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

U.S. Fish & Wildlife Service, 2014
Revised, May and July 2019
Web Version, 9/19/2019

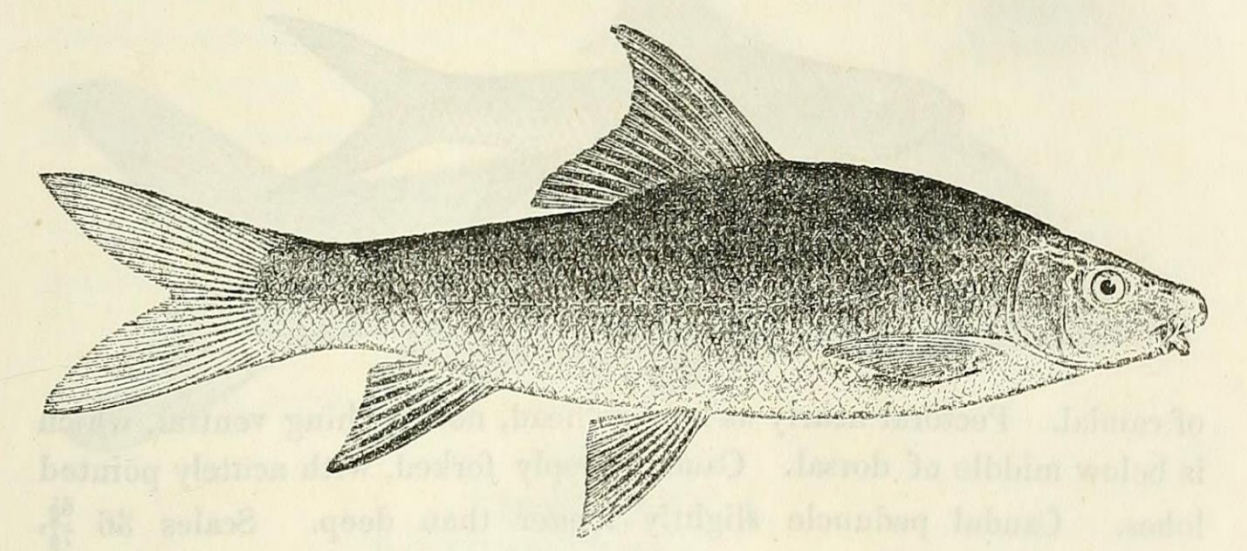

Image: G. A. Boulenger. Public domain. Available: https://archive.org/stream/catalogueoffres01brit/catalogueoffres01brit. (July 2019).

1 Native Range and Status in the United States

Native Range

From Froese and Pauly (2019):

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

From Barkhuizen et al. (2017):

"Native: Lesotho; Namibia; South Africa (Eastern Cape Province - Introduced, Free State, Gauteng, Mpumalanga, Northern Cape Province, North-West Province)"

Status in the United States
This species has not been reported as introduced or established in the United States. There is no indication that this species is in trade in the United States.

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

Remarks
A previous version of this ERSS was published in 2014.

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing
From ITIS (2019):

"Kingdom Animalia
Subkingdom Bilateria
Infrakingdom Deuterostomia
Phylum Chordata
Subphylum Vertebrata
Infraphylum Gnathostomata
Superclass Actinopterygii
Class Teleostei
Superorder Ostariophysi
Order Cypriniformes
Superfamily Cyprinoidea
Family Cyprinidae
Genus *Labeo*
Species *Labeo capensis* (Smith, 1841)"

From Fricke et al. (2019):

"Current status: Valid as *Labeo capensis* (Smith 1841). Cyprinidae: Labeoninae."

Size, Weight, and Age Range
From Froese and Pauly (2019):

"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 Froese and Pauly (2019):

"Freshwater; benthopelagic."

Climate/Range

From Froese and Pauly (2019):

"Subtropical; 24°S - 30°S."

Distribution Outside the United States

Native

From Froese and Pauly (2019):

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

From Barkhuizen et al. (2017):

"Native: Lesotho; Namibia; South Africa ([…] Free State, Gauteng, Mpumalanga, Northern Cape Province, North-West Province)"

Introduced

Ellender and Weyl (2014) report *Labeo capensis* as established outside its native range in South Africa, with a "Self-sustaining population in the wild, with individuals surviving and reproducing a significant distance from the original point of introduction".

From Barkhuizen et al. (2017):

"Has been introduced through the inter-basin water transfer scheme to the Great Fish River in the Eastern Cape [South Africa] where it has become established."

From Erasmus et al. (2019):

"The aims of the current study were to provide evidence of the introduction of *Labeo capensis* into the Crocodile River (West) system [in South Africa], using morphological and molecular techniques, and to record the fish health and gonadosomatic index to determine the invasive status of *L. capensis*. From the fish health assessment index and gonadosomatic index of *L. capensis* collected from Olifantsnek Dam, it can be concluded that *L. capensis* is a healthy reproducing population."

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 [South Africa] 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 b). 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 1977b)."

"The presence of *Labeo capensis* in the Sterfontein dam (on the Wilge River, Vaal system) (OFS Nature Conservation 1983, 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 Froese and Pauly (2019):

"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 flowing 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 1977b). 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 Barkhuizen et al. (2017):

"Important angling species in the Free State Province, South Africa."

From Froese and Pauly (2019):

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

Diseases

No OIE-reportable diseases (OIE 2019) have been documented for this species.

From de Moor and Bruton (1988):

"In van As and Basson's (1984) checklist, five species of parasite have been recorded on *L.capensis* [*sic*]. Of these one *(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."

Threat to Humans

From Froese and Pauly (2019):

"Harmless"

3 Impacts of Introductions

From de Moor and Bruton (1988):

"*L. 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 (1977b) 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."

4 Global Distribution

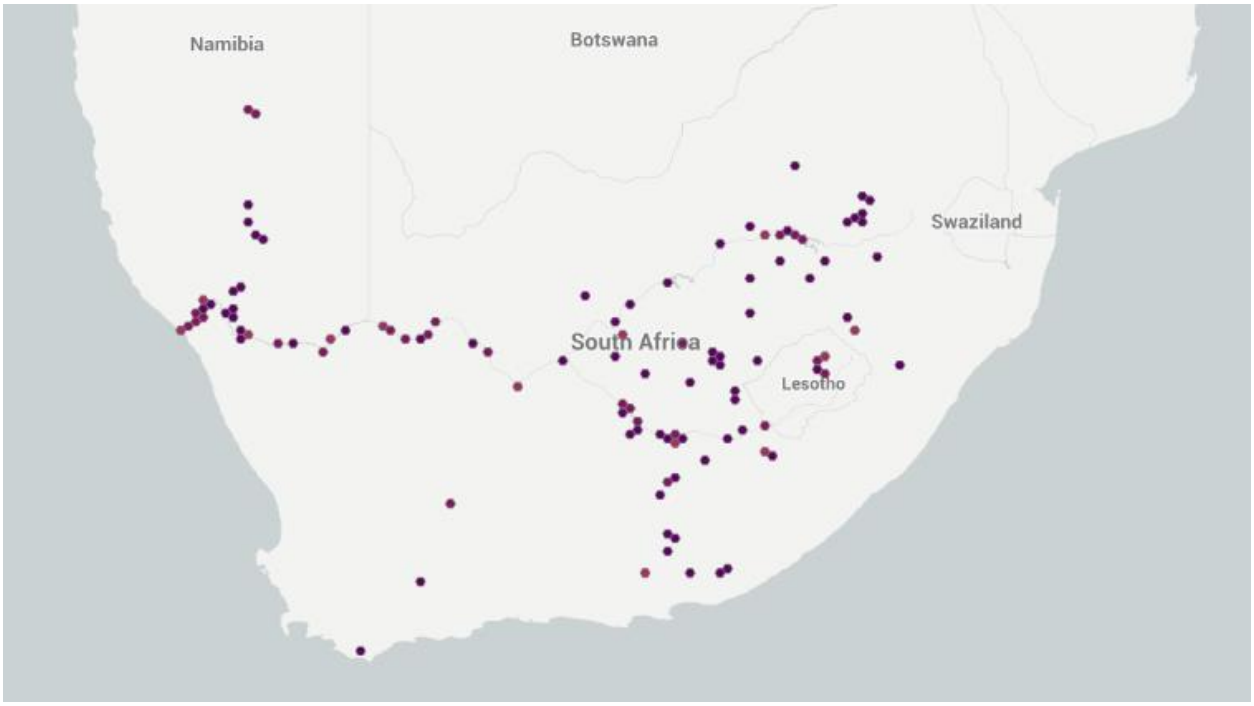

Figure 1. Known global distribution of *Labeo capensis*, reported from southern Africa. Map from GBIF Secretariat (2019). The two southwestern-most points in South Africa were excluded from the climate matching analysis because no evidence of an established population of *L. capensis* was found for the region where those two points are located.

5 Distribution Within the United States

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

6 Climate Matching

Summary of Climate Matching Analysis

The Climate 6 score (Sanders et al. 2018; 16 climate variables; Euclidean distance) for the contiguous United States was 0.138, indicating an overall high climate match. (Scores of 0.103 or greater are classified as high.) States that had a high climate score were: Arizona, Colorado, Kansas, New Mexico, Oklahoma, and Texas. The climate match was high in much of the Southwest. Some, mostly southern, areas of the Great Plains, Interior West, and California had medium matches. Climate match was low in the East, Northwest, and North-central regions of the contiguous United States.

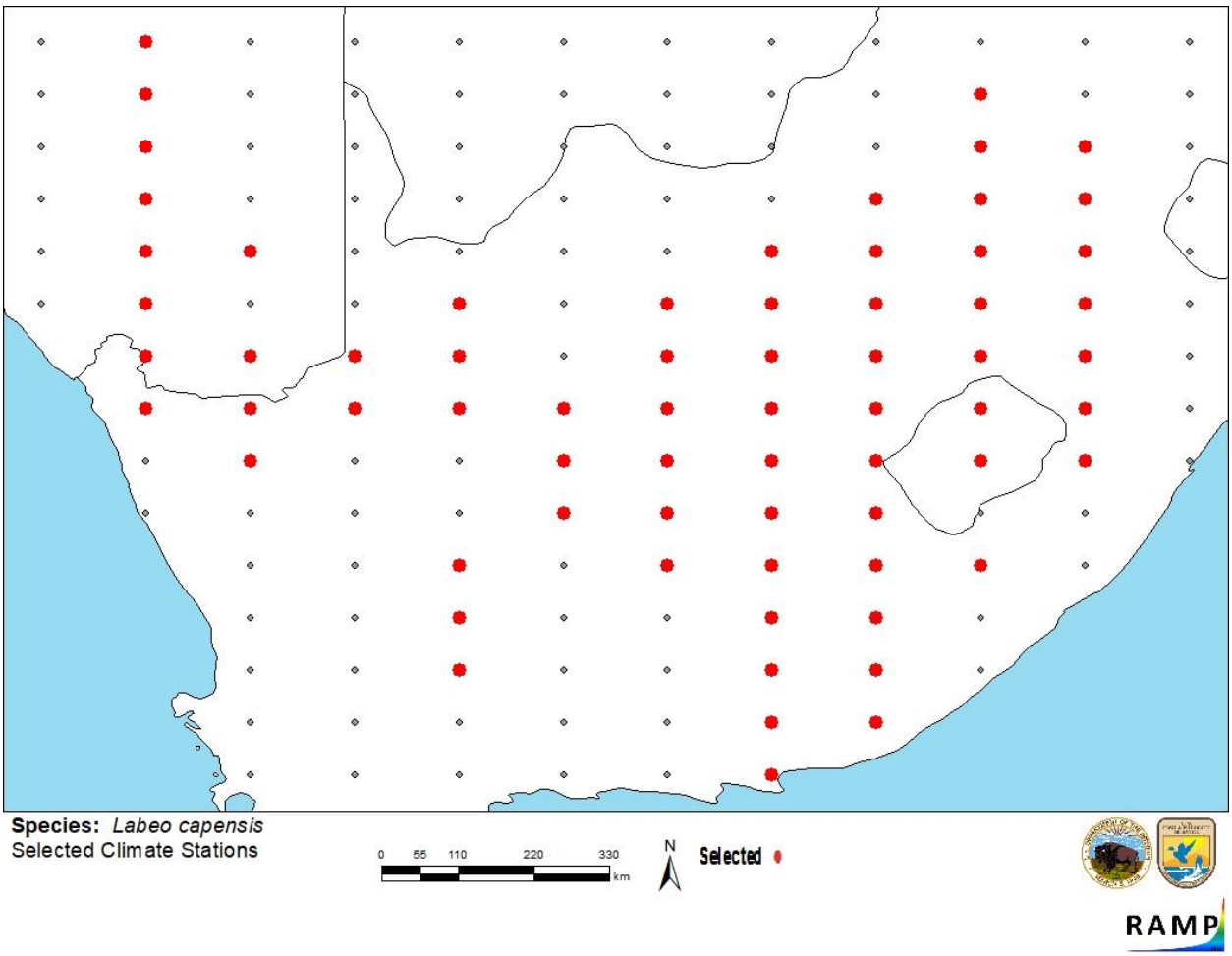

Figure 2. RAMP (Sanders et al. 2018) source map showing weather stations in southern Africa selected as source locations (red; South Africa, Namibia, Lesotho) and non-source locations (gray) for *Labeo capensis* climate matching. Source locations from GBIF Secretariat (2019).

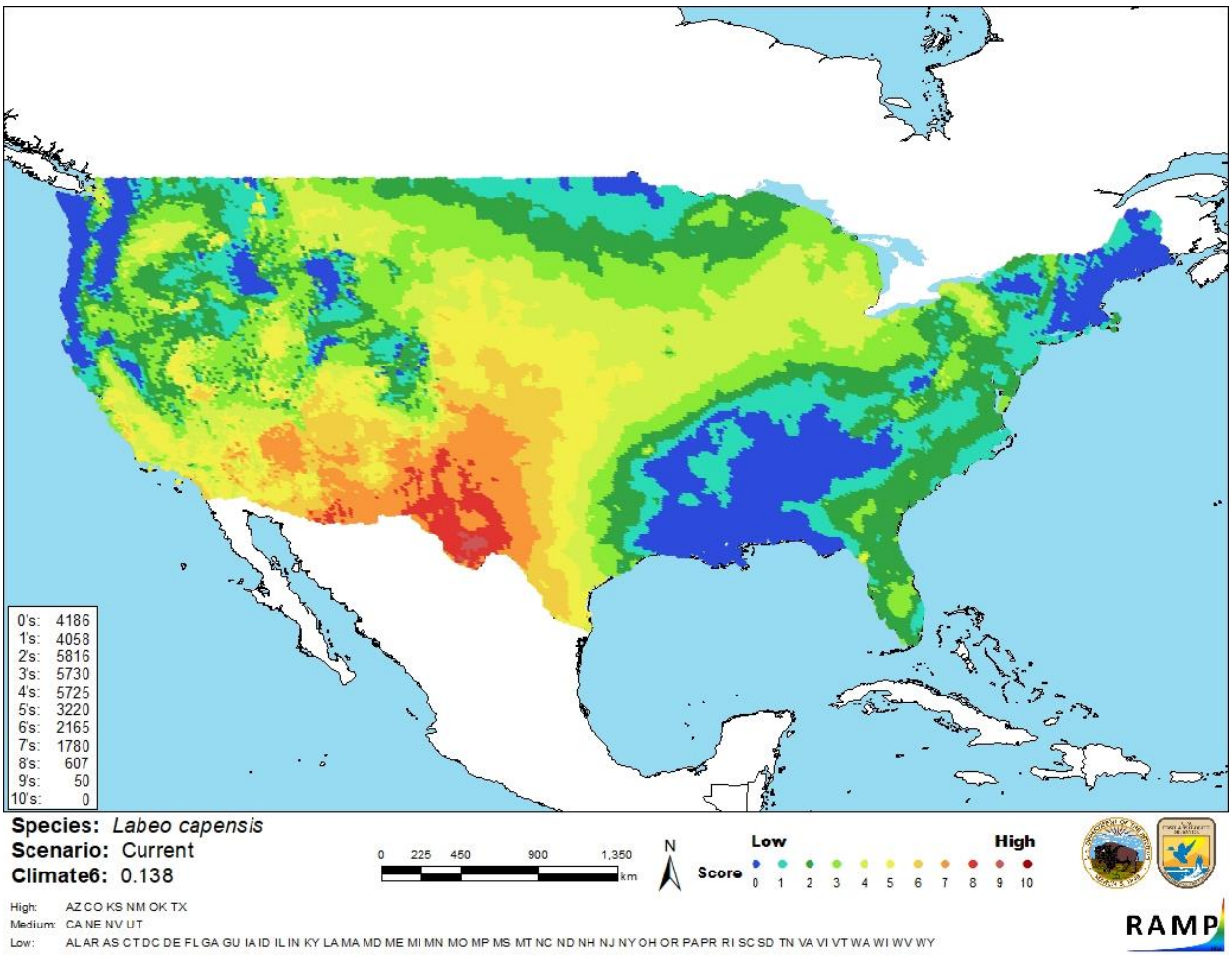

Figure 3. Map of RAMP (Sanders et al. 2018) climate matches for *Labeo capensis* in the contiguous United States based on source locations reported by GBIF Secretariat (2019). 0 = Lowest match, 10 = Highest match.

The "High", "Medium", and "Low" climate match categories are based on the following table:

Climate 6: Proportion of (Sum of Climate Scores 6-10) / (Sum of total Climate Scores)	Climate Match Category
0.000≤X≤0.005	Low
0.005<X<0.103	Medium
≥0.103	High

7 Certainty of Assessment

Information is available on the biology, ecology, and distribution of *Labeo capensis*. There is speculation about impacts of this species to native fish, but no conclusive evidence was found. Without further information on impacts of introduction of *L. capensis*, the certainty of this assessment is low.

8 Risk Assessment

Summary of Risk to the Contiguous United States

Labeo capensis, Orange River Mudfish, is a freshwater fish native to the Orange-Vaal river system in southern Africa. This species has been translocated within South Africa through inter-basin water transfers, and has successfully established outside its native range. Potential, although as yet unproven, impacts of *L. capensis* introduction include competition, hybridization, and parasite transmission. History of invasiveness is "None Documented." This species is a gamefish and an experimental aquaculture species. The climate match analysis resulted in a high match for the contiguous United States with the highest matches found in the Southwest. Certainty of this assessment is low because of a lack of reliable documentation of impacts of introduction. The overall risk posed by *L. capensis* to the contiguous United States is uncertain.

Assessment Elements

- **History of Invasiveness (Sec. 3): None Documented**
- **Climate Match (Sec. 6): High**
- **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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