Orange River Mudfish (*Labeo capensis*)
Ecological Risk Screening Summary

Web Version—07/10/2014

Photo (edited): © Dionne Crafford from Froese and Pauly (2012).

1 Native Range, and Status in the United States

Native Range
From Reid (1985):

"Africa: within the drainage basin of the Orange-Vaal River system to which it is possibly restricted. Hitherto thought to occur in the Limpopo system and in southern Cape watersheds which records may be erroneous."

Status in the United States
This species has not been reported as introduced in the United States.

Means of Introductions in the United States
This species has not been reported as introduced in the United States.

Remarks
N/A

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing
From ITIS (2012):

"Kingdom Animalia
Phylum Chordata
Subphylum Vertebrata
Superclass Osteichthyes
Class Actinopterygii
Subclass Neopterygii
Infraclass Teleostei
Superorder Ostariophysi
Order Cypriniformes
Superfamily Cyprinoidea
Family Cyprinidae
Genus Labeo
Species Labeo capensis (Smith, 1841)

Taxonomic Status: Valid."

Size, Weight, and Age Range
From Reid (1985):

"Max length : 50.0 cm FL male/unsexed; (de Moor and Bruton 1988); common length : 45.0 cm FL male/unsexed; (Lévêque and Daget 1984); max. published weight: 3,830 g (Skelton 1993)."

Environment
From Reid (1985):

"Freshwater; benthopelagic."

Climate/Range
From Reid (1985):

"Subtropical; 24°S - 30°S."

Distribution Outside the United States

Native

From Reid (1985):

"Africa: within the drainage basin of the Orange-Vaal River system to which it is possibly restricted. Hitherto thought to occur in the Limpopo system and in southern Cape watersheds which records may be erroneous."

Introduced

From Shine et al. (2000):

Introduced in South Africa.

From de Moor and Bruton (1988):

Introduced to the Great Fish River System.

From Laurenson et al. (1989):

"*Labeo capensis* was first detected in the Great Fish River drainage in 1975 (Cambray and Jubb 1977a). Therefore, six to eight year old fishes should be present in the river. The absence of older fishes implies that the species is not established (*sensu stricto* Laurenson and Hocutt 1986) in the GFR. Further, the species does not reach sexual maturity in the drainage…Populations of the species are being maintained by continued translocation of eggs, larvae and the occasional adult through the [Orange-Fish] tunnel."

Means of Introduction Outside the United States

From Shine et al. (2000):

"In South Africa, at least four species (*Austroglanis sclateri*, *Barbus aeneus*, *Clarias gariepinus* and *Labeo capensis*) are thought to have been accidentally translocated through inter-basin transfers of water (de Moor & Bruton 1988). Recent massive movements of water between catchments in Namibia are considered by some to present a high risk of establishing new populations of aquatic species beyond their normal distribution (Day 2000)."

From de Moor and Bruton (1988):

"Translocated to the Great Fish River system with the opening in 1975 of the Orange-Fish tunnel. First recorded in the Grassridge dam (Great Fish River system) in 1976 (Cambray and Jubb 1977a and Cambray and Jubb 1977b). In 1980 a specimen was caught further downstream at a farm, Bekkersdal, near Fort Brown (Fogarty 1980). Expected to be translocated from the Fish to the Sundays system with the opening of the Cookhouse tunnel (Cambray and Jubb 1977a).

The presence of *Labeo capensis* in the Sterfontein dam (on the Wilge River, Vaal system) (OFS Nature Conservation 1983, OFS Nature Conservation 1984) means that there is a possibility that this species will be translocated into the Tugela system should the Sterkfontein dam ever be filled to capacity."

Short description

From de Moor and Bruton (1988):

"A large powerful cyprinid fish. Large adults have a humped shoulder and prominent sickle-shaped fins. Tail large and powerful. Mouth inferior with well-developed lips fringed with papillae and two pairs of short barbels. Snout prominent, without tubercles. Scales moderately small. Color silvery to mottled grey, fins often darker. Maximum size 500 mm Fl, 3 kg (Bruton et al. 1982)."

Biology

From Reid (1985):

"Occurs in a variety of habitats: quiet well vegetated backwaters, standing open waters, flowing open waters, sandy-rocky stretches and rocky rapids. Their preferred habitat is flowing rocky channels. Bottom feeder which grazes algae and organic detritus (de Moor and Bruton 1988). Breeds in summer, gathering in large numbers in shallow rocky rapids where eggs are laid. Larvae hatch after 3 or 4 days. May live up to 8 or 9 years (Skelton 1993)."

From De Moor and Bruton (1988):

"Habitat preferences: Found in a variety of habitats: quiet well-vegetated backwaters, standing open waters, flowing open waters, sandy-rocky stretches and rocky rapids. Their preferred habitat is flower rocky channels (Skelton and Cambray 1981). Population levels increased after the building of the Verwoerd dam; this species is obviously able to adapt to living in large impoundments (Hamman 1980). Occurs in both lotic and lentic habitats (Cambray and Jubb 1977a). In Lake le Roux juveniles were found along the shores of the lake and early survival appeared to be dependent on the presence of newly flooded areas. Larger species were found further offshore in relatively shallow areas where they continued to feed on the substrate (Jackson et al. 1983)."

"Breeding: This species has a prolonged breeding season from spring into summer. During this time several spawnings may take place, but each individual female only spawns once per season. Normally spawns on recently inundated floodplains and in Lake le Roux was observed to spawn in suitable inflowing rivers. Requires local flooding in order to initiate spawning (Tomasson et al. 1983a) and elevated water levels are necessary to ensure a good survival of juveniles (Tomasson et al. 1983b). The eggs have a non-adhesive membrane and spawning takes place over clear areas with either a rocky or muddy substratum (Cambray 1985)."

"*Labeo capensis* is a relatively fecund species with the females carrying up to 257,000 eggs at a time. The incubation time is short with hatching occurring within 48 hours of fertilization. After

hatching the larvae repeatedly swim up into the water column before sinking again (Tomasson et al. 1983a). The parents do not guard the young (Cambray 1985)."

"Cambray (1985) concluded that spawning normally occurs with the annual flooding of rivers but in the highly regulated lower Orange River there is little seasonal difference in the flow rate, and spawning is then more dependent on other factors such as temperature and photoperiod [i.e.] in this habitat it does not appear to be essential to have rain in order to initiate spawning in this species."

"Feeding: Bottom feeder. Grazes algae and organic detritus (Bruton et al. 1982)."

"Behavior: The species is relatively sedentary and is not readily caught with a hook. In Lake le Roux a sudden increase in turbidity, which resulted in food shortages, was followed by a dispersal of juveniles into new areas where they had not previously been found (Tomasson et al. 1983b)."

Human uses

From Reid (1985):

"Fisheries: of potential interest; aquaculture: experimental; gamefish: yes."

Diseases

There are no known OIE-reportable diseases for this species.

Threat to humans

Harmless.

3 Impacts of Introductions

From De Moor and Bruton (1988):

"*Labeo capensis* may have a negative impact (through strong competition) on small localised populations of *Sandelia bainsii* and *Barbus pallidus* in the Great Fish River (Laurenson and Hocutt 1986)."

"It is difficult to predict the effect which the introduction of *L. capensis* will have on the Great Fish River population of *Labeo umbratus*. Cambray and Jubb (1977a) noted that where *L. capensis* and *L .umbratus* occur together in the Orange-Vaal system, *L. capensis* tends to occupy both lotic and lentic habitats whereas *L. umbratus* is found predominantly in lentic conditions. In the Great Fish River (in the absence of competition from *L. capensis*), *L. umbratus* is found in both lotic and lentic habitats and has developed different mouth forms suitable for feeding in these different habitats. It could therefore be expected that the establishment of *L. capensis* in the Great Fish and the Sundays River systems will probably exclude *L. umbratus* from certain habitats."

"Should *L. capensis* be translocated into the Tugela catchment there is a possibility that it may interbreed with *Labeo rubromaculatus* which is endemic to the Tugela system and is closely related to *L. umbratus* (Jubb 1967; Skelton personal communication)."

"In van As and Basson's (1984) checklist, five species pf parasite have been recorded on *L. capensis*. Of these (*Argulus japonicus*) is an alien to southern Africa. The translocation of *L. capensis* into new areas has probably facilitated the spread of parasites into new localities."

It should be noted that the above impacts are speculative and there is no known evidence to support these claims. Due to the lack of available evidence, the impacts of introduction are uncertain.

4 Global Distribution

Figure 1. Map of known global distribution of *Labeo capensis*. Map from GBIF (2014). Location near Blomfontein, South Africa was not included because it was incorrectly located. Locations in the Great Fish River basin were not included because it is unknown whether *L. capensis* is established there.

5 Distribution within the United States

This species has not been reported as introduced in the United States.

6 CLIMATCH

Summary of Climate Matching Analysis

The climate match (Australian Bureau of Rural Sciences 2008; 16 climate variables; Euclidean Distance) had low and medium matches scattered throughout the contiguous United States with higher matches in the southwest. Climate 6 proportion indicated that the contiguous U.S. has a medium climate match. The range for a medium climate match is 0.005 - 0.103; climate match of *Labeo capensis* is 0.089.

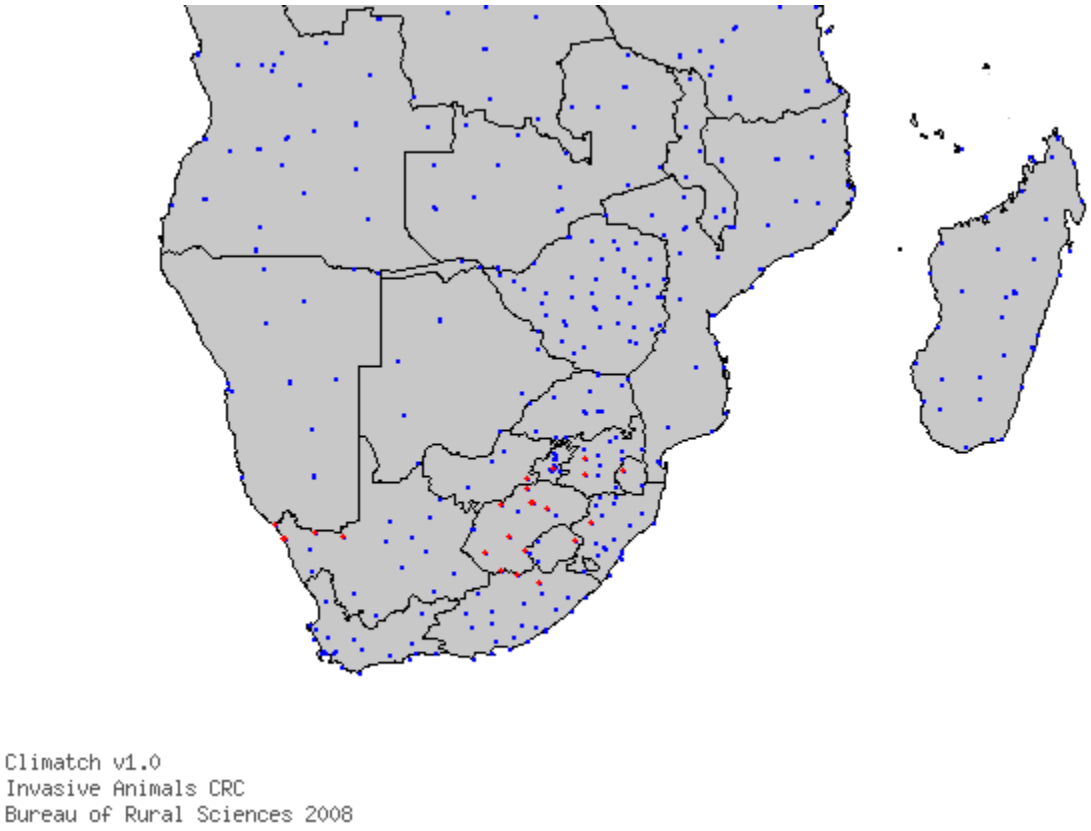

Figure 2. CLIMATCH (Australian Bureau of Rural Sciences 2008) source map showing weather stations selected as source locations (red) and non-source locations (blue) for *Labeo capensis* climate matching. Source locations from GBIF (2014).

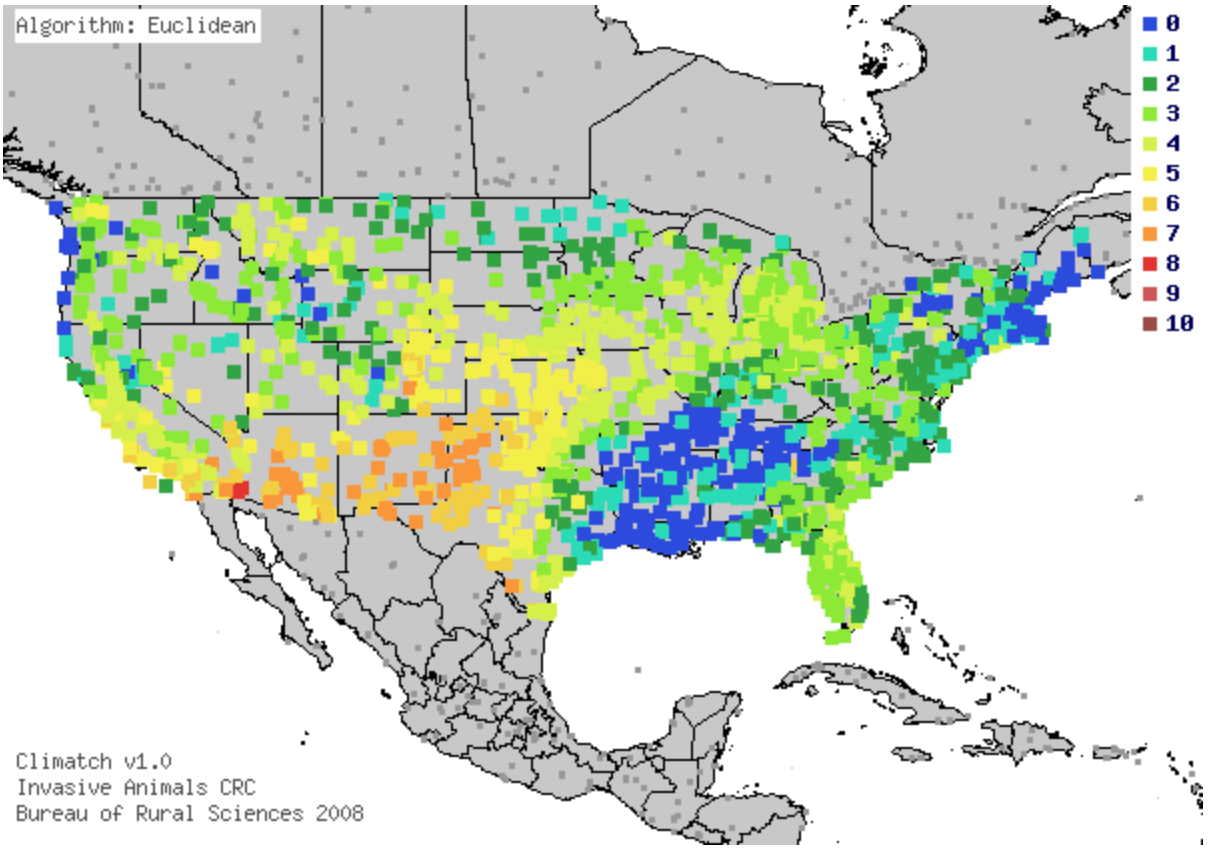

Figure 3. Map of CLIMATCH (Australian Bureau of Rural Sciences 2008) climate matches for *Labeo capensis* in the contiguous United States based on source locations reported by GBIF (2014). 0= Lowest match, 10=Highest match.

Table 1. CLIMATCH (Australian Bureau of Rural Sciences 2008) climate match scores.

CLIMATCH Score	0	1	2	3	4	5	6	7	8	9	10
Count	218	226	312	458	378	206	106	66	4	0	0
Climate 6 Proportion =		0.089									

7 Certainty of Assessment

Literature is available on *Labeo capensis*, but it is not sufficient to conclusively determine the distribution and impacts of the species. *Labeo capensis* has been introduced to the Great Fish River basin but it is unknown whether the species is surviving and reproducing in the introduced range. Impacts have been speculated upon but there is no known evidence of impacts by this species. Certainty of this assessment is low.

8 Risk Assessment

Summary of Risk to the Contiguous United States

Labeo capensis is a freshwater fish native to the Orange-Vaal river system in southern Africa. It eats algae and detritus and can occupy a variety of habitats. This species can be translocated through tunnel construction and inter-basin water transfer, but it is unknown whether it has successfully established outside its native range. Some have speculated that introduced *Labeo capensis* could have impacts through competition, hybridization, and parasite transmission. There is no known evidence to support these claims. This species is an experimental aquaculture species. The climate match analysis resulted in a medium match for the contiguous United States. Highest matches were found in the Southwest. The overall risk for this species is uncertain due to uncertainty surrounding the established range and the impacts of introduction.

Assessment Elements

- **History of Invasiveness (Sec. 3):** Uncertain
- **Climate Match (Sec.6):** Medium
- **Certainty of Assessment (Sec. 7):** Low
- **Overall Risk Assessment Category: Uncertain**

9 References

Note: The following references were accessed for this ERSS. References cited within quoted text but not accessed are included below in Section 10.

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10 References Quoted But Not Accessed

Note: The following references are cited within quoted text within this ERSS, but were not accessed for its preparation. They are included here to provide the reader with more information.

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