Clown Knifefish (*Chitala ornata*)

Ecological Risk Screening Summary

U.S. Fish and Wildlife Service, December 2023
Revised, April 2024
Web Version, 1/22/2026

Organism Type: Fish
Overall Risk Assessment Category: High

Photo: Florida Museum of Natural History Icthyology. Licensed under CC BY-NC 4.0 DEED.
Available: https://www.gbif.org/occurrence/1228635641 (December 2023).

1 Native Range and Status in the United States

Native Range

From Vidthayanon (2012):

"Extant (resident): Cambodia; Lao People's Democratic Republic; Thailand; Viet Nam"

From Nico et al. (2025):

"Tropical Asia. The Mekong and Chao Phraya basins of Indochina and Thailand (Roberts 1992). Laos (Baird et al. 1999)."

Status in the United States

From Nico et al. (2025):

"Established in Florida. Fewer than 100 individuals were collected between 1994-2003 (P. Shafland, pers. comm.), though many additional specimens have been caught since by both the Florida Fish and Wildlife Conservation Commission and by anglers; its numbers appear to be steadily increasing (Shafland et al. 2008). Failed introduction in Missouri, and possibly failed in North Carolina: no further reports from the state, but Lake Norman contains several warm-water outfalls that could act as thermal refugia for this species (G. Bray, personal communication)."

Nico et al. (2025) lists two observations of *Chitala ornata* in Texas (1993, Lower Brazos-Little Brazos, and 1992, South Concho), one in Hawaii (2025, Oahu), and one in New York (2024, Southern Long Island) with no further information regarding establishment status. They also list failed introductions of *Chitala ornata* in New York (2017, Lake Erie) and Vermont (2013, Winooski River).

Chitala ornata is in trade within the United States (e.g., Aqua Imports 2023, Aquarium Fish Sale 2023, AZ Gardens 2023, Pet Zone SD 2023, Petzlover 2023, Predatory Fins 2023, The Wet Spot 2023, Worldwide Fish and Pets 2023).

Regulations

Chitala ornata is regulated in Hawaii (HDOA 2019) and New Mexico (NMDGF 2023). Please refer back to state agency regulatory documents for details on the regulations, including restrictions on activities involving this species. While effort was made to find all applicable regulations, this list may not be comprehensive. Notably, it does not include regulations that do not explicitly name this species or its genus or family, for example, when omitted from a list of authorized species with blanket regulation for all unnamed species.

Means of Introductions within the United States

From Nico et al. (2025):

"Probable aquarium release."

Remarks

This ERSS was previously published in September 2017. Revisions were completed to incorporate new information and conform to updated standards.

Mention of commercial products in this Ecological Risk Screening Summary does not entail endorsement by the U.S. Federal Government.

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From ITIS (2023):

Kingdom Animalia
Subkingdom Bilateria
Infrakingdom Deuterostomia
Phylum Chordata
Subphylum Vertebrata
Infraphylum Gnathostomata
Superclass Actinopterygii
Class Teleostei
Superorder Osteoglossomorpha
Order Osteoglossiformes
Suborder Notopteroidei
Superfamily Notopteroidea
Family Notopteridae
Genus *Chitala* Fowler, 1934
Species *Chitala ornata* (Gray, 1831)

According to Fricke et. al. (2023), *Chitala ornata* is the current valid name for this species.

The following synonyms of *Chitala ornata* were used to search for information for this report: *Notopterus ornatus,* and *Notopterus chitala*.

Size, Weight, and Age Range

From Nico et al. (2025):

"To 100 cm SL [standard length] and about 5 kg; slightly smaller in Florida."

Environment

From Froese and Pauly (2023):

"Freshwater; pelagic; potamodromous [Riede 2004]. […] 24°C - 28°C"

From Vidthayanon (2012):

"This species inhabits lowland river mainstreams and tributaries including floodplains, marshland and larger waterbodies. It is well-adaptive [sic] to impounded waters."

Climate
From Froese and Pauly (2023):

"Tropical"

Distribution Outside the United States
Native
From Vidthayanon (2012):

"Extant (resident): Cambodia; Lao People's Democratic Republic; Thailand; Viet Nam"

From Nico et al. (2025):

"Tropical Asia. The Mekong and Chao Phraya basins of Indochina and Thailand (Roberts 1992). Laos (Baird et al. 1999)."

Introduced
Tan et al. (2020) indicate that while *Chitala ornata* have been found in various lakes and reservoirs in Singapore, the species is not considered to have established a breeding population.

From Chen et al. (2017):

"In 2009, an investigative report of the Taiwan Wetland Conservation Association [no date] indicated that Jhouzai Wetland and Lotus Pond were both of the natural habitats for various aquatic organisms. […] Among these [fish], […] 16 are alien species such as […] *Chitala ornata* (clown featherback)."

Chan et al. (2023) list *Chitala ornata* as being found in the Plover Cover Reservoir, Aberdeen Lower Reservoir, and Lai King area of Hong Kong but indicate that there was no evidence of breeding.

From Vidthayanon (2012):

"Extant & Introduced (resident): Myanmar; Philippines"

From Marambe et al. (2011):

"The clown knifefish (*Chitala ornata*) is a large predator introduced [to Sri Lanka] in 1994."

Means of Introduction Outside the United States
From Abarra et al. (2017):

"Ornamental fish trade has contributed to the introduction of knife fish to the Philippines (Guerrero, 2014). […] It is believed that the fish found its way into Laguna de Bay in two ways: accidental escape from aquariums and ornamental fish farms primarily due to flooding, or

deliberate release of hobbyists into waterways when the fish got too big for aquariums and they wanted to get rid of them (Despuez, 2012)."

From Vidthayanon (2012):

"It has been introduced to Myanmar and the Philippines for aquaculture."

According to Marambe et al. (2011), *Chitala ornata* was introduced to Sri Lanka via the ornamental fish trade.

Short Description

From FFWCC (2026):

"Very distinct, flat, silvery fish with long anal fin that gives the knifefish its common name; tiny dorsal fin and 5-10 black spots ringed with white distinguish it from all other fish in Florida; juveniles possess dark vertical bands instead of spots; long anal fin equally allows for forward and backward movements."

From Nico et al. (2025):

"This species (along with other members of the family Notopteridae) can be distinguished from all North American native freshwater fishes by the long anal fin that is continuous with the caudal fin."

From Froese and Pauly (2023):

"Distinguished from other members of the family by the presence of a row of large ocellated spots above the base of the anal fin [Kottelat 1998]. Differs from *C. chitala* in lacking silver or gold transverse streaks on dorsum and from *C. blanci* and *C. lopis* in lacking a basal pectoral spot [Roberts 1992]."

Biology

From Froese and Pauly (2023):

"Obligate air-breathing [Müller et al. 2022]; […] A predator on surface-feeding fishes, crustaceans and insects, with a crepuscular or nocturnal activity pattern. Moves into inundated forest during the high water period from June to October."

From Nico et al. (2025):

"Clown knifefish is generally found around submerged structure (e.g., rocks, wood, aquatic vegetation) in lakes or deeper pools of rivers. Submerged structure is used as a daytime refuge as well as a spawning substrate. Reproduction occurs from March to July, with eggs deposited on submerged wood and guarding of eggs and fry performed by one of the parents."

From Vidthayanon (2012):

“Feeds in mainstream [Mekong River] and the Sesan tributary system, lives in deep pools of mainstreams. 'Black' seasonal movement, moving from river channels into seasonally flooded areas (Poulsen *et al.* 2004).”

Human Uses

From Nico et al (2025):

“This is an important food fish in Thailand (Berra 1981) and a popular aquarium fish in the United States. Anglers target the Palm Beach County population for sport, sometimes with guides specializing in non-native fishes.”

From Vidthayanon (2012):

“It is a popularly consumed, fished at large and small scales, and found in aquaculture. Juveniles are popular in the aquarium trade and large fish are popular for public aquaria. In Thailand, it is often used in food products.”

Diseases

No information was found associating *Chitala ornata* with any diseases listed by the World Organisation for Animal Health (2023).

According to Poelen et al. (2014), *Chitala ornata* is a carrier for the parasitic nematode *Gnathostoma spinigerum.*

Threat to Humans

According to Herman and Chiodini (2009), gnathostomiasis can be caused by the consumption of raw fish contaminated with *Gnathastoma spp.* helminths, which may be carried by *Chitala ornata*.

3 Impacts of Introductions

From Marambe et al. (2011):

“The clown knifefish (*Chitala ornata*) is a large predator introduced in 1994. Subsequently, there have been decreases in the abundance of native fish such as *Aplochielus dayi, A. parvus, Horadandiya athukorali, P. vittatus, P. bimaculatus, R. daniconius* and *Amblypharyngodon melettinus* (Gunawardena 2002).”

From Abarra et al. (2017):

“Aquaculture production in Laguna de Bay contributed 2.33% (48,767 metric tons) to the 2,093,371 metric tons total aquaculture production of the Philippines in 2006 (BFAR Region 1V-A 2007). Moreover, aquaculture production of the bay comprised 1.11% of the 4,409,526 metric

tons total fisheries production of the country (Israel, 2007). Unfortunately, the aquaculture industry of Laguna de Bay is currently facing knife fish infestation and has become the center of population control efforts."

"Having an aggressive and carnivorous nature, knife fish preys on smaller fish species, especially cultured milkfish (*Chanos chanos*), bighead carp (*Aristichthys nobilis*), and tilapia (*Oreochromis niloticus*) in fish pens and cages (Mayuga, 2013). Knife fish fry is very small and can penetrate fish pens and cages. Once inside, the fish grows and consume [sic] cultured stocks inside the pens and cages (Despuez, 2012). Currently, knife fish is a regular catch among fishermen instead of cultured and indigenous species (Mayuga, 2013). Moreover, knife fish has a very low market demand and a market value of US$ 0.10–0.30 per kg only. Its low market demand is due to the consumer perception that the fish is exotic and not part of the regular fish staple (Despuez, 2012). The extremely high supply and low demand for knife fish translates huge investment loss on the livelihood of those dependent on the fishing industry."

4 History of Invasiveness

Chitala ornata has been introduced to and become established in Myanmar and the Philippines. Negative impacts from those introduced populations on both native species and commercial fishery production have been documented from reliable sources. The History of Invasiveness for *Chitala ornata* is classified as High.

5 Global Distribution

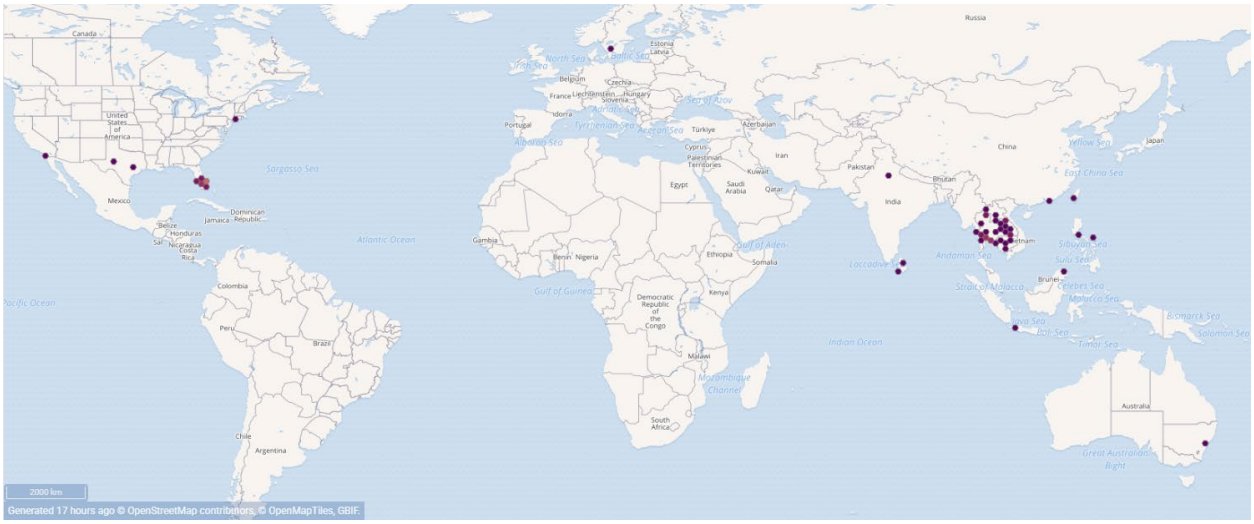

Figure 1. Reported global distribution of *Chitala ornata*. Map from GBIF Secretariat (2023). Observations are reported from the United States (California, Florida, New York, Texas), Sweden, India, Sri Lanka, Laos, Myanmar, Cambodia, Thailand, Vietnam, Hong Kong, Taiwan, the Philippines, Malaysia, Indonesia, and Australia. The point in northern India is a misidentified specimen and does not represent an established population. The points in California, Texas, New York, Sweden, Hong Kong, Malaysia (Borneo), Indonesia, and Australia also do not represent established populations and along with the point in India were not used in the climate matching analysis.

6 Distribution Within the United States

Figure 2. Reported distribution of *Chitala ornata* in the contiguous United States. Map from Nico et al. (2025). Observations are reported from Florida, Missouri, New York, North Carolina, Texas, and Vermont. Yellow diamonds represent established populations. Orange diamonds represent observations with unknown status or failed introductions. Only observations representing established populations were used in the climate matching analysis.

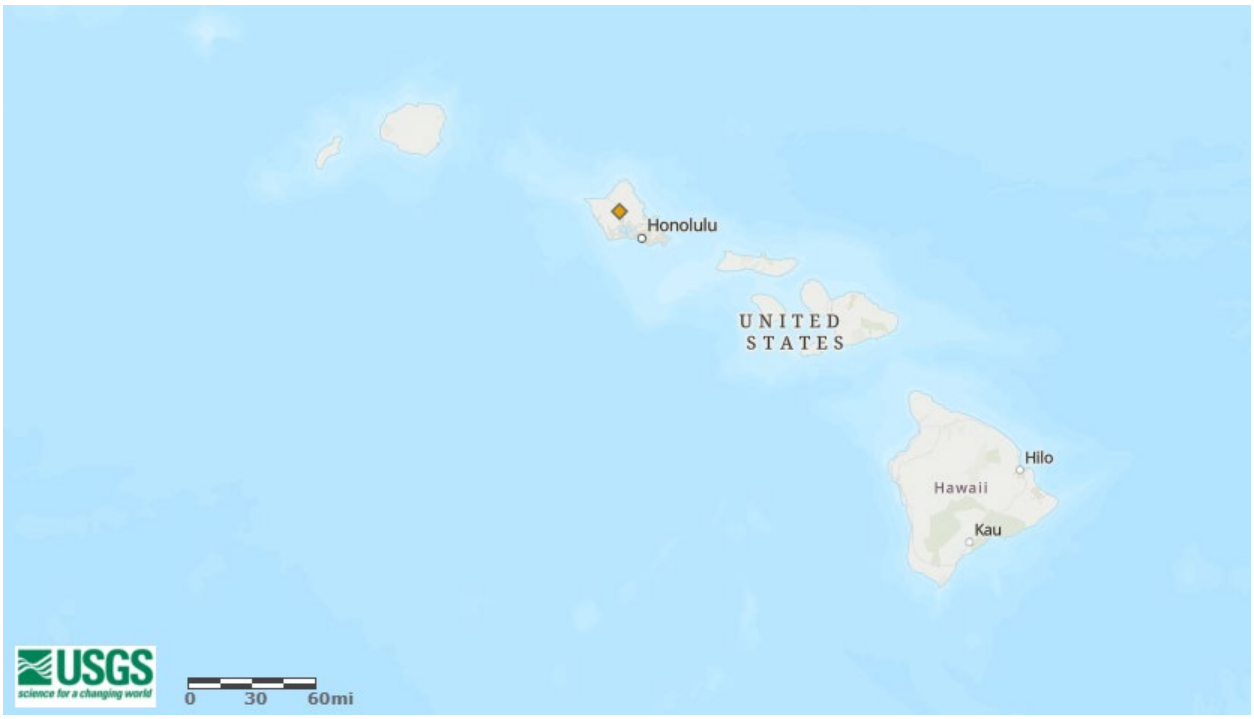

Figure 3. Reported distribution of *Chitala ornata* in Hawaii. Map from Nico et al. (2025). The observation on Oahu does not represent an established population and was not used in the climate matching analysis.

7 Climate Matching

Summary of Climate Matching Analysis

The climate match for *Chitala ornata* to the contiguous United States was mostly low to medium. Areas of high match were found in southern Florida. The southern Atlantic Coast and the Gulf Coast had areas of medium match. There were also areas of medium match in the southeast and west into Texas and southern Arizona. The overall Climate 6 score (Sanders et al. 2023; 16 climate variables; Euclidean distance) for the contiguous United States was 0.032, indicating that Yes, there is establishment concern for this species. The Climate 6 score is calculated as: (count of target points with scores ≥ 6)/(count of all target points). Establishment concern is warranted for Climate 6 scores greater than or equal to 0.002 based on an analysis of the establishment success of 356 nonnative aquatic species introduced to the United States (USFWS 2024).

Projected climate matches in the contiguous United States under future climate scenarios are available for *Chitala ornata* (see Appendix). These projected climate matches are provided as additional context for the reader; future climate scenarios are not factored into the Overall Risk Assessment Category.

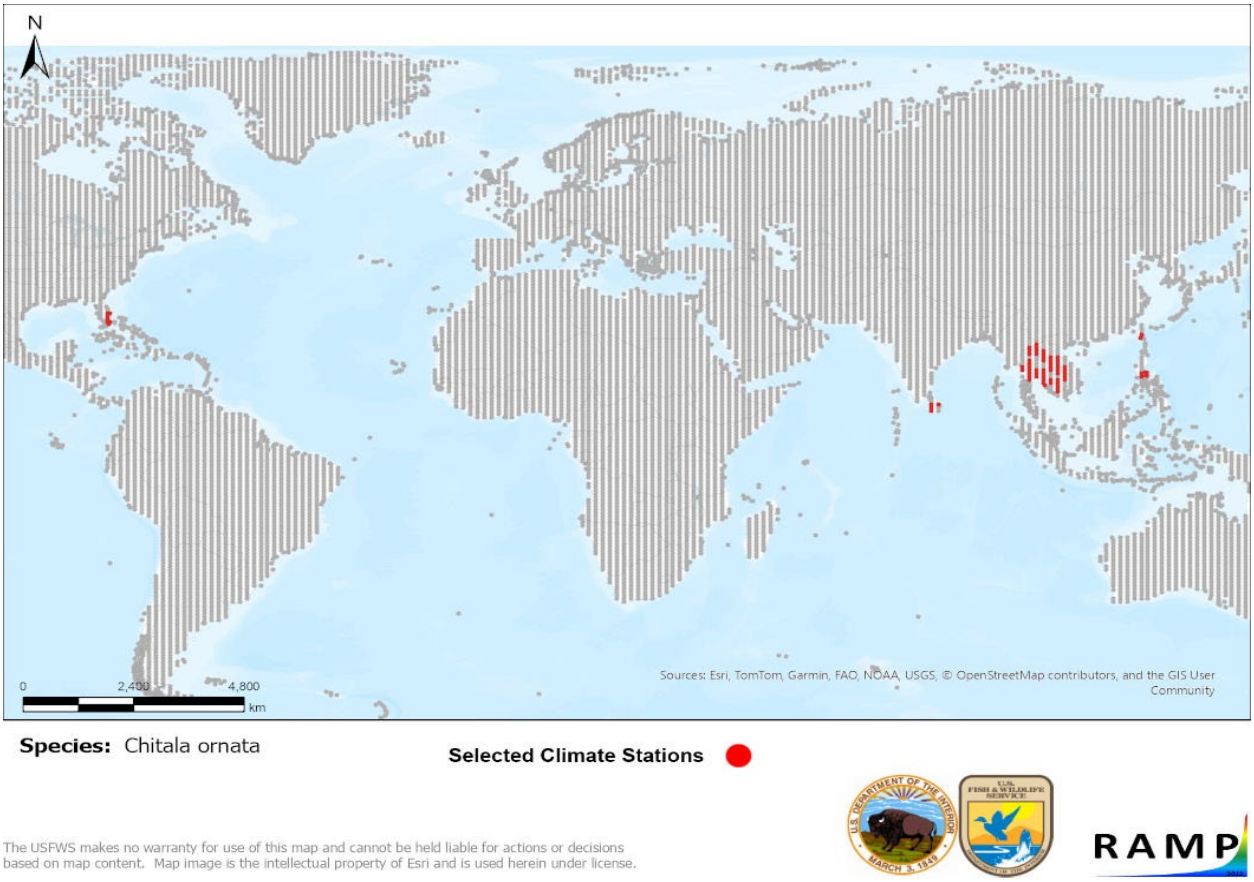

Figure 4. RAMP (Sanders et al. 2023) source map showing weather stations in North America and Asia selected as source locations (red; United States [Florida], Sri Lanka, Myanmar, Thailand, Laos, Cambodia, Philippines, Taiwan) and non-source locations (gray) for *Chitala ornata* climate matching. Source locations from GBIF Secretariat (2023). Selected source locations are within 100 km of one or more species occurrences, and do not necessarily represent the locations of occurrences themselves.

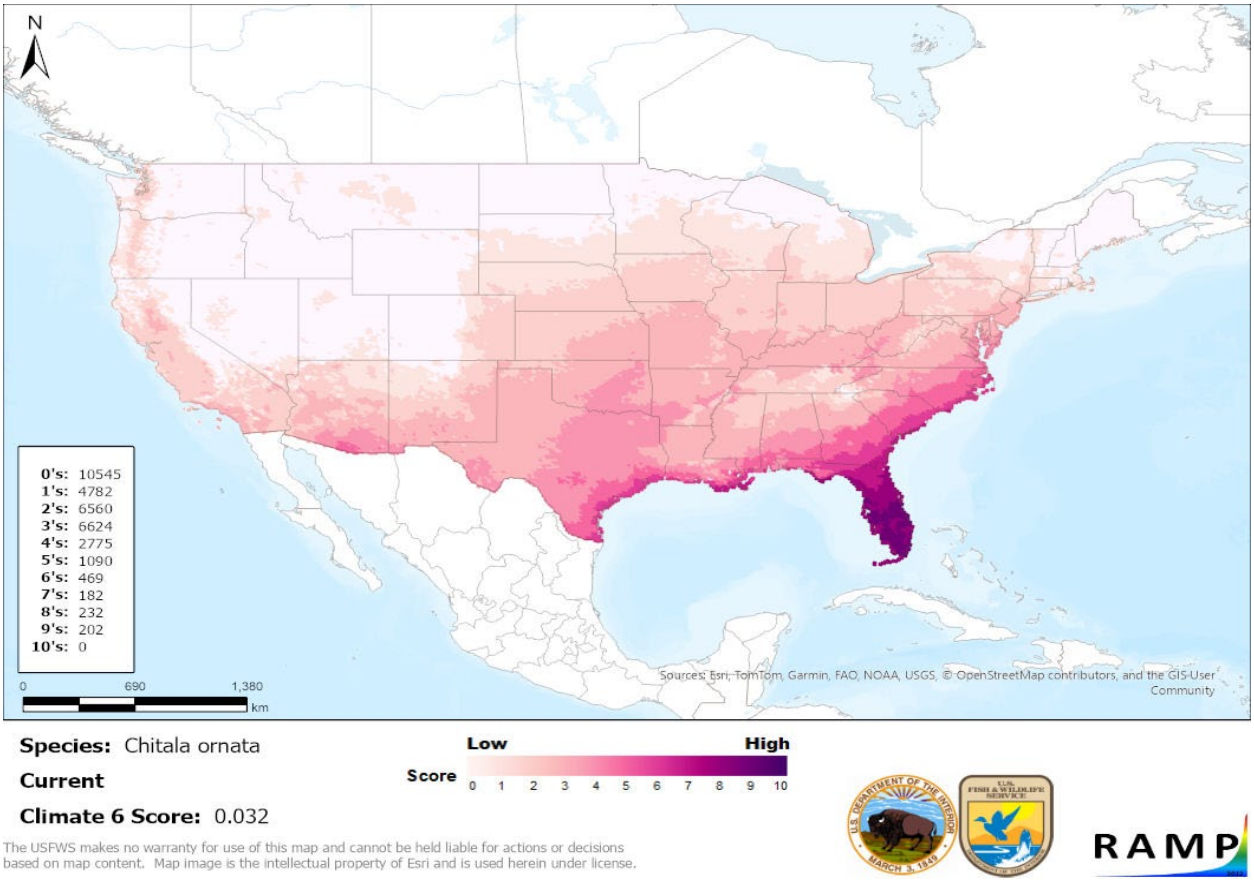

Figure 5. Map of RAMP (Sanders et al. 2023) climate matches for *Chitala ornata* in the contiguous United States based on source locations reported by GBIF Secretariat (2023). Counts of climate match scores are tabulated on the left. 0/Pale Pink = Lowest match, 10/Dark Purple = Highest match.

8 Certainty of Assessment

Information regarding the biology, ecology, and distribution of *Chitala ornata* was available. Records of introduction, establishment, and negative impacts were available from reliable sources. The Certainty of Assessment for *Chitala ornata* is classified as High.

9 Risk Assessment

Summary of Risk to the Contiguous United States

Chitala ornata, the clown knifefish, is a fish native to Laos, Thailand, Cambodia, and Vietnam. Nonnative populations of *Chitala ornata* have become established in Myanmar, Sri Lanka, the Philippines, as well as in the United States (Florida), likely via ornamental aquarium releases. This species is popular in the aquarium trade and grows large enough that it is not manageable for most aquarists. Introductions in Sri Lanka and the Philippines have adversely affected native fish populations and aquaculture production. The History of Invasiveness for *Chitala ornata* is classified as High due to these documented impacts from established nonnative populations. The climate matching analysis for the contiguous United States indicates establishment concern for this species. Southern Florida, the southern Atlantic Coast, and the Gulf Coast had areas of high

climate match for *Chitala ornata*, with the southeastern and portions of the southwestern contiguous United States showing a medium climate match. The Certainty of Assessment for this ERSS is classified as High due to documented negative impacts of established nonnative populations. The Overall Risk Assessment Category for *Chitala ornata* in the contiguous United States is High.

Assessment Elements

- **History of Invasiveness (see Section 4): High**
- **Establishment Concern (see Section 7): Yes**
- **Certainty of Assessment (see Section 8): High**
- **Remarks, Important additional information: Carrier of *Gnathastoma spinigerum*, a parasite which causes gnathostomiasis in humans.**
- **Overall Risk Assessment Category: High**

10 Literature Cited

Note: The following references were accessed for this ERSS. References cited within quoted text but not accessed are included below in section 11.

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11 Literature Cited in Quoted Material

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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Appendix

Summary of Future Climate Matching Analysis

Future climate projections represent two Shared Socioeconomic Pathways (SSP) developed by the Intergovernmental Panel on Climate Change (IPCC 2021): SSP5, in which emissions triple by the end of the century; and SSP3, in which emissions double by the end of the century. Future climate matches were based on source locations reported by GBIF Secretariat (2023).

Under the future climate scenarios (figure A1), on average, high climate match for *Chitala ornata* was projected to occur in the Southern Florida region of the contiguous United States. Areas of low climate match were projected to occur in California, the Colorado Plateau, Great Basin, Great Lakes, Northeast, Northern Pacific Coast, Northern Plains, Southwest, and Western Mountains regions. The Climate 6 scores for the individual future scenario models (figure A2) ranged from a low of 0.020 (model: UKESM1-0-LL, SSP5, 2085) to a high of 0.048 (model: MRI-ESM2-0, SSP3, 2055). All future scenario Climate 6 scores were above the Establishment Concern threshold, indicating that Yes, there is establishment concern for this species under future scenarios. The Climate 6 score for the current climate match (0.032, figure 5) falls within the range of scores for future projections. The time step and climate scenario with the most change relative to current conditions was SSP5, 2085, the most extreme climate change scenario. Under one or more time step and climate scenarios, areas within the Appalachian Range, California, Colorado Plateau, Great Lakes, Northeast, Northern Pacific Coast, Northern Plains, and Southwest saw a moderate increase in the climate match relative to current conditions. No large increases were observed regardless of time step and climate scenarios. Under one or more time step and climate scenarios, areas within the Gulf Coast, Southern Atlantic Coast, and Southern Florida saw a moderate decrease in the climate match relative to current conditions. No large decreases were observed regardless of time step and climate scenarios. Changes, both increases and decreases, in climate match were more widespread under the 2085 time steps for both SSP scenarios. Additional, very small areas of large or moderate change may be visible on the maps (figure A3).

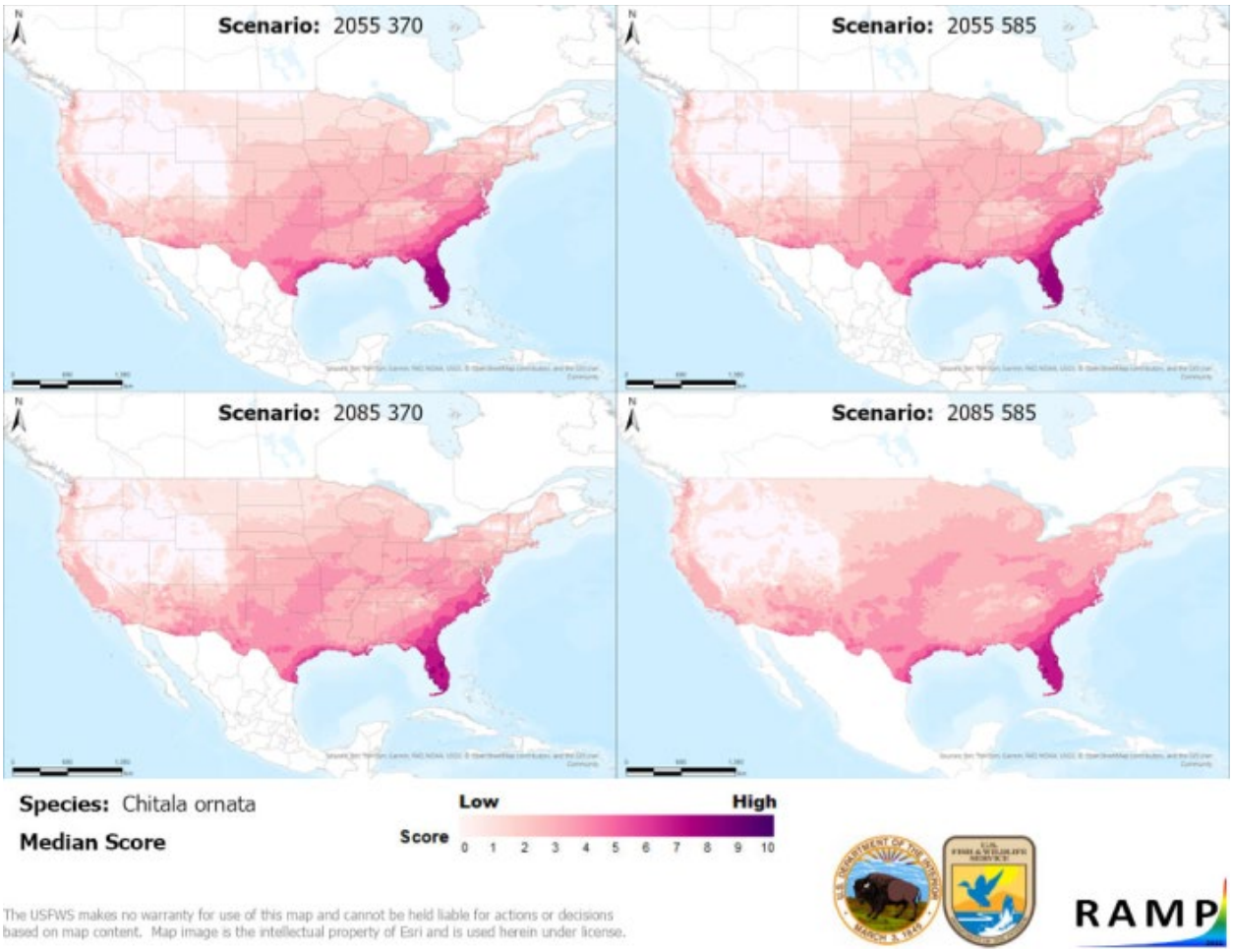

Figure A1. Maps of median RAMP (Sanders et al. 2023) climate matches projected under potential future climate conditions using five global climate models for *Chitala ornata* in the contiguous United States. Climate matching is based on source locations reported by GBIF Secretariat (2023). Shared Socioeconomic Pathways (SSPs) used (from left to right): SSP3, SSP5 (IPCC 2021). Time steps: 2055 (top row) and 2085 (bottom row). Climate source data from CHELSA (Karger et al. 2017, 2018); global climate models used: GFDL-ESM4, UKESM1-0-LL, MPI-ESM1-2-HR, IPSL-CM6A-LR, and MRI-ESM2-0. 0/Pale Pink = Lowest match, 10/Dark Purple = Highest match.

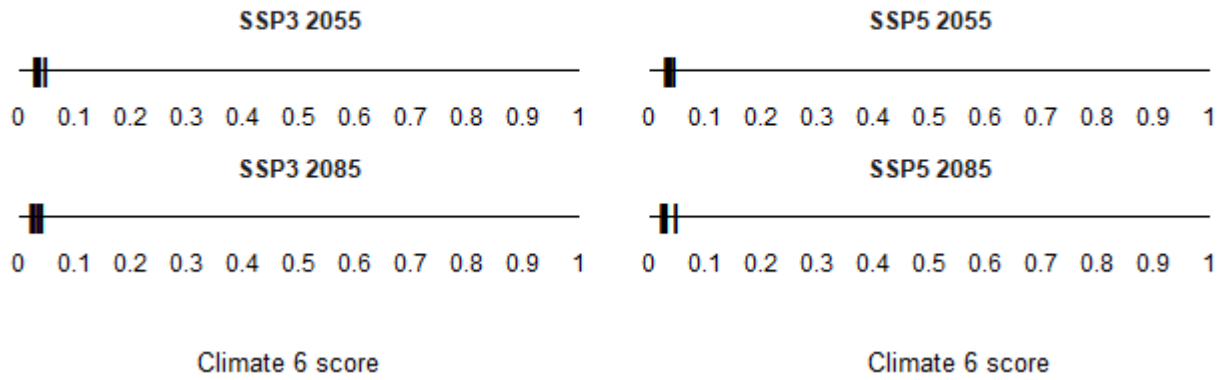

Figure A2. Comparison of projected future Climate 6 scores for *Chitala ornata* in the contiguous United States for each of five global climate models under four combinations of Shared Socioeconomic Pathway (SSP) and time step. SSPs used (from left to right): SSP3, SSP5 (Karger et al. 2017, 2018; IPCC 2021). Time steps: 2055 (top row) and 2085 (bottom row). Climate source data from CHELSA (Karger et al. 2017, 2018); global climate models used: GFDL-ESM4, UKESM1-0-LL, MPI-ESM1-2-HR, IPSL-CM6A-LR, and MRI-ESM2-0.

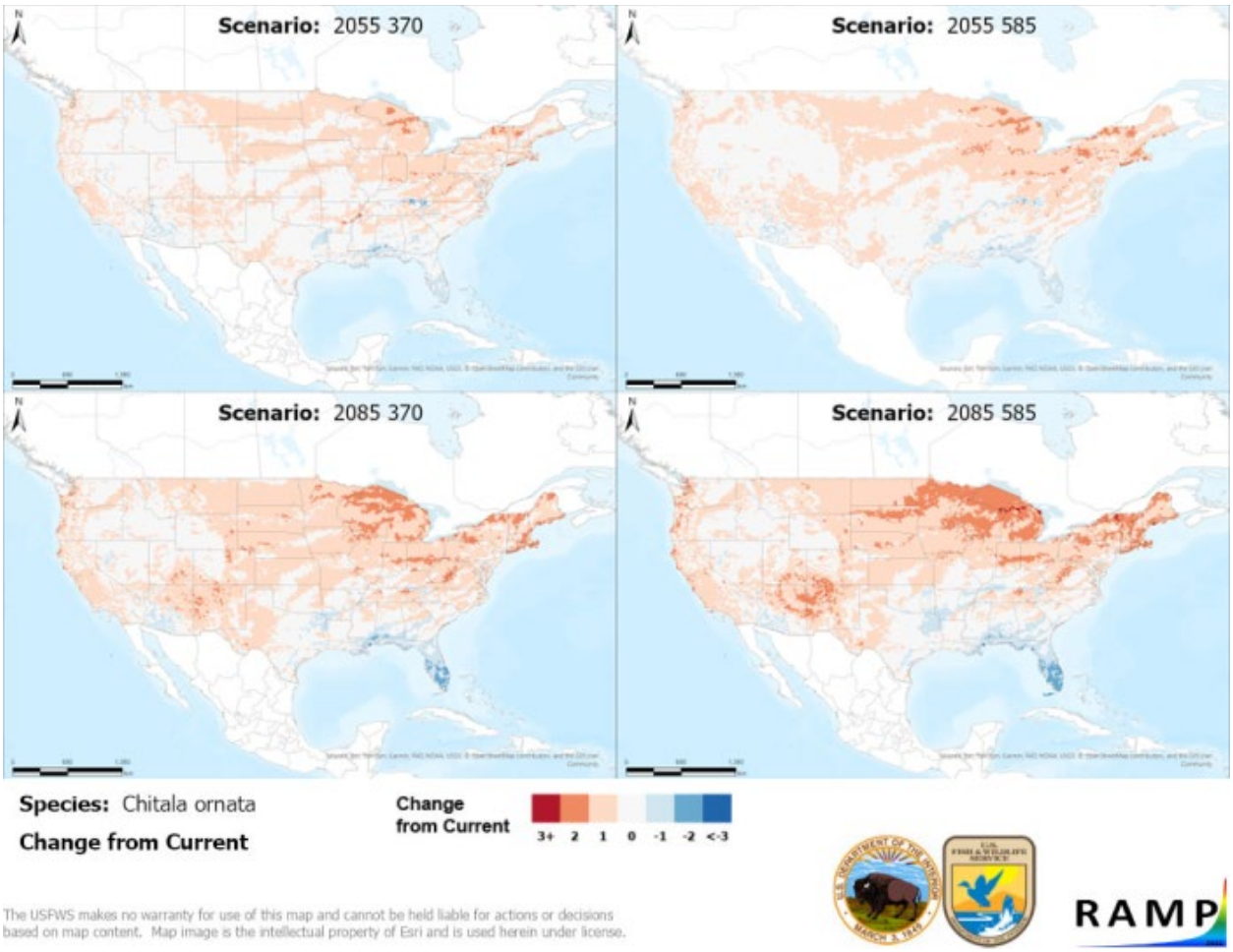

Figure A3. RAMP (Sanders et al. 2023) maps of the contiguous United States showing the difference between the current climate match target point score (figure 5) and the median target point score for future climate scenarios (figure A1) for *Chitala ornata* based on source locations reported by GBIF Secretariat (2023). Shared Socioeconomic Pathways (SSPs) used (from left to right): SSP3, SSP5 (IPCC 2021). Time steps: 2055 (top row) and 2085 (bottom row). Climate source data from CHELSA (Karger et al. 2017, 2018); global models used: GFDL-ESM4, UKESM1-0-LL, MPI-ESM1-2-HR, IPSL-CM6A-LR, and MRI-ESM2-0. Shades of blue indicate a lower target point score under future scenarios than under current conditions. Shades of red indicate a higher target point score under future scenarios than under current conditions. Darker shades indicate greater change.

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