Convict Cichlid (*Amatitlania nigrofasciata*)

Ecological Risk Screening Summary

U.S. Fish and Wildlife Service, February 2011
Revised, May 2018
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1 Native Range and Status in the United States

Native Range

From Froese and Pauly (2018a):

"Central America: Pacific slope, from Río Sucio, El Salvador to Río Suchiate, Guatemala; Atlantic slope, from Río Patuca, Honduras to Río Jutiapa, Guatemala. Not in slope to Panama, Costa Rica or even Nicaragua, as formerly considered."

Status in the United States

From Nico et al. (2018):

"Established or locally established in Hawaii, Idaho, and Nevada; possibly established in Arizona, but current status unknown (Courtenay and Hensley 1979); established locally in California and Louisiana. Failed in Alabama, Florida, Texas, and Wyoming. One population eradicated in Florida."

Nico et al. (2018) also report nonindigenous occurrences in Puerto Rico (Cibuco-Guajataca, eastern Puerto Rico).

"[…] this species is popular in the aquarium trade […]"

Means of Introductions in the United States

From Nico et al. (2018):

"As this species is popular in the aquarium trade, aquarium release is the most likely source of introduction in all instances."

Remarks

This species has had multiple scientific names over the years.

From Nico et al. (2018):

"Archocentrus nigrofasciatus (Günther, 1867)"

From Eschmeyer et al. (2018):

"Valid as *Amatitlania nigrofasciata* (Günther 1867)"

From Froese and Pauly (2018b):

"Synonymised names
Cichlasoma nigrofasciatum (Günther, 1867)
Heros nigrofasciatus Günther, 1867"

Information searches for this report used all the above synonyms as well as the valid scientific name as search terms.

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From Froese and Pauly (2018b):

"Biota > Animalia (Kingdom) > Chordata (Phylum) > Vertebrata (Subphylum) > Gnathostomata (Superclass) > Pisces (Superclass) > Actinopterygii (Class) > Perciformes (Order) > Labroidei (Suborder) > Cichlidae (Family) > Cichlinae (Subfamily) > *Amatitlania* (Genus) > *Amatitlania nigrofasciata* (Species)"

"Status
accepted"

Size, Weight, and Age Range

From Froese and Pauly (2018a):

"Max length : 10.0 cm SL male/unsexed; [Kullander 2003]; common length : 8.5 cm TL male/unsexed; [Hugg 1996]."

Environment

From Froese and Pauly (2018a):

"Freshwater; benthopelagic; pH range: 7.0 - 8.0; dH range: 9 – 20. […] 20°C - 36°C [Bussing 1998; unknown whether this temperature range refers to nature or aquaria]"

Climate/Range

From: Froese and Pauly (2018a):

"Tropical; […] 15°N - 8°N."

Distribution Outside the United States

Native

From Froese and Pauly (2018a):

"Central America: Pacific slope, from Río Sucio, El Salvador to Río Suchiate, Guatemala; Atlantic slope, from Río Patuca, Honduras to Río Jutiapa, Guatemala. Not in slope to Panama, Costa Rica or even Nicaragua, as formerly considered."

Introduced

Froese and Pauly (2018a) reported that *Amatitlania nigrofasciata* has been introduced and established in the Philippines, Japan, Italy (Fossa Calda in Tuscany), Australia, and Reunion (an island off the coast of Africa). They also reported that *A. nigrofasciata* has probably established in Mexico and probably not established in Israel and Canada.

From Goren and Galil (2005):

"The South American cichlid *Archocentrus nigrofasciatus* was found in a small stream (Nahal haKibbuzim) in the central Jordan River basin [Israel] for a period of 10 years, from the mid-1980s. […] For unknown reasons, this non-native fish disappeared from the river."

From Mousavi-Sabel and Eagderi (2016):

"The convict cichlid, *Amatitlania nigrofasciata* (Günther, 1867) is recorded for the first time from Soleymaniyeh spring, Namak Lake basin in central Iran, the second record of this species from the country."

Means of Introduction Outside the United States

Froese and Pauly (2018a) report ornamental trade and aquaculture as reasons for introduction.

From Mousavi-Sabel and Eagderi (2016):

"*Amatitlania nigrofasciata* has been probably released into the spring [in Iran], as an aquarium fish by local people […]"

Short Description

From Froese and Pauly (2018a):

"Dorsal spines (total): 17 - 19; Dorsal soft rays (total): 7 - 9; Anal spines: 8 - 10; Anal soft rays: 6 - 7; Vertebrae: 27 - 28. This species is distinguished by the following characters: two (vs. one) distal rows of interradial scales on anal fin; arms in the first epibranchial bone are parallel (vs. divergent); posterior end of dentigerous arm of dentary rounded or squarish (vs. triple-spined or bluntly pointed); peritoneal coloration is uniformly dark (vs. not uniformly dark); rostrad directed pronounced convexity on the ventral process of the articular absent (vs. present); body less deep than as compared with its congeners *kanna* and *siquia*; 4th bar not Y-shaped [Schmitter-Soto 2007]."

Biology

From Froese and Pauly (2018a):

"Adults inhabit flowing water from small creeks and streams to the shallows of large and fast flowing rivers [Conkel 1993]. Prefer rocky habitats and finds sanctuary in the various cracks and crevices provided by this type of environment [Conkel 1993], or among roots and debris [Yamamoto and Tagawa 2000]. They occur in warm pools of springs and their effluents [Mills and Vevers 1989]. Feed on worms, crustaceans, insects, fish and plant matter [Mills and Vevers 1989; Yamamoto and Tagawa 2000]. Also used in behavioral studies [Robins et al. 1991]. Approximately 100-150 eggs are deposited and are vigorously guarded and cared for by both male and female [Yamamoto and Tagawa 2000]. A popular aquarium fish which requires high temperature to maintain itself in an environment, e.g. artificially heated waters of power stations. Aquarium keeping: in pairs; minimum aquarium size 80 cm [BMELF 1999]."

Human Uses

From Froese and Pauly (2018a):

"Fisheries: of no interest; aquarium: highly commercial"

Diseases

From Froese and Pauly (2018a):

"White spot Disease, Parasitic infestations (protozoa, worms, etc.)
Spiroxys Infestation, Parasitic infestations (protozoa, worms, etc.)

From Matey et al. (2015):

"In September 2007 and May 2014, the Asian fish tapeworm, *Bothriocephalus acheilognathi* Yamaguti,1934 (Cestoda: Bothriocephalidea), was found in populations of the non-native convict cichlid (*Archocentrus nigrofasciatus*) and mosquitofish (*Gambusia affinis*) collected from the discharge channel of a water treatment plant in Los Angeles County. Prevalence and mean intensity of infection of 450 convict cichlids and 70 mosquitofish were 55.3%/9.3 and 11%/1.4, respectively."

No OIE reportable diseases have been documented for this species.

Threat to Humans

From Froese and Pauly (2011):

"Potential pest [Yamamoto and Tagawa 2000]"

3 Impacts of Introductions

From Nico et al. (2018):

"Mostly unknown. According to Deacon et al. (1964), *C*[*ichlasoma*] *nigrofasciatum* [a synonym of *A. nigrofasciata*], in combination with other foreign fishes, apparently caused the decline and extermination of a population of the native speckled dace *Rhinichthys osculus* near the Overton arm of Lake Mead, Nevada. Along with other foreign species, it has been implicated as a threat to the survival of the endangered White River springfish *Crenichthys baileyi* and other native White River fish in southeastern Nevada [Deacon and Bradley 1972; Page and Burr 1991]. Tippie et al. (1991) produced experimental evidence for reduced growth and recruitment of White River springfish in the presence of convict cichlids. Introductions, in combination with other human-induced changes, caused the disappearance of all native fishes from Hiko Spring, Nevada [Courtenay et al. 1985]."

"Concern exists that this aggressive cichlid will compete with native sunfishes for spawning sites [Courtenay and Hensley 1979]. There was early concern that Nevada populations, if they were to

become established in Lake Mead, might affect the sport fishery adversely [Deacon et al. 1964]. An attempt in December 1963 to eliminate the Nevada population at Rogers Spring failed [Hubbs and Deacon 1964]."

From Contreras-MacBeath et al. (1998):

"One further impact on freshwater habitats has been the introduction of the convict cichlid, *C. nigrofasciatum*. Due to the mismanagement of this exotic species within an ornamental farm located in the town of Cuautitla in the county of Tetecala, a tank containing a stock of *C. nigrofasciatum* was spilled into the River Chalma and this introduction has resulted in serious ecological disturbances to the state's lotic waters (Contreras-MacBeath, [1991]). From research done in 1990, which aimed at evaluating the distribution and ecological impact of *C. nigrofasciatum* in the state's rivers, this species was found to be dominant in the Rivers Amacuzac, Chalma and Tembemebe and accounted for approximately 50% of the total fish community as based upon biomass and abundance. The survey also showed a clear displacement of the native *C*[*ichlasoma*] *istlanum*, the almost total disappearance of tilapias and the complete absence of *I*[*ctalurus*] *balsanus*."

From De La Torre Zavala et al. (2018):

"Local populations of the Mexican mojarra, *Cichlasoma istlanum*, have been hypothesized to be negatively affected by the introduction of the convict fish, *Amatitlania nigrofasciata*. The Mexican mojarra is a cichlid fish native to the Balsas-River Basin. As a first approach to understand the behavioral effect of the convict fish on Mexican mojarra, we experimentally studied the behavioral responses of the latter when exposed to the former. Thus, we recorded refuge use, swimming activity and feeding rate of Mexican mojarra in the presence of a convict fish, a conspecific, and alone. Mexican mojarra used refuges for longer, swum for shorter and ate less in the presence of convict fish than with conspecifics or alone. Because prolonged use of refuge habitat may deprive Mexican mojarra of opportunities to feed, grow, and reproduce, we hypothesize that convict fish can negatively affect the fitness of the former where the two species co-occur."

From Goren and Galil (2005):

"The South American cichlid *Archocentrus nigrofasciatus* was found in a small stream (Nahal haKibbuzim) in the central Jordan River basin for a period of 10 years, from the mid-1980s. During this time, this species established a self-sustaining population and suppressed the native fish *Astatotilapia flaviijosephi*."

Froese and Pauly (2018) reported that there are probably some ecological effects from the introduced population in Puerto Rico and unknown or no data for the potential ecological effects for the introduced populations in Mexico, Japan, Italy, Reunion and the United States.

4 Global Distribution

Figure 1. Reported global distribution of *Amatitlania nigrofasciata*. Map from GBIF Secretariat (2017). No occurrences were reported for established locations in Japan or the Philippines. Points in Nicaragua, Costa Rica, and Panama were excluded from the climate matching analysis because the species has been redefined so that it does not include populations in those countries. Points in the U.S. states of Wyoming, Alabama, and Florida, as well as points in Canada, Colombia, northern Italy, and Thailand were not included in the climate matching analysis because they do not represent established populations of *A. nigrofasciata*.

5 Distribution Within the United States

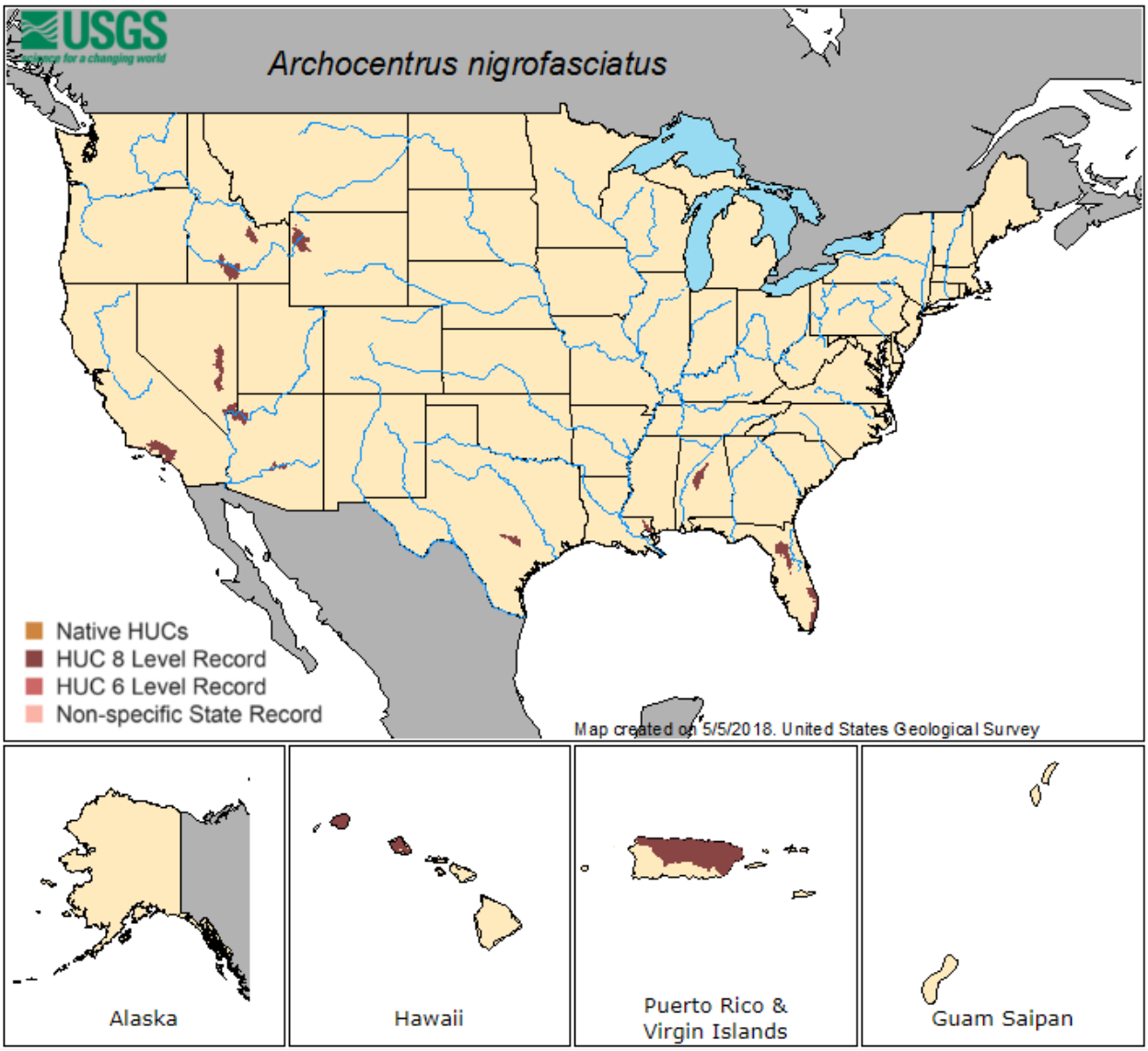

Figure 2. United States distribution map of *Amatitlania nigrofasciata* recorded in Hawaii, Puerto Rico and multiple states across the contiguous United States. Map from Nico et al. (2018). Populations are believed to have failed in Alabama, Florida, Texas and Wyoming.

6 Climate Matching

Summary of Climate Matching Analysis

The climate match (Sanders et al. 2018; 16 climate variables; Euclidean Distance) was high overall for the contiguous United States, reflected in a Climate 6 proportion of 0.139. Climate 6 proportions greater than or equal to 0.103 indicate a high match. High matches occurred in southern peninsular Florida, throughout California and Nevada, and in other scattered locations in the Interior West. Medium matches occurred in southern New England, northern Florida,

coastal Texas, and much of the West that did not match high. Low matches occurred in most of the eastern contiguous United States, in the Great Plains, and along the Pacific coast and parts of interior Washington and Oregon.

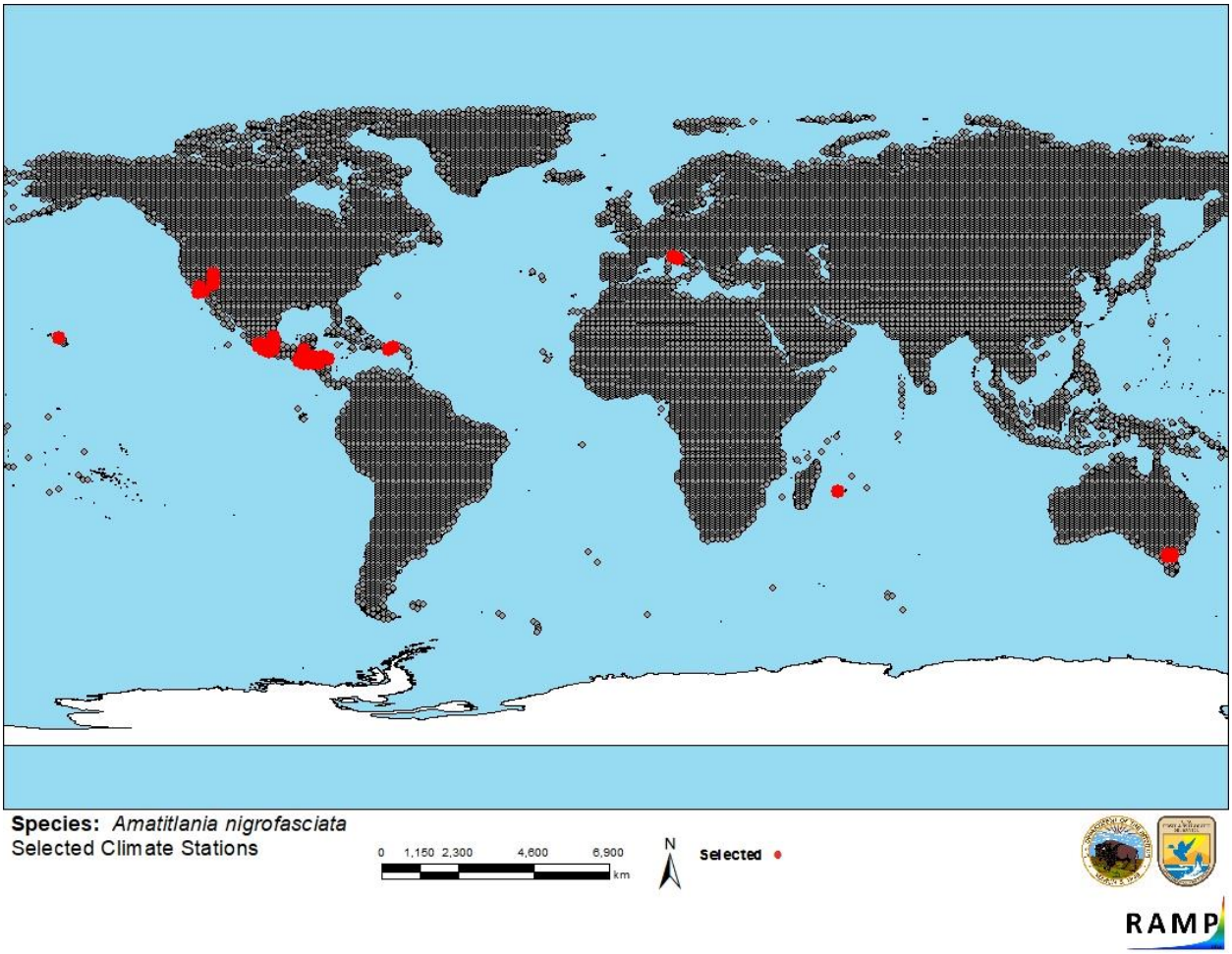

Figure 3. RAMP (Sanders et al. 2018) source map showing weather stations across the globe selected as source locations (red; United States including Hawaii, California, Nevada, and Puerto Rico; Mexico; El Salvador; Guatemala; Honduras; Italy; Reunion; Australia) for *Amatitlania nigrofasciata* climate matching. Source locations from GBIF Secretariat (2017), Froese and Pauly (2018), and Nico et al. (2018).

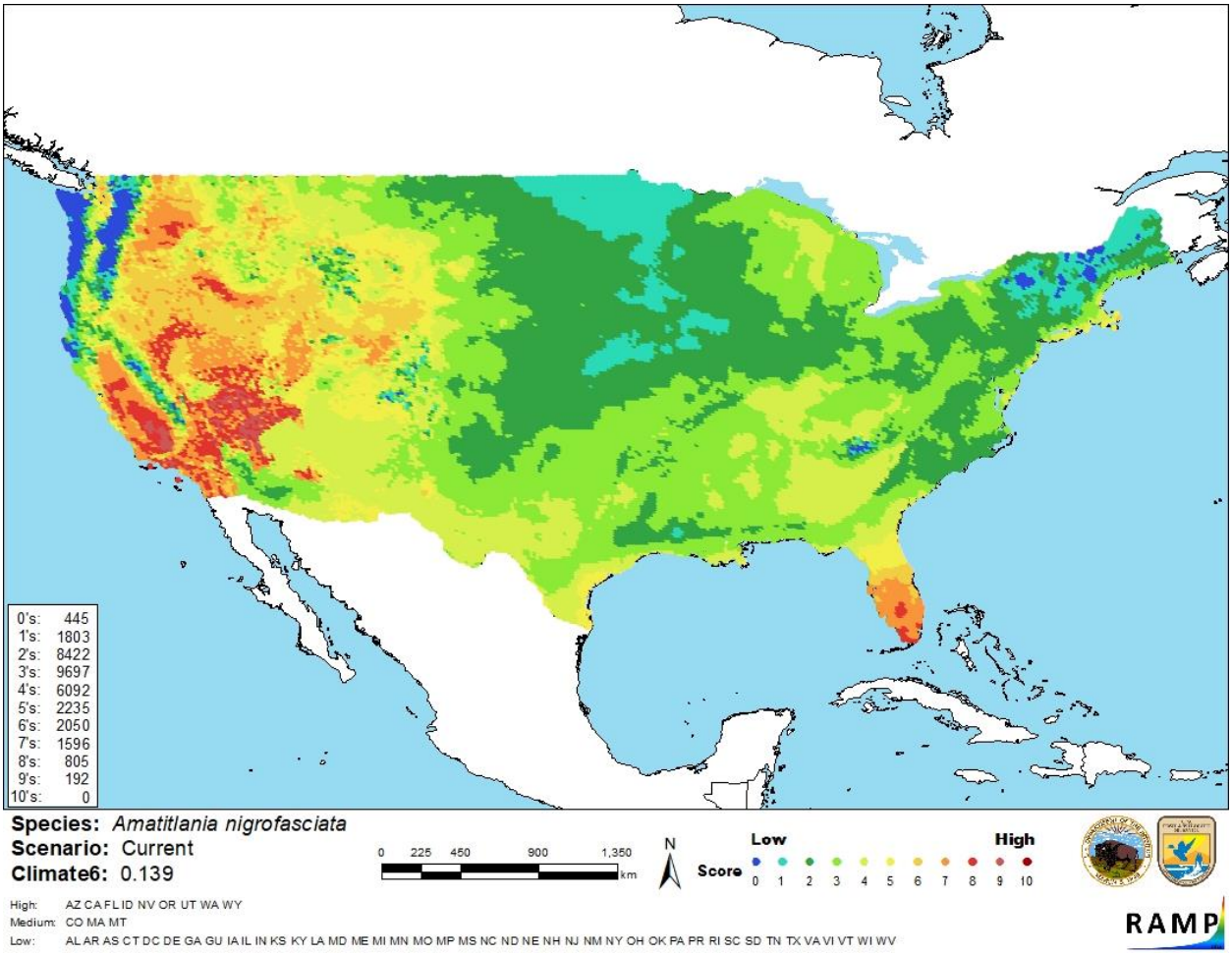

Figure 4. Map of RAMP (Sanders et al. 2018) climate matches for *Amatitlania nigrofasciata* in the contiguous United States based on source locations reported by GBIF Secretariat (2017), Froese and Pauly (2018), and Nico et al. (2018). 0=Lowest match, 10=Highest match.

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 on the biology and ecology of *Amatitlania nigrofasciata* is available. *A. nigrofasciata* has been reported as introduced across the world and into multiple areas across the United States with multiple peer-reviewed studies documenting negative impacts of introduction. No further information is needed to assess the potential harm caused by this species. Certainty of this species is high.

8 Risk Assessment

Summary of Risk to the Contiguous United States

Convict Cichlid (*Amatitlania nigrofasciata*) is a Central American cichlid fish species that has been shipped around the world in the aquarium trade. This has resulted in populations becoming established in Australia, Philippines, Japan, Italy, Puerto Rico, Reunion and in multiple U.S. states. It has been reported as probably established in Mexico and probably not established in Canada and Israel. Multiple studies have documented introduced populations of *A. nigrofasciata* suppressing or displacing populations of native species, or changing their behavior. *Amatitlania nigrofasciata* has a high climate match with the United States. The Southwest and southern Florida recorded the highest matches. The overall risk assessment for this species is high.

Assessment Elements

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

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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