Table 1. FISK v2 protocol for *Australoheros facetus*, Risk Assessment area (RA): Portugal; threshold = 20.

Section	Question	Reply	Comments & References	Certainty
A. Biogeography/Historical				
1. Domestication/Cultivation				
1.01 (Cb)	Is the species highly domesticated or widely cultivated for commercial, angling or ornamental purposes?	Y	Information on breeding and aquarium keeping of this species, can easily be found online, and it is known as the oldest Neotropical aquarium fish brought alive to Europe (Rícan & Kullander, 2006) (e.g. www.cichlidae.com/article.php?id=371).	4
1.02 (Cb)	Has the species established self-sustaining populations where introduced?	Y	There is scientific information available describing populations in introduced sites in Chile (Ruiz et al 1992) and Iberian Peninsula (Ribeiro et al 2007, Hermoso et al., 2011).	4
1.03 (Cb)	Does the species have invasive races/varieties/sub-species?	Y	This species come from a species complex, formerly named *Cichlasoma facetum* (Rícan & Kullander, 2006). Although this term was not used, it is reasonable to assume this species as "invasive" from the results on impacts of *C. facetum* on autochthone fauna described by Ruiz et al. (1992). In addition, exotic populations in introduced sites may originally be from different races/varieties/sub-species of this complex.	3
2. Climate and Distribution				
2.01 (Cb)	What is the level of matching between the species' reproductive tolerances and the climate of the RA area?	3	Data collected from National System of Hydrological Resources, from Portugal and from Brazil, and presented in a recent study on temperature tolerance (Baduy et al., 2017b) and reproductive behaviour (Baduy et al, 2017a) in the RA area, show a high overlap between both regions. In addition, an approximation was done based in work presented by Peel et al., 2007. Both regions are classified as temperate with hot summers. The principal difference is that in the invaded area, the summer is dry, while in the native range there isn't a dry season (Peel et al., 2007). >>http://snirh.apambiente.pt << >> http://www.snirh.gov.br/<<	4
2.02 (Cb)	What is the quality of the climate match data?	3	See Q 2.01	4

(*Continued*)

Table 1 (*Continued*)

Section	Question	Reply	Comments & References	Certainty
2.03 (Cb)	Does the species have self-sustaining populations in three or more (Köppen-Geiger) climate zones?	Y	There is online information about aquarium keeping in Germany and United States, despite no information about wild populations. Discarding these, wild populations outside its native range are found in Chile (Köppen-Geiger classification: Csb) (Ruiz et al 1992), Portugal and Spain (Csa) (Ribeiro et al 2007; Hermoso et al., 2011), and in its native range (Cfa), in at least three climate zones.	3
2.04 (Cb)	Is the species native to, or has established self-sustaining populations in, regions with similar climates to the RA area?	Y	Due to an approximation based in Peel et al. (2007), all regions are classified as temperate despite covering three different climate zones (see Q 2.03)	4
2.05 (Cb)	Does the species have a history of being introduced outside its natural range?	Y	See Q 1.02	4
3. Invasive elsewhere				
3.01 (Cb)	Has the species established one or more self-sustaining populations beyond its native range?	Y	See Q 1.02	4
3.02 (N)	In the species' introduced range, are there impacts to wild stocks of angling or commercial species?	N	There is no available information for that.	3
3.03 (A)	In the species' introduced range, are there impacts to aquacultural, aquarium or ornamental species?	N	See Q 3.02	3
3.04 (E)	In the species' introduced range, are there impacts to rivers, lakes or amenity values?	N	There is no available information for that.	3
3.05 (Cb)	Does the species have invasive congeners?	Y	Although this term was not used, it is reasonable to assume this species as “invasive” from the results on impacts of *C. facetum* on autochthone fauna (Ruiz et al. (1992). In addition, there are *Cichlasoma* spp described as invasive (e.g. *C. urophthalmus*, Adams & Wolfe 2007), although none *Australoheros* spp was yet described as invasive.	3

(*Continued*)

Table 1 (*Continued*)

Section	Question	Reply	Comments & References	Certainty
B. Biology/Ecology				
4. Undesirable traits				
4.01 (Cb)	Is the species poisonous/venomous, or poses other risks to human health?	N	No such evidence was observed experimentally or in the literature.	4
4.02 (Cb)	Does the species out-compete with native species?	Y	In the RA area, despite the paper about its feeding ecology had no conclusion about direct impacts (Ribeiro et al 2007), it is possible that *A. facetus* predates on eggs or juveniles of other species. In addition, they can compete for territories, and its aggressive behaviour can displace other species (Baduy et al 2017).	3
4.03 (Cb)	Is the species parasitic of other species?	N	No such evidence was observed experimentally or in the literature.	4
4.04 (A)	Is the species unpalatable to, or lacking, natural predators?	N	There are other non-native species in Southern Portugal observed eating juveniles of *A. facetus* (e.g. *Micropterus salmoides*).	3
4.05 (Cb)	Does the species prey on a native species previously subjected to low (or no) predation?	Y	Although a paper about feeding ecology was inconclusive about direct impacts (Ribeiro et al 2007), it is possible that *A. facetus* predates on eggs or juveniles of other species previously subjected to low (or no) predation.	3
4.06 (Cb)	Does the species host, and/or is it a vector, for one or more recognised non-native infectious agents?	?	There is no available information for that.	2
4.07 (N)	Does the species achieve a large ultimate body size (i.e. >15 cm total length) (more likely to be abandoned)?	Y	The authors of the present study collected animals larger than 17cm of total length in Portugal.	4
4.08 (E)	Does the species have a wide salinity tolerance or is euryhaline at some stage of its life cycle?	Y	During salinity tolerance trials, we observed normal behaviour and physiology within a range of 0-12ppt and despite some physiological cost at 15ppt, no mortality was observed at least for 30 days (Baduy et al 2016a; Baduy et al 2016b).	4

(*Continued*)

Table 1 (*Continued*)

Section	Question	Reply	Comments & References	Certainty
4.09 (E)	Is the species able to withstand being out of water for extended periods (e.g. minimum of one or more hours)?	?	There is no available information for that.	2

4.10 (E)	Is the species tolerant of a range of water velocity conditions (e.g. versatile in habitat use)	N	*Cichlasoma facetum* subjected to velocities above 0.07 m/sec move in favour of the current and were passively dragged Gomez et al. (2003).	4
4.11 (E)	Does feeding or other behaviours of the species reduce habitat quality for native species?	Y	Its aggressiveness, territorial and reproductive behaviour can reduce quality habitat availability for other species through displacement (Baduy et al., 2017a).	4
4.12 (Cb)	Does the species require minimum population size to maintain a viable population?	N	Since this species have a high degree of parental care, can spawn several times during the reproductive season and has high fertility rates (Baduy et al., 2017a; Ruiz et al., 1992), it is reasonable to assume that it can maintain viable populations even when present in low numbers. In addition, in the RA area, during the rainy season or wet years, its population densities are usually low (Bernardo et al., 2003; Matono et al., 2012). However, it easily recovers to high abundances when the weather become dryer (See chapter 2 of the present thesis).	3
5. Feeding guild				
5.01 (E)	If the species is mainly herbivorous or piscivorous/carnivorous (e.g. amphibia), then is its foraging likely to have an adverse impact in the RA area?		Not applicable.	
5.02 (Cb)	If the species is an omnivore (or a generalist predator), then is its foraging likely to have an adverse impact in the RA area	Y	See Q 4.05	3
5.03 (Cb)	If the species is mainly planktivorous or detritivorous or algivorous, then is its foraging likely to have an adverse impact in the RA area?		Not applicable.	

(*Continued*)

Table 1 (*Continued*)

Section	Question	Reply	Comments & References	Certainty
5.04 (Cb)	If the species is mainly benthivorous, then is its foraging likely to have an adverse impact in the RA area?		Not applicable.	
6. Reproduction				

6.01 (Cb)	Does the species exhibit parental care and/or is it known to reduce age-at-maturity in response to environment?	Y	This species has a striking bi-parental care (Baduy et al., 2017a). In addition, it was observed in captivity reproducing with ~5cm of standard length (with less than 1 year of age).	4
6.02 (Cb)	Does the species produce viable gametes?	Y	There is information about several self-populations in different areas, outside or within its native range (e.g. Ribeiro et al., 2007; Alexandre et al., 2012).	4
6.03 (A)	Is the species likely to hybridize with native species (or use males of native species to activate eggs) in the RA area?	N	There are no records of congeneres of this species or closely related species in the RA area that could hybridize with *A. facetus*.	4
6.04 (Cb)	Is the species hermaphroditic?	N	Although we observed a homossocial pair in experimental conditions (Baduy et al 2017a), we have no evidence of this possibility.	3
6.05 (Cb)	Is the species dependent on the presence of another species (or specific habitat features) to complete its life cycle?	Y	This species has adhesive eggs that are attached preferable to stones or another hard substrate. This seems to be the only habitat feature necessary to complete its life cycle.	2
6.06 (A)	Is the species highly fecund (>10,000 eggs/kg), iteropatric or has an extended spawning season relative to native species?	Y	Ruiz et al. (1992) counted 900 to 1034 eggs per female. Adding to this observation that the mean weight of reproductive fish observed in captivity was ~77g (Baduy et al., 2017a), it can be suggested a proportion of ~12000 eggs/kg.	4
6.07 (Cb)	What is the species' known minimum generation time (in years)?	1	One year. We observed small fish (~ 5cm of TL) ~12 months old that hatched in captivity and followed throughout their life, breeding with viable eggs/offspring. There is no information available about wild populations.	3

(*Continued*)

Table 1 (*Continued*)

Section	Question	Reply	Comments & References	Certainty
7. Dispersal mechanisms				
7.01 (A)	Are life stages likely to be dispersed unintentionally?	Y	It is likely that the juveniles could be dragged downstream (Gasith & Resh 1999; Baduy et al 2017b; Baduy et al 2016a; Baduy et al 2016b) and survive in brackish water since this species has a great environmental tolerance and flash floods are common in the RA area.	3
7.02 (Cb)	Are life stages likely to be dispersed intentionally by humans (and suitable habitats abundant nearby)?	Y	As an ornamental species, however very aggressive, is likely that people dispose unwanted individuals in rivers. Anecdotal reports of such behaviours are common.	3

7.03 (A)	Are life stages likely to be dispersed as a contaminant of commodities?	N	There is no such evidence.	3
7.04 (Cb)	Does natural dispersal occur as a function of egg dispersal?	N	*A. facetus* lays adhesive eggs on the substrate and provides bi-parental care to the eggs and offspring (Ruiz et al 1992; Baduy et al 2017a).	4
7.05 (E)	Does natural dispersal occur as a function of dispersal of larvae (along linear and/or 'stepping stone' habitats)?	Y	This species presents substrate spawning and bi-parental care of the clutch (Ruiz et al 1992; Baduy et al 2017a). However, due to the occurrence of winter floods in the RA area (Gasith & Resh, 1999), it is possible that the larvae are dragged downstream reaching new habitats. Adults of *A. facetus* were no able to maintain its position in the water column in flow faster than 0.07m/sec (Gomez et al., 2003).	3
7.06 (E)	Are juveniles or adults of the species known to migrate (spawning, smolting, feeding)?	Y	They are highly territorial and it is possible that breeding pairs should migrate, at a small scale, in order to find adequate sites for spawning (Baduy et al., 2017a).	3
7.07 (Cb)	Are eggs of the species known to be dispersed by other animals (externally)?	N	There is no available information for that.	3

(*Continued*)

Table 1 (*Continued*)

Section	Question	Reply	Comments & References	Certainty
7.08 (Cb)	Is dispersal of the species density dependent?	Y	They are highly territorial and it is possible that breeding pairs should migrate, at a small scale, in order to find adequate sites for spawning (Baduy et al., 2017a).	2
8. Persistence attributes				
8.01 (Cb)	Are any life stages likely to survive out of water transport?	?	There is no available information for that.	2
8.02 (Cb)	Does the species tolerate a wide range of water quality conditions, especially oxygen depletion and temperature extremes?	Y	This species has critical thermal maxima ranging from 36.5ºC to 39.1ºC and critical thermal minima from 4.5ºC to 5.8ºC. The minimum value of dissolved oxygen during CTMax and Min trials was 4.6mg/L (Baduy et al 2017b), and with high concentration of endosulfan (LC50=13.6ug/L; Crupkin et al., 2013).	4

8.03 (A)	Is the species readily susceptible to piscicides at the doses legally permitted for use in the risk assessment area?	?	There is no available information for that.	2
8.04 (A)	Does the species tolerate or benefit from environmental disturbance?	Y	This species has a wide environmental tolerance (Baduy et al 2017b), therefore it is reasonable to assume that it is tolerant to environmental disturbance. Furthermore, the RA area is known to have severe summer droughts (Gasith & Resh 1999) and this species was described in higher densities compared to native species in those conditions (Godinho et al., 1997).	3
8.05 (Cb)	Are there effective natural enemies of the species present in the risk assessment area?	Y	It is unlikely that natural enemies exist among native species. However, among other exotic species, as *M. salmoides*, it is possible that the eggs and juveniles could be predated.	3

Sector Codes (in Parentheses) are: A = Aquaculture; E = Environmental; N = Nuisance; Cb = Combined. Scoring subroutines for "Climate matching" and "Invasive elsewhere," and "Generation time" are described in Copp et al. (2005) and other responses are: Y = Yes; N = No; ? = Don't Know. Certainty values range from 1 = Very uncertain to 4 = Very certain. RA: Risk Assessment area.

Table 2. AS-ISK *Australoheros facetus*. Backward-compatibility (*BC*) of questions relative to FISK (v2) with corresponding Q# in parentheses: D = Different; N = New; NI = Near-identical; Sim = Similar.

Risk Screening context:
Reason: The currently classification of this species in Portugal is as a non-native species, however not invasive. New data from a PhD carried out by Flávia Baduy, suggests the inclusion of this species in the "invasive species" list.
Taxonomy: It was formely called as *Cichlasoma facetum*, and after genus review by Rivan and Kullander (2006). it was included in a new genus, *Australoheros*. Because of the confusion and new descriptions of species from the formely called '*Cichlasoma*' *facetum* group, it is possible that the species found in Portugal came from different lineages, subspecies, or even species, from South America.
Native range: Coastal drainages from Southern Brazil, Argentina and Uruguay.
Introduced range: Southern Portugal.

Section / (*BC*)	Question	Reply	Comments & References	Certainty
A. Biogeography/Historical				
1. Domestication/Cultivation				
1.01 (C) *NI (1.01)*	Has the taxon been the subject of domestication (or cultivation) for at least 20 generations?	Y	Information on breeding and aquarium keeping of this species, can easily be found online, and it is known as the oldest Neotropical aquarium fish brought alive to Europe (Rícan & Kullander, 2006) (e.g. www.cichlidae.com/article.php?id=371).	4
1.02 (C) *D*	Is the taxon harvested in the wild and likely to be sold or used in its live form?	Y	Information on how to get some individuals in lakes and ponds in Lisbon or from some sites in Alentejo is available online. However, there is no information about official selling. (e.g. http://www.ciclideos.com/forum/ "Peixes que suportam o inverno em Portugal")	2
1.03 (N) *NI (1.03)*	Does the taxon have invasive races, varieties, sub-taxa or congeners?	Y	This species comes from a species complex, formerly named *Cichlasoma facetum* (Rícan & Kullander, 2006). Although this term was not used, it is reasonable to assume this species as "invasive" from the results on impacts of *C. facetum* on autochthone fauna described by Ruiz et al. (1992). In addition, exotic populations in introduced sites may originally be from different races/varieties/sub-species of this complex. Congener *Cichlasoma urophthalmus*, is known to have large impacts mainly in Florida (e.g. Porter-Whitaker et al., 2012).	3

(*Continued*)

Section / (*BC*)	Question	Reply	Comments & References	Certainty
2. Climate, distribution and introduction risk				
2.01 (E) *Sim (2.01)*	How similar are the climatic conditions of the RA area and the taxon's native range?	3	Data collected from National System of Hydrological Resources, from Portugal and from Brazil, and presented in recent studies in the RA area (Baduy et al., 2017a, b), show a high overlap between both regions. In addition, an approximation was done based in work presented by Peel et al., 2007. Both regions are classified as temperate with hot summers. The principal difference is that in the invaded area, the summer is dry, while in the native range there isn't a dry season (Peel et al., 2007). >>http://snirh.apambiente.pt << >> http://www.snirh.gov.br/<<	4
2.02 (E) *NI (2.02)*	What is the quality of the climate matching data?	3	See Q 2.01	4
2.03 (CN) *D*	Is the taxon already present outside of captivity in the RA area?	Y	Several studies describe this species in the wild ichthyofauna, mainly at Guadiana, Sado and Arade basins (e.g. Alexandre et al., 2012; Ribeiro e Collares-Pereira, 2010; Pires et al., 2010).	4
2.04 (CN) *D*	How many potential vectors could the taxon use to enter in the RA area?	1	To enter in the RA area this species probably used just one vector: human (or as an ornamental species or for mosquito control) (Ribeiro et al., 2008)	3
2.05 (CN) *D*	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)?	n.a.	Not applicable. The taxon is already present in the RA area.	4
3. Invasive elsewhere				
3.01 (N) *NI (3.01)*	Has the taxon become naturalised (established viable populations) outside its native range?	Y	There are records of this species in the wild in Chile at least since 1959 (Ruiz et al., 1992); in Portugal since 1940 (Ribeiro et al., 2007) and in Spain at least since 1980 (Doadrio, 2002).	4
3.02 (C) *NI (3.02)*	In the taxon's introduced range, are there known adverse impacts to wild stocks or commercial taxa?	N	There is no available information for that.	2
3.03 (C) *NI (3.03)*	In the taxon's introduced range, are there known adverse impacts to aquaculture?	N	There is no available information for that.	2

(*Continued*)

Table 2 (*Continued*)

Section / (*BC*)	Question	Reply	Comments & References	Certainty
3.04 (E) *Sim (3.04)*	In the taxon's introduced range, are there known adverse impacts to ecosystem services?	N	There is no available information for that.	3
3.05 (C) *D*	In the taxon's introduced range, are there known adverse socio-economic impacts?	N	There is no available information for that.	3
B. Biology/Ecology				
4. Undesirable (or persistence) traits				
4.01 (N) *NI (4.01)*	Is it likely that the taxon will be poisonous or pose other risks to human health?	N	No such evidence was observed experimentally or in the literature.	4
4.02 (N) *Sim (4.02)*	Is it likely that the taxon will smother one or more native taxa (that are not threatened or protected)?	Y	In the RA area, despite the paper about its feeding ecology had no conclusion about direct impacts (Ribeiro et al 2007), it is possible that *A. facetus* predates on eggs or juveniles of other species previously subjected to low (or no) predation. In addition, they can compete for territories, and its aggressive behaviour can displace other species (Baduy et al 2017).	3
4.03 (N) *Sim (4.03)*	Are there threatened or protected taxa that the non-native taxon would parasitize in the RA area? (obs.: in the guidance, it is used the sentence: "would become a *predator* or parasite (…)")	Y	As an omnivore species (Ribeiro et al., 2007; Ruiz et al., 1992), it is possible that *A. facetus* predates on eggs or juveniles from other species as the threatened chub *Squalius pyrenaicus* and saramugo *Anaecypris hispanica*.	3
4.04 (N) *D*	Is the taxon adaptable in terms of climatic and other environmental conditions, thus enhancing its potential persistence if it has invaded or could invade the RA area?	Y	Its wide environmental tolerance, especially to temperature but also to salinity changes (Baduy et al., 2017b; Baduy et al., 2016) could be one of the reasons for why this species adapted well to the differences between the dry summers of the Iberian Peninsula when compared to its native range (Peel et al., 2007).	3
4.05 (E) *D*	Is the taxon likely to disrupt food-web structure/function in aquatic ecosystems it has or is likely to invade in the RA area?	N	From the data about its feeding ecology, as a generalist opportunistic fish, it is unlikely to occur a disruption in the food-web (Ribeiro et al., 2007; Ruiz et al., 1992).	3
4.06 (E) *D*	Is the taxon likely to exert adverse impacts on ecosystem services in the RA area?	N	There is no available information for that.	3

(*Continued*)

Table 2 (*Continued*)

Section / (*BC*)	Question	Reply	Comments & References	Certainty
4.07 (N) *D*	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?	N	There is no available information for that.	2
4.08 (N) *D*	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?	N	There is no available information for that.	3
4.09 (N) *Sim (4.07)*	Is it likely that the taxon will achieve a body size that will make it more likely to be released from captivity?	Y	The authors of the present study collected animals larger than 17cm of total length in Portugal.	4
4.10 (N) *NI (4.10)*	Is the taxon capable of sustaining itself in a range of water velocity conditions (e.g. versatile in habitat use)?	N	*Cichlasoma facetum* subjected to velocities above 0.07 m/sec move in favour of the current and were passively dragged Gomez et al. (2003).	4
4.11 (E) *Sim (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?	Y	Its aggressiveness, territorial and reproductive behaviour can reduce quality habitat availability for other species through displacement (Baduy et al., 2017a).	3
4.12 (N) *NI (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)?	Y	Since this species have a high degree of parental care, can spawn several times during the reproductive season and has high fertility rates (Baduy et al., 2017a; Ruiz et al., 1992), it is reasonable to assume that it can maintain viable populations even when present in low numbers. In addition, in the RA area, during the rainy season or wet years, its population densities are usually low (Bernardo et al., 2003; Matono et al., 2012). However, it easily recovers to high abundances when the weather become dryer (See chapter 2 of the present thesis).	3
5. Resource exploitation				
5.01 (E) *D*	Is the taxon likely to consume threatened or protected native taxa in RA area?	Y	As an omnivore species (Ribeiro et al., 2007; Ruiz et al., 1992), it is possible that *A. facetus* predates on eggs or juveniles from other species as the threatened chub *Squalius pyrenaicus* and the saramugo *Anaecypris hispanica*.	3

(*Continued*)

Table 2 (*Continued*)

Section / (*BC*)	Question	Reply	Comments & References	Certainty
5.02 (N) *D*	Is the taxon likely to sequester food resources (including nutrients) to the detriment of native taxa in the RA area?	Y	There is some overlap with native species (Ribeiro et al., 2007), although direct impacts are inconclusive. However, as Kodde and colleagues (2016) showed, the foraging success of the endangered native Southern Iberian chub *Squalius pyrenaicus* is generally lower than that of the *A. facetus* when both species are present, especially when the temperature increases. It is therefore reasonable to assume that, in the presence of *A. facetus*, *S. pyrenaicus* could have a decrease in quantity and quality of its diet.	3
6. Reproduction				
6.01 (N) *NI (6.01)*	Is the taxon likely to exhibit parental care and/or to reduce age-at-maturity in response to environmental conditions?	Y	This species has a striking bi-parental care (Baduy et al., 2017a). In addition, it was observed in captivity reproducing with ~5cm of standard length (with less than 1 year of age).	4
6.02 (N) *NI (6.02)*	Is the taxon likely to produce viable gametes or propagules (in the RA area)?	Y	There is information about several self-populations in different areas, outside or within its native range. (e.g. Ribeiro et al., 2007; Alexandre et al., 2012).	4
6.03 (N) *NI (6.03)*	Is the taxon likely to hybridize naturally with native taxa?	N	There are no records of congeneres of this species or closely related species in the RA area that could hybridize with *A. facetus*.	4
6.04 (N) *NI (6.04)*	Is the taxon likely to be hermaphroditic or to display asexual reproduction?	N	Although we observed homosocial pair during experiments (Baduy, 2017a), we have no evidence of this possibility.	3
6.05 (N) *NI (6.05)*	Is the taxon dependent on the presence of another taxon (or specific habitat features) to complete its life cycle?	Y	This species has adhesive eggs that are attached preferable to stones or another hard substrate. This seems to be the only habitat feature necessary to complete its life cycle.	2
6.06 (N) *Sim (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)?	Y	Ruiz et al. (1992) counted 900 to 1034 eggs per female. This species can spawn at 15-day intervals during the reproductive season (Baduy et al 2017a)	4

(*Continued*)

Table 2 (*Continued*)

Section / (*BC*)	Question	Reply	Comments & References	Certainty
6.07 (N) *Sim (6.07)*	How many time units (days, months, years) does the taxon require to reach the age-at-first-reproduction? [In the Justification field, indicate the relevant time unit being used.]	1	One year. We observed small fish (~ 5cm of TL) ~12 months old that hatched in captivity and followed throughout their life, breeding with viable eggs/offspring. There is no information available about wild populations.	3
7. Dispersal mechanisms				
7.01 (CN) *D*	How many potential internal pathways could the taxon use to disperse within the RA area (with suitable habitats nearby)?	>1	Winter floods are common in the RA area (Gasith & Resh, 1999), thus it is possible that the fish could be dragged downstream reaching new habitats since at water flows above 0.7m/sec *A. facetus* cannot maintain its position in the water column (Gomez et al., 2003). A second pathway is through aquarium trade. There is information available online about how to get individuals in lakes and ponds in urban or wild sites. However, there is no information about official selling. (http://www.ciclideos.com/forum/ "Peixes que suportam o inverno em Portugal")	3
7.02 (EN) *D*	Will any of these pathways bring the taxon in close proximity to one or more protected areas (e.g. MCZ, MPA, SSSI)?	Y	This species is already found at Guadiana Valley Natural Park.	4
7.03 (N) *D*	Does the taxon have a means of actively attaching itself to hard substrata (e.g. ship hulls, pilings, buoys) such that it enhances the likelihood of dispersal?	N	There is no such evidence.	4
7.04 (N) *NI (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?	N	*A. facetus* lays adhesive eggs on the substrate and provides bi-parental care to the eggs and offspring (Ruiz et al 1992; Baduy et al 2017a).	4
7.05 (N) *NI (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?	Y	This species presents substrate spawning and bi-parental care of the clutch (Ruiz et al 1992; Baduy et al 2017a). However, due to the occurrence of winter floods in the RA area (Gasith & Resh, 1999), it is possible that the larvae are dragged downstream reaching new habitats. Adults of *A. facetus* were no able to maintain its position in the water column in flow faster than 0.07m/sec (Gomez et al., 2003).	3

(*Continued*)

Table 2 (*Continued*)

Section / (*BC*)	Question	Reply	Comments & References	Certainty

7.06 (N) *Sim (7.06)*	Are older life stages of the taxon likely to migrate in the RA area for reproduction?	Y	They are highly territorial and it is possible that breeding pairs should migrate, at a small scale, in order to find adequate sites for spawning (Baduy et al., 2017a).	3
7.07 (N) *NI (7.07)*	Are propagules or eggs of the taxon likely to be dispersed in the RA area by other animals?	N	There is no available information for that.	3
7.08 (CN) *D*	Is dispersal of the taxon along any of the pathways mentioned in the previous seven questions (7.01–7.07; i.e. both unintentional or intentional) likely to be rapid?	Y	The flash floods in the RA area can occur more than once a year.	3
7.09 (N) *NI (7.08)*	Is dispersal of the taxon density dependent?	Y	They are highly territorial and it is possible that breeding pairs should migrate, at a small scale, in order to find adequate sites for spawning (Baduy et al., 2017a).	2
8. Tolerance attributes				
8.01 (N) *NI (4.09)*	Is the taxon able to withstand being out of water for extended periods (e.g. minimum of one or more hours) at some stage of its life cycle?	N	There is no available information for that.	2
8.02 (N) *NI (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.]	Y	This species has critical thermal maxima ranging from 36.5ºC to 39.1ºC and critical thermal minima from 4.5ºC to 5.8ºC. The minimum value of dissolved oxygen during CTMax and Min trials was 4.6mg/L (Baduy et al 2017b), and with high concentration of endosulfan (LC50=13.6ug/L; Crupkin et al., 2013).	4
8.03 (N) *NI (8.03)*	Can the taxon be controlled or eradicated in the wild with chemical, biological, or other agents/means?	Y	There is no available information for that.	2
8.04 (N) *NI (8.04)*	Is the taxon likely to tolerate or benefit from environmental/human disturbance?	Y	This species has a wide environmental tolerance (Baduy et al 2017b), therefore it is reasonable to assume that it is tolerant to environmental disturbance. Furthermore, the RA area is known to have severe summer droughts (Gasith & Resh 1999) and this species was described in higher densities compared to native species in those conditions (Godinho et al., 1997).	3

(*Continued*)

Table 2 (*Continued*)

Section / (*BC*)	**Question**	**Reply**	**Comments & References**	**Certainty**

8.05 (N) *NI (4.08)*	Is the taxon able to tolerate salinity levels that are higher or lower than those found in its usual environment?	Y	During salinity tolerance trials, we observed normal behaviour and physiology within a range of 0-12ppt and despite some physiological cost at 15ppt, no mortality was observed at least for 30 days (Baduy et al 2016a; Baduy et al 2016b).	4
8.06 (N) *NI (8.05)*	Are there effective natural enemies (predators) of the taxon present in the RA area?	Y	It is unlikely that natural enemies exist among native species. However, among other exotic species, as *M. salmoides*, it is possible that the eggs and juveniles could be predated.	3
9. Climate change				
9.01 (N) *N*	Under the predicted future climatic conditions, are the risks of entry into the RA area posed by the taxon likely to increase, decrease or not change?	Nil	The entry of *A. facetus* into the RA area is mediated by human action, e.g. aquarium trade. It will probably not be affected by the predicted future climatic conditions.	3
9.02 (N) *N*	Under the predicted future climatic conditions, are the risks of establishment posed by the taxon likely to increase, decrease or not change?	+	This species is adapted to warmer waters, although can withstand temperatures as well (critical thermal maxima ranging from 36.5ºC to 39.1ºC and critical thermal minima from 4.5ºC to 5.8ºC; Baduy et al., 2017b). It is possible that an increase in water temperature could increase its abundance during winter and allow establishment in new areas.	2
9.03 (N) *N*	Under the predicted future climatic conditions, are the risks of dispersal within the RA area posed by the taxon likely to increase, decrease or not change?	+	The forecasted increase in strength and frequency of floods can spur its dispersal by creating new pathways and connections between water bodies.	3
9.04 (E) *N*	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on biodiversity and/or ecological integrity/status?	+	This species seems to dominate the ichthyofauna during the hot dry season (together *Lepomis gibbosus* in some sites, pers. obs), The forecasted climate change according to The International Panel on Climate Change (IPCC) is more frequent and extended periods of drought and water scarcity as well more episodes of flash-floods (Bates et al., 2008), so it is possible that the impacts on the endangered native fauna of Southern Portugal will increase.	3
9.05 (E) *N*	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem structure and/or function?	+	Due the observed dominance of *A. facetus* during the hot dry season, a decrease in biodiversity of the native ichthyofauna could be expected, affecting the food web and disrupting the ecosystem structure and function.	2

(*Continued*)

Table 2 (*Continued*)

Section / (*BC*)	**Question**	**Reply**	**Comments & References**	**Certainty**

9.06 (C) *N*	Under the predicted future climatic conditions, what is the likely magnitude of future potential impacts on ecosystem services/socio-economic factors?	+	If *A. facetus* benefits from future climate changes, due to its ability to colonize new habitats (high parental care, high fecundity, high environmental tolerance, opportunistic feeding; Baduy et al 2017a,b; Ruiz et al, 1992, Ribeiro et al., 2007), it is possible that this species dominate the ichthyofauna, leading to a homogenization of the fish fauna, which can decrease the interest of people in fishing or diving.	2

Sector codes (in parentheses): C = Commercial; E = Environmental; N = Nuisance. Responses are: Y = Yes; N = No; Nil = no change; + = increase; - = decrease. Certainty values range from 1 = Very uncertain to 4 = Very certain. RA: Risk Assessment area.