also, they are very common | |
| | | | | aquarium fish around the world. Nearly all of their introduced populations are caused by pet release or aquaculture escape | |
| 23 | 4.10 | Is the taxon capable of sustaining itself in a | Yes | The taxon was collected from medium-velocity rivers no more | High |
| | | range of water velocity conditions (e.g. | | than two meters deep near the river banks (Chavez, et al., 2006) | |
| 24 | 4.11 | versatile in habitat use)? Is it likely that the taxon's mode of existence | Yes | The foraging activities of different-sized Pterygoplichthys had | High |
| | | (e.g. excretion of by-products) or behaviours | | potentially strong negative effects on the number of catfish eggs | |
| | | (e.g. feeding) will reduce habitat quality for | | and first-feeding fry. Therefore, these invasive alien fish pose a | |
| | | native taxa? | | risk to the native aquatic resources [of Thailand] (Chaichana et al., 2012) Pterygoplichthys species are also generally herbivores, | |
| | | | | and large populations can significantly alter the energy budget of | |
| | | | | a water body by reducing the amount of energy available to other | |
| | | | | herbivores, such as aquatic insects and other arthropods (Kottelat | |
| | | | | et al 1993); Fuller et al 1999; Nico and Martin 2001). Reductions in the population of the arthropods will lead to reduced | |
| | | | | populations of other animals that feed on arthropods (Inger and | |
| 25 | 4.12 | Is the taxon likely to maintain a viable | Yes | The taxon can maintain viable population under low density condition which is reported in the Chacamax River, Chiapas, | High |
| | | population even when present in low densities (or persisting in adverse conditions | | Mexico (Capps and Flecker, 2015) | |
| _ | | by way of a dormant form)? | | | |
| | | e exploitation Is the taxon likely to consume threatened or | No | This taxon feeds primarily on benthic algae, detritus, various plant | High |
| 20 | 5.01 | protected native taxa in the RA area? | | matter, worms, insect larvae, fish eggs and other bottom-dwellers | |
| | | | | which do not fall under threatened or protected status in the RA | |
| 27 | 5.02 | Is the taxon likely to sequester food | Yes | area. (IUCN, 2010) Food competition by the said taxa, in which it reduces the food | High |
| 21 | 5.02 | resources (including nutrients) to the | 100 | resources such as aquatic insects and vegetation in the area, can | i iigii |
| _ | | detriment of native taxa in the RA area? | | be detrimental to the native taxa (Orfinger & Goodding, 2018). | |
| | <u>ергоди</u> 6.01 | <i>uction</i> Is the taxon likely to exhibit parental care | Yes | This species exhibits parental care through building nests, given | High |
| 20 | 0.01 | and/or to reduce age-at-maturity in response | 100 | that their found habitat lacks predator and exploitation (Jasso et | i iigii |
| | | to environmental conditions? | | al., 2013). | |
| 29 | 6.02 | Is the taxon likely to produce viable gametes | No | There are no reports that the taxon is likely to produce viable | Medium |
| 30 | 6.03 | or propagules (in the RA area)? Is the taxon likely to hybridise naturally with | No | gametes or propagules (in the RA area). There is no native taxa present in the RA area where the genus | High |
| | | native taxa? | | Pterygoplichtys can hybridise (Papa and Mamaril, 2011). | |
| 31 | 6.04 | Is the taxon likely to be hermaphroditic or to | Yes | The taxon mates through external fertilization, where the female | High |
| | | display asexual reproduction? | | deposits eggs on smooth rocks, depressions or burrows in the river bank. The eggs are then fertilized by the male. Afterwards, | |
| | | | | the eggs are guarded by one or both parents. In captivity, the | |
| | | | | most successful breedings have occurred in ponds with steep clay | |
| | | | | or mud banks. The fish dig tunnels close to the water level and | |
| | I | 1 | | the males quard the eggs until they hatch. (Jumawan et al. 2014) | 1 |

| 32 | 6.05 | Is the taxon dependent on the presence of another taxon (or specific habitat features) | No | The taxon does not depend on other taxa and or other means to complete lifecycle (Power, 2003). | High |
|----|------|---|----------------|---|--------|
| 33 | 6.06 | to complete its life cycle? Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? | Yes | Catfish have a minimum of three to five spawning bouts every breeding season (Winemiller, 1989) | High |
| | 6.07 | How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? | Not applicable | There are no reports of time units that the taxon requires to reach the age-at-first-reproduction. | Low |
| | | 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 | The taxon can enter the RA through natural dispersal and its succes is increased because of its environmental tolerances. Also, it can be dispersed intentionally because of its abundant ornamental use and unintentionally through aquarium escape during natural calamities like flooding which the RA area is prone (Brändlin & Winqard 2013; CABI, 2015) | High |
| 36 | 7.02 | Will any of these vectors/pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)? | Yes | The taxon can enter the RA through natural dispersal and its success is increased because of its environmental tolerances. Also, it can be dispersed intentionally because of its abundant ornamental use and unintentionally through aquarium escape during natural calamities like flooding which the RA area is prone (Brändlin & Winqard 2013; CABI, 2015) | 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? | Yes | The modified mouth allows the taxon to feed, breathe, and attach to the substrate through suction (CABI,2015). | 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 | In the case of an invasive species such as P. pardalis, accidental release of eggs and juveniles may result in assured higher survival rates in the wild (Jumawan et al., 2014). | 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 | Book-paper/after hatching they disperse/after consuming the egg, the young swim away/disperse | Medium |
| | 7.06 | Are older life stages of the taxon likely to migrate in the RA area for reproduction? | No | There are no reports that the older life stages of the taxon are likely to migrate in the RA area for reproduction. | Medium |
| | 7.07 | Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? | No | There are no reports that the propagules or eggs of the taxon are likely to be dispersed in the RA area by other animals | 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. either unintentional or intentional) likely to be | Not applicable | There are no reports if the dispersal of the taxon along any of the pathways mentioned in the previous seven questions is likely to be rapid. | Low |
| | 7.09 | Is dispersal of the taxon density dependent? | Not applicable | There are no reports if the dispersal of the taxon density is | Low |
| | | 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? | Yes | Members of this taxon also have the ability to breathe air and are able to survive up to 30 h out of water (Val and De Almeida-Val, 1995). Pterygoplichthys and many other loricariids are facultative air-breathers, able to persist indefinitely in hypoxic conditions and even able to survive out of water for many hours (Graham, 1997) Taxon are taken to water any uncon logical and | 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 | Yes | Taxon can tolerate water pollution, low oxygen levels, and elevated salinity (Capps et al., 2011; Özgür et al., 2016) | High |
| 46 | 8.03 | Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? | Yes | A successful eradication through human intervention was done in the Rainbow River, Florida USA (Hill and Sowards, 2015). Also, a preliminary study of the potential eradication of P. pardalis by three native Thai piscivorous species yielded interesting results. Demersal species such as H. wyckioides and O. marmorata could more effectively eliminate P. pardalis than other native species such as P. sanitwongsei. In particular, H. wyckioides was the most effective consumer of P. pardalis, as it could efficiently ingest individuals up to 10 cm in length. Pterygoplichthys pardalis longer than 10 cm can stretch out their body fins, preventing H. wyckioides from feeding on them. The potential of native fish to help control certain invasive fish species was also addressed by | High |
| 47 | 8.04 | Is the taxon likely to tolerate or benefit from environmental/human disturbance? | Yes | Taxon is tolerant of (and likely to benefit from) eutrophication and other forms of aquatic disturbance, as evidenced by their occurrence in nutrient-rich Lake Thonotosassa and Lake Maggiore, Florida and Nong Yai Canal, East Thailand (Hoover et al., 2004; Chaichana et al., 2011). | High |
| 48 | 8.05 | Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual equipment? | Yes | Taxon can tolerate elevated salinity (Capps et al., 2011). | High |
| 49 | 8.06 | its usual environment? Are there effective natural enemies (predators) of the taxon present in the RA area? | No | Based on the list of fish species present in lake Taal (Papa and Mamaril, 2011), there is none that could possibly prey on the taxon being assessed. | High |
| | | e change | | | |
| | | change | T | | |
| 50 | 9.01 | Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? | Increase | Lake Taal is close but completely isolated from Laguna de Bay and other rivers in Luzon Island where Pterygoplichthys spp. were recorded and thus may only require accidental and/or intentional vectors of introduction, together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) the risk of entry through accidental release from aquarium would most likely increase the risk of entry of this | High |

| 51 | 9.02 | Under the predicted future climatic | Increase | As a fact that the RA area is prone to natural calamities such as | High |
|----|------|---|----------|---|--------|
| | | conditions, are the risks of establishment | | typhoons and floods (Brändlin & Wingard, 2013) the risk of | |
| | | posed by the taxon likely to increase, | | dispersal through accidental release from aquarium together with | |
| | | decrease or not change? | | their fitness to counter act environmental disturbances, this would | |
| | | | | most likely increase the risk of establishment of this taxon. | |
| 52 | 9.03 | Under the predicted future climatic | Increase | As a fact that the RA area is prone to natural calamities such as | High |
| | | conditions, are the risks of dispersal within | | typhoons and floods (Brändlin & Wingard, 2013) the risk of | |
| | | the RA area posed by the taxon likely to | | dispersal through accidental release from aquarium together with | |
| | | increase, decrease or not change? | | their fitness to counter act environmental disturbances, this would | |
| | | | | most likely increase the dispersal of this taxon. | |
| 53 | 9.04 | Under the predicted future climatic | Higher | Since they can survive the future climatic conditions of the RA | High |
| | | conditions, what is the likely magnitude of | | area, this taxon can cause increased scarcity of nutrient | |
| | | future potential impacts on biodiversity | | resources, alter food webs, increase turbidity and cause bank | |
| | | and/or ecological integrity/status? | | erosion due to their nest building activity which alters the amount | |
| | | | | of light that can pass down through the water column, and thus, | |
| | | | | slows down photosynthesis and primary productivity which | |
| | | | | physically inhibit other aquatic organisms specially the local fishes | |
| 54 | 9.05 | Under the predicted future climatic | Higher | Since they can survive the future climatic conditions of the RA | High |
| | | conditions, what is the likely magnitude of | | area, this taxon can cause increased scarcity of nutrient | |
| | | future potential impacts on ecosystem | | resources, alter food webs, increase turbidity and cause bank | |
| | | structure and/or function? | | erosion due to their nest building activity which alters the amount | |
| | | | | of light that can pass down through the water column, and thus, | |
| | | | | slows down photosynthesis and primary productivity which | |
| | | | | physically inhibit other aquatic organisms specially the local fishes | |
| 55 | 9.06 | Under the predicted future climatic | Higher | As this taxon can survive the future climatic conditions of the RA | Medium |
| | 1 | conditions, what is the likely magnitude of | | area and can establish viable population on it, it can pose a huge | |
| | 1 | future potential impacts on ecosystem | | impact on the ecosystem services and socio-economic factors of | |
| | | services/socio-economic factors? | | the RA area by competing on the existence of the local species | |
| | | | | which would eventually replace their existence in the RA area, | |
| | | | | thus affecting the livelihood services and the genetic diversity of | |
| | | | | the ecosystem in the area. | |

| Statistics | |
|--|----------|
| Scores | |
| BRA | 49.0 |
| BRA Outcome | High |
| BRA+CCA | 61.0 |
| BRA+CCA Outcome | High |
| Score partition | |
| A. Biogeography/Historical | 26.0 |
| 1. Domestication/Cultivation | 4.0 |
| 2. Climate, distribution and introduction risk | 4.0 |
| 3. Invasive elsewhere | 18.0 |
| B. Biology/Ecology | 23.0 |
| 4. Undesirable (or persistence) traits | 10.0 |
| 5. Resource exploitation | 2.0 |
| 6. Reproduction | 3.0 |
| 7. Dispersal mechanisms | 1.0 |
| 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 |
| 2. Climate, distribution and introduction risk | <u>5</u> |
| 3. Invasive elsewhere B. Biology/Ecology | 36 |
| | 12 |
| 4. Undesirable (or persistence) traits 5. Resource exploitation | |
| 6. Reproduction | 2 |
| 7. Dispersal mechanisms | 9 |
| 8. Tolerance attributes | 6 |
| C. Climate change | 6 |
| 9. Climate change | 6 |
| Sectors affected | 0 |
| Commercial | 22 |
| Environmental | 12 |
| Species or population nuisance traits | 33 |
| | |
| Thresholds | |
| BRA | 34.5 |
| BRA+CCA | 34.5 |
| Confidence | - 110 |
| BRA+CCA | 0.70 |

| Confidence | | |
|---------------|----------|-------------|
| | BRA+CCA | 0.70 |
| | BRA | 0.69 |
| | CCA | 0.71 |
| | | |
| Date and Time | | |
| | 24/02/20 | 19 20:28:49 |
| | | |

| Taxon and Assessor details | |
|------------------------------------|---|
| Category | Fishes and Lampreys (freshwater) |
| Taxon name | Puntigrus tetrazona |
| Common name | Sumatra barb |
| Assessor | Gilles, Pavia |
| Risk screening context | |
| Reason and socio-economic benefits | Ornamental |
| Risk assessment area | Lake Taal |
| Taxonomy | Actinopteri (ray-finned fishes) > Cypriniformes (Carps) > Cyprinidae (Minnows or carps) > |
| Native range | Asia: Sumatra and Borneo. |
| Introduced range | Introduced widely and has been reared in several countries in facilities for breeding aquarium fishes |
| URL | https://www.fishbase.se/summary/Puntigrus-tetrazona.html |

| A. Blogescapty/Hitchick A. Blogescapty/Hitchick I. 10.1 Has the taxon here in the subject of domescaption/converting of cultivation) for at least 20 to be sold or used in its be form? Yes file:///C/User/Use/Desktop/Thesis%20Ref/Feltchea2016.pdf high 2. 10.2 Is the taxon have imvasive races, body and used in its be form? Yes file:///C/User/Use/Desktop/Thesis%20Ref/Feltchea2016.pdf Hedium 4. 20.1 How similar are the clinatic conditions of the Risk Assessment (RA) area and the taxon? Hedium file:///C/User/User/Desktop/Thesis%20Ref/Actis/2006.pdf High 6. 20.0 Is the taxon have invasive races, rative range? Yes https://www.fishbase.ddp/introductions/Introduction/Introductions/Introduction/Introductions | | | | Response | Justification (references and/or other information) | Confidence |
|---|------|---------|---|----------------|---|------------|
| 1 1.0.1 Has the taxon been the subject of demonstration for at least 30 models and the subject of demonstration for at least 30 models and the subject of demonstration for at least 30 models. His///C/Users/User/Desktop/Thesis%20Ref/Teletches%202016.pdf High 1 1.0.1 Has the taxon haves built on the wild and likely for subject of the taxon have invasive races. Yes His///C/Users/User/Desktop/Thesis%20Ref/Teletches%202016.pdf High 2. Correct & sub-bas or consolence? Yes His///C/Users/User/Desktop/Thesis%20Ref/Actitek2006.pdf High 2. Correct & sub-bas or consolence? Yes His///C/Users/User/Desktop/Thesis%20Ref/Actitek2006.pdf High 2. Correct & sub-bas or consolence present outside of captivity in the RA area? Yes Thits:///C/Users/User/Desktop/Thesis%20Ref/Actitek2006.pdf High 2. 2.0 Has the near future (c.e., unintertional addition of the sub-bas definitional additional additionadditional additional additionadditiona | A. I | Biogeo | graphy/Historical | - | | |
| Second | 1. C | omesti | ication/Cultivation | | | |
| Image: constraint of the second hard second in the wild and likely to be sold or used in its live form? Yes Its:///C/Users/User/Desktop/Thesis%20Ref/Teletchas%202016.pl Medium 2 103 Does the town harvesteed in the wild and likely of the town harvestee modes. Yes Its:///C/Users/User/Desktop/Thesis%20Ref/Kottek2006.pdf High 2 Constact distribution and introduction rate matching this Assessment (RA) area and the taxon's matching this Assessment (RA) area and the taxon's matching the distribution and users into a constant in the RA area? Yes Ite:///C/Users/User/Desktop/Thesis%20Ref/Kottek2006.pdf High 2 2.02 Mate the taxon lined present outside of constant into RA area? Yes Ite://C/Users/User/Desktop/Thesis%20Ref/Kottek2006.pdf High 2 2.02 Mate the day area? Yes Ite://C/Users/User/Desktop/Thesis%20Ref/Josh%20Ref/Jos% | 1 | 1.01 | Has the taxon been the subject of | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/eletchea2016.pdf | High |
| 2 1.02 Is the taxon have invasive naces, variable sub-taxon comparents Ivestige of a sub-tax or comparents Vestige Ivestige of a sub-tax or comparents Medium 3 1.03 Does the taxon have invasive naces, variable sub-taxon comparents Vestige Nttps://www.fishbase.de/summary/Puntigrus-tetrazona.html Medium 4 2.02 What the clinitic conditions of the mative range? Nttps://www.fishbase.de/introductions/introductins/introduction/introduction/in | | | | | | |
| It be be sold or used in its live form? df 1.03 Does that som have invester acces, version of the som have invester and the samo have invested of the same and have invested of the same and the samo have invested of the same and the samo have invested of the same and have and have invested of the same and have have and have have and have have have and have and have and have | | | | | | |
| 3 1.03 Does the taxon have invasive naces, varieties, sub-taxo ar congeners? Yes https://www.fishbase.de/summary/Puntigrus-tetrazona.html Medium 2.00045 2.00045 Sub-taxo ar congeners? High File://C/Users/User/Desktop/Thesis%20Ref/kottek2006.pdf High 3 2.00045 Sub-taxo ar congeners? Yes File:///C/Users/User/Desktop/Thesis%20Ref/kottek2006.pdf High 4 2.01 How many potential vectors could the taxon aready present outside of cp united the taxon area and access and a | 2 | 1.02 | | Yes | | Medium |
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| 2.Commex distribution and introduction insk 2.0.1 How imitiar are the climate conditions of the Risk Assessment (RA) area and the taxon's native range? High High High 2.0.2 What is the quality of the climate matching captive range? High High High 2.0.2 State stom already present outside of captively in the Aarea? Yes Thits:///C:/Usery/User/Desktop/Thesis%20Ref/Nottek2006.pdf High 2.0.2 A How many potential vectors could the taxon 11 Risk//C:/Usery/User/Desktop/Thesis%20Ref/Nottek2006.pdf High 2.0.3 Is the taxon already present outside of captively to, and likely to enter into, RA Rarea? Not applicable proximity to, and likely to enter into, RA Rarea? Not applicable naswer in Q6 was YES High 8 2.0.5 Is the taxon become naturalised (statabilised viable populations) outside its native range? Not applicable range Not applicable range Not applicable range Not applicable range Not applicable range High 1 3.0.2 In the taxon's introduction range, are there known adverse impacts to widi stock or rative range? Not applicable range Not applicable range High 3.0.2 In thexon's introducided range, are there known adverse impacts to widi | 3 | 1.03 | | Yes | https://www.fishbase.de/summary/Puntigrus-tetrazona.html | Medium |
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| acquivity in the RA area? 7668GenusName=Purtigrus8SpeciesName=tetrazona86c=1228Sto ckCode=4990 7 2.04 How many potential vectors could the taxon is used to test in the RA area? Not applicable 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 3U Has the taxon built to enter into the RA area in the near future (e.g. unintentional and intentional introductions)? Not applicable 3U Has the taxon built to enter into. Not applicable Not applicable 3U Has the taxon built to enter into. Not applicable Not applicable 3U Has the taxon built to enter into. Not applicable Not applicable Not applicable 10 3.02 In the taxon's introduced range, are there known adverse impacts to associations? No Nile:///C./Users/User/Desktop/Thesis%20Ref/Ning2015.pdf Medium 11 3.03 In the taxon's introduced range, are there known adverse impacts to associations? Yes Nile:///C./Users/User/Desktop/Thesis%20Ref/Ho%20Kim%202002. Medium 11 3.03 In the taxon's introduced range, are there known adverse impacts to associations or more adverse impacts to association andverse impact to prostecter transe | 6 | 2.03 | | Yes | https://www.fishbase.de/Introductions/IntroductionsList.php?ID=4 | High |
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| use to enter in the RA area? Q2016.pdf 2.05 Is te 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 naswer in Q6 was YES High 3. <i>Invasue estewhere</i> 1 1 Yes nttps://www.fishbase.de/IntroductionsList.php?ID=4 (established viable populations) outside its native range? High 3.0.2 In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? No file:///C./Users/User/Desktop/Thesis%20Ref/Ho%20Kim%202002. Medium 11 3.0.30 In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa? Yes file:///C./Users/User/Desktop/Thesis%20Ref/Ho%20Kim%202002. Medium 13 3.0.6 In the taxon's introduced range, are there known adverse impacts to eoxystem Yes file:///C./Users/User/Desktop/Thesis%20Ref/Ho%20Kim%202002. Medium 13 3.0.5 In the taxon's introduced range, are there known adverse impacts to eoxystem Yes file:///C./Users/User/Desktop/Thesis%20Ref/Ho%20Kim%202002. Medium 13 3.0.5 In the taxon's introduced range, are there known adverse impacts to eoxystem Yes file:///C./Users/User/Desktop/Thesis%20Ref/Ho%20Kim%202002. <t< td=""><td>7</td><td>2.04</td><td>How many potential vectors could the taxon</td><td>>1</td><td></td><td>Hiah</td></t<> | 7 | 2.04 | How many potential vectors could the taxon | >1 | | Hiah |
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| 9 3.01 Has the taxon become naturalised (testablished viable populations) outside its native range? Yes https://www.fishbase.de/introductions/Introductiontens/Introductions/Introductions/Introductions/Introductintens/In | | | and intentional introductions)? | | | |
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| another taxon (or specific habital features) =476563CenusName=PuntigrusASpeciesName=tetrazona8fc=1228 is does its taxon known (or likely) to produce a large number of propaguises or dfspring effectives of the specific state and the specific stat | another taxon (or specific habitat features) =47668GenusMame=PuntigrusSepeciesName=tetrazona&fc=122& StocK-Code=4990 36.06 Is the taxon known (or likely) to produce a large number of programs File:///C:/Users/User/Desktop/Thesis%20Ref/Harfloglu%202018.pd Hig ft: 37 6.07 How many time units (daws, motths, years) does the taxon nequire to reach the age-at- first-reproduction? 2 http://animal-world.com/encyclo/fresh/cyprinids/tigerbarb.php Me 7 7.01 How many protein tai internal vectors/pathways could the taxon use to dispersal mechanisms >1 file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf Hitp 37 7.03 Does the taxon near earce and the unitable taxon in close provinity to one or one protected areas (e.g. McZ, MPA, SSSI)? No https://www.fishbase.de/summary/Puntigrus-tetrazona.html Hitp 38 7.04 Is natural dispersal of the taxon likely to occur as larvae/juveniles (for naminals) or as fragments/seedings (for plants) in the RA area? No https://www.fishbase.de/summary/Puntigrus-tetrazona.html Hitp 39 7.05 Snotkard leages of the taxon likely to occur as larvae/juveniles (for animals) or as fragments/seedings (for plants) in the RA area? No https://www.fishbase.de/summary/Puntigrus-tetrazona.html Hitp 40 7.06 Are older life stages of the taxon lik | | , . | No | =4766&GenusName=Puntigrus&SpeciesName=tetrazona&fc=122& | High |
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| 46 6.07 How many time units (days, months, years) of dest texaon require to reach the age-at- first-reproduction? http://animal-world.com/encyclo/fresh/cyprinids/tigerbarb.php Medium 7.08 Memory time units (days, months, years) (rst-reproduction? >1 http://animal-world.com/encyclo/fresh/cyprinids/tigerbarb.php Medium 7.02 Will any of these vectors/pathways could be taxon use to disperse within the RA area (with suitable for 202 will any of these vectors/pathways could be taxon use to disperse within the RA area (with suitable for 202 will any of these vectors/pathways bring the protected areas (e.g., dwith substrate (e.g., ship attaching itseft to hard area and attaching itseft to hard acrea? No https://www.fishbase.de/summary/Puntigrus-tetrazona.html High 17 7.05 Area porteal reason interval attaching itseft to hard area by other animals? Yes https://www.fishbase.de/summary/Puntigrus-tetrazona.html High 17 Are | 34 6.07 How many time units (days, months, years) 2 http://animal-world.com/encyclo/fresh/cyprinids/tigerbarb.php Met 7 7.05 How many potential internal >1 file:///C./Users/User/Desktop/Thesis%20Ref/joshi.pdf Hiv 35 7.01 How many potential internal >1 file:///C./Users/User/Desktop/Thesis%20Ref/joshi.pdf Hig 36 7.02 Will any of these vectors/pathways could be taxon use to disperse within the RA area (with suitable Not applicable No data for this question Hig 37 7.03 Does the taxon have a means of actively No https://www.fishbase.de/summary/Puntigrus-tetrazona.html Hig 38 7.04 Is netural diopersial of the taxon likely to occur as eggs (for animals) or as propagules No https://www.fishbase.de/summary/Puntigrus-tetrazona.html Hig 39 7.03 Is netural diopersial of the taxon likely to occur as larvaef/tivenells (for animals) or as propagules of the taxon likely to occur as larvaef/tivenells (for animals) or as propagules or eggs of the taxon likely to occur as larvaef/tivenells (for animals) or as fragments/seedings (for plants) in the RA area? Yes https://www.fishbase.de/summary/Puntigrus-tetrazona.html Hig 14 7.04 Are older life stages of the taxon likely to occur as larvaef/tiven animinals? </td <td>i Is th large</td> <td>the taxon known (or likely) to produce a ge number of propagules or offspring</td> <td>Yes</td> <td></td> <td>High</td> | i Is th large | the taxon known (or likely) to produce a ge number of propagules or offspring | Yes | | High |
| 2. Dispersal mechanisms 7. D1 How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable >1 File:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf High 67.02 Will any of these vectors/pathways bring the more more retected areas (e.g. MCZ, MPA, SSSI)? Not applicable No data for this question High 77.03 Does the taxon have a means of actively more retected areas (e.g. MCZ, MPA, SSSI)? No https://www.fishbase.de/summary/Puntigrus-tetrazona.html High 87.04 Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules for panes) in the RA harea? No https://www.fishbase.de/summary/Puntigrus-tetrazona.html High 97 7.05 Is natural dispersal of the taxon likely to occur as larvad/jweniles (for animals) or as propagules or eggs of the taxon likely to migrate in the RA area for reproduction? No https://www.fishbase.de/summary/Puntigrus-tetrazona.html High 10 7.06 Are ofer life stages of the taxon likely to migrate in the RA area for reproduction? No https://www.fishbase.de/summary/Puntigrus-tetrazona.html High 11 7.07 Are propagules or eggs of the taxon likely to weater animals? No https://www.fishbase.de/summary/Puntigrus-tetrazona.html High | Z. Dispersal mechanisms Solution 35 7.01 How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable disperse disperse) File:///C:/Users/Users/Users/Desktop/Thesis%20Ref/joshi.pdf Hitg 36 7.02 Will any of these vectors/pathways bring the taxon in close provide dispersal (e.g. MCZ, MPA, SSSI)? Not applicable Not applicable Not applicable Not applicable 37 7.03 Does the taxon have a means of actively attacking itself to add substrata (e.g. ship hulls, pilings, buoys) such that it enhances this file. No https://www.fishbase.de/summary/Puntigrus-tetrazona.html Hitg 38 7.04 Is natural dispersal of the taxon likely to occur as larave/juveniles (for animals) or as propagules No https://www.fishbase.de/summary/Puntigrus-tetrazona.html Hitg 39 7.05 Is natural dispersal of the taxon likely to occur as larave/juveniles (for animals) or as fragments/seedling to for animals) or as fragments/seedling of the taxon likely to no https://www.fishbase.de/summary/Puntigrus-tetrazona.html Hitg 20 7.06 Are older life stages of the taxon likely to no https://www.fishbase.de/summary/Puntigrus-tetrazona.html Hitg | ' How does | w many time units (days, months, years) es the taxon require to reach the age-at- | 2 | http://animal-world.com/encyclo/fresh/cyprinids/tigerbarb.php | Medium |
| 57 7.01 How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable disperse within the RA area (with suitable received areas (e.g., MCZ, MPA, SSS1)? Not applicable Not applicable No data for this question High 17 7.02 Will may of these vectors/pathways controls (e.g., ship thulls, pilings, buoys) such that it enhances the likelihood of dispersal? No https://www.fishbase.de/summary/Puntigrus-tetrazona.html High 18 7.04 Is natural dispersal of the taxon likely to occur as larvae/juveniles (for paints) or as progaules (for plants; seeds, spores) in the RA area? No https://www.fishbase.de/summary/Puntigrus-tetrazona.html High 19 7.05 Is natural dispersal of the taxon likely to occur as larvae/juveniles (for paints) in the RA area? No https://www.fishbase.de/summary/Puntigrus-tetrazona.html High 17 7.05 Is natural dispersal of the taxon likely to mainals or as grag (for animals) or as progradues or grood the taxon likely to mainare in the RA area for reproduction? Yes https://www.fishbase.de/summary/Puntigrus-tetrazona.html High 12 7.06 Is dispersal of the taxon likely to mode on the revious gives the taxon along any of the vectors/pathways mentioned in the previous seven question (ST-41; i.e. either unintentional previous question (ST-41; i.e. either area for reproduction? High 13 7.09 | 35 7.01 How many potential internal vectors/pathways could the taxon use to disperse within the RA area (with suitable >1 file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf Hito within the RA area (with suitable 36 7.02 Will any of these vectors/pathways could the taxon use to disperse within the RA area (with suitable Not applicable No data for this question Hito 37 7.03 Does the taxon have a means of a citvely attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances No https://www.fishbase.de/summary/Puntigrus-tetrazona.html Hito with the response of the taxon likely to occur as ergags (for animals) or as propagules (for plants: seeds, sopres) in the RA area? No https://www.fishbase.de/summary/Puntigrus-tetrazona.html Hito with the response of the taxon likely to or as larvae/junvelies (for animals) or as fragments/seedlings (for plants) in the RA area? No https://www.fishbase.de/summary/Puntigrus-tetrazona.html Hito with the response of the taxon likely to migrate in the RA area for reproduction? No https://www.fishbase.de/summary/Puntigrus-tetrazona.html Hito with the response of the taxon along any of the vectors/pathways mentioned in the previous seven question (S-41; i.e. either unintentional or intentional) likely to be dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven question (S-41; i.e. either unintentional or intentional) likely to be dispersal of the taxon along any of the vectors/pathways meating of its life Yes https://www.fishbase.de/summary/ | | | | | |
| vectors/pathways could the taxon use to disperse within the RA area (with suitable No def 7.02 Will any of these vectors/pathways bring the protected areas (e.g. MCZ, MRA, SSSI)? No https://www.fishbase.de/summary/Puntigrus-tetrazona.html High 7 7.03 Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship phulks, plings, burys) such that it enhances the likelihood of dispersal? No https://www.fishbase.de/summary/Puntigrus-tetrazona.html High 8 7.04 Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules for plants: seeds, somes) in the RA area? Yes https://www.fishbase.de/summary/Puntigrus-tetrazona.html High 10 7.05 Is natural dispersal of the taxon likely to occur as larvae/juveniles (for animals) or as fragment/seedlings (for plants) in the RA area? No applicable No applicable No applicable 11 7.07 Are polar in the RA area for reproduction? migrate in the RA area for reproduction? No applicable No applicable No applicable No applicable Yes 12 7.06 Is objeersal of the taxon likely to unintentional or intertional) likely to be dispersal of the taxon along on or the wetors/pathways mentioned in the previous seven questions (35-41; i.e. either unintentional or interinional) kiely to be the taxon density dependent? </td <td>vectors/pathways could the taxon use to disperse within the RA area (with suitable protected areas (c.g., MCZ, MPA, SSS1)? Not applicable No data for this question Hig https://www.fishbase.de/summary/Puntigrus-tetrazona.html 37 7.02 Will any of these vectors/pathways bring the protected areas (c.g., MCZ, MPA, SSS1)? No https://www.fishbase.de/summary/Puntigrus-tetrazona.html Hig https://www.fishbase.de/summary/Puntigrus-tetrazona.html Me 40 7.05 Is dispersal of the taxon likely to migrate in the RA area by other animals? Yes https://www.fishbase.de/summa</td> <td></td> <td></td> <td>>1</td> <td>file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf</td> <td>High</td> | vectors/pathways could the taxon use to disperse within the RA area (with suitable protected areas (c.g., MCZ, MPA, SSS1)? Not applicable No data for this question Hig https://www.fishbase.de/summary/Puntigrus-tetrazona.html 37 7.02 Will any of these vectors/pathways bring the protected areas (c.g., MCZ, MPA, SSS1)? No https://www.fishbase.de/summary/Puntigrus-tetrazona.html Hig https://www.fishbase.de/summary/Puntigrus-tetrazona.html Me 40 7.05 Is dispersal of the taxon likely to migrate in the RA area by other animals? Yes https://www.fishbase.de/summa | | | >1 | file:///C:/Users/User/Desktop/Thesis%20Ref/joshi.pdf | High |
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| 7 7.0 Does the taxon have a means of actively hulls, pilings, buoys) such that it enhances the likelihood of dispersal? No https://www.fishbase.de/summary/Puntigrus-tetrazona.html High 8 7.04 Is natural dispersal of the taxon likely to occur as eggs (for animals) or as propagules (for plants: seeds, spores) in the RA area? No https://www.fishbase.de/summary/Puntigrus-tetrazona.html High 9 7.05 Is natural dispersal of the taxon likely to occur as larvace/juveniles (for animals) or as propagules (for plants): net RA area? Yes https://www.fishbase.de/summary/Puntigrus-tetrazona.html High 10 7.06 Are older life stages of the taxon likely to mode of the taxon ling of the taxon density dependent? Not applicable 12 7.07 Are propagules or eggs of the taxon likely to mode of the taxon density dependent? No https://www.fishbase.de/summary/Puntigrus-tetrazona.html Medium 13 | 37 7.0 Does the taxon have a means of actively hulls, pilings, buoys) such that it enhances the likelihood of dispersal? No https://www.fishbase.de/summary/Puntigrus-tetrazona.html Hig 38 7.04 Is natural dispersal of the taxon likely to occur as layrae/juveniles (for plants): seeds, spores) in the RA area? No https://www.fishbase.de/summary/Puntigrus-tetrazona.html Hig 39 7.05 Is natural dispersal of the taxon likely to occur as layrae/juveniles (for plants): seeds, spores) in the RA area? No https://www.fishbase.de/summary/Puntigrus-tetrazona.html Hig 40 7.06 Are older life stages of the taxon likely to mirate in the RA area for reproduction? Not applicable No data for this question Hig 41 7.07 Are propagules of the taxon along any of the vectors/pathways mentioned in the previous seven questions (53-41; i.e. either uninitely to be dispersal of the taxon along any of the vectors/pathways mentioned in the previous seven questions (53-41; i.e. either uninitely to be dispersal of the taxon along out of water for extended periods (e.g. minimum of exclose). Yes https://www.fishbase.de/summary/Puntigrus-tetrazona.html Me 43 7.09 Is the taxon along any of the vectors/pathways mentioned in the previous seven questions (53-41; i.e. either Yes https://www.fishbase.de/summary/Puntigrus-tetrazona.html Me 43 7.09 Is the t | Will | II any of these vectors/pathways bring the | Not applicable | No data for this question | High |
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| 8. Tolerance attributes Not applicable | 8. Tolerance attributes 1 <td></td> <td></td> <td>Vac</td> <td>https://www.fichhoco.do/cummon//Duntiania_tatuana_thtp:/</td> <td>Modium</td> | | | Vac | https://www.fichhoco.do/cummon//Duntiania_tatuana_thtp:/ | Modium |
| 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 https://www.fishbase.de/summary/Puntigrus-tetrazona.html 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 file:///C:/Users/User/Desktop/Thesis%20Ref/Xiong2015.pdf Medium 46 8.03 Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Not applicable No data for this question Medium 48 8.05 Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment? Not applicable No data for this question Medium 49 8.06 Are there effective natural enemies (predators) of the taxon present in the RA Yes file:///C:/Users/User/Desktop/Thesis%20Ref/Joshi%20et%20al%2 High C. Climate change State change State change Yes file:///C:/Users/User/Desktop/Thesis%20Ref/Joshi%20et%20al%2 High | 444 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? https://www.fishbase.de/summary/Puntigrus-tetrazona.html Me 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 file:///C:/Users/User/Desktop/Thesis%20Ref/Xiong2015.pdf Me 46 8.03 Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Not applicable No data for this question Me 47 8.04 Is the taxon able to tolerate or benefit from environmental/human disturbance? Yes file:///C:/Users/User/Desktop/Thesis%20Ref/Xiong2015.pdf Me 48 8.05 Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment? Not applicable No data for this question Me 49 8.06 Are there effective natural enemies (predators) of the taxon present in the RA Yes file:///C:/Users/User/Desktop/Thesis%20Ref/Joshi%20et%20al%2 Hig | | | 165 | nups://www.fishbase.de/summary/Puntigrus-tetrazona.html | Ineaium |
| 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 file:///C:/Users/User/Desktop/Thesis%20Ref/Xiong2015.pdf Medium 8 8.03 Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Not applicable No data for this question Medium 8 8.04 Is the taxon able to tolerate or benefit from environmental/human disturbance? Yes file:///C:/Users/User/Desktop/Thesis%20Ref/Xiong2015.pdf Medium 8 8.05 Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment? Not applicable No data for this question Medium 9 8.06 Are there effective natural enemies (predators) of the taxon present in the RA Yes file:///C:/Users/User/Desktop/Thesis%20Ref/Joshi%20et%20al%2 High C. Climate change Ket applicable Not applicable <t< td=""><td>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 file:///C:/Users/User/Desktop/Thesis%20Ref/Xiong2015.pdf Me 46 8.03 Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Not applicable No data for this question Me 47 8.04 Is the taxon able to tolerate or benefit from environmental/human disturbance? Yes file:///C:/Users/User/Desktop/Thesis%20Ref/Xiong2015.pdf Me 48 8.05 Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment? Not applicable No data for this question Me 49 80.06 Are there effective natural enemies (predactors) of the taxon present in the RA Yes file:///C:/Users/User/Desktop/Thesis%20Ref/Joshi%20et%20al%2 Hig</td><td>Is th wate one</td><td>the taxon able to withstand being out of ater for extended periods (e.g. minimum of e or more hours) at some stage of its life</td><td>Yes</td><td>https://www.fishbase.de/summary/Puntigrus-tetrazona.html</td><td>Medium</td></t<> | 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 file:///C:/Users/User/Desktop/Thesis%20Ref/Xiong2015.pdf Me 46 8.03 Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Not applicable No data for this question Me 47 8.04 Is the taxon able to tolerate or benefit from environmental/human disturbance? Yes file:///C:/Users/User/Desktop/Thesis%20Ref/Xiong2015.pdf Me 48 8.05 Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment? Not applicable No data for this question Me 49 80.06 Are there effective natural enemies (predactors) of the taxon present in the RA Yes file:///C:/Users/User/Desktop/Thesis%20Ref/Joshi%20et%20al%2 Hig | Is th wate one | the taxon able to withstand being out of ater for extended periods (e.g. minimum of e or more hours) at some stage of its life | Yes | https://www.fishbase.de/summary/Puntigrus-tetrazona.html | Medium |
| 16 8.03 Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Not applicable No data for this question Medium 17 8.04 Is the taxon likely to tolerate or benefit from environmental/human disturbance? Yes file:///C:/Users/User/Desktop/Thesis%20Ref/Xiong2015.pdf Medium 18 8.05 Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment? Not applicable No data for this question Medium 19 8.06 Are there effective natural enemies (predators) of the taxon present in the RA Yes file:///C:/Users/User/Desktop/Thesis%20Ref/Joshi%20et%20al%2 High 2. Climate change Ket Ket Ket Ket Ket | 46 8.03 Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Not applicable No data for this question Me 47 8.04 Is the taxon likely to tolerate or benefit from environmental/human disturbance? Yes file:///C:/Users/User/Desktop/Thesis%20Ref/Xiong2015.pdf Me 48 8.05 Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment? Not applicable No data for this question Me 49 8.06 Are there effective natural enemies (predators) of the taxon present in the RA Yes file:///C:/Users/User/Desktop/Thesis%20Ref/Joshi%20et%20al%2 Hig | Is th wate taxo | the taxon tolerant of a wide range of ater quality conditions relevant to that xon? [In the Justification field, indicate the | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/Xiong2015.pdf | Medium |
| 17 8.04 Is the taxon likely to tolerate or benefit from environmental/human disturbance? Yes file:///C:/Users/User/Desktop/Thesis%20Ref/Xiong2015.pdf Medium 18 8.05 Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment? Not applicable No data for this question Medium 19 8.06 Are there effective natural enemies (predators) of the taxon present in the RA Yes file:///C:/Users/User/Desktop/Thesis%20Ref/Joshi%20et%20al%2 High 20 C. Climate change Contract change Contract change Contract change Contract change | 47 8.04 Is the taxon likely to tolerate or benefit from environmental/human disturbance? Yes file:///C:/Users/User/Desktop/Thesis%20Ref/Xiong2015.pdf Me 48 8.05 Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment? Not applicable No data for this question Me 49 8.06 Are there effective natural enemies (predators) of the taxon present in the RA Yes file:///C:/Users/User/Desktop/Thesis%20Ref/Joshi%20et%20al%2 Hig | Can the | n the taxon be controlled or eradicated in e wild with chemical, biological, or other | Not applicable | No data for this question | Medium |
| 8 0.5 Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment? Not applicable No data for this question Medium 99 8.06 Are there effective natural enemies (predators) of the taxon present in the RA Yes file:///C:/Users/User/Desktop/Thesis%20Ref/Joshi%20et%20al%2 High C. Climate change Ves 02016.pdf Ves Ves Ves | 48 8.05 Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment? Not applicable No data for this question Me 49 8.06 Are there effective natural enemies (predators) of the taxon present in the RA Yes file:///C:/Users/User/Desktop/Thesis%20Ref/Joshi%20et%20al%2 Hig | Is th | the taxon likely to tolerate or benefit from | Yes | file:///C:/Users/User/Desktop/Thesis%20Ref/Xiong2015.pdf | Medium |
| (predators) of the taxon present in the RA 02016.pdf | (predators) of the taxon present in the RA 02016.pdf | i Is th that its u | the taxon able to tolerate salinity levels at are higher or lower than those found in | Not applicable | | |
| C. Climate change | | | | Yes | | High |
| | C. Climate change | | | l | 02016.pdf | <u> </u> |
| | | | | | | |

| | 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 | file:///C:/Users/User/Desktop/Thesis%20Ref/Joshi%20et%20al%2 02016.pdf | |
|----|------|---|----------|---|------|
| 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 | file:///C:/Users/User/Desktop/Thesis%20Ref/Joshi%20et%20al%2 02016.pdf | 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 | file:///C:/Users/User/Desktop/Thesis%20Ref/Joshi%20et%20al%2 02016.pdf | 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 | file:///C:/Users/User/Desktop/Thesis%20Ref/Joshi%20et%20al%2 02016.pdf | High |
| 54 | 9.05 | Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? | Higher | file:///C:/Users/User/Desktop/Thesis%20Ref/Joshi%20et%20al%2 02016.pdf | 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 | file:///C:/Users/User/Desktop/Thesis%20Ref/Joshi%20et%20al%2 02016.pdf | High |

Statistics

| Scores | |
|--|------------------------|
| BRA | 29.0 |
| BRA Outcome | Medium |
| BRA+CCA | 41.0 |
| BRA+CCA Outcome | High |
| Score partition | |
| A. Biogeography/Historical | 13.0 |
| 1. Domestication/Cultivation | 4.0 |
| 2. Climate, distribution and introduction risk | 2.0 |
| 3. Invasive elsewhere | 7.0 |
| B. Biology/Ecology | 16.0 |
| 4. Undesirable (or persistence) traits | 9.0 |
| 5. Resource exploitation | 2.0 |
| 6. Reproduction | 0.0 |
| 7. Dispersal mechanisms | 1.0 |
| 8. Tolerance attributes | 4.0 |
| C. Climate change | 12.0 |
| 9. Climate change | 12.0 |
| Answered Questions | |
| Total | 55 |
| A. Biogeography/Historical | 13 |
| 1. Domestication/Cultivation | 3 5 5 36 |
| 2. Climate, distribution and introduction risk | 5 |
| 3. Invasive elsewhere | 5 |
| B. Biology/Ecology | |
| 4. Undesirable (or persistence) traits | 12 |
| 5. Resource exploitation | 2 |
| 6. Reproduction | 12 2 7 9 6 |
| 7. Dispersal mechanisms | 9 |
| 8. Tolerance attributes | |
| | 6 |
| C. Climate change | |
| 9. Climate change | 6 |
| 9. Climate change Sectors affected | |
| 9. Climate change Sectors affected Commercial | |
| 9. Climate change Sectors affected Commercial Environmental | 6 13 7 |
| 9. Climate change Sectors affected Commercial | 6 13 7 25 |

| Thresholds | |
|---------------|--------------|
| BRA | 34.5 |
| BRA+CCA | 34.5 |
| Confidence | |
| BRA+CCA | 0.67 |
| BRA | 0.66 |
| CCA | 0.75 |
| | |
| Date and Time | |
| 20/04/2 | 019 17:36:19 |

| axon and Assessor details | | | | | |
|---|--|--|--|--|--|
| Category Fishes and Lampreys (freshwater) | | | | | |
| Taxon name | Sarotherodon melanotheron | | | | |
| Common name | blackchin tilapia | | | | |
| Assessor | Gilles | | | | |
| Risk screening context | | | | | |
| Reason and socio-economic benefits | Aquaculture | | | | |
| Risk assessment area | Lake Taal | | | | |
| Taxonomy | Actinopteri (ray-finned fishes) > Cichliformes (Cichlids, convict blennies) > Cichlidae (Cichlids) > | | | | |
| Native range | Africa | | | | |
| Introduced range | introduced elswhere including the Philippines | | | | |
| | | | | | |

| | | | Response | Justification (references and/or other information) | Confidence |
|------|----------|--|----------|--|------------|
| | | graphy/Historical | | | |
| | | ication/Cultivation | 1 | | |
| 1 | 1.01 | Has the taxon been the subject of | Yes | This taxon is a productive and tolerant species that has been | High |
| | | domestication (or cultivation) for at least 20 | | introduced worldwide for aquaculture/farming, angling, and the | |
| _ | 1.02 | generations? | ¥ | control of aquatic vegetation (GSID, 2020). | LU ala |
| 2 | 1.02 | Is the taxon harvested in the wild and likely | Yes | This taxon is a productive and tolerant species that has been | High |
| | | to be sold or used in its live form? | | introduced worldwide for aquaculture/farming, angling, and the | |
| 3 | 1.03 | Does the taxon have invasive races, | Yes | control of aquatic vegetation (GSID, 2020). | High |
| 3 | 1.03 | | res | The following subspecies of the taxon were reported to cause adverse ecological impacts after introduction: Oreochromis | High |
| | | varieties, sub-taxa or congeners? | | niloticus baringoensis, Oreochromis niloticus cancellatus, | |
| | | | | Oreochromis niloticus eduardianus, Oreochromis niloticus filoa, | |
| | | | | Oreochromis niloticus niloticus, Oreochromis niloticus sugutae, | |
| | | | | Oreohromis niloticus tana and Oreohromis niloticus vulcani | |
| 2. C | limate. | , distribution and introduction risk | | oreonomis moticus tana and oreonomis moticus valcam | |
| | 2.01 | How similar are the climatic conditions of the | Hiah | This taxon is cold tolerant but prefers a tropical climate, the | High |
| | | Risk Assessment (RA) area and the taxon's | | temperatures ranges from 8-30°C and tolerating up to 41°C | |
| | | native range? | | (CABI,2020; FishBAse, 2019). | |
| 5 | 2.02 | What is the quality of the climate matching | High | This taxon is cold tolerant but prefers a tropical climate, the | Very high |
| | | data? | - | temperatures ranges from 8-30°C and tolerating up to 41°C which | |
| | | | | is the climate in the RA area (CABI,2020; FishBAse, 2019). |] |
| 6 | 2.03 | Is the taxon already present outside of | Yes | The taxon has been introduced in the country for farming and | Very high |
| | | captivity in the RA area? | | breeding to be used as a food source (Guerrero, 2019). | |
| 7 | 2.04 | How many potential vectors could the taxon | >1 | Accidental introduction from aquaculture activities and intentional | High |
| | | use to enter in the RA area? | | introduction with human intervention (CABI, 2020). | |
| 8 | 2.05 | Is the taxon currently found in close | Yes | The taxon has been introduced in the country for farming and | Very high |
| | | proximity to, and likely to enter into, the RA | | breeding to be used as a food source (Guerrero, 2019). | |
| | | area in the near future (e.g. unintentional | | |] |
| | | and intentional introductions)? | | | |
| | | e elsewhere | | | line i |
| 9 | 3.01 | Has the taxon become naturalised | Yes | This taxon has been established in different parts of the Unitited | High |
| | | (established viable populations) outside its | | States, namely: Arizona, California, Florida, Nevada, North |] |
| | | native range? | | Carolina, and Texas. This taxon has been considered the most |] |
| | | | | widespread foreign fish in Florida for more than a decade (U.S. |] |
| 10 | 3.02 | In the taxon's introduced range, are them. | Voc | Fish and Wildlife Service, 2011). | Von hich |
| 10 | 5.02 | In the taxon's introduced range, are there known adverse impacts to wild stocks or | Yes | This taxon mainly competes with native fishes for food, spawning area, and space, and exhibits aggressive behavior. Their | Very high |
| | | commercial taxa? | | introductions have caused reductions in abundance of native |] |
| | | | | fishes, vegetation and even molluscs and there are reports that in |] |
| | | | | some introduced areas, they have caused the lost of most and |] |
| | | | | nearly all native fishes such as in the warm springs area of |] |
| | | | | Nevada, USA (USGS, 2020; IUCNGSID, 2020). |] |
| 11 | 3.03 | In the taxon's introduced range, are there | Yes | This taxon mainly competes with native fishes for food, spawning | Very high |
| | 2.00 | known adverse impacts to aquaculture? | | area, and space, and exhibits aggressive behavior. Their | |
| | | | | introductions have caused reductions in abundance of native |] |
| | | | | fishes, vegetation and even molluscs and there are reports that in |] |
| | | | | some introduced areas, they have caused the lost of most and |] |
| | | | | nearly all native fishes such as in the warm springs area of |] |
| | | | | Nevada, USA (USGS, 2020; IUCNGSID, 2020). |] |
| 12 | 3.04 | In the taxon's introduced range, are there | Yes | This taxon mainly competes with native fishes for food, spawning | Very high |
| | | known adverse impacts to ecosystem | | area, and space, and exhibits aggressive behavior. Their | ., |
| | | services? | | introductions have caused reductions in abundance of native |] |
| | | | | fishes, vegetation and even molluscs and there are reports that in | |
| | | | | some introduced areas, they have caused the lost of most and |] |
| | | | | nearly all native fishes such as in the warm springs area of |] |
| | | | | Nevada, USA (USGS, 2020; IUCNGSID, 2020). | |
| 13 | 3.05 | In the taxon's introduced range, are there | No | The introduction of this taxon has resulted in a significant | High |
| | | known adverse socio-economic impacts? | | development of aquaculture because of its commercial | |
| | | | | importance, which improved the economic status of the introduced |] |
| | | | | range (CABI,2020). | |
| | | //Ecology | | | |
| 4 1 | Indesira | able (or persistence) traits | N/ | This have been seen as the indication of the second set of the sec | |
| | 4.01 | | Ires | This taxon has records of being infected by a wide range of | Very high |
| | 4.01 | Is it likely that the taxon will be poisonous or | | | |
| | 4.01 | Is it likely that the taxon will be poisonous or pose other risks to human health? | | diseases and parasites, such as, Flexibacter columnaris (Bacteria), | |
| | 4.01 | | | Apiosoma piscicolum, Epistylis colisarum, Trichodina sp., | |
| | 4.01 | | | Apiosoma piscicolum, Epistylis colisarum, Trichodina sp., Trypanoplasma sp. (Protozoa), Cichlidogyrus tilapiae, | |
| | 4.01 | | | Apiosoma piscicolum, Epistylis colisarum, Trichodina sp., | |

| 15 | 4.02 | Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? | Yes | This taxon mainly competes with native fishes for food, spawning area, and space, and exhibits aggressive behavior. Their introductions have caused reductions in abundance of native | High |
|----|-----------------|--|----------------|--|-----------|
| 16 | 4.03 | Are there any threatened or protected taxa | Yes | fishes, vegetation and even molluscs and there are reports that in some introduced areas, they have caused the lost of most and nearly all native fishes such as in the warm springs area of <u>Nevada. USA (USGS, 2020; IUCNGSID, 2020).</u> This taxon mainly competes with native fishes for food, spawning | High |
| | | that the non-native taxon would parasitise in the RA area? | | area, and space, and exhibits aggressive behavior. Their introductions have caused reductions in abundance of native fishes, vegetation and even molluscs and there are reports that in some introduced areas, they have caused the lost of most and nearly all native fishes such as in the warm springs area of Nevada, USA (USGS, 2020; IUCNGSID, 2020). | |
| 17 | 4.04 | Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? | Yes | This taxon is considered hardy species, tolerant of a wide range of habitat conditions and water quality (CABI, 2020). | High |
| 18 | 4.05 | Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA area? | Yes | This taxon mainly competes with native fishes for food, spawning area, and space, and exhibits aggressive behavior. Their introductions have caused reductions in abundance of native fishes, vegetation and even molluscs and there are reports that in some introduced areas, they have caused the lost of most and nearly all native fishes such as in the warm springs area of Nevada. USA (USGS. 2020: IUCNGSID. 2020). | Very high |
| 19 | 4.06 | Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? | Yes | This taxon mainly competes with native fishes for food, spawning area, and space, and exhibits aggressive behavior. Their introductions have caused reductions in abundance of native fishes, vegetation and even molluscs and there are reports that in some introduced areas, they have caused the lost of most and nearly all native fishes such as in the warm springs area of Nevada. USA (USGS. 2020: IUCNGSID. 2020). | 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 | There are no reports that the taxon may carry pests or infectious agents that are endemic in Lake Taal. | 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 | There are many viruses that are associated with this taxa, examples are: betanodavirus, tilapia larvae encephalitis virus (TELV) and tilapia lake virus disease (TiLV) (Jansen et al., 2018). | Very high |
| 22 | 4.09 | Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity? | Yes | This taxon can reach a large body size, having a maximum length of 50.8 cm (IUCNGSID,2020). | Very high |
| 23 | 4.10 | Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)? | Yes | This taxon is considered hardy species, tolerant of a wide range of habitat conditions and water quality. It is usually found in estuarine habitats, lakes, water courses, warm ponds, dam reservoirs and in open water, among vegetation and stones (CABI, | 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 | This taxon can stir up bottom sediments as they create nesting areas which causes siltation and bioturbidity reducing water quality and degrading aquatic habitats (CABI, 2020). | 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)? | Not applicable | There are no reports of etablished population of this taxon persisting at low density. | Medium |
| | Resourc 5.01 | <i>e exploitation</i> Is the taxon likely to consume threatened or | Yes | Considiring that this taxon competes with native fishes for food, | Very high |
| | | protected native taxa in the RA area? | | spawning area, and space, and exhibits aggressive behaviour. Their introductions have caused reductions in abundance of native fishes, vegetation and even molluscs and there are reports that in some introduced areas, they have caused the lost of most and nearly all native fishes such as in the warm springs area of | , ingli |
| 27 | 5.02 | Is the taxon likely to sequester food | Yes | Nevada, USA (USGS, 2020; IUCNGSID, 2020). As this taxon feeds primarily on phytoplankton and epiphytic | Very high |
| | | resources (including nutrients) to the detriment of native taxa in the RA area? | | algae, insects, zooplankton, vascular plants, and larval and juvenile fishes (IUCNGSID, 2020). | |
| | Reprodu | | Ves | | Von List |
| | 6.01 | Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? | Yes | This taxon are maternal mouthbrooders. When a female lays her eggs in a nest prepared by the male. Then the male fertilizes the eggs, afterwhich the female picks up the eggs and incubates them in her mouth (CABI, 2020). | Very high |
| 29 | 6.02 | Is the taxon likely to produce viable gametes or propagules (in the RA area)? | Yes | The conditions of the RA meets the required conditions for maturation and reproduction of this taxon, which will enable it to produce a viable gametes (CABI, 2020). | High |
| 30 | 6.03 | Is the taxon likely to hybridise naturally with native taxa? | Yes | This taxon can hybridize with its congeners and produces hybrids that are morphologically difficult to identify such as the Oreochromis niloticus x O. aureus (USGS, 2020; CABI, 2020). | High |
| 31 | 6.04 | Is the taxon likely to be hermaphroditic or to display asexual reproduction? | No | There are no documented evidence of hermaphroditism/asexual reproduction of this species. | Medium |
| 32 | 6.05 | Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? | Yes | This taxon requires nesting sites in order for the egss to be fertilized before the female can incubate them in their mouth (CABI, 2020). | 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 | This taxon have a huge reproductive capacity with a female producing of upto 2000 eggs which hatches 3 days after fertilization (CABI, 2020). | Very high |

| 21 | 1 | | | | 1 |
|---|---------|---|----------------|--|-----------|
| 54 | 6.07 | How many time units (days, months, years) | 5 | This taxon reaches the age of maturity at 5-6 months (IUCNGSID, | Very high |
| | | does the taxon require to reach the age-at- first-reproduction? | | 2020). | |
| 7 | Dicnerc | al mechanisms | | | |
| | | How many potential internal | >1 | Accidental introduction from aquaculture activities and intentional | Very high |
| ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, | /.01 | vectors/pathways could the taxon use to | -1 | introduction with human intervention (USGS, 2020). | veryingn |
| | | disperse within the RA area (with suitable | | | |
| 36 | 7.02 | Will any of these vectors/pathways bring the | Yes | Because of the taxons commercial importance, the aquaculture/ | High |
| | | taxon in close proximity to one or more | | fish farming pathway could bring this taxon in close proximity to | |
| | | protected areas (e.g. MCZ, MPA, SSSI)? | | one or more protected areas. | |
| 37 | 7.03 | Does the taxon have a means of actively | No | Their physical characteristics does not allow attachment to any | High |
| | | attaching itself to hard substrata (e.g. ship | | substrata (FishBase, 2020) | - |
| | | hulls, pilings, buoys) such that it enhances | | | |
| | | the likelihood of dispersal? | | | |
| 38 | 7.04 | Is natural dispersal of the taxon likely to | No | Since the eggs are protected by the mother until it hatches | High |
| | | occur as eggs (for animals) or as propagules | | (CABI,2020) | |
| | | (for plants: seeds, spores) in the RA area? | | | |
| 39 | 7.05 | Is natural dispersal of the taxon likely to | No | Since the eggs are protected by the mother until it hatches and | High |
| | | occur as larvae/juveniles (for animals) or as | | even when the fry are free-swimming they will return to the | |
| | | fragments/seedlings (for plants) in the RA area? | | mouth of the female for protection (CABI,2020). | |
| 10 | 7.06 | Are older life stages of the taxon likely to | No | There are no records about this taxon's migratory behaviour. | Medium |
| 10 | 7.00 | migrate in the RA area for reproduction? | | | |
| 41 | 7.07 | Are propagules or eggs of the taxon likely to | Yes | As this taxon lives in shallow waters in which can easily be | Verv high |
| - | | be dispersed in the RA area by other animals? | | targeted and in return they can be predated by birds (CABI, 2020). | |
| 12 | 7.08 | Is dispersal of the taxon along any of the | Yes | This taxon which is readily available in commercial markets | Very high |
| | | vectors/pathways mentioned in the previous | | (alive) and in aquaculture farms can be rapidly disperesed, | |
| | | seven questions (35-41; i.e. either | | knowing also the fact that the RA area is highly susceptable to | |
| | | unintentional or intentional) likely to be | | flooding and natural calamities which could rapidly disperesed this | |
| | | Is dispersal of the taxon density dependent? | Not applicable | There are no records about this taxon's density dependence. | Very high |
| | | ce attributes | N | | ha ti |
| 44 | 8.01 | Is the taxon able to withstand being out of | Not applicable | There are no records about this. | Medium |
| | | water for extended periods (e.g. minimum of one or more hours) at some stage of its life | | | |
| | | cycle? | | | |
| 15 | 8.02 | Is the taxon tolerant of a wide range of | Yes | "This taxon is tolerant of a range of conditions such as Ammonium | Very high |
| ŤĴ | 0.02 | water quality conditions relevant to that | 103 | (mg/l): 0.02 - 0.5, Dissolved oxygen (mg/l): 3 optimum, Salinity | Very high |
| | | taxon? [In the Justification field, indicate the | | (part per thousand) 29-45, Water pH (pH): $3.7 - 11$ and $8-30^{\circ}$ C | |
| | | relevant water quality variable(s) being | | and tolerating up to 41°C (CABI, 2020)." | |
| 46 | 8.03 | Can the taxon be controlled or eradicated in | Yes | For biological control, the predatory fish Morone saxatilis X Morone | High |
| | | the wild with chemical, biological, or other | | chrysops, Sciaenops ocellatus, Channa striata, Megalops | 5 |
| | | agents/means? | | cyprinoides, Nile perch, Hemichromis fasciatus, and Cichlasoma | |
| | | | | managuens was usedto reduce wild spawning among tilapia | |
| | | | | hybrids in aquaculture growout ponds. For the physical control, in | |
| | | | | Brunner Island, Pennsylvania a condenser was used to cool the | |
| | | | | down the water until it became lethal to the taxon (IUCNGSID, | |
| +7 | 8.04 | Is the taxon likely to tolerate or benefit from | Yes | Due to their ability to survive in a wide range of environmental | Very high |
| | | environmental/human disturbance? | | conditions specially in tropical countries (RA area) it can benefit | |
| 18 | 8.05 | Is the taxon able to tolerate salinity levels | Yes | from environmental/human distrubances (CABI, 2020). This taxon can tolerate a wide range of salinity from 29 to 45 ppt | High |
| 70 | 0.05 | that are higher or lower than those found in | 105 | (CABI, 2020). | ingii |
| | 1 | its usual environment? | | | |
| 49 | 8.06 | Are there effective natural enemies | Yes | Channa striata can be a predator if this taxon which is present in | Very high |
| | | (predators) of the taxon present in the RA | | the RA area (CABI, 2020). | - , .5 |
| с. (| Climat | e change | | | |
| | | change | | | |
| 50 | 9.01 | Under the predicted future climatic | Increase | Together with the fact that the RA area is prone to natural | High |
| | 1 | conditions, are the risks of entry into the RA | | calamities such as typhoons and floods (Brändlin & Wingard, | |
| | | area posed by the taxon likely to increase, | | 2013) and their ability to survive the cilamatic conditions of a | |
| | | decrease or not change? | | tropical environtment waters, the risk of entry through accidental | |
| | | | | introduction from aquaculture activities, intentional introduction | |
| | 1 | | | with human intervention and aquarium escape would most likely | |
| | 9.02 | Under the predicted future elimetic | Incroace | increase the risk of entry of this taxon. Together with the fact that the RA area is prone to natural | High |
| 51 | 17.02 | Under the predicted future climatic | Increase | 5 | High |
| 51 | | conditions are the risks of ostablishment | 1 | calamities such as typhoons and floods (Brändlin & Wingard, | |
| 51 | | conditions, are the risks of establishment | | | |
| 51 | | posed by the taxon likely to increase, | | 2013) and their ability to survive the cilamatic conditions of a tropical environtment waters, the risk of entry through accidental | |
| 51 | | | | tropical environtment waters, the risk of entry through accidental | |
| 51 | | posed by the taxon likely to increase, | | tropical environtment waters, the risk of entry through accidental introduction from aquaculture activities, intentional introduction | |
| 51 | | posed by the taxon likely to increase, | | tropical environtment waters, the risk of entry through accidental introduction from aquaculture activities, intentional introduction with human intervention and aquarium escape would most likely | |
| | 9.03 | posed by the taxon likely to increase, | Increase | tropical environtment waters, the risk of entry through accidental introduction from aquaculture activities, intentional introduction with human intervention and aquarium escape would most likely increase the risk of entry of this taxon. | High |
| | | posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic | Increase | tropical environtment waters, the risk of entry through accidental introduction from aquaculture activities, intentional introduction with human intervention and aquarium escape would most likely increase the risk of entry of this taxon. Together with the fact that the RA area is prone to natural | High |
| | | posed by the taxon likely to increase, decrease or not change? | Increase | tropical environtment waters, the risk of entry through accidental introduction from aquaculture activities, intentional introduction with human intervention and aquarium escape would most likely increase the risk of entry of this taxon. | High |
| | | posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within | Increase | tropical environtment waters, the risk of entry through accidental introduction from aquaculture activities, intentional introduction with human intervention and aquarium escape would most likely increase the risk of entry of this taxon. Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, | High |
| | | 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 | tropical environtment waters, the risk of entry through accidental introduction from aquaculture activities, intentional introduction with human intervention and aquarium escape would most likely increase the risk of entry of this taxon. Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to survive the cilamatic conditions of a | High |
| | | 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 | tropical environtment waters, the risk of entry through accidental introduction from aquaculture activities, intentional introduction with human intervention and aquarium escape would most likely increase the risk of entry of this taxon. Together with the fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) and their ability to survive the cilamatic conditions of a tropical environtment waters, the risk of entry through accidental | High |

| 9.04 | Under the predicted future climatic | Higher | Since this taxon mainly competes with native fishes for food, | Very high |
|------|---|---|---|--|
| | conditions, what is the likely magnitude of | - | spawning area, and space, and exhibits aggressive behavior. Their | , - |
| | future potential impacts on biodiversity | | introductions have caused reductions in abundance of native | |
| | and/or ecological integrity/status? | | fishes, vegetation and even molluscs and there are reports that in | |
| | | | some introduced areas, they have caused the lost of most and | |
| | | | nearly all native fishes such as in the warm springs area of | |
| | | | Nevada, USA. Morover, since this taxon has records of being | |
| | | | infected by a wide range of diseases and parasites, there is a | |
| | | | chance that these diseases may be introduced in the RA area also | |
| | | | (CABI, 2020; USGS, 2020; IUCNGSID, 2020). | |
| 9.05 | | Higher | | Very high |
| | | | | |
| | | | | |
| | structure and/or function? | | , 3 | |
| | | | | |
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| | | | · · · · · · · · · · · · · · · · · · · | |
| | | | , | |
| | | | , | |
| 0.00 | Lindon the survey intend forthous allower the | L l'ala au | | Mana hiah |
| 9.06 | | Higher | | Very high |
| | | | | |
| | | | | |
| | Services/socio-economic factors? | | , 3 | |
| | | | | |
| | | | , | |
| | | | · · · · · · · · · · · · · · · · · · · | |
| | | | | |
| | | | (CABL 2020: USGS, 2020: IUCNGSID, 2020). | |
| | 9.04 | conditions, what is the likely magnitude of 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? | 9.05 Under the predicted future climatic conditions, what is the likely magnitude of 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? 9.06 Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem 9.06 Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem | conditions, what is the likely magnitude of 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? 9.06 Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? 9.06 Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? 9.06 Higher the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? 9.06 Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? 9.06 Higher the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors? 9.06 Higher the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors? 9.06 Higher the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors? 9.06 Higher the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors? 9.06 Higher the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors? 9.06 Higher the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors? 9.06 Higher the predicted future climatic conditions, what is t |

| Statistics | |
|---|--------------|
| Scores | |
| BRA | 44.0 |
| BRA Outcome | High |
| BRA+CCA | 56.0 |
| BRA+CCA Outcome | High |
| Score partition | |
| A. Biogeography/Historical | 22.0 |
| 1. Domestication/Cultivation | 4.0 |
| 2. Climate, distribution and introduction risk | 4.0 |
| 3. Invasive elsewhere | 14.0 |
| B. Biology/Ecology | 22.0 |
| 4. Undesirable (or persistence) traits | 10.0 |
| 5. Resource exploitation | 7.0 |
| 6. Reproduction | 1.0 |
| 7. Dispersal mechanisms | 0.0 |
| 8. Tolerance attributes | 4.0 |
| C. Climate change | 12.0 |
| 9. Climate change | 12.0 |
| Answered Questions | |
| Total | 55 |
| A. Biogeography/Historical | 13 |
| 1. Domestication/Cultivation | 3 |
| 2. Climate, distribution and introduction risk 3. Invasive elsewhere | 3 5 5 |
| B. Biology/Ecology | 36 |
| 4. Undesirable (or persistence) traits | 12 |
| 5. Resource exploitation | 12 2 7 |
| 6. Reproduction | 7 |
| 7. Dispersal mechanisms | 9 |
| 8. Tolerance attributes | 6 |
| C. Climate change | 6 |
| 9. Climate change | 6 |
| Sectors affected | |
| Commercial | 19 |
| Environmental | 17 |
| Species or population nuisance traits | 27 |
| | |
| Thresholds | |
| BRA | 34.5 |
| | 24 5 |
| BRA+CCA | 34.5 |
| BRA+CCA Confidence | 34.5 |
| Confidence BRA+CCA | 34.5 0.85 |
| Confidence | |

Date and Time

07/07/2020 15:46:57

| axon and Assessor details | | | | | |
|------------------------------------|--|--|--|--|--|
| Category | Fishes and Lampreys (freshwater) | | | | |
| Taxon name | Trichopodus leerii | | | | |
| Common name pearl gourami | | | | | |
| Assessor | Gilles, Pavia | | | | |
| Risk screening context | | | | | |
| Reason and socio-economic benefits | Ornamental | | | | |
| Risk assessment area | Lake Taal | | | | |
| Taxonomy | Order - Anabantiformes Family - Osphronemidae | | | | |
| Native range | South America | | | | |
| Introduced range | No Data | | | | |
| URL | https://www.fishbase.de/summary/Trichopodus-leerii | | | | |

| | | | Response | Justification (references and/or other information) | Confidence |
|--|---|--|----------------------------------|--|--|
| Α. Ι | Biogeo | ography/Historical | | | |
| | | tication/Cultivation | | | |
| 1 | 1.01 | Has the taxon been the subject of | Yes | Fisher's Woodcat, Trachelyopterus fisheri, is not a very common | Low |
| | | domestication (or cultivation) for at least 20 | | species. So I was very pleased when I encountered three | |
| | | generations? | | specimens in a shop in Amersfoort, here in the Netherlands. | |
| 2 | 1.02 | Is the taxon harvested in the wild and likely | Yes | Fisher's Woodcat, Trachelyopterus fisheri, is not a very common | High |
| | | to be sold or used in its live form? | | species. So I was very pleased when I encountered three | |
| | | | | specimens in a shop in Amersfoort, here in the Netherlands. | |
| 3 | 1.03 | Does the taxon have invasive races, | No | No data found | Low |
| | | varieties, sub-taxa or congeners? | | | |
| 2. (| Climate | e, distribution and introduction risk | | | |
| 4 | 2.01 | How similar are the climatic conditions of the | Medium | The taxa can be located in South America which has almost | High |
| | | Risk Assessment (RA) area and the taxon's | | similar conditions as the RA Area. (Planet Catfish, 2019) | |
| | | native range? | | | |
| 5 | 2.02 | What is the quality of the climate matching | Medium | The taxa can be located in South America which has almost | High |
| | | data? | | similar conditions as the RA Area. (Planet Catfish, 2019) | |
| 6 | 2.03 | Is the taxon already present outside of | No | Not applicable | Low |
| | | captivity in the RA area? | | | |
| 7 | 2.04 | How many potential vectors could the taxon | >1 | The taxon can be introduced through aquaculture and research | High |
| 1 | | use to enter in the RA area? | | (Planet Catfish, 2019) | |
| 8 | 2.05 | Is the taxon currently found in close | Yes | The taxon is now present in pet stores for ornamental use, such | High |
| 1 | | proximity to, and likely to enter into, the RA | | as in Cartimar Market where importation and sale of this taxon is | |
| | | area in the near future (e.g. unintentional | | highly abundant. | |
| | | and intentional introductions)? | | | |
| | | e elsewhere | 1 | | |
| 9 | 3.01 | Has the taxon become naturalised | Yes | the taxon has been widely used in ornamental trading in Europe | High |
| 1 | | (established viable populations) outside its | | especially in Scotland. (Stabel, 2007) | |
| 10 | 3.02 | In the taxon's introduced range, are there | Not applicable | No data found | Low |
| | | known adverse impacts to wild stocks or | | | |
| I | | commercial taxa? | | | |
| 11 | 3.03 | In the taxon's introduced range, are there | Not applicable | No data found | Low |
| 1 | | known adverse impacts to aquaculture? | | | |
| 12 | 3.04 | In the taxon's introduced range, are there | No | No data found | Low |
| 1 | L | known adverse impacts to ecosystem | | | |
| 13 | 3.05 | In the taxon's introduced range, are there | No | No data found | Low |
| | i. | | | | |
| | | known adverse socio-economic impacts? | | | |
| | | y/Ecology | | | |
| 4. l | Jndesir | y/Ecology rable (or persistence) traits | | | |
| 4. l | Jndesir | y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or | No | The said taxon has no poisonous or significant threat to human | High |
| <u>4. (</u> 14 | <i>Jndesir</i> 4.01 | y/Ecology rable (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? | | life. (Planet Catfish, 2019) | |
| <u>4. (</u> 14 | Jndesir | y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or | No | life. (Planet Catfish, 2019) They are calm and gentle like all Auchenipterids - being surface | High |
| <u>4. (</u> 14 | <i>Jndesir</i> 4.01 | y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or | | life. (Planet Catfish, 2019) They are calm and gentle like all Auchenipterids - being surface feeders - they are particularly fond of insects and their larvae but | |
| <u>4. (</u> 14 | <i>Jndesir</i> 4.01 | y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or | | life. (Planet Catfish, 2019) They are calm and gentle like all Auchenipterids - being surface feeders - they are particularly fond of insects and their larvae but can also feed on small fish that could fit in their mouth . (Planet | |
| <u>4. (</u> 14 15 | <i>Jndesir</i> 4.01 4.02 | y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? | No | life. (Planet Catfish, 2019) They are calm and gentle like all Auchenipterids - being surface feeders - they are particularly fond of insects and their larvae but can also feed on small fish that could fit in their mouth . (Planet Catfish, 2019) | High |
| <u>4. (</u> 14 15 | <i>Jndesir</i> 4.01 | y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa | | life. (Planet Catfish, 2019) They are calm and gentle like all Auchenipterids - being surface feeders - they are particularly fond of insects and their larvae but can also feed on small fish that could fit in their mouth . (Planet | |
| <u>4. (</u> 14 15 | <i>Jndesir</i> 4.01 4.02 | y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in | No | life. (Planet Catfish, 2019) They are calm and gentle like all Auchenipterids - being surface feeders - they are particularly fond of insects and their larvae but can also feed on small fish that could fit in their mouth . (Planet Catfish, 2019) | High |
| <u>4. (</u> 14 15 16 | <u>Indesir</u> 4.01 4.02 4.03 | y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? | No | life. (Planet Catfish, 2019) They are calm and gentle like all Auchenipterids - being surface feeders - they are particularly fond of insects and their larvae but can also feed on small fish that could fit in their mouth . (Planet Catfish, 2019) No data found | High |
| <u>4. (</u> 14 15 16 | <i>Jndesir</i> 4.01 4.02 | y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic | No | life. (Planet Catfish, 2019) They are calm and gentle like all Auchenipterids - being surface feeders - they are particularly fond of insects and their larvae but can also feed on small fish that could fit in their mouth . (Planet Catfish, 2019) No data found The species are sensitive to water change and needs to be in their | High |
| <u>4. (</u> 14 15 16 | <u>Indesir</u> 4.01 4.02 4.03 | y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus | No | life. (Planet Catfish, 2019) They are calm and gentle like all Auchenipterids - being surface feeders - they are particularly fond of insects and their larvae but can also feed on small fish that could fit in their mouth . (Planet Catfish, 2019) No data found The species are sensitive to water change and needs to be in their preferred water pH conditions and clean water at all times. (Planet | High |
| <u>4. (</u> 14 15 16 | <u>Indesir</u> 4.01 4.02 4.03 | y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has | No | life. (Planet Catfish, 2019) They are calm and gentle like all Auchenipterids - being surface feeders - they are particularly fond of insects and their larvae but can also feed on small fish that could fit in their mouth . (Planet Catfish, 2019) No data found The species are sensitive to water change and needs to be in their | High |
| <u>4. (</u> 14 15 16 17 | Indesir 4.01 4.02 4.03 4.04 | y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? | No No No | life. (Planet Catfish, 2019) They are calm and gentle like all Auchenipterids - being surface feeders - they are particularly fond of insects and their larvae but can also feed on small fish that could fit in their mouth . (Planet Catfish, 2019) No data found The species are sensitive to water change and needs to be in their preferred water pH conditions and clean water at all times. (Planet Catfish, 2019) | High Low High |
| <u>4. (</u> 14 15 16 17 | <u>Indesir</u> 4.01 4.02 4.03 | y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web | No | life. (Planet Catfish, 2019) They are calm and gentle like all Auchenipterids - being surface feeders - they are particularly fond of insects and their larvae but can also feed on small fish that could fit in their mouth . (Planet Catfish, 2019) No data found The species are sensitive to water change and needs to be in their preferred water pH conditions and clean water at all times. (Planet Catfish, 2019) They are calm and gentle like all Auchenipterids - being surface | High |
| 4. (14 15 16 17 | Indesir 4.01 4.02 4.03 4.04 | y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus 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 No | life. (Planet Catfish, 2019) They are calm and gentle like all Auchenipterids - being surface feeders - they are particularly fond of insects and their larvae but can also feed on small fish that could fit in their mouth . (Planet Catfish, 2019) No data found The species are sensitive to water change and needs to be in their preferred water pH conditions and clean water at all times. (Planet Catfish, 2019) They are calm and gentle like all Auchenipterids - being surface feeders - they are particularly fond of insects and their larvae but | High Low High |
| <u>4. (</u> 14 15 16 17 | Indesir 4.01 4.02 4.03 4.04 | y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus 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 No | life. (Planet Catfish, 2019) They are calm and gentle like all Auchenipterids - being surface feeders - they are particularly fond of insects and their larvae but can also feed on small fish that could fit in their mouth . (Planet Catfish, 2019) No data found The species are sensitive to water change and needs to be in their preferred water pH conditions and clean water at all times. (Planet Catfish, 2019) They are calm and gentle like all Auchenipterids - being surface feeders - they are particularly fond of insects and their larvae but can also feed on small fish that could fit in their mouth . (Planet | High Low High |
| <u>4. (</u> 14 15 16 17 18 | 4.01 4.02 4.03 4.04 4.05 | y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus 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? | No No No | life. (Planet Catfish, 2019) They are calm and gentle like all Auchenipterids - being surface feeders - they are particularly fond of insects and their larvae but can also feed on small fish that could fit in their mouth . (Planet Catfish, 2019) No data found The species are sensitive to water change and needs to be in their preferred water pH conditions and clean water at all times. (Planet Catfish, 2019) They are calm and gentle like all Auchenipterids - being surface feeders - they are particularly fond of insects and their larvae but can also feed on small fish that could fit in their mouth . (Planet Catfish, 2019) | High Low High High |
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| 4. (14 15 16 17 18 19 | Jndesir 4.01 4.02 4.03 4.04 4.05 4.06 | y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus 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 No No | life. (Planet Catfish, 2019) They are calm and gentle like all Auchenipterids - being surface feeders - they are particularly fond of insects and their larvae but can also feed on small fish that could fit in their mouth . (Planet Catfish, 2019) No data found The species are sensitive to water change and needs to be in their preferred water pH conditions and clean water at all times. (Planet Catfish, 2019) They are calm and gentle like all Auchenipterids - being surface feeders - they are particularly fond of insects and their larvae but can also feed on small fish that could fit in their mouth . (Planet Catfish, 2019) They are calm and gentle like all Auchenipterids - being surface feeders - they are particularly fond of insects and their larvae but catfish, 2019) | High Low High High |
| <u>4. (</u> 14 15 16 17 18 18 | 4.01 4.02 4.03 4.04 4.05 | y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA area? Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or | No No No | life. (Planet Catfish, 2019) They are calm and gentle like all Auchenipterids - being surface feeders - they are particularly fond of insects and their larvae but can also feed on small fish that could fit in their mouth . (Planet Catfish, 2019) No data found The species are sensitive to water change and needs to be in their preferred water pH conditions and clean water at all times. (Planet Catfish, 2019) They are calm and gentle like all Auchenipterids - being surface feeders - they are particularly fond of insects and their larvae but can also feed on small fish that could fit in their mouth . (Planet Catfish, 2019) They are calm and gentle like all Auchenipterids - being surface feeders - they are particularly fond of insects and their larvae but can also feed on small fish that could fit in their mouth . (Planet Catfish, 2019) They are calm and gentle like all Auchenipterids - being surface | High Low High High |
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| 4. (14 15 16 17 18 19 20 | Jndesir 4.01 4.02 4.03 4.04 4.05 4.06 4.07 | y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA area? Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are endemic in the RA act as a vector for, recognised pests and | No No No No No | life. (Planet Catfish, 2019) They are calm and gentle like all Auchenipterids - being surface feeders - they are particularly fond of insects and their larvae but can also feed on small fish that could fit in their mouth . (Planet Catfish, 2019) No data found The species are sensitive to water change and needs to be in their preferred water pH conditions and clean water at all times. (Planet Catfish, 2019) They are calm and gentle like all Auchenipterids - being surface feeders - they are particularly fond of insects and their larvae but can also feed on small fish that could fit in their mouth . (Planet Catfish, 2019) They are calm and gentle like all Auchenipterids - being surface feeders - they are particularly fond of insects and their larvae No data found | High Low High High Low |
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| 4. (14 15 16 17 18 19 20 21 | Indesir 4.01 4.02 4.03 4.04 4.05 4.06 4.07 4.08 | y/Ecology able (or persistence) traits Is it likely that the taxon will be poisonous or pose other risks to human health? Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA area? Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel to) the RA area? | No No No No No No | life. (Planet Catfish, 2019) They are calm and gentle like all Auchenipterids - being surface feeders - they are particularly fond of insects and their larvae but can also feed on small fish that could fit in their mouth . (Planet Catfish, 2019) No data found The species are sensitive to water change and needs to be in their preferred water pH conditions and clean water at all times. (Planet Catfish, 2019) They are calm and gentle like all Auchenipterids - being surface feeders - they are particularly fond of insects and their larvae but can also feed on small fish that could fit in their mouth . (Planet Catfish, 2019) They are calm and gentle like all Auchenipterids - being surface feeders - they are particularly fond of insects and their larvae No data found No data found | High Low High High Low Low |

| | | | <u> </u> | | |
|------|---------|--|----------------|--|--------|
| 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 species are sensitive to water change and needs to be in their preferred water pH conditions and clean water at all times. (Planet Catfish, 2019) | High |
| | 4.11 | Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa? | No | in terms of general captive behaviour, this species doesn't resemble its congeners, but is more easily compared to the larger Auchenipterichthys and smaller ageneiosids. It's a very gentle species that glides through the water and never displays the hastiness which is so typical for other members of its genus. Moreover, the nape and the enlarged dorsal spine make it look more like an Ageneiosus or a Tetranematichthys. (Planet Catfish, | High |
| 25 | 4.12 | Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)? | No | The species are sensitive to water change and needs to be in their preferred water pH conditions and clean water at all times. (Planet Catfish, 2019) | High |
| 5. R | lesourc | e exploitation | | | |
| 26 | 5.01 | Is the taxon likely to consume threatened or protected native taxa in the RA area? | No | They are calm and gentle like all Auchenipterids - being surface feeders - they are particularly fond of insects and their larvae but can also feed on small fish that could fit in their mouth . (Planet Catfish, 2019) | Medium |
| 27 | 5.02 | Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area? | Yes | They are calm and gentle like all Auchenipterids - being surface feeders - they are particularly fond of insects and their larvae but can also feed on small fish that could fit in their mouth . (Planet Catfish, 2019) | High |
| 6. R | leprodu | ıction | 1 | | |
| | 6.01 | Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? | No | Has been recorded (see Reference notes below). Like other Auchenipterids these fish have internal fertilization. The bodies are wrapped around each other and to stay in position the male uses its barbels, dorsal spine and spawning tubercles. The actual mating lasts for about 30 seconds or less. Four weeks later the female lays her eggs. The parents will neither look after their eags. nor eat them. (Planet Catfish. 2019) | Medium |
| 29 | 6.02 | Is the taxon likely to produce viable gametes or propagules (in the RA area)? | Yes | Has been recorded (see Reference notes below). Like other Auchenipterids these fish have internal fertilization. The bodies are wrapped around each other and to stay in position the male uses its barbels, dorsal spine and spawning tubercles. The actual mating lasts for about 30 seconds or less. Four weeks later the female lays her eggs. The parents will neither look after their eggs, nor eat them. (Planet Catfish, 2019) | High |
| 30 | 6.03 | Is the taxon likely to hybridise naturally with native taxa? | Yes | Has been recorded (see Reference notes below). Like other Auchenipterids these fish have internal fertilization. The bodies are wrapped around each other and to stay in position the male uses its barbels, dorsal spine and spawning tubercles. The actual mating lasts for about 30 seconds or less. Four weeks later the female lays her eggs. The parents will neither look after their eggs, nor eat them. (Planet Catfish, 2019) | High |
| 31 | 6.04 | Is the taxon likely to be hermaphroditic or to display asexual reproduction? | Yes | Has been recorded (see Reference notes below). Like other Auchenipterids these fish have internal fertilization. The bodies are wrapped around each other and to stay in position the male uses its barbels, dorsal spine and spawning tubercles. The actual mating lasts for about 30 seconds or less. Four weeks later the female lays her eggs. The parents will neither look after their eggs, nor eat them. (Planet Catfish, 2019) | High |
| 32 | 6.05 | Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? | Yes | They are calm and gentle like all Auchenipterids - being surface feeders - they are particularly fond of insects and their larvae but can also feed on small fish that could fit in their mouth . (Planet Catfish, 2019) | High |
| | 6.06 | Is the taxon known (or likely) to produce a large number of propagules or offspring within a short time span (e.g. < 1 year)? | No | No propagule number found. (Planet catfish, 2019) | High |
| | 6.07 | How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? al mechanisms | Not applicable | The actual mating lasts for about 30 seconds or less. Four weeks later the female lays her eggs. The parents will neither look after their eggs, nor eat them. (Planet Catfish, 2019) | High |
| | 7.01 | How many potential internal | One | One pathways of dispersal is aquarium release. (Planet catfish, | High |
| | 7.02 | vectors/pathways could the taxon use to disperse within the RA area (with suitable Will any of these vectors/pathways bring the taxon in close proximity to one or more | Yes | 2019) If released in their typical water conditions. (Planet catfish, 2019) | High |
| | | protected areas (e.g. MCZ, MPA, SSSI)? | | | |
| 37 | 7.03 | Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? | Yes | around each other and to stay in position the male uses its barbels, dorsal spine and spawning tubercles. The actual mating lasts for about 30 seconds or less. Four weeks later the female lays her eggs. The parents will neither look after their eggs, nor eat them. (Planet Catfish, 2019) | 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 | around each other and to stay in position the male uses its barbels, dorsal spine and spawning tubercles. The actual mating lasts for about 30 seconds or less. Four weeks later the female lays her eggs. The parents will neither look after their eggs, nor eat them. (Planet Catfish, 2019) | 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 | around each other and to stay in position the male uses its barbels, dorsal spine and spawning tubercles. The actual mating lasts for about 30 seconds or less. Four weeks later the female lays her eggs. The parents will neither look after their eggs, nor eat them. (Planet Catfish, 2019) | High |

| 40 | 7.00 | | N | have the Wood Catfield lives in Transfeld dimension such as the DA | L li ala |
|------|---------|---|----------------|---|----------|
| 40 | 7.06 | Are older life stages of the taxon likely to migrate in the RA area for reproduction? | Yes | because the Wood Catfish lives in Tropical climates such as the RA Area. (Planet Catfish, 2019) | High |
| 41 | 7.07 | Are propagules or eggs of the taxon likely to | Yes | The actual mating lasts for about 30 seconds or less. Four weeks | High |
| 71 | /.0/ | be dispersed in the RA area by other animals? | 103 | later the female lays her eggs. The parents will neither look after | ingn |
| | | be dispersed in the KK area by other animals: | | their eggs, nor eat them. (Planet Catfish, 2019) | |
| 42 | 7.08 | Is dispersal of the taxon along any of the | Yes | The actual mating lasts for about 30 seconds or less. Four weeks | High |
| 12 | /.00 | vectors/pathways mentioned in the previous | 105 | later the female lays her eggs. The parents will neither look after | ingii |
| | | seven questions (35–41; i.e. either | | their eggs, nor eat them. (Planet Catfish, 2019) | |
| | | unintentional or intentional) likely to be | | then eggs, for eat them. (Hanet eathsh, 2019) | |
| 43 | 7.09 | Is dispersal of the taxon density dependent? | No | The actual mating lasts for about 30 seconds or less. Four weeks | High |
| | / 10 5 | | | later the female lays her eggs. The parents will neither look after | |
| | | | | their eggs, nor eat them. (Planet Catfish, 2019) | |
| 8. T | olerand | ce attributes | | | |
| 44 | 8.01 | Is the taxon able to withstand being out of | Not applicable | No data found | 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 | The species are sensitive to water change and needs to be in their | High |
| | | water quality conditions relevant to that | | preferred water pH conditions and clean water at all times. (Planet | |
| | | taxon? [In the Justification field, indicate the | | Catfish, 2019) | |
| | | relevant water quality variable(s) being | | | |
| 46 | 8.03 | Can the taxon be controlled or eradicated in | Not applicable | No data found | High |
| | | the wild with chemical, biological, or other | | | |
| | | agents/means? | | | |
| 47 | 8.04 | Is the taxon likely to tolerate or benefit from | No | No data found | Low |
| | | environmental/human disturbance? | | | |
| 48 | 8.05 | Is the taxon able to tolerate salinity levels | No | The species are sensitive to water change and needs to be in their | High |
| | | that are higher or lower than those found in | | preferred water pH conditions and clean water at all times. (Planet | |
| | | its usual environment? | | Catfish, 2019) | |
| 49 | 8.06 | Are there effective natural enemies | Yes | bigger taxa are natural enemies of these taxon. (Fishbase, 2019) | High |
| | | (predators) of the taxon present in the RA | | | |
| | | e change | _ | | _ |
| | 9.01 | change Under the predicted future climatic | Decrease | The species are sensitive to water change and needs to be in their | High |
| 50 | 9.01 | conditions, are the risks of entry into the RA | Decrease | preferred water pH conditions and clean water at all times. (Planet | riigii |
| | | | | | |
| | | area posed by the taxon likely to increase, decrease or not change? | | Catfish, 2019 | |
| 51 | 9.02 | Under the predicted future climatic | Decrease | The species are sensitive to water change and needs to be in their | High |
| 51 | 5.02 | conditions, are the risks of establishment | Decieuse | preferred water pH conditions and clean water at all times. (Planet | gii |
| | | posed by the taxon likely to increase, | | Catfish, 2019 | |
| | | decrease or not change? | | | |
| 52 | 9.03 | Under the predicted future climatic | Decrease | The species are sensitive to water change and needs to be in their | High |
| | | conditions, are the risks of dispersal within | | preferred water pH conditions and clean water at all times. (Planet | |
| | | the RA area posed by the taxon likely to | | Catfish, 2019 | |
| | | increase, decrease or not change? | | | |
| 53 | 9.04 | Under the predicted future climatic | Lower | The species are sensitive to water change and needs to be in their | Hiah |
| | | conditions, what is the likely magnitude of | | preferred water pH conditions and clean water at all times. (Planet | 5 |
| | | future potential impacts on biodiversity | | Catfish, 2019 | |
| | | and/or ecological integrity/status? | | | |
| 54 | 9.05 | Under the predicted future climatic | Lower | The species are sensitive to water change and needs to be in their | High |
| | | conditions, what is the likely magnitude of | | preferred water pH conditions and clean water at all times. (Planet | - |
| | | future potential impacts on ecosystem | | Catfish, 2019 | |
| | | structure and/or function? | | | |
| | 9.06 | Under the predicted future climatic | Lower | The species are sensitive to water change and needs to be in their | High |
| 55 | 1 | conditions, what is the likely magnitude of | | preferred water pH conditions and clean water at all times. (Planet | - |
| 55 | | conditions, what is the likely magnitude of | | | |
| 55 | | future potential impacts on ecosystem | | Catfish, 2019 | |
| 55 | | | | | |

| Statistics | |
|--|-------------|
| Scores | |
| BRA | 15.5 |
| BRA Outcome | Medium |
| BRA+CCA | 3.5 |
| BRA+CCA Outcome | Medium |
| Score partition | |
| A. Biogeography/Historical | 6.5 |
| 1. Domestication/Cultivation | 2.0 |
| 2. Climate, distribution and introduction risk | 3.0 |
| 3. Invasive elsewhere | 1.5 |
| B. Biology/Ecology | 9.0 |
| 4. Undesirable (or persistence) traits | 0.0 |
| 5. Resource exploitation | 2.0 |
| 6. Reproduction | 2.0 |
| 7. Dispersal mechanisms | 7.0 |
| 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 | 2 |
|---------------------------------------|------|
| 6. Reproduction | 7 |
| 7. Dispersal mechanisms | 9 |
| 8. Tolerance attributes | 6 |
| C. Climate change | 6 |
| 9. Climate change | 6 |
| Sectors affected | |
| Commercial | 5 |
| Environmental | -3 |
| Species or population nuisance traits | 7 |
| | |
| Thresholds | |
| BRA | 34.5 |
| BRA+CCA | 34.5 |
| | |
| Confidence | |

| Confidence | |
|---------------|--------------|
| BRA+CCA | 0.63 |
| BRA | 0.62 |
| CCA | 0.75 |
| | |
| Date and Time | |
| 07/07/2 | 020 15:48:46 |

| Taxon and Assessor details | |
|------------------------------------|--|
| Category | Fishes and Lampreys (freshwater) |
| Taxon name | Trichopodus pectoralis |
| Common name | snakeskin gourami |
| Assessor | Gilles |
| Risk screening context | |
| Reason and socio-economic benefits | Aquaculture: commercial |
| Risk assessment area | Lake Taal |
| Taxonomy | Actinopteri (ray-finned fishes) > Anabantiformes (Gouramies, snakeheads) > Osphronemidae |
| Native range | Asia: Mekong basin in Laos, Thailand, Cambodia and Vietnam; also Chao Phraya basin |
| Introduced range | Introduced elsewhere and at least one country reports adverse ecological impact after introduction |
| URL | https://www.fishbase.se/summary/Trichopodus-pectoralis.html |

| | | | Response | Justification (references and/or other information) | Confidence |
|-----------------|------|---|----------|--|------------|
| | | graphy/Historical | | | |
| <i>1.1</i> 1 | | <i>ication/Cultivation</i> Has the taxon been the subject of | Yes | Responses to mass selection in a domesticated population of | Very high |
| 1 | 1.01 | domestication (or cultivation) for at least 20 | Tes | snakeskin gourami, Trichopodus pectoralis, Regan 1910, and | very nigh |
| | | generations? | | confounding effects from stocking densities | |
| 2 | 1.02 | Is the taxon harvested in the wild and likely | Yes | A study by Hails and Abdullah (1982) stated that this fish species | Very high |
| | | to be sold or used in its live form? | | are abundant because of its economic factor as a food source. | -, 5 |
| | | | | Also, numerous studies confirm that T. pectoralis are sold as | |
| | | | | ornamental and food fish in the market | |
| 3 | 1.03 | Does the taxon have invasive races, | Yes | Snakeskin Gourami (Trichopodus pectoralis) Ecological Risk | Very high |
| | | varieties, sub-taxa or congeners? | | Screening Summary U.S. Fish & Wildlife Service, June 2014 | |
| | | | | Revised, December 2017 Web Version, 9/11/2019 | |
| | 1 | , distribution and introduction risk | | | |
| 4 | 2.01 | How similar are the climatic conditions of the | Medium | The climatch resulted in a value of 7 which is medium in terms of | Very high |
| | | Risk Assessment (RA) area and the taxon's | | similarity | |
| 5 | 2.02 | native range? What is the quality of the climate matching | High | The only station from the target region is from the region of | Very high |
| э | 2.02 | data? | підп | , | very nign |
| 6 | 2.03 | Is the taxon already present outside of | Yes | Sablayan, Occidental Mindoro, which is distant from the RA area Based on Labatos' (2012) study, T. pectoralis in 1 of the | Very high |
| ĭ | 2.05 | captivity in the RA area? | | tributaries of Lake Taal and in nearby rivers. | . cry mgn |
| 7 | 2.04 | How many potential vectors could the taxon | >1 | The only recorded potential vector for T. pectoralis is uninentional | Very high |
| | | use to enter in the RA area? | | through tributaries river (Labatos, 2012) | , , , |
| 8 | 2.05 | Is the taxon currently found in close | Yes | History of the biodiversity and limno-ecological studies on Lake | Very high |
| 1 | | proximity to, and likely to enter into, the RA | | Taal with notes on the current state of Philippine limnology (Papa | |
| 1 | | area in the near future (e.g. unintentional | | & Mamaril, 2011) | |
| | | and intentional introductions)? | | | |
| <i>3.</i> 1 | | e elsewhere | Vec | Deced on Eichbace, there have have been recently of Theorem 11. (| Vom bich |
| 9 | 3.01 | Has the taxon become naturalised (established viable populations) outside its | Yes | Based on Fishbase, there have been records of T. pectoralis from 1950-1965 therefore have been able to establish viable population | Very high |
| | 1 | native range? | | outside its native ranges | |
| 10 | 3.02 | In the taxon's introduced range, are there | Yes | "It is difficult to gauge the impact this species has had on the | Very high |
| Ĩ | 5.52 | known adverse impacts to wild stocks or | | environment [in Malaysia]. Soong (1948) maintained that this | , |
| | 1 | commercial taxa? | | species has had no deleterious effect on other rice-field fishes, | |
| | | | | especially the climbing perch (Anabas testudineus), the | |
| | 1 | | | snakehead (Channa striata) and catfish (Clarias spp.). However, it | |
| | 1 | | | is certain that the indigenous Trichogaster trichopterus has been | |
| | 1 | | | displaced, at least to some extent, since both have similar feeding | |
| | | | | habits and occupy the same niche in the paddy field ecosystem." | |
| 11 | 3.03 | In the taxon's introduced range, are there | No | Snakeskin Gourami (Trichopodus pectoralis) Ecological Risk | High |
| | 1 | known adverse impacts to aquaculture? | | Screening Summary U.S. Fish & Wildlife Service, June 2014 | |
| 12 | 3.04 | In the taxon's introduced range, are there | No | Revised, December 2017 Web Version, 9/11/2019 | High |
| 12 | 5.04 | In the taxon's introduced range, are there known adverse impacts to ecosystem | NU | Snakeskin Gourami (Trichopodus pectoralis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, June 2014 | High |
| | 1 | services? | | Revised, December 2017 Web Version, 9/11/2019 | |
| 13 | 3.05 | In the taxon's introduced range, are there | No | There are no studies implying adverse effects of T. pectoralis to | High |
| Ē | 5.05 | known adverse socio-economic impacts? | | aquaculture. In fact, many studies have stated how beneficial the | |
| | | | | fish species are to its economic value | |
| | | y/Ecology | | | |
| | | able (or persistence) traits | | | |
| 14 | 4.01 | Is it likely that the taxon will be poisonous or | No | There are no studies implying adverse effects of T. pectoralis to | High |
| 1 | 1 | pose other risks to human health? | | aquaculture. In fact, many studies have stated how beneficial the | |
| | 1 | | | fish species are for culturing due to its high quality meat, and is | |
| 15 | 4.02 | Is it likely that the taxon will smother and an | No | cultured ornamentally and as food (Fishbase) | High |
| 12 | 4.02 | Is it likely that the taxon will smother one or more native taxa (that are not threatened or | INU | There are no studies suggesting that T. pectoralis is able to supress the growth of other taxa. Snakeskin Gourami | High |
| | 1 | protected)? | | (Trichopodus pectoralis) Ecological Risk Screening Summary U.S. | |
| | 1 | | | Fish & Wildlife Service, June 2014 Revised, December 2017 Web | |
| 16 | 4.03 | Are there any threatened or protected taxa | No | There are no studies in the RA suggesting the parasitism or | High |
| | | that the non-native taxon would parasitise in | | predator behavior of T. pectoralis. Also, fishbase states that it | |
| | | the RA area? | | feeds on aquatic plants therefore not a threat to other taxa. | |
| 17 | 4.04 | Is the taxon adaptable in terms of climatic | Yes | There no studies suggesting the highly adaptive mechanism of T. | High |
| | 1 | and other environmental conditions, thus | | pectoralis to different climatic and environmental conditions. In | |
| | | enhancing its potential persistence if it has | | fact, a study by Setijaningsih et al. (2018) shows the optimum | |
| | | invaded or could invade the RA area? | | values of T. pectoralis at which it grows. | |
| 18 | 4.05 | Is the taxon likely to disrupt food-web | Yes | In an online invasiveness database (CABI.org) it was stated that | High |
| | 1 | structure/function in aquatic ecosystems if it | | one of the ecological impacts of T. pectoralis includes alteration of | |
| | 1 | has invaded or is likely to invade the RA | | food webs. However, this is an international database and does | |
| I | I | area? | 1 | not represent the food web of the RA area | |

| 10 | | | | | |
|---|--|---|-----------------|---|--|
| 19 | 4.06 | Is the taxon likely to exert adverse impacts | No | There are no existing studies regarding the adverse effect of T. | High |
| | | on ecosystem services in the RA area? | | pectoralis on the ecosystem services of the RA areaSnakeskin Gourami (Trichopodus pectoralis) Ecological Risk Screening | |
| | | | | Summary U.S. Fish & Wildlife Service, June 2014 Revised, | |
| | | | | December 2017 Web Version, 9/11/2019 | |
| 20 | 4.07 | Is it likely that the taxon will host, and/or | No | There are no existing studies regarding the potential hosting of T. | High |
| | | act as a vector for, recognised pests and | | pectoralis on endemic pests and agents in the RA area Snakeskin | |
| | | infectious agents that are endemic in the RA | | Gourami (Trichopodus pectoralis) Ecological Risk Screening | |
| | | area? | | Summary U.S. Fish & Wildlife Service, June 2014 Revised, December 2017 Web Version, 9/11/2019 | |
| 21 | 4.08 | Is it likely that the taxon will host, and/or | Yes | A study by Dinh-Hung et al. (2022) shows how T. pectoralis is a | Very high |
| | | act as a vector for, recognised pests and | | carrier of a lethal pathogen, Streptococcus suis | |
| | | infectious agents that are absent from (novel | | | |
| 22 | 4.09 | to) the RA area? Is it likely that the taxon will achieve a body | No | Max length : 25.0 cm TL male/unsexed; common length : 15.0 cm | Very high |
| | | size that will make it more likely to be | | TL male/unsexed);published weight: 500.00 g FishBase 2020 | , |
| | | released from captivity? | | | |
| 23 | 4.10 | Is the taxon capable of sustaining itself in a | No | Based on fishbase, this fish species are only found in sluggish/ | High |
| | | range of water velocity conditions (e.g. versatile in habitat use)? | | standing waters. This statement was also used in the study by Suryaningshi et al. (2018) | |
| | | | | https://www.fishbase.se/summary/Trichopodus-pectoralis.html | |
| 24 | 4.11 | Is it likely that the taxon's mode of existence | No | There are no studies suggesting the adverse effects of T. | High |
| | | (e.g. excretion of by-products) or behaviours | | pectoralis and its mode of existence. | |
| | | (e.g. feeding) will reduce habitat quality for | | https://www.fishbase.se/summary/Trichopodus-pectoralis.html | |
| 25 | 4.12 | native taxa? Is the taxon likely to maintain a viable | No | No. although a study by Herder et al., 2012 mentioned that T. | Very high |
| | 7.12 | population even when present in low | | pectoralis are known to inhabit shallow habitats with dense | Cry mgn |
| | | densities (or persisting in adverse conditions | | vegetation, there is no evidence that mentions that the species | |
| | | by way of a dormant form)? | | can persist even when present in low densities | |
| 5 ' | 2050 | | | https://www.fishbase.se/summary/Trichopodus-pectoralis.html | l |
| | | ce exploitation Is the taxon likely to consume threatened or | No | This fish species are recorded to feed on plants, detritus, and | High |
| | | protected native taxa in the RA area? | | zooplankton (fishbase) therefore are not likely to consume | - |
| | | | | threatend or protected taxa in the RA area. | |
| 7 | 5.02 | Is the taxon likely to sequester food | No | https://www.fishbase.se/summary/Trichopodus-pectoralis.html | High |
| 27 | 5.02 | resources (including nutrients) to the | NO | No, however, studies have shown that the introduced t. Pectoralis are likely to sequester food resources that could possibly harm | High |
| | | detriment of native taxa in the RA area? | | indigenous fishes. But in terms of this in the RA area, there are no | |
| | | | | studies that mentions | |
| 6 | | | | this.https://www.fishbase.se/summary/Trichopodus- | |
| | R <u>eprodu</u> 6.01 | Is the taxon likely to exhibit parental care | Yes | Yes, according to Robison (1971), T. pectoralis exhibit parental | High |
| 2 | | and/or to reduce age-at-maturity in response | | care but female fishes take no active part in parental care, instead | |
| | | to environmental conditions? | 1 | they remain fair from the nest and the male fishes. Snakeskin | 1 |
| | | | | | |
| | | | | Gourami (Trichopodus pectoralis) Ecological Risk Screening | |
| | | | | Gourami (Trichopodus pectoralis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, June 2014 Revised, | |
| 29 | 6.02 | Is the taxon likely to produce viable gametes | No | Gourami (Trichopodus pectoralis) Ecological Risk Screening | High |
| 29 | 6.02 | | No | Gourami (Trichopodus pectoralis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, June 2014 Revised, December 2017 Web Version, 9/11/2019 No because there are no studies of reproduction of t. Pectoralis in the RA area. However, in terms of its breeding patterns, | High |
| 29 | 6.02 | Is the taxon likely to produce viable gametes | No | Gourami (Trichopodus pectoralis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, June 2014 Revised, December 2017 Web Version, 9/11/2019 No because there are no studies of reproduction of t. Pectoralis in the RA area. However, in terms of its breeding patterns, trichopodus species all follow a generally similar pattern of | High |
| 29 | 6.02 | Is the taxon likely to produce viable gametes | No | Gourami (Trichopodus pectoralis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, June 2014 Revised, December 2017 Web Version, 9/11/2019 No because there are no studies of reproduction of t. Pectoralis in the RA area. However, in terms of its breeding patterns, trichopodus species all follow a generally similar pattern of breeding and it its quite effective that they are sexually isolated | High |
| | | Is the taxon likely to produce viable gametes or propagules (in the RA area)? | No | Gourami (Trichopodus pectoralis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, June 2014 Revised, December 2017 Web Version, 9/11/2019 No because there are no studies of reproduction of t. Pectoralis in the RA area. However, in terms of its breeding patterns, trichopodus species all follow a generally similar pattern of breeding and it its quite effective that they are sexually isolated even when breeding in the same tank. | |
| | 6.02 | Is the taxon likely to produce viable gametes | | Gourami (Trichopodus pectoralis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, June 2014 Revised, December 2017 Web Version, 9/11/2019 No because there are no studies of reproduction of t. Pectoralis in the RA area. However, in terms of its breeding patterns, trichopodus species all follow a generally similar pattern of breeding and it its quite effective that they are sexually isolated | High |
| | | Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with | | Gourami (Trichopodus pectoralis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, June 2014 Revised, December 2017 Web Version, 9/11/2019 No because there are no studies of reproduction of t. Pectoralis in the RA area. However, in terms of its breeding patterns, trichopodus species all follow a generally similar pattern of breeding and it its quite effective that they are sexually isolated even when breeding in the same tank. No, there are no studies about hybrids of t. Pectoralis with other native taxa. Snakeskin Gourami (Trichopodus pectoralis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, | |
| 30 | 6.03 | 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 | Gourami (Trichopodus pectoralis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, June 2014 Revised, December 2017 Web Version, 9/11/2019 No because there are no studies of reproduction of t. Pectoralis in the RA area. However, in terms of its breeding patterns, trichopodus species all follow a generally similar pattern of breeding and it its quite effective that they are sexually isolated even when breeding in the same tank. No, there are no studies about hybrids of t. Pectoralis with other native taxa. Snakeskin Gourami (Trichopodus pectoralis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, June 2014 Revised, December 2017 Web Version, 9/11/2019 | High |
| 30 | | 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 | | Gourami (Trichopodus pectoralis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, June 2014 Revised, December 2017 Web Version, 9/11/2019 No because there are no studies of reproduction of t. Pectoralis in the RA area. However, in terms of its breeding patterns, trichopodus species all follow a generally similar pattern of breeding and it its quite effective that they are sexually isolated even when breeding in the same tank. No, there are no studies about hybrids of t. Pectoralis with other native taxa. Snakeskin Gourami (Trichopodus pectoralis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, June 2014 Revised, December 2017 Web Version, 9/11/2019 There are no studies suggesting the herrmaphroditism of T. | |
| 30 | 6.03 | 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 | Gourami (Trichopodus pectoralis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, June 2014 Revised, December 2017 Web Version, 9/11/2019 No because there are no studies of reproduction of t. Pectoralis in the RA area. However, in terms of its breeding patterns, trichopodus species all follow a generally similar pattern of breeding and it its quite effective that they are sexually isolated even when breeding in the same tank. No, there are no studies about hybrids of t. Pectoralis with other native taxa. Snakeskin Gourami (Trichopodus pectoralis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, June 2014 Revised, December 2017 Web Version, 9/11/2019 There are no studies suggesting the hermaphroditism of T. pectoralis, in fact the fish species exhibits sexual dimorphism | High |
| 30 | 6.03 | Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to | No | Gourami (Trichopodus pectoralis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, June 2014 Revised, December 2017 Web Version, 9/11/2019 No because there are no studies of reproduction of t. Pectoralis in the RA area. However, in terms of its breeding patterns, trichopodus species all follow a generally similar pattern of breeding and it its quite effective that they are sexually isolated even when breeding in the same tank. No, there are no studies about hybrids of t. Pectoralis with other native taxa. Snakeskin Gourami (Trichopodus pectoralis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, June 2014 Revised, December 2017 Web Version, 9/11/2019 There are no studies suggesting the herrmaphroditism of T. | High |
| 30 | 6.03 | Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction? | No | Gourami (Trichopodus pectoralis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, June 2014 Revised, December 2017 Web Version, 9/11/2019 No because there are no studies of reproduction of t. Pectoralis in the RA area. However, in terms of its breeding patterns, trichopodus species all follow a generally similar pattern of breeding and it its quite effective that they are sexually isolated even when breeding in the same tank. No, there are no studies about hybrids of t. Pectoralis with other native taxa. Snakeskin Gourami (Trichopodus pectoralis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, June 2014 Revised, December 2017 Web Version, 9/11/2019 There are no studies suggesting the herrmaphroditism of T. pectoralis, in fact the fish species exhibits sexual dimorphism Snakeskin Gourami (Trichopodus pectoralis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, June 2014 Revised, December 2017 Web Version, 9/11/2019 | High |
| 30 | 6.03 | 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 | Gourami (Trichopodus pectoralis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, June 2014 Revised, December 2017 Web Version, 9/11/2019 No because there are no studies of reproduction of t. Pectoralis in the RA area. However, in terms of its breeding patterns, trichopodus species all follow a generally similar pattern of breeding and it its quite effective that they are sexually isolated even when breeding in the same tank. No, there are no studies about hybrids of t. Pectoralis with other native taxa. Snakeskin Gourami (Trichopodus pectoralis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, June 2014 Revised, December 2017 Web Version, 9/11/2019 There are no studies suggesting the herrmaphroditism of T. pectoralis, in fact the fish species exhibits sexual dimorphism Snakeskin Gourami (Trichopodus pectoralis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, June 2014 Revised, December 2017 Web Version, 9/11/2019 There are no records suggesting the dependence of T. pectoralis | High |
| 30 | 6.03 | Is the taxon likely to produce viable gametes or propagules (in the RA area)? Is the taxon likely to hybridise naturally with native taxa? Is the taxon likely to be hermaphroditic or to display asexual reproduction? Is the taxon dependent on the presence of another taxon (or specific habitat features) | No | Gourami (Trichopodus pectoralis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, June 2014 Revised, December 2017 Web Version, 9/11/2019 No because there are no studies of reproduction of t. Pectoralis in the RA area. However, in terms of its breeding patterns, trichopodus species all follow a generally similar pattern of breeding and it its quite effective that they are sexually isolated even when breeding in the same tank. No, there are no studies about hybrids of t. Pectoralis with other native taxa. Snakeskin Gourami (Trichopodus pectoralis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, June 2014 Revised, December 2017 Web Version, 9/11/2019 There are no studies suggesting the hermaphroditism of T. pectoralis, in fact the fish species exhibits sexual dimorphism Snakeskin Gourami (Trichopodus pectoralis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, June 2014 Revised, December 2017 Web Version, 9/11/2019 There are no records suggesting the dependence of T. pectoralis on the presence of another taxa. Snakeskin Gourami (Trichopodus | High |
| 30 | 6.03 | 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 | Gourami (Trichopodus pectoralis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, June 2014 Revised, December 2017 Web Version, 9/11/2019 No because there are no studies of reproduction of t. Pectoralis in the RA area. However, in terms of its breeding patterns, trichopodus species all follow a generally similar pattern of breeding and it its quite effective that they are sexually isolated even when breeding in the same tank. No, there are no studies about hybrids of t. Pectoralis with other native taxa. Snakeskin Gourami (Trichopodus pectoralis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, June 2014 Revised, December 2017 Web Version, 9/11/2019 There are no studies suggesting the herrmaphroditism of T. pectoralis, in fact the fish species exhibits sexual dimorphism Snakeskin Gourami (Trichopodus pectoralis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, June 2014 Revised, December 2017 Web Version, 9/11/2019 There are no records suggesting the dependence of T. pectoralis | High |
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| 30 31 33 34 35 | 6.03 6.04 6.05 6.06 6.07 7.01 | 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 habitats nearby)? Will any of these vectors/pathways bring the taxon in close proximity to one or more | No No Yes 1 >1 | Gourami (Trichopodus pectoralis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, June 2014 Revised, December 2017 Web Version. 9/11/2019 No because there are no studies of reproduction of t. Pectoralis in the RA area. However, in terms of its breeding patterns, trichopodus species all follow a generally similar pattern of breeding and it its quite effective that they are sexually isolated even when breeding in the same tank. No, there are no studies about hybrids of t. Pectoralis with other native taxa. Snakeskin Gourami (Trichopodus pectoralis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, June 2014 Revised, December 2017 Web Version, 9/11/2019 There are no studies suggesting the hermaphroditism of T. pectoralis, in fact the fish species exhibits sexual dimorphism Snakeskin Gourami (Trichopodus pectoralis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, June 2014 Revised, December 2017 Web Version, 9/11/2019 There are no records suggesting the dependence of T. pectoralis on the presence of another taxa. Snakeskin Gourami (Trichopodus pectoralis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, June 2014 Revised, December 2017 Web Version, Based on fishbase, the fecundity of T. pectoralis is at 1000 min - 10,000 max Snakeskin Gourami (Trichopodus pectoralis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, June 2014 Revised, December 2017 Web Version, 9/11/2019 Based on Panthum et al. (2021), mature sex organs can be seen in T. pectorals after a year. In a study by Papa & Mamaril (2012), 2 tributaries from Taal Naujan were positive with the presence of T. pectoralis. Namely, Malbog River and Subaan River. This may mean that from the 2 tributaries, all of them may be considered as potential pathways that the T. pectoralis could probably be used in its dispersal within Yes. From the 2 tributaries mentioned, all of them are surrounding taal lake or the RA area. With the T. pectoralis being an | High High High Very high Very high |
| 30 31 32 33 34 7. <i>1</i> 35 | 6.03 6.04 6.05 6.06 6.07 7.01 | 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 habitats nearby)? Will any of these vectors/pathways bring the | No No Yes 1 >1 | Gourami (Trichopodus pectoralis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, June 2014 Revised, December 2017 Web Version. 9/11/2019 No because there are no studies of reproduction of t. Pectoralis in the RA area. However, in terms of its breeding patterns, trichopodus species all follow a generally similar pattern of breeding and it its quite effective that they are sexually isolated even when breeding in the same tank. No, there are no studies about hybrids of t. Pectoralis with other native taxa. Snakeskin Gourami (Trichopodus pectoralis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, June 2014 Revised, December 2017 Web Version, 9/11/2019 There are no studies suggesting the hermaphroditism of T. pectoralis, in fact the fish species exhibits sexual dimorphism Snakeskin Gourami (Trichopodus pectoralis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, June 2014 Revised, December 2017 Web Version, 9/11/2019 There are no records suggesting the dependence of T. pectoralis on the presence of another taxa. Snakeskin Gourami (Trichopodus pectoralis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, June 2014 Revised, December 2017 Web Version, Based on fishbase, the fecundity of T. pectoralis is at 1000 min - 10,000 max Snakeskin Gourami (Trichopodus pectoralis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, June 2014 Revised, December 2017 Web Version, 9/11/2019 Based on Panthum et al. (2021), mature sex organs can be seen in T. pectorals after a year. | High High High Very high Very high |
| 30 31 32 33 34 7. <i>1</i> 35 | 6.03 6.04 6.05 6.06 6.07 7.01 | 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 habitats nearby)? Will any of these vectors/pathways bring the taxon in close proximity to one or more | No No Yes 1 >1 | Gourami (Trichopodus pectoralis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, June 2014 Revised, December 2017 Web Version. 9/11/2019 No because there are no studies of reproduction of t. Pectoralis in the RA area. However, in terms of its breeding patterns, trichopodus species all follow a generally similar pattern of breeding and it its quite effective that they are sexually isolated even when breeding in the same tank. No, there are no studies about hybrids of t. Pectoralis with other native taxa. Snakeskin Gourami (Trichopodus pectoralis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, June 2014 Revised, December 2017 Web Version, 9/11/2019 There are no studies suggesting the hermaphroditism of T. pectoralis, in fact the fish species exhibits sexual dimorphism Snakeskin Gourami (Trichopodus pectoralis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, June 2014 Revised, December 2017 Web Version, 9/11/2019 There are no records suggesting the dependence of T. pectoralis on the presence of another taxa. Snakeskin Gourami (Trichopodus pectoralis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, June 2014 Revised, December 2017 Web Version, Based on fishbase, the fecundity of T. pectoralis is at 1000 min - 10,000 max Snakeskin Gourami (Trichopodus pectoralis) Ecological Risk Screening Summary U.S. Fish & Wildlife Service, June 2014 Revised, December 2017 Web Version, 9/11/2019 Based on Panthum et al. (2021), mature sex organs can be seen in T. pectorals after a year. In a study by Papa & Mamaril (2012), 2 tributaries from Taal Naujan were positive with the presence of T. pectoralis. Namely, Malbog River and Subaan River. This may mean that from the 2 tributaries, all of them may be considered as potential pathways that the T. pectoralis could probably be used in its dispersal within Yes. From the 2 tributaries mentioned, all of them are surrounding taal lake or the RA area. With the T. pectoralis being an | High High High Very high Very high |

| 37 | 7.03 | Does the taxon have a means of actively | No | | High |
|------|---------|--|----------------|---|------------------------|
| | | attaching itself to hard substrata (e.g. ship | | to hard substrata. Snakeskin Gourami (Trichopodus pectoralis) | |
| | | hulls, pilings, buoys) such that it enhances | | Ecological Risk Screening Summary U.S. Fish & Wildlife Service, | |
| 20 | 7.04 | the likelihood of dispersal? Is natural dispersal of the taxon likely to | No | June 2014 Revised, December 2017 Web Version, 9/11/2019 No, although there are studies that are not in the RA area that | High |
| 20 | 7.04 | occur as eggs (for animals) or as propagules | NO | mentioned that the eggs of t. Pectoralis were dispersed over the | nign |
| | | (for plants: seeds, spores) in the RA area? | | water surface (Degani, n.d.) | |
| 39 | 7.05 | Is natural dispersal of the taxon likely to | No | No. there are no studies about dispersal of t. Pectoralis as larvae | High |
| | | occur as larvae/juveniles (for animals) or as | | in the RA area. | |
| | | fragments/seedlings (for plants) in the RA | | | |
| | | area? | | | |
| 40 | 7.06 | Are older life stages of the taxon likely to | Yes | Most likely, yes, according to Heckman (1979), adult T. pectoralis | Very high |
| | | migrate in the RA area for reproduction? | | tend to nest in shallow waters but generally prefer deep waters. | |
| 41 | 7.07 | Are propagules or eggs of the taxon likely to | No | No. the eggs of t. Pectoralis are more likely to float on water | High |
| | | be dispersed in the RA area by other animals? | | rather than being dispersed by animals. Snakeskin Gourami (Trichopodus pectoralis) Ecological Risk Screening Summary U.S. | |
| | | | | Fish & Wildlife Service, June 2014 Revised, December 2017 Web | |
| 42 | 7.08 | Is dispersal of the taxon along any of the | No | Based from Santos et al ' study in the RA area and according to | High |
| | | vectors/pathways mentioned in the previous | | previous answers that mentions the tributaries, most likely the | |
| | | seven questions (35-41; i.e. either | | dispersal of the T. pectoralis from any of the pathways can be | |
| | | unintentional or intentional) likely to be | | rapid, considering that they are found near/within the area of Lake | |
| 43 | 7.09 | Is dispersal of the taxon density dependent? | No | No. There was no evidence of the species spreading out when its | High |
| 0 7 | Tala | | l | population increases. | |
| | | <i>ce attributes</i> Is the taxon able to withstand being out of | No | No. There are no studies about t. Pectoralis withstanding being | Very high |
| 7.7 | 5.01 | water for extended periods (e.g. minimum of | | out of water Snakeskin Gourami (Trichopodus pectoralis) | very night |
| | | one or more hours) at some stage of its life | | Ecological Risk Screening Summary U.S. Fish & Wildlife Service, | |
| | | cvcle? | | June 2014 Revised, December 2017 Web Version, 9/11/2019 | |
| 45 | 8.02 | Is the taxon tolerant of a wide range of | Yes | Yes, according to Yanagitsuru et al., 2019, t. Pectoralis is highly | Very high |
| | | water quality conditions relevant to that | | adapted to tolerate low pH. | |
| | | taxon? [In the Justification field, indicate the | | | |
| 16 | 8.03 | relevant water quality variable(s) being | Not applicable | no data | Medium |
| 40 | 0.05 | Can the taxon be controlled or eradicated in the wild with chemical, biological, or other | Not applicable | | Medium |
| | | agents/means? | | | |
| 47 | 8.04 | Is the taxon likely to tolerate or benefit from | No | No, . according to Ahmadi (2021), t. Pectoralis can be found | Very high |
| | | environmental/human disturbance? | | occasionally in running waters as well as impounded and man | |
| | | | | made water bodies but it does not tolerate polluted watters | |
| 48 | 8.05 | Is the taxon able to tolerate salinity levels | Yes | A study by Setijaningsih (2019) shows the optimal salinity level of | Very high |
| | | that are higher or lower than those found in its usual environment? | | 3 g/L for Trichopodus pectoralis which stabilizes the blood levels, preventing stress | |
| 49 | 8.06 | Are there effective natural enemies | Not applicable | | Low |
| | 0.00 | (predators) of the taxon present in the RA | not applicable | | 2011 |
| C. (| Climate | e change | | | |
| | | change | r | | r |
| 50 | 9.01 | Under the predicted future climatic | Increase | study by Tolentino et al. (2016) shows the projected increase of | High |
| | | conditions, are the risks of entry into the RA | | water in the rivers in the Philippines due to climate change. | |
| | | area posed by the taxon likely to increase, decrease or not change? | | Increased water levels will allow an easier migration of this fish species. | |
| 51 | 9.02 | Under the predicted future climatic | Decrease | Based on a database by CABI, the max temperature for the | Very high |
| | 5.52 | conditions, are the risks of establishment | | reproduction of T. pectoralis is 29 degrees celsius. Because of | , |
| | | posed by the taxon likely to increase, | | global warming, we expect the temperature of the lake to increase | |
| | | decrease or not change? | | therefore pose a threat to its reproduction | |
| 52 | 9.03 | Under the predicted future climatic | No change | There are no evidences of how future climatic conditions will | High |
| | | conditions, are the risks of dispersal within | | affect the dispersal in the RA area. However, impact of climate | |
| | 1 | the RA area posed by the taxon likely to | | change in the Philippines might affect in the future. | |
| | | incrosco docrosco or net change? | | | |
| 53 | 9.04 | increase, decrease or not change? | No change | There are no evidences/studies that shows the effect of future | Very high |
| 53 | 9.04 | Under the predicted future climatic | No change | There are no evidences/studies that shows the effect of future climatic conditions to the potential impacts on biodiversity and | Very high |
| 53 | 9.04 | | No change | There are no evidences/studies that shows the effect of future climatic conditions to the potential impacts on biodiversity and ecological integrity | Very high |
| | | Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? | _ | climatic conditions to the potential impacts on biodiversity and ecological integrity | Very high |
| | 9.04 | Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic | _ | climatic conditions to the potential impacts on biodiversity and ecological integrity There are no evidences/studies that shows the effect of future | Very high Very high |
| | | Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of | _ | climatic conditions to the potential impacts on biodiversity and ecological integrity | |
| | | 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 | _ | climatic conditions to the potential impacts on biodiversity and ecological integrity There are no evidences/studies that shows the effect of future | |
| 54 | 9.05 | 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? | Not applicable | climatic conditions to the potential impacts on biodiversity and ecological integrity There are no evidences/studies that shows the effect of future climatic conditions to the potential impacts on ecosystem structure | Very high |
| 54 | | 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 | Not applicable | climatic conditions to the potential impacts on biodiversity and ecological integrity There are no evidences/studies that shows the effect of future climatic conditions to the potential impacts on ecosystem structure There are no evidences/studies that shows the effect of future | |
| 54 | 9.05 | 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 | Not applicable | climatic conditions to the potential impacts on biodiversity and ecological integrity There are no evidences/studies that shows the effect of future climatic conditions to the potential impacts on ecosystem structure | Very high |
| 54 | 9.05 | 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 | Not applicable | climatic conditions to the potential impacts on biodiversity and ecological integrity There are no evidences/studies that shows the effect of future climatic conditions to the potential impacts on ecosystem structure There are no evidences/studies that shows the effect of future | Very high |

| Statistics | |
|--|--------|
| Scores | |
| BRA | 16.0 |
| BRA Outcome | Medium |
| BRA+CCA | 16.0 |
| BRA+CCA Outcome | Medium |
| Score partition | |
| A. Biogeography/Historical | 11.0 |
| 1. Domestication/Cultivation | 4.0 |
| 2. Climate, distribution and introduction risk | 4.0 |
| 3. Invasive elsewhere | 3.0 |
| B. Biology/Ecology | 5.0 |
| 4. Undesirable (or persistence) traits | 3.0 |
| 5. Resource exploitation | 0.0 |
| 6. Reproduction | 2.0 |

| 7. Dispersal mechanisms | -1.0 |
|--|------------------|
| 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 | 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 | 2 7 9 6 |
| 8. Tolerance attributes | 6 |
| C. Climate change | 6 |
| 9. Climate change | 6 |
| Sectors affected | |
| Commercial | 10 |
| Environmental | 2 |
| Species or population nuisance traits | 10 |
| | |
| Thresholds | |
| BRA | 34.5 |
| BRA+CCA | 34.5 |
| Confidence | |

| Confidence | |
|---------------|------|
| BRA+CCA | 0.85 |
| BRA | 0.85 |
| CCA | 0.88 |
| | |
| Date and Time | |

. 12/02/2023 20:19:04

| Taxon and Assessor details | |
|------------------------------------|----------------------------------|
| Category | Fishes and Lampreys (freshwater) |
| Taxon name | Trichopodus trichopterus |
| Common name | three spot gourami |
| Assessor | Gilles, Pavia |
| Risk screening context | |
| Reason and socio-economic benefits | Ornamental |
| Risk assessment area | Lake Taal |
| Taxonomy | |
| Native range | |
| Introduced range | |
| URL | |

| | | | Response | Justification (references and/or other information) | Confidence |
|-----|---------|---|----------------|---|------------|
| | | ography/Historical | | | _ |
| | | tication/Cultivation | Voc | Voc it was stated in fishbase that this fish species are estimated | High |
| | 1.01 | Has the taxon been the subject of | Yes | Yes, it was stated in fishbase that this fish species are commonly | High |
| | | domestication (or cultivation) for at least 20 | | seen in the aquarium fish trade | |
| | | generations? | | https://www.fishbase.de/Introductions/IntroductionsList.php?ID=4 | |
| | | | | 675&GenusName=Trichopodus&SpeciesName=trichopterus&fc=429 | |
| | | | | &StockCode=4893 | |
| | 1.02 | Is the taxon harvested in the wild and likely | Yes | Yes, fishbase stated that it is marketed fresh and commonly seen | High |
| | | to be sold or used in its live form? | | in aquarium fish trade | |
| | 1.03 | Does the taxon have invasive races, | Yes | Yes, CABI labeled this fish species as invasive outside its native | Medium |
| | | varieties, sub-taxa or congeners? | | range https://www.fishbase.de/summary/Trichopodus- | |
| | | e, distribution and introduction risk | 1 | | 1 |
| | 2.01 | How similar are the climatic conditions of the | Low | The climatch score only garnered a score of 1 which means the | High |
| | | Risk Assessment (RA) area and the taxon's | | climate from its native range is completely different from the | |
| | | native range? | | introduced range. | |
| | 2.02 | What is the quality of the climate matching | High | climatch matching was used to generate the climate analysis | High |
| | | data? | | | |
| | 2.03 | Is the taxon already present outside of | Yes | Corpuz et al. 2016 paper Diversity and Distribution of Freshwater | High |
| | | captivity in the RA area? | | Fish Assemblages in Lake Taal River Systems in Batangas, | 5 |
| | 2.04 | How many potential vectors could the taxon | >1 | Impacts of Introduced Freshwater Fishes in the Philippines (1905- | High |
| | - | use to enter in the RA area? | | 2013): A Review and Recommendations (Guerrero 2014) | |
| | 2.05 | Is the taxon currently found in close | Not applicable | | High |
| | | proximity to, and likely to enter into, the RA | | Fish Assemblages in Lake Taal River Systems in Batangas, | |
| | | area in the near future (e.g. unintentional | | Philippines | |
| | | and intentional introductions)? | | i imppines | |
| | Invaciv | re elsewhere | | | 1 |
| 1 | | Has the taxon become naturalised | Yes | Yes, it was stated in fishbase that it does have established | High |
| | 5.01 | | 105 | | ingn |
| 0 | 2.02 | (established viable populations) outside its | ¥ | populations in its introduced range. | Madisse |
| J | 3.02 | In the taxon's introduced range, are there | Yes | Yes, CABI stated that T. trichopterus is a resource competitor for | Medium |
| | | known adverse impacts to wild stocks or | | the Puntius semifasciolatus which caused its decline in China | |
| | | commercial taxa? | | | |
| 1 | 3.03 | In the taxon's introduced range, are there | Yes | There are no specific studies regarding its adverse effects on | Medium |
| | | known adverse impacts to aquaculture? | | aquaculture however it was stated that it is an opportunistic | |
| | | | | carnivore that might prey on native species. (Krishnakumar et al., | |
| 2 | 3.04 | In the taxon's introduced range, are there | No | There are no known adverse impacts to ecosystem services. | Medium |
| | | known adverse impacts to ecosystem | | | |
| 3 | 3.05 | In the taxon's introduced range, are there | Yes | It was stated in CABI that the aggressivess of the male T. | Medium |
| | | known adverse socio-economic impacts? | | trichopterus may displace native species, this might affect the | |
| | | | | livelihood and sport fishing in the introduced ranges. | |
| | Biolog | y/Ecology | | | |
| . 1 | Undesir | rable (or persistence) traits | | | |
| 4 | 4.01 | Is it likely that the taxon will be poisonous or | No | There are no known harmful effects of T. trichopterus to humans. | Very high |
| | | pose other risks to human health? | | https://www.fishbase.de/summary/Trichopodus-trichopterus.html | |
| 5 | 4.02 | Is it likely that the taxon will smother one or | Yes | It was stated in CABI that the aggressivess of the male T. | Medium |
| | | more native taxa (that are not threatened or | | trichopterus may displace native species. | |
| | | protected)? | | https://www.fishbase.de/summary/Trichopodus-trichopterus.html. | |
| 6 | 4.03 | Are there any threatened or protected taxa | Yes | There are threatened or protected taxa in the RA area based on | Medium |
| - | | that the non-native taxon would parasitise in | | Mutia et al. 2018 checklist that might be possible preyed by the T. | |
| | | the RA area? | | trichopterus | |
| 7 | 4.04 | Is the taxon adaptable in terms of climatic | Yes | Yes, CABI stated that it was able to successfully colonize outside | High |
| | | and other environmental conditions, thus | | its native range due to its high adaptability to environmental | |
| | | | | fluctuations | |
| | | enhancing its potential persistence if it has | | | |
| 0 | 4.05 | invaded or could invade the RA area? | Voc | Voc. CARL included that the T trichenterus may compate for | Modium |
| ď | 4.05 | Is the taxon likely to disrupt food-web | Yes | Yes, CABI included that the T. trichopterus may compete for | Medium |
| | | structure/function in aquatic ecosystems if it | | resources which alter aquatic food webs | |
| _ | 1 | has invaded or is likely to invade the RA | | | |
| 9 | 4.06 | Is the taxon likely to exert adverse impacts | Yes | Yes, CABI stated that this fish species may displace other species | High |
| | | on ecosystem services in the RA area? | | because of the male aggressiveness, this may cause other species | |
| | 1 | | | used in sport fishing to be affected | |
| 0 | 4.07 | Is it likely that the taxon will host, and/or | No | There are no endemic pathogens in the RA area that might | Medium |
| | | act as a vector for, recognised pests and | | parasitise T. trichopterus | |
| | | infectious agents that are endemic in the RA | | | |
| 1 | 4.08 | Is it likely that the taxon will host, and/or | No | There are no novel pests that T. trichopterus might serve as a | High |
| | | act as a vector for, recognised pests and | | vector for | - |
| | | infectious agents that are absent from (novel | | | |
| | | to) the RA area? | | | |
| 2 | 4.09 | Is it likely that the taxon will achieve a body | No | No, fishbase recorded a max length of only 15.0 cm. | High |
| | | | | https://www.fishbase.de/summary/Trichopodus-trichopterus.html | |
| 2 | | Isize that will make it more likely to be | | | |
| 2 | | size that will make it more likely to be released from captivity? | | https://www.fishbase.ue/summary/inchopodus-thchopterus.html | |

| 23 | 4.10 | Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)? | No | Fishbase stated that this fish species inhabit sluggish and/or standing waters.https://www.fishbase.de/summary/Trichopodus- trichopterus.html | High |
|----|--------|--|----------------|---|-----------|
| | 4.11 | Is it likely that the taxon's mode of existence (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for native taxa? | Yes | CABI stated that its feeding behavior (detritus) will cause resource competition which will affect the food web of the habitat. | 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 | Yes since based on a study by Urthaivat et al. (n.d.) there are no significant difference in the growth rate of T. trichopterus on different stocking densities. | Medium |
| | | e exploitation | 1 | | l |
| 26 | 5.01 | Is the taxon likely to consume threatened or protected native taxa in the RA area? | No | Since this fish species are not carnivores, it is not likely that it consumes threatened or protected taxa in the RA area. detritus (https://www.fishbase.de/TrophicEco/DietCompoList.php?ID=4675 &GenusName=Trichopodus&SpeciesName=trichopterus&fc=429&St ockCode=4893) | High |
| | 5.02 | Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area? | Yes | Yes, CABI reported a competition of resources with native taxa in China due to its feeding habits. detritus (https://www.fishbase.de/TrophicEco/DietCompoList.php?ID=4675 &GenusName=Trichopodus&SpeciesName=trichopterus&fc=429&St ockCode=4893) | Very high |
| | eprodu | | NI- | These are as shuding successing the homeon has different f | Link |
| | | Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions? | No | There are no studies suggesting the herrmaphroditism of T. tichopterus. https://www.fishbase.de/Reproduction/FishReproSummary.php?ID =4675&GenusName=Trichopodus&SpeciesName=trichopterus&fc= 429&StockCode=4893 | High |
| 29 | 6.02 | Is the taxon likely to produce viable gametes or propagules (in the RA area)? | Yes | according to Azizan et al., (2021), T. trichopterus are eurytopic species which are tolerable to slightly acidic or slightly alkaline. Therefore, it is possible that the production of gametes can be done in this RA area since there are already evidences of its occurrence and the nature of the species being tolerable of a wide. https://www.fishbase.de/Reproduction/FishReproSummary.php?ID =4675&GenusName=Trichopterus&fc= 429&StockCode=4893 | Very high |
| 30 | 6.03 | Is the taxon likely to hybridise naturally with native taxa? | No | No, there are no studies of hybridization with native. https://www.fishbase.de/Reproduction/FishReproSummary.php?ID =4675&GenusName=Trichopodus&SpeciesName=trichopterus&fc= 429&StockCode=4893 | Low |
| 31 | 6.04 | Is the taxon likely to be hermaphroditic or to display asexual reproduction? | No | No. there are no studies saying the species is hermaphroditic. https://www.fishbase.de/Reproduction/FishReproSummary.php?ID =4675&GenusName=Trichopodus&SpeciesName=trichopterus&fc= 429&StockCode=4893 | 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 information found, it is unlikely to be dependent on the presence of another taxon. https://www.fishbase.de/Reproduction/FishReproSummary.php?ID =4675&GenusName=Trichopodus&SpeciesName=trichopterus&fc= 429&StockCode=4893 | 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 | According to a study by (Zukal, 1983; Richter, 1988; Pethiyagoda, 1991),Trichopterus fecundity is size dependent and usually ranges from 300 for smaller females, up to maximum of 2000 to 4000 eggs for larger females, However, the year of reproduction time is not mentioned. Also according to another source in CABI, Trichopterus can reach sexual maturity at 7 cm TL and 12 to 14 | High |
| | 6.07 | How many time units (days, months, years) does the taxon require to reach the age-at- first-reproduction? | 4 | weeks of age (McKinnon and Lilev. 1987) According to CABI, Trichopterus can reach sexual maturity at 7 cm TL and 12 to 14 weeks of age (McKinnon and Liley, 1987). Under favourable environmental conditions, the species exhibits a protracted breeding period, with temperature and day length being important reproductive. | High |
| | | al mechanisms How many potential internal | >1 | Corpuz et al. 2016 paper Diversity and Distribution of Freshwater | High |
| | 7.01 | vectors/pathways could the taxon use to disperse within the RA area (with suitable habitats nearby)? | | Fish Assemblages in Lake Taal River Systems in Batangas, Philippines. This may mean that from the tributaries mentioned, they may be considered as potential pathways that the T. trichopterus could probably be used in its dispersal within the RA | i ngn |
| 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 | Yes based from the tributaries mentioned that surrounds Naujan lake or the RA area. with the T. trichopodus being an introduced species and according to Mutia et al' study in 2012, majority of the species that is recorded in this lake was migratory species wherein they live primarily in marine environments but frequently visit freshwater ecosystems. Therefore, the pathways that aid in dispersion of this species, can bring the taxon closer to protected | Medium |
| | 7.03 | Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal? | No | In terms of dispersal, no. but in a study it was mentioned that, fish that are infected usually exhibit what is commonly called flashing, which is actually the fish rubbing itself on a hard substrate or shaking its body in an attempt to remove the parasite | 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? | Not applicable | No information. unlikely | 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? | Not applicable | No information. unlikely | High |

| | 7.06 | Are older life stages of the taxon likely to | No | Corpuz et al. 2016 paper Diversity and Distribution of Freshwater | Low |
|----------------------|------------------------------|--|--------------------------------|---|------------------------|
| | 7.00 | migrate in the RA area for reproduction? | 110 | Fish Assemblages in Lake Taal River Systems in Batangas, | LOW |
| | | | | Philippines. | |
| | | | | https://www.fishbase.de/Reproduction/FishReproSummary.php?ID =4675&GenusName=Trichopodus&SpeciesName=trichopterus&fc= | |
| 41 | 7.07 | Are propagules or eggs of the taxon likely to | No | No information of dispersal by other animals . | High |
| | | be dispersed in the RA area by other animals? | | https://www.fishbase.de/Reproduction/FishReproSummary.php?ID | 5 |
| | | | | =4675&GenusName=Trichopodus&SpeciesName=trichopterus&fc= | |
| | | | | 429&StockCode=4893 | |
| 42 | 7.08 | Is dispersal of the taxon along any of the | Yes | Base on the previous question. Corpuz et al. 2016 paper Diversity | Medium |
| | | vectors/pathways mentioned in the previous seven questions (35–41; i.e. either | | and Distribution of Freshwater Fish Assemblages in Lake Taal River Systems in Batangas, Philippines. This may mean that from | |
| | | unintentional or intentional) likely to be | | the tributaries mentioned, they may be considered as potential | |
| | | rapid? | | pathways that the T. trichopterus could probably be used in its | |
| | | • | | dispersal within the RA area. | |
| 43 | 7.09 | Is dispersal of the taxon density dependent? | No | No, there are no studies of it being density dependent during | High |
| 87 | oleran | oce attributes | | dispersal. | |
| | 8.01 | Is the taxon able to withstand being out of | Yes | Yes, according to CABI, T. trichopterus is highly tolerant of | High |
| | | water for extended periods (e.g. minimum of | | hypoxic conditions, as it possesses an auxiliary respiratory organ | |
| | | one or more hours) at some stage of its life | | that allows it to breathe air. | |
| 45 | 8.02 | cycle? Is the taxon tolerant of a wide range of | Yes | Yes, according to Herder et al., 2012, the species is said to | Very high |
| +3 | 0.02 | water quality conditions relevant to that | 105 | tolerate increased salinity. | very nigh |
| | | taxon? [In the Justification field, indicate the | | https://www.fishbase.de/summary/Trichopodus-trichopterus.html | |
| | | relevant water quality variable(s) being | | | |
| 46 | 8.03 | Can the taxon be controlled or eradicated in | Yes | No. there are no studies of it being controlled in the wild with | Medium |
| | | the wild with chemical, biological, or other | | chemicals. https://www.fishbase.de/summary/Trichopodus- | |
| 47 | 8.04 | agents/means? Is the taxon likely to tolerate or benefit from | Yes | trichopterus.html Yes, according to CABI, T. trichopterus is highly tolerant of | Medium |
| ., | 5.54 | environmental/human disturbance? | | hypoxic conditions, as it possesses an auxiliary respiratory organ | |
| | | | | that allows it to breathe air. | |
| 48 | 8.05 | Is the taxon able to tolerate salinity levels | Yes | Although, the percentage of salinity was not mentioned, it was | Medium |
| | | that are higher or lower than those found in | | said in CABI that it is able to tolerate wide ranges of water | |
| | | its usual environment? | | hardness, pH, temperature, salinity and dissolved oxygen | |
| 49 | 8.06 | Are there effective natural enemies | No | conditions, also according to Herder et al., 2012, the species is No information found. unlikely to be present | Low |
| | 0.00 | (predators) of the taxon present in the RA | | | 2011 |
| | Climate | e change | | | |
| 9.1 | | | | | |
| | | change | Increase | A study by Toletino et al. (2016), shows the projected increase of | High |
| | | <i>change</i> Under the predicted future climatic | Increase | A study by Toletino et al . (2016), shows the projected increase of water in the rivers in the Philippines due to climate change. | High |
| | | change | Increase | A study by Toletino et al . (2016), shows the projected increase of water in the rivers in the Philippines due to climate change. increased water levels will allow an easier migration of the fish | High |
| 50 | 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? | | water in the rivers in the Philippines due to climate change. increased water levels will allow an easier migration of the fish species. | |
| 50 | | 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 | water in the rivers in the Philippines due to climate change. increased water levels will allow an easier migration of the fish species. Most liklely it will increase. according to CABI, although there are | High High |
| 50 | 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 | | water in the rivers in the Philippines due to climate change. increased water levels will allow an easier migration of the fish species. Most liklely it will increase. according to CABI, although there are conflicting reports of its minimum temperature being 18, 22 or | |
| 50 | 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, | | water in the rivers in the Philippines due to climate change. increased water levels will allow an easier migration of the fish species. Most liklely it will increase. according to CABI, although there are conflicting reports of its minimum temperature being 18, 22 or 23°C (Axelrod et al., 1967; Degani 1989; Froese and Pauly, | |
| 50 | 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 | | water in the rivers in the Philippines due to climate change. increased water levels will allow an easier migration of the fish species. Most liklely it will increase. according to CABI, although there are conflicting reports of its minimum temperature being 18, 22 or | |
| 50 | 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, | | water in the rivers in the Philippines due to climate change. increased water levels will allow an easier migration of the fish species. Most liklely it will increase. according to CABI, although there are conflicting reports of its minimum temperature being 18, 22 or 23°C (Axelrod et al., 1967; Degani 1989; Froese and Pauly, 2014). Anecdotal reports from aquarists/ornamental industry | |
| 50 | 9.01 | change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? | Increase | water in the rivers in the Philippines due to climate change. increased water levels will allow an easier migration of the fish species. Most liklely it will increase. according to CABI, although there are conflicting reports of its minimum temperature being 18, 22 or 23°C (Axelrod et al., 1967; Degani 1989; Froese and Pauly, 2014). Anecdotal reports from aquarists/ornamental industry suggest the species can cope in temperatures as low as 18°C (Premier Pet, 2018). Therefore, the risk of entry may be high due to its ability to survive in temperatures as low as 18°C | High |
| 50 | 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 | | water in the rivers in the Philippines due to climate change. increased water levels will allow an easier migration of the fish species. Most liklely it will increase. according to CABI, although there are conflicting reports of its minimum temperature being 18, 22 or 23°C (Axelrod et al., 1967; Degani 1989; Froese and Pauly, 2014). Anecdotal reports from aquarists/ornamental industry suggest the species can cope in temperatures as low as 18°C (Premier Pet, 2018). Therefore, the risk of entry may be high due to its ability to survive in temperatures as low as 18°C Most liklely it will increase. As stated in CABI, Natural dispersal | |
| 50 | 9.01 | change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within | Increase | water in the rivers in the Philippines due to climate change. increased water levels will allow an easier migration of the fish species. Most liklely it will increase. according to CABI, although there are conflicting reports of its minimum temperature being 18, 22 or 23°C (Axelrod et al., 1967; Degani 1989; Froese and Pauly, 2014). Anecdotal reports from aquarists/ornamental industry suggest the species can cope in temperatures as low as 18°C (Premier Pet, 2018). Therefore, the risk of entry may be high due to its ability to survive in temperatures as low as 18°C Most likley it will increase. As stated in CABI, Natural dispersal and anthropogenic translocation of introduced populations of T. | High |
| 50 | 9.01 | change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to | Increase | water in the rivers in the Philippines due to climate change. increased water levels will allow an easier migration of the fish species. Most liklely it will increase. according to CABI, although there are conflicting reports of its minimum temperature being 18, 22 or 23°C (Axelrod et al., 1967; Degani 1989; Froese and Pauly, 2014). Anecdotal reports from aquarists/ornamental industry suggest the species can cope in temperatures as low as 18°C (Premier Pet, 2018). Therefore, the risk of entry may be high due to its ability to survive in temperatures as low as 18°C Most lilkely it will increase. As stated in CABI, Natural dispersal and anthropogenic translocation of introduced populations of T. trichopterus are more likely to occur in areas that already contain | High |
| 50 | 9.01 | change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within | Increase | water in the rivers in the Philippines due to climate change. increased water levels will allow an easier migration of the fish species. Most liklely it will increase. according to CABI, although there are conflicting reports of its minimum temperature being 18, 22 or 23°C (Axelrod et al., 1967; Degani 1989; Froese and Pauly, 2014). Anecdotal reports from aquarists/ornamental industry suggest the species can cope in temperatures as low as 18°C (Premier Pet, 2018). Therefore, the risk of entry may be high due to its ability to survive in temperatures as low as 18°C Most likley it will increase. As stated in CABI, Natural dispersal and anthropogenic translocation of introduced populations of T. | High |
| 50 | 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 | water in the rivers in the Philippines due to climate change. increased water levels will allow an easier migration of the fish species. Most liklely it will increase. according to CABI, although there are conflicting reports of its minimum temperature being 18, 22 or 23°C (Axelrod et al., 1967; Degani 1989; Froese and Pauly, 2014). Anecdotal reports from aquarists/ornamental industry suggest the species can cope in temperatures as low as 18°C (Premier Pet, 2018). Therefore, the risk of entry may be high due to its ability to survive in temperatures as low as 18°C Most liklely it will increase. As stated in CABI, Natural dispersal and anthropogenic translocation of introduced populations of T. trichopterus are more likely to occur in areas that already contain multiple, large and/or widely distributed populations of the species. Thus, considering Mutia et al 2018' study, it was mentioned that it is present in many tributaries. | High Medium |
| 50 | 9.01 | change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic 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 | water in the rivers in the Philippines due to climate change. increased water levels will allow an easier migration of the fish species. Most liklely it will increase. according to CABI, although there are conflicting reports of its minimum temperature being 18, 22 or 23°C (Axelrod et al., 1967; Degani 1989; Froese and Pauly, 2014). Anecdotal reports from aquarists/ornamental industry suggest the species can cope in temperatures as low as 18°C (Premier Pet, 2018). Therefore, the risk of entry may be high due to its ability to survive in temperatures as low as 18°C (Most ilikely it will increase. As stated in CABI, Natural dispersal and anthropogenic translocation of introduced populations of T. trichopterus are more likely to occur in areas that already contain multiple, large and/or widely distributed populations of the species. Thus, considering Mutia et al 2018' study, it was mentioned that it is present in many tributaries. Connsidering that it is able to survive in low temperatures and | High |
| 50 | 9.01 9.02 9.03 | change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic 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 | water in the rivers in the Philippines due to climate change. increased water levels will allow an easier migration of the fish species. Most liklely it will increase. according to CABI, although there are conflicting reports of its minimum temperature being 18, 22 or 23°C (Axelrod et al., 1967; Degani 1989; Froese and Pauly, 2014). Anecdotal reports from aquarists/ornamental industry suggest the species can cope in temperatures as low as 18°C (Premier Pet, 2018). Therefore, the risk of entry may be high due to its ability to survive in temperatures as low as 18°C Most lilkely it will increase. As stated in CABI, Natural dispersal and anthropogenic translocation of introduced populations of T. trichopterus are more likely to occur in areas that already contain multiple, large and/or widely distributed populations of the species. Thus, considering Mutia et al 2018' study, it was mentioned that it is present in many tributaries. Connsidering that it is able to survive in low temperatures and high salinity,most lilkely its magnitude of potential impacts may | High Medium |
| 50 | 9.01 9.02 9.03 | change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic 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 | water in the rivers in the Philippines due to climate change. increased water levels will allow an easier migration of the fish species. Most liklely it will increase. according to CABI, although there are conflicting reports of its minimum temperature being 18, 22 or 23°C (Axelrod et al., 1967; Degani 1989; Froese and Pauly, 2014). Anecdotal reports from aquarists/ornamental industry suggest the species can cope in temperatures as low as 18°C (Premier Pet, 2018). Therefore, the risk of entry may be high due to its ability to survive in temperatures as low as 18°C Most liklely it will increase. As stated in CABI, Natural dispersal and anthropogenic translocation of introduced populations of T. trichopterus are more likely to occur in areas that already contain multiple, large and/or widely distributed populations of the species. Thus, considering Mutia et al 2018' study, it was mentioned that it is present in many tributaries. Connsidering that it is able to survive in low temperatures and high salinity,most liklely its magnitude of potential impacts may be higher. According to CABI, T. trichopterus may compete with | High Medium |
| 50 | 9.01 9.02 9.03 | change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic 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 | water in the rivers in the Philippines due to climate change. increased water levels will allow an easier migration of the fish species. Most liklely it will increase. according to CABI, although there are conflicting reports of its minimum temperature being 18, 22 or 23°C (Axelrod et al., 1967; Degani 1989; Froese and Pauly, 2014). Anecdotal reports from aquarists/ornamental industry suggest the species can cope in temperatures as low as 18°C (Premier Pet, 2018). Therefore, the risk of entry may be high due to its ability to survive in temperatures as low as 18°C Most lilkely it will increase. As stated in CABI, Natural dispersal and anthropogenic translocation of introduced populations of T. trichopterus are more likely to occur in areas that already contain multiple, large and/or widely distributed populations of the species. Thus, considering Mutia et al 2018' study, it was mentioned that it is present in many tributaries. Connsidering that it is able to survive in low temperatures and high salinity,most lilkely its magnitude of potential impacts may be higher. According to CABI, T. trichopterus may compete with indigenous fishes for food and, during reproduction, males become | High Medium |
| 50 | 9.01 9.02 9.03 | change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic 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 | water in the rivers in the Philippines due to climate change. increased water levels will allow an easier migration of the fish species. Most liklely it will increase. according to CABI, although there are conflicting reports of its minimum temperature being 18, 22 or 23°C (Axelrod et al., 1967; Degani 1989; Froese and Pauly, 2014). Anecdotal reports from aquarists/ornamental industry suggest the species can cope in temperatures as low as 18°C (Premier Pet, 2018). Therefore, the risk of entry may be high due to its ability to survive in temperatures as low as 18°C Most liklely it will increase. As stated in CABI, Natural dispersal and anthropogenic translocation of introduced populations of T. trichopterus are more likely to occur in areas that already contain multiple, large and/or widely distributed populations of the species. Thus, considering Mutia et al 2018' study, it was mentioned that it is present in many tributaries. Connsidering that it is able to survive in low temperatures and high salinity,most liklely its magnitude of potential impacts may be higher. According to CABI, T. trichopterus may compete with | High Medium |
| 50 51 52 53 | 9.01 9.02 9.03 | change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic 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 | water in the rivers in the Philippines due to climate change. increased water levels will allow an easier migration of the fish species. Most liklely it will increase. according to CABI, although there are conflicting reports of its minimum temperature being 18, 22 or 23°C (Axelrod et al., 1967; Degani 1989; Froese and Pauly, 2014). Anecdotal reports from aquarists/ornamental industry suggest the species can cope in temperatures as low as 18°C (Premier Pet, 2018). Therefore, the risk of entry may be high due to its ability to survive in temperatures as low as 18°C Most liklely it will increase. As stated in CABI, Natural dispersal and anthropogenic translocation of introduced populations of T. trichopterus are more likely to occur in areas that already contain multiple, large and/or widely distributed populations of the species. Thus, considering Mutia et al 2018' study, it was mentioned that it is present in many tributaries. Connsidering that it is able to survive in low temperatures and high salinity,most liklely its magnitude of potential impacts may be highner. According to CABI, T. trichopterus may compete with indigenous fishes for food and, during reproduction, males become aggressive and may displace indigenous fish that may possibly have an impact on biodiversity. Considering that it is able to survive in low temperatures and high | High Medium |
| 50 51 52 53 | 9.01 9.02 9.03 9.04 | Change Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change? Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status? Under the predicted future climatic conditions, what is the likely magnitude of | Increase Increase Higher | water in the rivers in the Philippines due to climate change. increased water levels will allow an easier migration of the fish species. Most liklely it will increase. according to CABI, although there are conflicting reports of its minimum temperature being 18, 22 or 23°C (Axelrod et al., 1967; Degani 1989; Froese and Pauly, 2014). Anecdotal reports from aquarists/ornamental industry suggest the species can cope in temperatures as low as 18°C (Premier Pet, 2018). Therefore, the risk of entry may be high due to its ability to survive in temperatures as low as 18°C Most lilkely it will increase. As stated in CABI, Natural dispersal and anthropogenic translocation of introduced populations of T. trichopterus are more likely to occur in areas that already contain multiple, large and/or widely distributed populations of the species. Thus, considering Mutia et al 2018' study, it was mentioned that it is present in many tributaries. Connsidering that it is able to survive in low temperatures and high salinity,most lilkely its magnitude of potential impacts may be higher. According to CABI, T. trichopterus may compete with indigenous fishes for food and, during reproduction, males become aggressive and may displace indigenous fish that may possibly have an impact on biodiversity. Considering that it is able to survive in low temperatures and high salinity,most lilkely its magnitude of potential impacts may be | High Medium High |
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| Statistics | |
|--|--------|
| Scores | |
| BRA | 25.5 |
| BRA Outcome | Medium |
| BRA+CCA | 37.5 |
| BRA+CCA Outcome | High |
| Score partition | |
| A. Biogeography/Historical | 9.5 |
| 1. Domestication/Cultivation | 4.0 |
| 2. Climate, distribution and introduction risk | 2.0 |
| 3. Invasive elsewhere | 3.5 |

| B. Biology/Ecology | 16.0 |
|--|------|
| 4. Undesirable (or persistence) traits | 7.0 |
| 5. Resource exploitation | 2.0 |
| 6. Reproduction | 0.0 |
| 7. Dispersal mechanisms | 0.0 |
| 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 |
| 2. Climate, distribution and introduction risk | 5 |
| 3. Invasive elsewhere | 5 |
| B. Biology/Ecology | 36 |
| 4. Undesirable (or persistence) traits | 12 |
| 5. Resource exploitation | 2 |
| 6. Reproduction | |
| 7. Dispersal mechanisms | 9 |
| 8. Tolerance attributes | 6 |
| C. Climate change | 6 |
| 9. Climate change | 6 |
| Sectors affected | |
| Commercial | 12 |
| Environmental | 8 |
| Species or population nuisance traits | 23 |
| | |
| Thresholds | |
| BRA | 34.5 |
| BRA+CCA | 34.5 |

| BRA+CCA | 34.5 |
|---------------|------|
| Confidence | |
| BRA+CCA | 0.65 |
| BRA | 0.65 |
| CCA | 0.67 |
| | |
| Date and Time | |

13/02/2023 00:07:34

| Taxon and Assessor details | | | |
|------------------------------------|--|--|--|
| Category | Fishes and Lampreys (freshwater) | | |
| Taxon name | Xiphophorus maculatus | | |
| Common name | southern platyfish | | |
| Assessor | Gilles, To | | |
| Risk screening context | | | |
| Reason and socio-economic benefits | Aquarium, commercial | | |
| Risk assessment area | Lake Taal | | |
| Taxonomy | Actinopteri (ray-finned fishes) > Cyprinodontiformes (Rivulines, killifishes and live bearers) > | | |
| Native range | North and Central America | | |
| Introduced range | thailand, Philippines, Malaysia etc. | | |
| URL | https://www.fishbase.se/summary/Xiphophorus-maculatus.html | | |

| | | | Response | Justification (references and/or other information) | Confidence |
|------|------|--|----------|---|------------------------|
| | | graphy/Historical | | | |
| 1. C | | ication/Cultivation | | | |
| 1 | 1.01 | Has the taxon been the subject of | Yes | This taxon is a popular ornamental fish which exhibits a wide | Very high |
| | | domestication (or cultivation) for at least 20 | | range of color patterns. It has been subjected to hybridizitation by | |
| | | generations? | | aquaculturists creating varieties of forms and colors. It is third | |
| | | | | most imported ornamental species in United States. It is mass | |
| | | | | produced in Florida fish farms for aquarium trade and in Ausrallia, | |
| | | | | it is considered as of "high" importance as an ornamental fish | |
| 2 | 1.02 | Is the taxon harvested in the wild and likely | Yes | The taxon has been harvested in the wild for ornamental purposes | Very high |
| | | to be sold or used in its live form? | | as pets and aquarium species (CABI, 2020). | |
| 3 | 1.03 | Does the taxon have invasive races, | Yes | Once concerete example is the Poecilia latipinna which already | Very high |
| | | varieties, sub-taxa or congeners? | | have records of invasion and its associated negative impacts. | , 5 |
| | | ······································ | | According to Juliano et al. (1989), in the Philippines, this taxon | |
| | | | | competes with the native milkfish or Chanos chanos, for food. On | |
| | | | | the other hand Englund (1999) implicated that this taxon and | |
| | | | | | |
| | | | | other introduced Poeciliids (Xiphophorus hellerii and Gambusia | |
| | | | | species) is responsible for the decline of native damselflies or | |
| | | | | Megalagrion species on Oahu, Hawaii. Morover in California, this | |
| | | | | taxon caused the the decline of the desert pupfish, Cyprinodon | |
| 2 | 1: 1 | distribution and internal of the | l | macularius (ILS, Fish and Wildlife Service, 1983; Robins, 2014; | l |
| | | , distribution and introduction risk | LU: - h | | luc-l- |
| 1 | 2.01 | How similar are the climatic conditions of the | High | The RA area and the taxon's native range has both tropical | High |
| | | Risk Assessment (RA) area and the taxon's native range? | | climate. FishBase 2020 | |
| 5 | 2.02 | What is the quality of the climate matching data? | High | Data from Climatch were used to facilitate the climate analysis. | High |
| 6 | 2.03 | Is the taxon already present outside of | Yes | The taxon is now present in pet stores for ornamental use, such | High |
| 5 | 2.05 | | 165 | as in Cartimar Market where importation and sale of this taxon is | riigii |
| | | captivity in the RA area? | | | |
| _ | 2.04 | | <u> </u> | highly abundant. | 1.12 1 |
| / | 2.04 | How many potential vectors could the taxon | One | The taxon could be introduced through intentional introduction | High |
| | | use to enter in the RA area? | | with human intervention and aquarium escape. | |
| 3 | 2.05 | Is the taxon currently found in close | Yes | The taxon is now present in pet stores for ornamental use, such | Very high |
| | | proximity to, and likely to enter into, the RA | | as in Cartimar Market where importation and sale of this taxon is | |
| | | area in the near future (e.g. unintentional | | highly abundant. | |
| | | and intentional introductions)? | | | |
| | | e elsewhere | 1 | | 1 |
| Э | 3.01 | Has the taxon become naturalised | Yes | This taxon has already established populations in Asian, African, | Very high |
| | | (established viable populations) outside its | | Caribbean, Oceanic, South American, and North American | |
| | | native range? | | countries. (USGS, 2020; CABI, 2020). | |
| 0 | 3.02 | In the taxon's introduced range, are there | Yes | According to Juliano et al. (1989), in the Philippines, this taxon | Very high |
| | | known adverse impacts to wild stocks or | | competes with the native milkfish or Chanos chanos, for food. On | |
| | | commercial taxa? | | the other hand Englund (1999) implicated that this taxon and | |
| | | | | other introduced Poeciliids (Xiphophorus hellerii and Gambusia | |
| | | | | species) is responsible for the decline of native damselflies or | |
| | | | | Megalagrion species on Oahu, Hawaii. Morover in California, this | |
| | | | 1 | | |
| 1 | | | | | |
| | | | | taxon caused the the decline of the desert pupfish, Cyprinodon | |
| 1 | 3 03 | In the taxon's introduced range, are there | Yes | taxon caused the the decline of the desert pupfish, Cyprinodon macularius (U.S. Fish and Wildlife Service, 1983: Robins, 2014: | Very high |
| 1 | 3.03 | In the taxon's introduced range, are there | Yes | taxon caused the the decline of the desert pupfish, Cyprinodon macularius (U.S. Fish and Wildlife Service. 1983: Robins. 2014: According to Juliano et al. (1989), in the Philippines, this taxon | Very high |
| 1 | 3.03 | In the taxon's introduced range, are there known adverse impacts to aquaculture? | Yes | taxon caused the the decline of the desert pupfish, Cyprinodon macularius (U.S. Fish and Wildlife Service. 1983: Robins. 2014: According to Juliano et al. (1989), in the Philippines, this taxon competes with the native milkfish or Chanos chanos, for food. On | Very high |
| 1 | 3.03 | | Yes | taxon caused the the decline of the desert pupfish, Cyprinodon macularius (U.S. Fish and Wildlife Service. 1983: Robins. 2014: According to Juliano et al. (1989), in the Philippines, this taxon competes with the native milkfish or Chanos chanos, for food. On the other hand Englund (1999) implicated that this taxon and | Very high |
| 1 | 3.03 | | Yes | taxon caused the the decline of the desert pupfish, Cyprinodon macularius (U.S. Fish and Wildlife Service. 1983: Robins. 2014: According to Juliano et al. (1989), in the Philippines, this taxon competes with the native milkfish or Chanos chanos, for food. On the other hand Englund (1999) implicated that this taxon and other introduced Poeciliids (Xiphophorus hellerii and Gambusia | Very high |
| 1 | 3.03 | | Yes | taxon caused the the decline of the desert pupfish, Cyprinodon macularius (U.S. Fish and Wildlife Service. 1983: Robins. 2014: According to Juliano et al. (1989), in the Philippines, this taxon competes with the native milkfish or Chanos chanos, for food. On the other hand Englund (1999) implicated that this taxon and other introduced Poeciliids (Xiphophorus hellerii and Gambusia species) is responsible for the decline of native damselflies or | Very high |
| 1 | 3.03 | | Yes | taxon caused the the decline of the desert pupfish, Cyprinodon macularius (U.S. Fish and Wildlife Service. 1983: Robins. 2014: According to Juliano et al. (1989), in the Philippines, this taxon competes with the native milkfish or Chanos chanos, for food. On the other hand Englund (1999) implicated that this taxon and other introduced Poeciliids (Xiphophorus hellerii and Gambusia species) is responsible for the decline of native damselflies or Megalagrion species on Oahu, Hawaii. Morover in California, this | Very high |
| .1 | 3.03 | | Yes | taxon caused the the decline of the desert pupfish, Cyprinodon macularius (U.S. Fish and Wildlife Service. 1983: Robins. 2014: According to Juliano et al. (1989), in the Philippines, this taxon competes with the native milkfish or Chanos chanos, for food. On the other hand Englund (1999) implicated that this taxon and other introduced Poeciliids (Xiphophorus hellerii and Gambusia species) is responsible for the decline of native damselflies or Megalagrion species on Oahu, Hawaii. Morover in California, this taxon caused the the decline of the desert pupfish, Cyprinodon | Very high |
| | | known adverse impacts to aquaculture? | | taxon caused the the decline of the desert pupfish, Cyprinodon macularius (U.S. Fish and Wildlife Service. 1983: Robins. 2014: According to Juliano et al. (1989), in the Philippines, this taxon competes with the native milkfish or Chanos chanos, for food. On the other hand Englund (1999) implicated that this taxon and other introduced Poeciliids (Xiphophorus hellerii and Gambusia species) is responsible for the decline of native damselflies or Megalagrion species on Oahu, Hawaii. Morover in California, this taxon caused the the decline of the desert pupfish, Cyprinodon macularius (U.S. Fish and Wildlife Service. 1983: Robins. 2014: | |
| | 3.03 | | Yes | taxon caused the the decline of the desert pupfish, Cyprinodon macularius (U.S. Fish and Wildlife Service. 1983: Robins. 2014: According to Juliano et al. (1989), in the Philippines, this taxon competes with the native milkfish or Chanos chanos, for food. On the other hand Englund (1999) implicated that this taxon and other introduced Poeciliids (Xiphophorus hellerii and Gambusia species) is responsible for the decline of native damselflies or Megalagrion species on Oahu, Hawaii. Morover in California, this taxon caused the the decline of the desert pupfish, Cyprinodon | Very high Very high |
| | | known adverse impacts to aquaculture? | | taxon caused the the decline of the desert pupfish, Cyprinodon macularius (U.S. Fish and Wildlife Service. 1983: Robins. 2014: According to Juliano et al. (1989), in the Philippines, this taxon competes with the native milkfish or Chanos chanos, for food. On the other hand Englund (1999) implicated that this taxon and other introduced Poeciliids (Xiphophorus hellerii and Gambusia species) is responsible for the decline of native damselflies or Megalagrion species on Oahu, Hawaii. Morover in California, this taxon caused the the decline of the desert pupfish, Cyprinodon macularius (U.S. Fish and Wildlife Service. 1983: Robins. 2014: | |
| | | known adverse impacts to aquaculture? In the taxon's introduced range, are there | | taxon caused the the decline of the desert pupfish, Cyprinodon macularius (U.S. Fish and Wildlife Service. 1983: Robins. 2014: According to Juliano et al. (1989), in the Philippines, this taxon competes with the native milkfish or Chanos chanos, for food. On the other hand Englund (1999) implicated that this taxon and other introduced Poeciliids (Xiphophorus hellerii and Gambusia species) is responsible for the decline of native damselflies or Megalagrion species on Oahu, Hawaii. Morover in California, this taxon caused the the decline of the desert pupfish, Cyprinodon macularius (U.S. Fish and Wildlife Service. 1983: Robins. 2014: According to Juliano et al. (1989), in the Philippines, this taxon | |
| | | known adverse impacts to aquaculture? In the taxon's introduced range, are there known adverse impacts to ecosystem | | taxon caused the the decline of the desert pupfish, Cyprinodon macularius (U.S. Fish and Wildlife Service. 1983: Robins. 2014: According to Juliano et al. (1989), in the Philippines, this taxon competes with the native milkfish or Chanos chanos, for food. On the other hand Englund (1999) implicated that this taxon and other introduced Poeciliids (Xiphophorus hellerii and Gambusia species) is responsible for the decline of native damselflies or Megalagrion species on Oahu, Hawaii. Morover in California, this taxon caused the the decline of the desert pupfish, Cyprinodon macularius (U.S. Fish and Wildlife Service. 1983: Robins. 2014: According to Juliano et al. (1989), in the Philippines, this taxon competes with the native milkfish or Chanos chanos, for food. On the other hand Englund (1999) implicated that this taxon and | |
| | | known adverse impacts to aquaculture? In the taxon's introduced range, are there known adverse impacts to ecosystem | | taxon caused the the decline of the desert pupfish, Cyprinodon macularius (U.S. Fish and Wildlife Service. 1983: Robins. 2014: According to Juliano et al. (1989), in the Philippines, this taxon competes with the native milkfish or Chanos chanos, for food. On the other hand Englund (1999) implicated that this taxon and other introduced Poeciliids (Xiphophorus hellerii and Gambusia species) is responsible for the decline of native damselflies or Megalagrion species on Oahu, Hawaii. Morover in California, this taxon caused the the decline of the desert pupfish, Cyprinodon macularius (U.S. Fish and Wildlife Service. 1983: Robins. 2014: According to Juliano et al. (1989), in the Philippines, this taxon competes with the native milkfish or Chanos chanos, for food. On the other hand Englund (1999) implicated that this taxon and other introduced Poeciliids (Xiphophorus hellerii and Gambusia | |
| | | known adverse impacts to aquaculture? In the taxon's introduced range, are there known adverse impacts to ecosystem | | taxon caused the the decline of the desert pupfish, Cyprinodon macularius (U.S. Fish and Wildlife Service. 1983: Robins. 2014: According to Juliano et al. (1989), in the Philippines, this taxon competes with the native milkfish or Chanos chanos, for food. On the other hand Englund (1999) implicated that this taxon and other introduced Poeciliids (Xiphophorus hellerii and Gambusia species) is responsible for the decline of native damselflies or Megalagrion species on Oahu, Hawaii. Morover in California, this taxon caused the the decline of the desert pupfish, Cyprinodon macularius (U.S. Fish and Wildlife Service. 1983: Robins. 2014: According to Juliano et al. (1989), in the Philippines, this taxon competes with the native milkfish or Chanos chanos, for food. On the other hand Englund (1999) implicated that this taxon and other introduced Poeciliids (Xiphophorus hellerii and Gambusia species) is responsible for the decline of native damselflies or | |
| | | known adverse impacts to aquaculture? In the taxon's introduced range, are there known adverse impacts to ecosystem | | taxon caused the the decline of the desert pupfish, Cyprinodon macularius (U.S. Fish and Wildlife Service. 1983: Robins. 2014: According to Juliano et al. (1989), in the Philippines, this taxon competes with the native milkfish or Chanos chanos, for food. On the other hand Englund (1999) implicated that this taxon and other introduced Poeciliids (Xiphophorus hellerii and Gambusia species) is responsible for the decline of native damselflies or Megalagrion species on Oahu, Hawaii. Morover in California, this taxon caused the the decline of the desert pupfish, Cyprinodon macularius (U.S. Fish and Wildlife Service. 1983: Robins. 2014: According to Juliano et al. (1989), in the Philippines, this taxon competes with the native milkfish or Chanos chanos, for food. On the other hand Englund (1999) implicated that this taxon and other introduced Poeciliids (Xiphophorus hellerii and Gambusia species) is responsible for the decline of native damselflies or Megalagrion species on Oahu, Hawaii. Morover in California, this | |
| | | known adverse impacts to aquaculture? In the taxon's introduced range, are there known adverse impacts to ecosystem | | taxon caused the the decline of the desert pupfish, Cyprinodon macularius (U.S. Fish and Wildlife Service. 1983: Robins. 2014: According to Juliano et al. (1989), in the Philippines, this taxon competes with the native milkfish or Chanos chanos, for food. On the other hand Englund (1999) implicated that this taxon and other introduced Poeciliids (Xiphophorus hellerii and Gambusia species) is responsible for the decline of native damselflies or Megalagrion species on Oahu, Hawaii. Morover in California, this taxon caused the the decline of the desert pupfish, Cyprinodon macularius (U.S. Fish and Wildlife Service. 1983: Robins. 2014: According to Juliano et al. (1989), in the Philippines, this taxon competes with the native milkfish or Chanos chanos, for food. On the other hand Englund (1999) implicated that this taxon and other introduced Poeciliids (Xiphophorus hellerii and Gambusia species) is responsible for the decline of native damselflies or Megalagion species on Oahu, Hawaii. Morover in California, this taxon caused the the decline of the desert pupfish, Cyprinodon | |
| 2 | 3.04 | known adverse impacts to aquaculture? In the taxon's introduced range, are there known adverse impacts to ecosystem services? | Yes | taxon caused the the decline of the desert pupfish, Cyprinodon macularius (U.S. Fish and Wildlife Service. 1983: Robins. 2014: According to Juliano et al. (1989), in the Philippines, this taxon competes with the native milkfish or Chanos chanos, for food. On the other hand Englund (1999) implicated that this taxon and other introduced Poeciliids (Xiphophorus hellerii and Gambusia species) is responsible for the decline of native damselflies or Megalagrion species on Oahu, Hawaii. Morover in California, this taxon caused the the decline of the desert pupfish, Cyprinodon macularius (U.S. Fish and Wildlife Service. 1983: Robins. 2014: According to Juliano et al. (1989), in the Philippines, this taxon competes with the native milkfish or Chanos chanos, for food. On the other hand Englund (1999) implicated that this taxon and other introduced Poeciliids (Xiphophorus hellerii and Gambusia species) is responsible for the decline of native damselflies or Megalagrion species on Oahu, Hawaii. Morover in California, this taxon caused the the decline of the desert pupfish, Cyprinodon macularius (U.S. Fish and Wildlife Service. 1983: Robins. 2014: | Very high |
| .2 | | known adverse impacts to aquaculture? In the taxon's introduced range, are there known adverse impacts to ecosystem services? In the taxon's introduced range, are there | | taxon caused the the decline of the desert pupfish, Cyprinodon macularius (U.S. Fish and Wildlife Service. 1983: Robins. 2014: According to Juliano et al. (1989), in the Philippines, this taxon competes with the native milkfish or Chanos chanos, for food. On the other hand Englund (1999) implicated that this taxon and other introduced Poeciliids (Xiphophorus hellerii and Gambusia species) is responsible for the decline of native damselflies or Megalagrion species on Oahu, Hawaii. Morover in California, this taxon caused the the decline of the desert pupfish, Cyprinodon macularius (U.S. Fish and Wildlife Service. 1983: Robins. 2014: According to Juliano et al. (1989), in the Philippines, this taxon competes with the native milkfish or Chanos chanos, for food. On the other hand Englund (1999) implicated that this taxon and other introduced Poeciliids (Xiphophorus hellerii and Gambusia species) is responsible for the decline of native damselflies or Megalagrion species on Oahu, Hawaii. Morover in California, this taxon caused the the decline of the desert pupfish, Cyprinodon macularius (U.S. Fish and Wildlife Service. 1983: Robins. 2014: According to Juliano et al. (1989) implicated that this taxon and other introduced Poeciliids (Xiphophorus hellerii and Gambusia species) is responsible for the decline of native damselflies or Megalagrion species on Oahu, Hawaii. Morover in California, this taxon caused the the decline of the desert pupfish, Cyprinodon macularius (U.S. Fish and Wildlife Service. 1983: Robins. 2014: This taxon is a very popular ornamental fish which gave fish pet | |
| 2 | 3.04 | known adverse impacts to aquaculture? In the taxon's introduced range, are there known adverse impacts to ecosystem services? | Yes | taxon caused the the decline of the desert pupfish, Cyprinodon macularius (U.S. Fish and Wildlife Service. 1983: Robins. 2014: According to Juliano et al. (1989), in the Philippines, this taxon competes with the native milkfish or Chanos chanos, for food. On the other hand Englund (1999) implicated that this taxon and other introduced Poeciliids (Xiphophorus hellerii and Gambusia species) is responsible for the decline of native damselflies or Megalagrion species on Oahu, Hawaii. Morover in California, this taxon caused the the decline of the desert pupfish, Cyprinodon macularius (U.S. Fish and Wildlife Service. 1983: Robins. 2014: According to Juliano et al. (1989), in the Philippines, this taxon competes with the native milkfish or Chanos chanos, for food. On the other hand Englund (1999) implicated that this taxon and other introduced Poeciliids (Xiphophorus hellerii and Gambusia species) is responsible for the decline of native damselflies or Megalagrion species on Oahu, Hawaii. Morover in California, this taxon caused the the decline of the desert pupfish, Cyprinodon macularius (U.S. Fish and Wildlife Service. 1983: Robins. 2014: | Very high |

| 14 | 4.01 | Is it likely that the taxon will be poisonous or pose other risks to human health? | Yes | This taxon is a known carrier of trematode parasites, nematode (Camallanus cotti), and the Asian tapeworm (Bothriocephalus acheilognathi) in Hawaii , which may transferred to humans | Very high |
|----|-----------------------|---|-----|---|------------|
| 15 | 4.02 | Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)? | Yes | (IUCNGSID, 2020). This taxon is considered as a threath to native cyprinids and killifishes in the United States. In Nevada and Wyoming, it has been associated in the decline of native fishes and of damselflies | Very high |
| | | · · · · · · · · · · · · · · · · · · · | | in Hawaii. It eats the eggs of native fish species and It is also a known carrier of trematode parasites, nematode (Camallanus cotti), and the Asian tapeworm (Bothriocephalus acheilognathi) in | |
| 16 | 4.03 | Are there any threatened or protected taxa that the non-native taxon would parasitise in the RA area? | Yes | Hawaii , which may affect native fish species population This taxon has record of eating eggs of native species which have caused their decline in population (IUCNGSID, 2020; CABI, 2020). | Very high |
| 17 | 4.04 | Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area? | Yes | This taxon has wide range of environmental tolerances, they can tolerate high ranges of temperature, salinity and oxygen levels, they have the ability to colonize anthropogenically disturbed habitats, to give birth to live offspring, they can do trophic opportunism, and they grow in fast rates (CABI, 2020). | Very high |
| 18 | 4.05 | Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems if it has invaded or is likely to invade the RA area? | Yes | This taxon is considered as a threath to native cyprinids and killifishes in the United States. In Nevada and Wyoming, it has been associated in the decline of native fishes and of damselflies in Hawaii. It eats the eggs of native fish species and It is also a known carrier of trematode parasites, nematode (Camallanus cotti), and the Asian tapeworm (Bothriocephalus acheilognathi) in Hawaii , which may affect native fish species population. In the Phillippines, according to Juliano et al. (1989), this taxon competes with the native milkfish or Chanos chanos, for food (U.S. Fish and Wildlife Service. 1983: IUCNGSID. 2020; USGS. | Very high |
| 19 | 4.06 | Is the taxon likely to exert adverse impacts on ecosystem services in the RA area? | Yes | This taxon is considered as a threath to native cyprinids and killifishes in the United States. In Nevada and Wyoming, it has been associated in the decline of native fishes and of damselflies in Hawaii. It eats the eggs of native fish species and It is also a known carrier of trematode parasites, nematode (Camallanus cotti), and the Asian tapeworm (Bothriocephalus acheilognathi) in Hawaii , which may affect native fish species population. In the Phillippines, according to Juliano et al. (1989), this taxon competes with the native milkfish or Chanos chanos, for food (U.S. Fish and Wildlife Service. 1983: IUCNGSID. 2020; USGS. | Very high |
| 20 | 4.07 | Is it likely that the taxon will host, and/or act as a vector for, recognised pests and | No | There are no reports that the taxon may carry pests or infectious agents that are endemic in Lake Taal. | High |
| 21 | 4.08 | infectious agents that are endemic in the RA Is it likely that the taxon will host, and/or act as a vector for, recognised pests and infectious agents that are absent from (novel | Yes | This taxon is a known carrier of trematode parasites, nematode (Camallanus cotti), and the Asian tapeworm (Bothriocephalus acheilognathi) in Hawaii , which may affect native fish species | Very high |
| 22 | 4.09 | to) the RA area? Is it likely that the taxon will achieve a body size that will make it more likely to be | No | population (IUCNGSID, 2020). Ths taxon can only reach a large body size, having a maximum length of 6 cm (Fish Base, 2019). | High |
| 23 | 4.10 | released from captivity? Is the taxon capable of sustaining itself in a | No | This taxon inhabits slow-flowing lotic systems, such as upland and | Very high |
| 24 | 4.11 | (e.g. excretion of by-products) or behaviours (e.g. feeding) will reduce habitat quality for | Yes | coastal reaches of rivers, and lentic systems and within these habitats it prefers structure, i.e. aquatic or emergent vegetation This taxon can induce algal blooms when they eat the zooplankton grazers (USGS, 2020; CABI, 2020; U.S. Fish and Wildlife Service, 2017). | Very high |
| 25 | 4.12 | native taxa? Is the taxon likely to maintain a viable population even when present in low densities (or persisting in adverse conditions by way of a dormant form)? | Yes | The huge reproductive rate of this taxon can lead to rapid expansion of small founder populations with a doubling time of less than 15 months and then expand into surrounding areas (CABI, 2020). | Very high |
| | <i>esourc</i> 5.01 | e exploitation Is the taxon likely to consume threatened or | Yes | This taxon has record of eating eggs of native species which have | Very high |
| | 5.01 | Is the taxon likely to consume threatened or protected native taxa in the RA area? Is the taxon likely to sequester food | Yes | This craanism can compete with food source of native species which have taused their decline in population (IUCNGSID, 2020; CABI, 2020). This organism can compete with food source of native species as | Very high |
| | | resources (including nutrients) to the detriment of native taxa in the RA area? | | they consume plants and algal matter, periphyton, aquatic invertebrates and insects (CABI, 2020). | very night |
| | <u>eprodu</u> 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 exhibit any parental care, they are live bearing fishes (CABI, 2020). | Very high |
| 29 | 6.02 | Is the taxon likely to produce viable gametes or propagules (in the RA area)? | Yes | The conditions of the RA meets the required conditions for maturation and reproduction of this taxon, which will enable them to produce a viable gametes (Fish Base, 2019) | High |
| 30 | 6.03 | Is the taxon likely to hybridise naturally with native taxa? | Yes | This taxon has already been interbreed with many ornamental species creating hybrids, such as hybrids of P. latipinna X P. velifera, which are commonly available in the ornamental trade | Very high |
| 31 | 6.04 | Is the taxon likely to be hermaphroditic or to display asexual reproduction? | No | There are no documented evidence of hermaphroditism/asexual reproduction of this species. | High |
| 32 | 6.05 | Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle? | No | There are no requirments for this taxon being dependent on the other taxon since they are livebearers (CABI, 2020). | Very high |
| | 6.06 | Is the taxon known (or likely) to produce a | Yes | This taxon produces broods of 20-80 youngs, after 24-30 days of | Very high |

| | 6.07 | How many time units (days, months, years) | 3 | This taxon reaches the age of maturity within 3-4 months (CABI, | High |
|---|---|--|--|--|---|
| | | does the taxon require to reach the age-at- | - | 2020). | |
| 7 - | licnor | first-reproduction? | l | | <u> </u> |
| | oispers. 7.01 | al mechanisms How many potential internal | >1 | The taxon can enter the RA area through natural dispersal and its | High |
| 5 | | vectors/pathways could the taxon use to | - | succes is increased because of its broad environmental | |
| | | disperse within the RA area (with suitable | | tollerences. Also, it can be dispersed intentionally because of its | |
| | | habitats nearby)? | | abundant ornamental use and unintentionally through aquarium | |
| | | | | escape during natural calamities (flooding) which the RA area is | |
| 20 | 7 0 2 | | | prone to (CABI, 2020). |) (and bigh |
| 00 | 7.02 | Will any of these vectors/pathways bring the taxon in close proximity to one or more | Yes | The taxon can enter the RA area through natural dispersal and its succes is increased because of its broad environmental | Very high |
| | | protected areas (e.g. MCZ, MPA, SSSI)? | | tollerences. Also, it can be dispersed intentionally because of its | |
| | | ······································ | | abundant ornamental use and unintentionally through aquarium | |
| | | | | escape during natural calamities (flooding) which the RA area is | |
| | | | | prone to (CABI, 2020). | |
| 37 | 7.03 | Does the taxon have a means of actively | No | Their physical characteristics does not allow attachment to any | Very high |
| | | attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances | | substrata (Fish Base, 2019) | |
| | | the likelihood of dispersal? | | | |
| 38 | 7.04 | Is natural dispersal of the taxon likely to | No | Since this taxon is a livebearer and it only inhabits lentic or slow | Very high |
| | | occur as eggs (for animals) or as propagules | | flowing lotic environments; which means that if they are | , - |
| | | (for plants: seeds, spores) in the RA area? | | dispersed in a rapidly flowing or highly variable lotic | |
| 20 | 7.05 | | | environments, it may inhibit the species establishment or | |
| 39 | 7.05 | Is natural dispersal of the taxon likely to | Yes | The taxon can enter the RA area through natural dispersal and its | Very high |
| | | occur as larvae/juveniles (for animals) or as fragments/seedlings (for plants) in the RA | | succes is increased because of its broad environmental tollerences. Also, it can be dispersed intentionally because of its | |
| | | area? | | abundant ornamental use and unintentionally through aquarium | |
| | | | | escape during natural calamities (flooding) which the RA area is | |
| | | | | prone to (CABI, 2020). | |
| 40 | 7.06 | Are older life stages of the taxon likely to | No | This taxon does not have migratory characteristics (CABI 2020, | High |
| 4 1 | 7 07 | migrate in the RA area for reproduction? | Vaa | IUCNGSID, 2020). | Vom (hi-h |
| ÷Τ | 7.07 | Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals? | Yes | Since this taxon does not exhibit parental care, it makes the broods available for preadation and dispersion by other animals | Very high |
| | | be dispersed in the KA area by other animals? | | (CABI, 2020). | |
| 42 | 7.08 | Is dispersal of the taxon along any of the | Yes | This taxon which is readily available in the market for aquaculture | Very high |
| - | | vectors/pathways mentioned in the previous | | and as pets together with the fact that the RA area is prone to | -, |
| | | seven questions (35-41; i.e. either | | natural calamities such as typhoons (Brändlin & Wingard, 2013) | |
| | | unintentional or intentional) likely to be | | and its high adaptability to different environmental conditions | |
| 12 | 7.09 | rapid? Is dispersal of the taxon density dependent? | Not applicable | making them a habitat generalist makes their dispersal rapid There are no records that this taxon is density dependent in terms | High |
| 43 | | is dispersal of the taxon density dependent? | inot addilcadle | | |
| | | · · · · · · · · · · · · · · · · · · · | | | ingii |
| 3.7 | | ce attributes | | of dispersal. | |
| | oleran | <i>ce attributes</i> Is the taxon able to withstand being out of | | | High |
| | oleran | ce attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of | | of dispersal. | - |
| | oleran | ce attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life | | of dispersal. | - |
| 44 | <i>oleran</i> 8.01 | ce attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of | | of dispersal. | - |
| 14 | oleran | ce attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? | Not applicable | of dispersal. There are no records. | High |
| 14 | <i>oleran</i> 8.01 | ce attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the | Not applicable | of dispersal. There are no records. Water pH: 7-8, Temperature: 18°C - 25°C, dH: 9-19 and Salinity: | High |
| 44 | <u>oleran</u> 8.01 8.02 | ce attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being | Not applicable Yes | of dispersal. There are no records. Water pH: 7-8, Temperature: 18°C - 25°C, dH: 9-19 and Salinity: ppt <3 ppt (FishBase, 2019; CABI, 2020). | High Very high |
| 44 45 | <i>oleran</i> 8.01 | ce attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in | Not applicable | of dispersal. There are no records. Water pH: 7-8, Temperature: 18°C - 25°C, dH: 9-19 and Salinity: ppt <3 ppt (FishBase, 2019; CABI, 2020). The biological control of this taxa includes the introduction of | High |
| 14 | <u>oleran</u> 8.01 8.02 | ce attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other | Not applicable Yes | of dispersal. There are no records. Water pH: 7-8, Temperature: 18°C - 25°C, dH: 9-19 and Salinity: ppt <3 ppt (FishBase, 2019; CABI, 2020). The biological control of this taxa includes the introduction of larger predatory species, however, it is only possible in small, | High Very high |
| 14 15 | <u>oleran</u> 8.01 8.02 | ce attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in | Not applicable Yes | of dispersal. There are no records. Water pH: 7-8, Temperature: 18°C - 25°C, dH: 9-19 and Salinity: ppt <3 ppt (FishBase, 2019; CABI, 2020). The biological control of this taxa includes the introduction of larger predatory species, however, it is only possible in small, contained water bodies and it opens the possibility of introducing | High Very high |
| 44 45 46 | <u>oleran</u> 8.01 8.02 | ce attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? | Not applicable Yes Yes | of dispersal. There are no records. Water pH: 7-8, Temperature: 18°C - 25°C, dH: 9-19 and Salinity: ppt <3 ppt (FishBase, 2019; CABI, 2020). The biological control of this taxa includes the introduction of larger predatory species, however, it is only possible in small, contained water bodies and it opens the possibility of introducing further problem species (CABI, 2020). | High Very high Very high |
| 44 45 46 | <u>oleran</u> 8.01 8.02 8.03 | ce attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other | Not applicable Yes Yes | of dispersal. There are no records. Water pH: 7-8, Temperature: 18°C - 25°C, dH: 9-19 and Salinity: ppt <3 ppt (FishBase, 2019; CABI, 2020). The biological control of this taxa includes the introduction of larger predatory species, however, it is only possible in small, contained water bodies and it opens the possibility of introducing | High Very high Very high |
| 44 45 46 | <u>oleran</u> 8.01 8.02 8.03 | ce attributes Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle? Is the taxon tolerant of a wide range of water quality conditions relevant to that taxon? [In the Justification field, indicate the relevant water quality variable(s) being Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means? Is the taxon likely to tolerate or benefit from | Not applicable Yes Yes | of dispersal. There are no records. Water pH: 7-8, Temperature: 18°C - 25°C, dH: 9-19 and Salinity: ppt <3 ppt (FishBase, 2019; CABI, 2020). The biological control of this taxa includes the introduction of larger predatory species, however, it is only possible in small, contained water bodies and it opens the possibility of introducing further problem species (CABI, 2020). As this taxon has wide range of environmental tolerances,they can | High Very high Very high |
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| 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 | As a fact that the RA area is prone to natural calamities such as typhoons and floods (Brändlin & Wingard, 2013) together with their ability to survive a wide range of environmental conditions (temperature, salinity,low oxygen level, disturbed habitats and etc.) the risk of entry through accidental release from aquarium would most likely increase the dispersal of this taxon. | 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 | As this taxon can survive the future climatic conditions of the RA area and can establish viable population on it, it can pose a huge impact on the biodiversity and ecological status of the RA area by competing on food and nutrients of the local species and by introducing new diseases. | High |
| 54 | 9.05 | Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function? | Higher | As this taxon can survive the future climatic conditions of the RA area and can establish viable population on it, it can pose a huge impact on the biodiversity and ecological status of the RA area by competing on food and nutrients of the local species and by introducing new diseases. | 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 | As this taxon can survive the future climatic conditions of the RA area and can establish viable population on it, it can pose a huge impact on the biodiversity and ecological status of the RA area by competing on food and nutrients of the local species and by introducing new diseases. | High |

| Statistics | |
|--|------------------------|
| Statistics | |
| BRA | 46.0 |
| BRA Outcome | High |
| BRA+CCA | 58.0 |
| BRA+CCA Outcome | High |
| Score partition | mgn |
| A. Biogeography/Historical | 21.0 |
| 1. Domestication/Cultivation | 4.0 |
| 2. Climate, distribution and introduction risk | 3.0 |
| 3. Invasive elsewhere | 14.0 |
| B. Biology/Ecology | 25.0 |
| 4. Undesirable (or persistence) traits | 9.0 |
| 5. Resource exploitation | 7.0 |
| 6. Reproduction | 3.0 |
| 7. Dispersal mechanisms | 2.0 |
| 8. Tolerance attributes | 4.0 |
| C. Climate change | 12.0 |
| 9. Climate change | 12.0 |
| Answered Questions | |
| Total | 55 |
| A. Biogeography/Historical | 13 |
| 1. Domestication/Cultivation | 3 |
| 2. Climate, distribution and introduction risk | 5 |
| 3. Invasive elsewhere | 5 |
| B. Biology/Ecology | 5 5 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 | 18 |
| Environmental | 17 |
| Species or population nuisance traits | 29 |
| | |
| Thresholds | |
| BRA | 34.5 |
| BRA+CCA | 34.5 |
| Confidence | |
| BRA+CCA | 0.92 |
| | |

 BRA
 0.93

 BRA
 0.83

 CCA
 0.83

 Date and Time
 06/04/2020 12:36:59