

Risk Assessment

**Application to add *Labidochromis caeruleus* to the
Environment Protection and Biodiversity Conservation Act
1999 List of Specimens taken to be Suitable for Live Import**

August 2018

Introduction

Purpose of the proposed listing

Mr David Wilson of Aquagreen and Mr Evan Needham of Betta Aquatics jointly submitted an application to the Australian Government Department of the Environment and Energy (the Department) to amend the *List of Specimens Taken to be Suitable for Live Import* (Live Import List) to include *Labidochromis caeruleus* (Electric Yellow Cichlid). The application was submitted on 8 June 2017.

The background to this application is that while the Electric Yellow Cichlid is already present and traded in Australia, the species is not on the Live Import List. As the Northern Territory legislation on permitted species mirrors the Live Import List, aquarium fish traders and owners in the Northern Territory cannot legally possess or trade this species. In order to legally trade or possess this species, the Northern Territory based applicants wish to have the species added to the Live Import List. The applicants have stated that their main aim is to enable legal imports of the species into the Northern Territory from established breeders in other Australian states, rather than importing the species into the country.

L. caeruleus was introduced into Australia in the early 1990's, which predates the implementation of the Live Import List in 2000. The species was not listed in the *Wildlife Protection (Regulation of Exports and Imports) Act 1982* which regulated live imports before the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Therefore the species may have not been originally imported legally.

Background

Under s303EC of the EPBC Act, the Minister may amend the Live Import List by including a specimen in the list. There are two parts to the list—Part 1 comprises specimens that can be imported without a permit under the Act and Part 2 comprises specimens, including CITES species, that require a permit under the Act to be imported. Import restrictions may be applied to the species listed on Part 2, such as 'for non-commercial purposes' or 'high security facilities only'. Additional conditions may also be applied when an import permit is issued.

Before amending the Live Import List, the Minister must consult with other Ministers as the Minister considers appropriate and may consult other persons and organisations as the Minister considers appropriate, and consider a report assessing the potential environmental impacts of the proposed amendment. The Department carries out this consultation process on behalf of the Minister and considers all comments and information received when producing the assessment report for the Minister's consideration.

Taxonomy

Kingdom: Animalia
Phylum: Chordata
Class: Actinopterygii
Order: Cichliformes
Family: Cichlidae
Genus: *Labidochromis*
Species: *caeruleus*

The naming authority is Fryer, 1956.

Description

Labidochromis caeruleus is a small perch-like fish growing to 13–15 cm in length. The species is deep bodied, laterally compressed, and has a long spiny dorsal fin that flows into a moderately elongated soft dorsal fin. The species has several colour morphs, including pale silver, light blue and bright yellow. The applicants have indicated they wish to import the bright yellow colour morph from interstate breeders. This morph has a bright yellow body colouration, usually with a pronounced black stripe running the length of the spiny and soft dorsal fins. Common names for the yellow colour morph of this species are Electric Yellow Cichlid, Lemon Yellow Lab and Yellow Prince (Konings, 2016; Froese and Pauly, 2017).

The application is to primarily allow the electric yellow morph of the species to be legally sold and possessed in the Northern Territory. As there are no physical or ecological differences between the different recognised colour morphs, all would be included under the addition of *L. caeruleus* on the Live Import List.

Conservation status

L. caeruleus are listed on the IUCN Red List as 'Least Concern' (Kasembe, 2006). They are not listed on the *Convention on International Trade in Endangered Species of Wild Fauna and Flora* (CITES) list.

Distribution, Habitat and Biology of *Labidochromis caeruleus*

L. caeruleus is endemic to Lake Malawi, a large deep rift lake in the south-east of Africa, located between Malawi, Mozambique and Tanzania (Kasembe, 2006; Konings, 2016). The species is known only from the northwestern coast of the lake and has not been reported as establishing wild populations anywhere else in the world (Froese and Pauly, 2017). The latitude range of the species' habitats in Lake Malawi is approximately 10.15–11.90°S (Konings, 2016).

Lake Malawi supports a diverse assemblage of endemic cichlid species. They have undergone an explosive radiation into many different species utilising many different ecological niches. Lake Malawi cichlids are reported to hybridize with each other (Smith *et al.*, 2003). This is supported by a study on the phylogeny of the East African Cichlids showing that they were descendants of a common ancestor (Zardoya *et al.*, 1996).

L. caeruleus is an unusual species amongst this group in inhabiting small caves and holes in deep rocky areas in specific areas of the lake at depths of 10–25 metres. It usually occurs singly and is primarily an insectivore (Elieson, 2002; Konings, 2016; Froese and Pauly, 2017). They are sexually dimorphic with males being larger than the females. The species is not territorial and is tolerated by other cichlid species in the wild (Konings, 2016). In captivity the species should be kept at high densities with other Lake Malawi Cichlids to avoid fighting but should not be kept with other species (Bateman, 2018).

L. caeruleus is a maternal mouth brooder. Broods usually number between 15 and 20 fry, with incubation periods lasting typically 28 days. Spawning usually occurs in a shallow sand pit dug by the male near rocky cover with the female taking them into her mouth for the incubation period. Under ideal conditions the species can reproduce about every two months but this is dependent on the body condition of the female (Elieson, 2002).

Risk assessment

Assessing the risk of the potential of introducing a new organism into the environment involves assessing the risk of it becoming established and spreading and the likely impacts if establishment occurred.

Bomford (2008) found that for freshwater fish, the level of risk can be assumed in accordance with the four key factors of establishment success. These factors are:

- Propagule pressure—the release of large numbers of animals at different times and places enhances the chance of successful establishment
- Climate match—introduction to an area with a climate that closely matches that of the species' original range
- History of establishment elsewhere—previous successful establishment
- Taxonomic group—belonging to a family or genus which has a high establishment success rate.

Risk of establishment

Propagule pressure—the release of large numbers of animals at different times and places

The species has very specific habitat requirements that are uncommon in Australia. These locations are generally remote from populated areas. It is very unlikely that enough fish would be released into a suitable receiving environment to establish a breeding population as a result of an accident or being deliberately released into the local waterways.

The species is not a schooling species and males do not tolerate each other in a tank (Bateman 2018). This suggests that a release from a single source would not provide enough fish to form a viable population. The species is not territorial or schooling and any releases would disperse through the water way. To establish a self-sustaining population would require deliberate actions by a knowledgeable individual into a specific waterway and is highly unlikely to occur at random.

Climate match—introduction to an area with a climate that closely matches that of the species' original range

The climate match used by Bomford (2008) is based on terrestrial measurements and therefore does not accurately represent suitable aquatic ranges for the species in Australia.

The application provided outputs from Climatch which showed that far northern Australia was most climatically suited to the species where water temperatures are between 22 - 28° C. However, the applicants also discussed and indicated that although this region was climatically matched the species' specific water parameter requirements made most of this region unsuited to the species. The Department also ran the Climatch model and obtained almost identical predicted ranges.

L. caeruleus is a lacustrine or lake species requiring hard alkaline waters with rocky areas with caves and water depths of between 10 - 25 m. There are limited locations in Northern Australia meeting these requirements with most of these locations being remote from highly populated areas.

The species has not been reported in rivers or streams around Lake Malawi despite many being present, supporting that the species is purely a deep lake dwelling species. The likelihood of the

species being successfully released into a deep lake containing hard alkaline water with rocky outcrops is very low. It is very unlikely that accidental escape or dumping of fish into a waterway could lead to the establishment of the species.

History of establishment elsewhere—previous successful establishment

The application is to add the species to the list to allow import but also to allow possession in the Northern Territory. There is no evidence that despite being actively bred and traded in Australia for several decades that the species has established any wild populations. The species is found in one specific location in Africa and has not colonised all of Lake Malawi where the species is endemic. The species is reported to have been introduced to the Philippines in 1989 as an ornamental fish but it is unknown if the species has established (Froese and Pauly, 2017).

There are no reports of this species establishing in any country or outside its limited range in Lake Malawi, therefore its establishment potential should be considered very low.

Taxonomic group—belonging to a family or genus which has a high establishment success rate

L. caeruleus is a member of the *Cichlidae* family, which has over 1,650 identified members and is one of the largest vertebrate families in the world (Kullander, 1998). The *Cichlidae* family contains many known invasive species with eight genera and 17 species reported as having established in Australia (Bray and Goman, 2018).

There are no reports of any of the 18 members of the *Labidochromis* genus establishing feral populations. Closely related cichlids from Lake Malawi belonging to genera such as *Maylandia* and *Melonchromis* have also not been reported as establishing wild populations outside the lake ((Froese and Pauly, 2017). This suggests these types of Lake Malawi cichlids, generically called Mbuna or rock dwellers are not invasive.

There are no records of *L. caeruleus* establishing feral populations anywhere despite being a common aquarium fish worldwide. Given the lack of evidence of any members of the *Labidochromis* genus establishing in areas outside Lake Malawi, the Department does not consider *L. caeruleus* a high risk species in terms of the establishment of feral populations.

Potential impacts of established feral populations

In aquaria the species is known to be territorial and semi aggressive (Bateman, 2018), though in the wild the fish is recorded as not territorial but tolerant of other cichlid species. In aquaria it is reported that low density stocking can result in aggression to other Mbuna or territorial behaviour by males (Bateman, 2018). As there are no reports of any *Labidochromis* species establishing feral population's impacts are unknown, but this suggests that the species may bully other species.

L. caeruleus is a small (8-10 cm) brightly coloured (yellow, blue and white morphs) non schooling fish in the wild (Froese and Pauly, 2017). This suggests that if the species were to establish in the wild it would be a prey species for the many large predatory fish in Northern Australia, which may limit its population. The species is an omnivore preying on small invertebrates and plants. In the wild the species is described as wandering through their habitat rather than lingering in one area (Konings, 2016). This may reduce local impacts to food sources.

Other risks

Disease transmission to Australian fish and aquarium fish populations

The import of *L. caeruleus* will need to meet the conditions of an import permit issued by the Department of Agriculture and Water Resources who assess the disease and pathogen risks of the importation of the species.

L. caeruleus are commonly bred and traded in Australia. The greatest environmental disease risk is probably from pre-existing diseases in Australian aquarium populations being transferred to wild fish or aquatic environments. Listing of *L. caeruleus* is unlikely to change this risk rating.

Theft and deliberate release

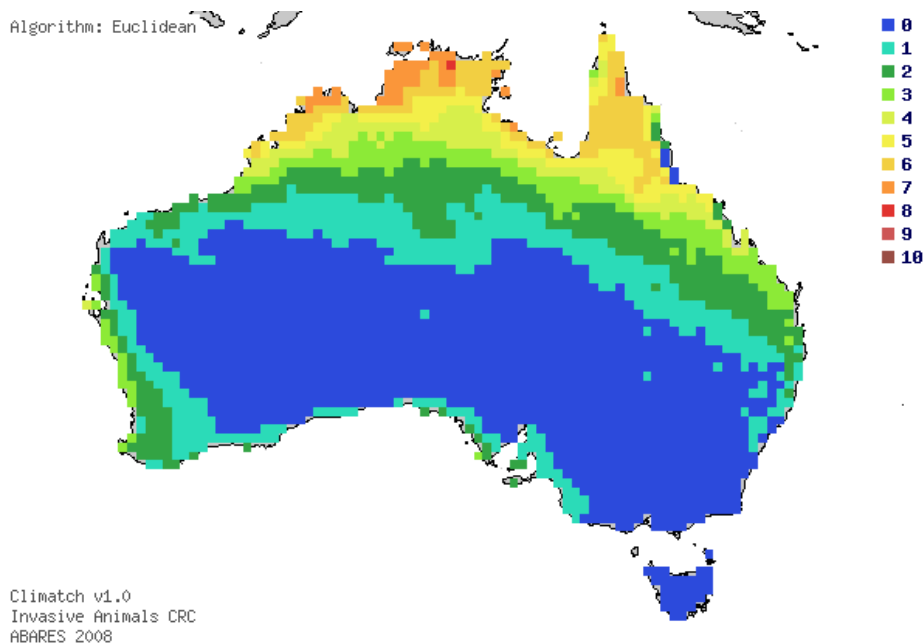
L. caeruleus are reasonably cheap (\$10 - 50 per fish) and freely available in Australia through aquarium stores. *L. caeruleus* is common enough in Australia that theft is unlikely due to lack of availability.

Only a very deliberate and planned release might result in establishment of *L. caeruleus*. Although a lack of possible suitable habitats and their remoteness from populated areas makes this scenario highly unlikely.

Climatch

Climatch was used to assist in identifying possible suitable habitat in Australia that the species could inhabit if released. Although Climatch is based on terrestrial climate data and the target species is a freshwater fish, the output shows the species could probably only inhabit far northern Australia with only one area scoring above 7 out of 10. The output is also limited by the low number of source weather points available in the native range of the species in Africa. This means the Climatch output may underestimate the possible range.

The Climatch result suggests that there are no areas strongly matched to the species and when this is combined with the species requirements for hard alkaline water with no salinity, indicates the species is unlikely to establish in Australian waters.



Exotic Freshwater Fish Risk Assessment Model (Bomford 2008)

Species identification and sources	Electric Yellow Cichlid
Common name	Electric Yellow Cichlid
Scientific name	<i>Labidochromis caeruleus</i>
Date assessed	30-May-18
Literature Search Type And Date:	FishBase May 2018

Scores	Value	Explanation
A. Climate Match Score (1–8)	5	Euclidian score level 5 = 259 or a score of 4. Added 1 increment due to low number of base stations available in home range (5 used).
B. Overseas Range Score (0–4)	1	5–10 grid squares
C. Establishment Score (0–3)	0	Introduced but never established in one location
D. Introduction Success Score (0–4)	0	Introduced but success rate = 0
E. Taxa Risk Score (0–5)	1	One introduction of genus (18 members) outside native range. Not known if established.

Summary	Score	Rank
Establishment Risk	7	Low

Comments on the proposal to import *L. caeruleus*

Three government and two public comments were received when the applicants' assessment report was posted on the Department of the Environment and Energy's website between 29 October 2017 and 29 November 2017.

Respondent	Summary of Relevant Comments	Department's Evaluation	Further Information/Comment Requested of the Applicant
ACT	Supports. The ACT supports amendment of the Live Import List to include the electric yellow cichlid as an aquarium fish	Noted	Not needed
QLD Fisheries Queensland	Supports Fisheries Queensland would support the inclusion of the electric yellow cichlids on the Live Import List on the basis that the species poses little risk of establishing viable populations within Queensland nor impacting on the indigenous species.	Noted	Not needed
SA Department of Environment, Water and Natural Resources	Supports The Government of South Australia supports the proposal to include the Electric Yellow	Noted	Not needed

Respondent	Summary of Relevant Comments	Department's Evaluation	Further Information/Comment Requested of the Applicant
	Cichlid on the Live Import List.		
PUBLIC	<p>Opposes</p> <p>1. No reason is given in the draft report for the legislation banning the species from the NT.</p> <p>2. The statement that accidental or deliberate release into the wild of captive populations is a negligible risk has not been correctly assessed.</p> <p>3. Climate is not necessarily a limiting factor for colonisation by exotic species.</p> <p>4. Some of the localities listed as having suitable habitat for this species are National Parks with heavily used camp sites. I suggest tourists and other visitors could be the pathway for introducing exotic species.</p> <p>5. The draft document describes the fish as an insectivore but also that it preys on snails which are not insects.</p> <p>6. The draft report does not say if the eggs of this fish species are resistant to desiccation and could therefore disperse and remain viable.</p>	<p>1. Incorrect -- the reason is stated in draft report - the NT list is based on EPBC Live Import List. Species is not banned it is not allowed.</p> <p>2. Disagree. The species have specific water requirements that would greatly limit its ability to colonise in Australian waterways.</p> <p>3. Correct to some degree. Climatch is one tool used to assess possible colonisation potential. The fact the species is common worldwide in the pet trade and has never established a feral population suggests the risk in Australia is very low.</p> <p>4. The waters in Kakadu and the Northern Territory are generally soft and neutral pH as distinct from the alkaline hard water deep water required by this species.</p> <p>5. The species utilises a range of food sources and is more a generalist than a specialist. Impacts to specific species is not known.</p> <p>6. The species is a resident of a reliable permanent freshwater lake habitat and is a mouth brooder. Given this, it is very unlikely eggs are resistant to desiccation.</p>	Not needed

Respondent	Summary of Relevant Comments	Department's Evaluation	Further Information/Comment Requested of the Applicant
	<p>7. Finally, there is no information in the draft document about the genetic integrity of any captive populations in Australia.</p> <p>8. Because of the omissions in the draft document listed above, I do not recommend that the legislation banning this cichlid fish from the Northern Territory be lifted.</p>	<p>7. Noted. Species has been present in Australia for over 20 years. It would be difficult to determine genetic integrity of population, plus unsure of how this would reduce any risks to environment.</p> <p>8. The species is not banned from the NT, it is not permitted. Application is to list the species nationwide not just in the Northern Territory.</p>	
Public	<p>Supports</p> <p>Daveney et al 2014 have had this species as one of the 11 species they worked on to obtain an assessment tool for species to be imported and they found that the "electric yellow cichlid" was a very low risk. The species is easily identified, never hybridised, does not grow large (8.5cm in the wild and up to 12cm in aquaria) and looks like no other species in the aquarium cichlid trade that should be allowed import forthwith.</p>	<p>Noted but literature suggests that the species may hybridise with related cichlid genera.</p>	

Govdex consultation round July 2018.

Respondent	Summary of Relevant Comments	Department's Evaluation
<p>ACT</p> <p>ACT Parks and Conservation Service</p>	<p>Supports.</p> <p>The ACT supports amendment of the live import list to include the electric yellow cichlid as an aquarium fish.</p>	<p>Noted</p>

<p>NT Fisheries Division / Department of Primary Industry and Resources</p>	<p>Supports.</p> <p>NT Fisheries supports the application to amend the Live Import List to include <i>Labidochromis caeruleus</i> (Electric Yellow Cichlid).</p>	<p>Noted</p> <p>NT government had a few comments to the applicants report.</p> <p>The comment summary (Attachment E of briefing package) addresses these questions.</p>
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Conclusion

The biology and ecology of the *Labidochromis caeruleus* suggests that if released, the species would be unlikely to establish populations in Australia. Additionally, evidence from around the world indicates that the species has not formed any feral populations in any country despite an extensive trade in the species since the 1980's. The species specific environmental requirements and small size indicate that it is unlikely that it could establish in Australia or have significant environmental impacts.

On the basis that the species is unlikely to establish in Australia, it is recommended that *Labidochromis caeruleus* be listed in Part 1 of the Live Import List.

References

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