Freshwater Garfish (*Xenentodon cancila*)

Ecological Risk Screening Summary

U.S. Fish and Wildlife Service, February 2011
Revised, January 2018
Web Version, 9/3/2019

Photo: G. Nicolas. Licensed under CC BY-SA 3.0. Available: https://commons.wikimedia.org/wiki/File:Xenentodon_cancila_(Wroclaw_zoo)-1.JPG. (January 2018).

1 Native Range and Status in the United States

Native Range

From Froese and Pauly (2017):

"Asia: Sri Lanka and India eastward to the Mekong."

From Fuller (2018):

"Fresh water, tropical Asia. Pakistan, India, Bangladesh, Sri Lanka, Burma, and Thailand (Talwar and Jhingran [1991]). Loas [probable misspelling of Laos] (Baird 1999)."

Status in the United States

From Fuller (2018):

"Introduced into the Wahiawa Reservoir (Lake Wilson), Oahu, Hawaii, where they were first reported in the spring of 1988 (Devick [1991]; Mundy 2005)."

"Status: Established in Hawaii."

This species is present in the aquarium trade in the United States, under the names "Needle Nose Gar" and "Asian Needlenose Gar." For example:

From Arizona Aquatic Gardens (2019):

"Asian Needlenose Gar
List: ~~$39.99~~
$32.00"

From LiveAquaria (2019):

"Needle Nose Gar
(*Xenentodon cancila*) Item: CN-89304
$ 29.99
[…]
Out of Stock"

Means of Introductions in the United States

From Fuller (2018):

"Probable aquarium release."

From Shluker (2003):

"Species such as […] stickfish (*Xenentodon cancila*)[…] can all trace their origins to aquatic species distributors and hobby enthusiasts."

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From ITIS (2018):

"Kingdom Animalia
Subkingdom Bilateria
Infrakingdom Deuterostomia
Phylum Chordata
Subphylum Vertebrata

Infraphylum Gnathostomata
Superclass Actinopterygii
Class Teleostei
Superorder Acanthopterygii
Order Beloniformes
Suborder Belonoidei
Superfamily Scomberesocoidea
Family Belonidae
Genus *Xenentodon*
Species *Xenentodon cancila* (Hamilton, 1822)"

From Eschmeyer et al. (2018):

"Current status: Valid as *Xenentodon cancila* (Hamilton 1822). Belonidae."

Size, Weight, and Age Range

From Froese and Pauly (2017):

"Max length : 40.0 cm TL male/unsexed; [Talwar and Jhingran 1991]; common length : 30.0 cm TL male/unsexed; [Talwar and Jhingran 1991]"

Environment

From Froese and Pauly (2017):

"Marine; freshwater; brackish; pelagic-neritic; pH range: 7.0 - 7.5; dH range: 20 - ?; amphidromous [Riede 2004]; depth range 0 - 2 m [Mundy 2005]. […] 22°C - 28°C [Riehl and Baensch 1991; presumed to be recommended aquarium water temperature]"

Climate/Range

From Froese and Pauly (2017):

"Tropical; […] 38°N - 5°N"

Distribution Outside the United States

Native

From Froese and Pauly (2017):

"Asia: Sri Lanka and India eastward to the Mekong."

From Fuller (2018):

"Fresh water, tropical Asia. Pakistan, India, Bangladesh, Sri Lanka, Burma, and Thailand (Talwar and Jhingran [1991]). Loas [probable misspelling of Laos] (Baird 1999)."

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

Means of Introduction Outside the United States
This species has not been reported as introduced outside the United States.

Short Description
From Froese and Pauly (2017):

"Dorsal spines (total): 0; Dorsal soft rays (total): 15-18; Anal spines: 0; Anal soft rays: 16 - 18. Body very elongate and slightly compressed. Dorsal fin inserted usually anterior to a vertical through the origin of the anal fin. Green-silvery dorsally, grading to whitish below. A silvery band with a dark margin run along the side; a series of four or five blotches (absent in young specimens) on sides between the pectoral and anal fins. Dorsal and anal fins with dark edges."

Biology
From Hossain et al. (2013):

"Freshwater garfish inhabits large and medium-sized rivers with adults occurring in areas that lack floating vegetation (Pethiyagoda 1991). *X. cancila* occurs primarily in rivers (Talwar & Jhingran 1991) but also found in ponds, canals, *beels* and inundated fields (Rahman 1989) and often found in slow-flowing pools in rivers with a rock or sand substrate (Pethiyagoda 1991). However, *X. cancila* occurs in clear, gravelly, perennial streams and ponds of Terai and Duars, North Bengal, India and is fairly common in the Ganges-Brahmaputra system (Talwar & Jhingran 1991). It is a solitary fish that swims in midwater, usually against the current and is capable of bursts of speed, especially when in pursuit of its prey. The freshwater garfish feeds exclusively on crustaceans, small fishes and insects in the wild; but takes live fish only when in an aquarium (Pethiyagoda 1991; Rainboth 1996). Moreover, *X. cancila* is oviparous and eggs may be found attached to objects in the water by tendrils on the egg's surface (Breder & Rosen 1966)."

From Froese and Pauly (2017):

"Male pursues a slow-moving female and upon catching up with the female, will begin shuddering from side to side while the pair is oriented parallel to each other; the pair positions themselves close to submerged vegetation; male assumes a slight head-down position , with his anal fin curled under the female's vent; the pair begins trembling until a single large egg is released; each female produces about a dozen eggs per day; eggs hatch in about a week; no parental care [Yamamoto and Tagawa 2000]."

Human Uses

From Hossain et al. (2013):

"The freshwater garfish, *Xenentodon cancila* (Hamilton 1822), is one of the commercially important, nutritionally valuable food fish in Asian countries, but the natural populations are seriously decreasing due to high fishing pressure and other factors."

This species is present in the aquarium trade in the United States, under the names "Needle Nose Gar" and "Asian Needlenose Gar." For example:

From Arizona Aquatic Gardens (2019):

"Asian Needlenose Gar
List: ~~$39.99~~
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Diseases

Poelen et al. (2014) lists the following as parasites of *Xenentodon cancila*: *Camallanus xenentodoni, Urocleidus xenentodonti, Camallanus cancelai, Procamallanus cancilus, Neocamallanus ophicephali, Paragendria bagarii, Paraquimperia xenentodinia, Bucephaloides cancilatus, Phyllodistomum macrobranchicola, Neascus kherai, Neascus srivastavi, Neocamallanus ophiocephali, Pallisentis ophiocephali, Camallanus xenentodoni, Philometra pellucida, Paracapillaria xenentodoni, Prosorhynchoides karvei, Centrocestus formosanus, Stellantchasmus falcatus, Dactylostomum gayaprashadi, Gangatrema hanumanthai, Isoparorchis hypselobagri, Urocleidus bhoopi, Pseudoproleptus fotedari, Gnathostoma spinigerum,* and *Neocamallanus ophiocephali* (Benesh et al. 2017; Strona et al. 2013).

From Foster (1973):

"Transmission of parasitic nematodes of the genus *Eustrongylides* to *Xenentodon* was accomplished by feeding the needlefish infected individuals of *Fundulus heteroclitus*."

From Seng et al. (2009):

"The bacteria of the genus *Neorickettsia* are strict intracellular bacteria of the *Anaplasmataceae* family. They are transmitted to their definitive host (humans and animals) by ingestion of raw fish, snails or aquatic insects that are parasitised by infected trematodes. Among them, three species (*N. sennetsu, N. helminthoeca* and *N. risticii*) are known to cause diseases in mammals

(humans and animals) [Brouqui et al. 2007] but two have not yet been associated with the disease (SF agent, and *Ehrlichia* species trout isolate)."

"Finally a new species of *Neorickettsia* was identified with a 1247 bp rrs sequence homology of 97% with *Ehrlichia* sp. trout isolate and 96% with *N. risticii* in the intestine of *Xenentodon cancila* fish collected in Cambodia."

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

Threat to Humans

From Froese and Pauly (2017):

"Traumatogenic [Pethiyagoda 1991]"

3 Impacts of Introductions

From Fuller (2018):

"During the summer of 1989, *Xenentodon* in Hawaii were preying on largemouth bass (also introduced), to the extent that the bass population appeared to be threatened (Devick [1991])."

4 Global Distribution

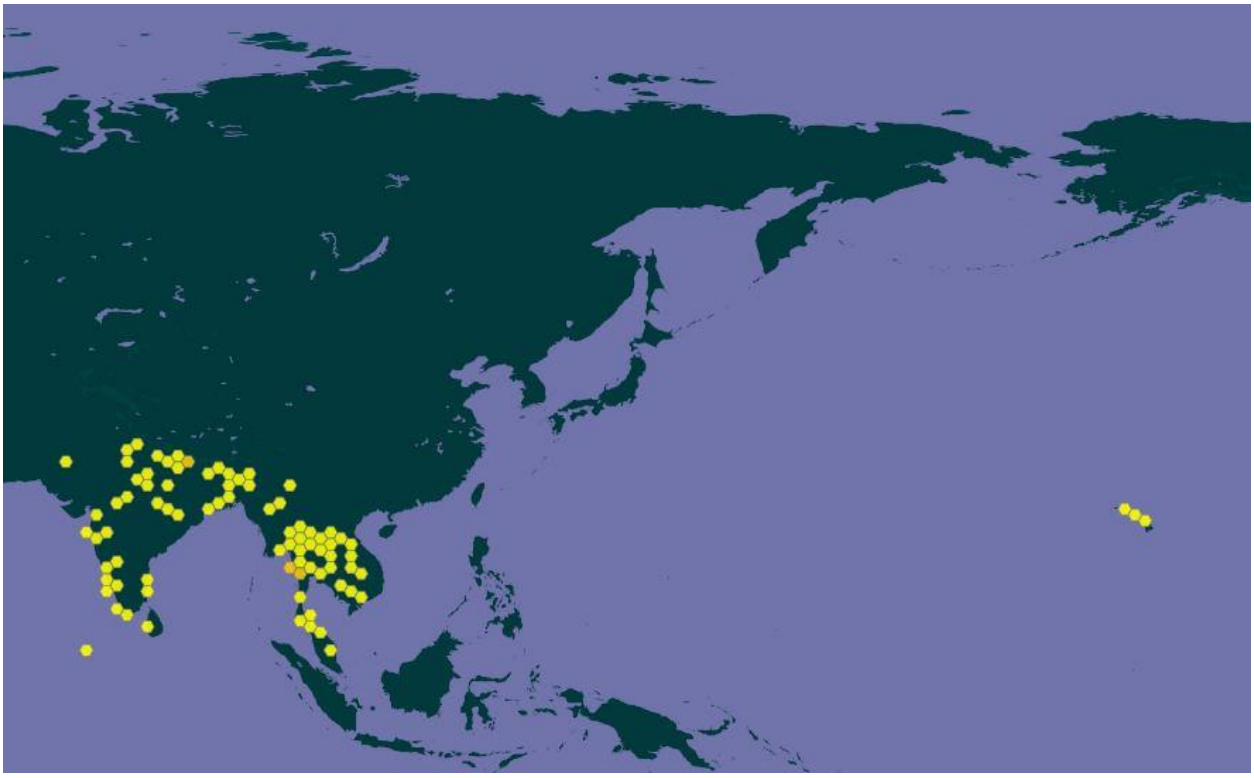

Figure 1. Known global distribution of *Xenentodon cancila*, reported from southern Asia from Pakistan to Vietnam, and in Hawaii. Map from GBIF Secretariat (2018).

5 Distribution Within the United States

Figure 2. Known distribution of *Xenentodon cancila* in the United States. Map from Fuller (2018).

6 Climate Matching

Summary of Climate Matching Analysis

The Climate 6 score (Sanders et al. 2014; 16 climate variables; Euclidean distance) for the contiguous United States was 0.009, which is a medium climate match. (Scores between 0.005 and 0.103 are classified as medium.) The climate score was high for Arizona, and medium for California and Texas. All other States had a low climate score. There was a medium match in the southern portions of Florida, Louisiana, Texas, Arizona, and far southeast California. The rest of the contiguous United States had a low climate match.

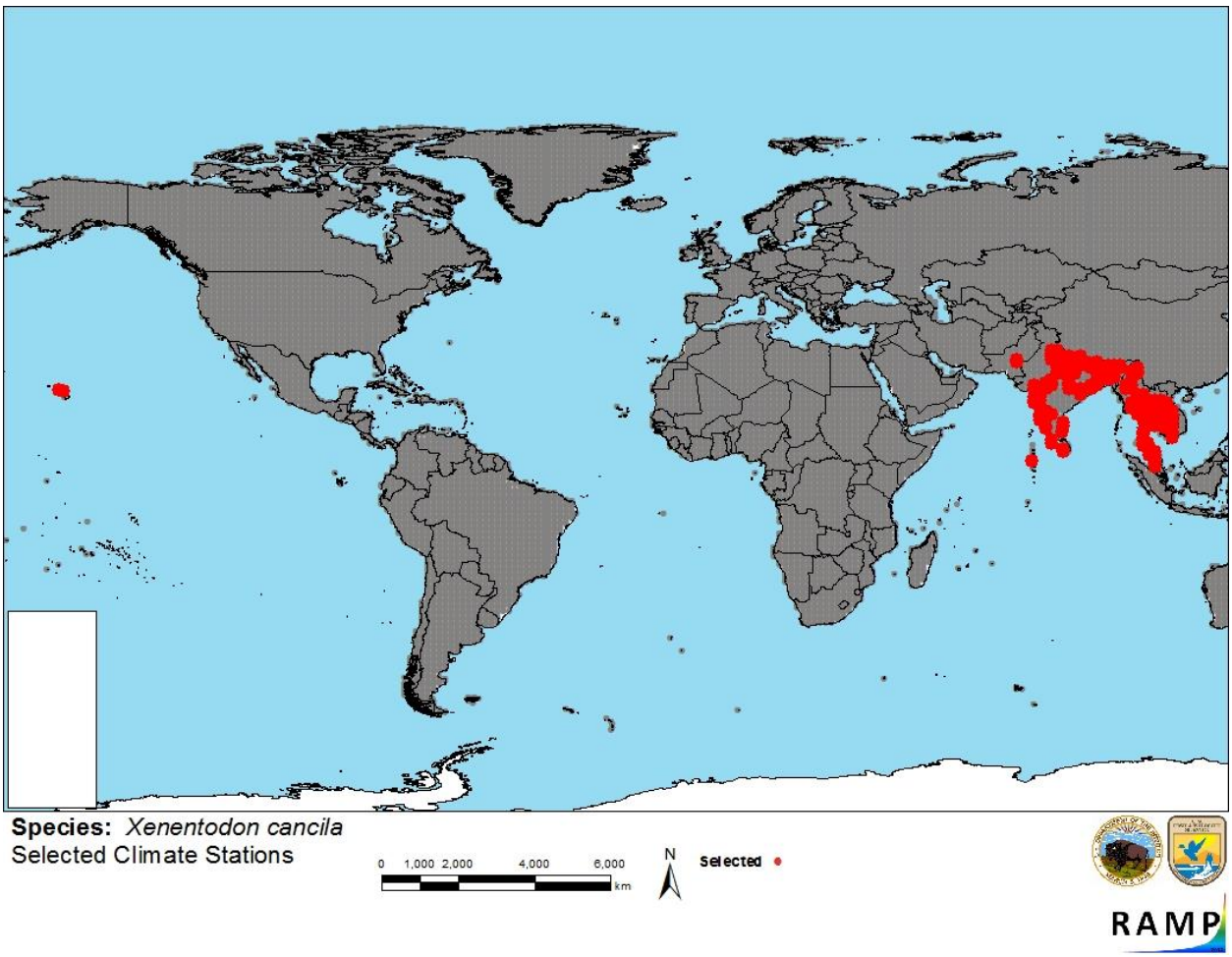

Figure 3. RAMP (Sanders et al. 2014) source map showing weather stations selected as source locations (red; Pakistan, India, Sri Lanka, the Maldives, Nepal, Bangladesh, Myanmar, Thailand, Laos, Cambodia, Vietnam, Malaysia, Hawaii) and non-source locations (gray) for *Xenentodon cancila* climate matching. Source locations from GBIF Secretariat (2018).

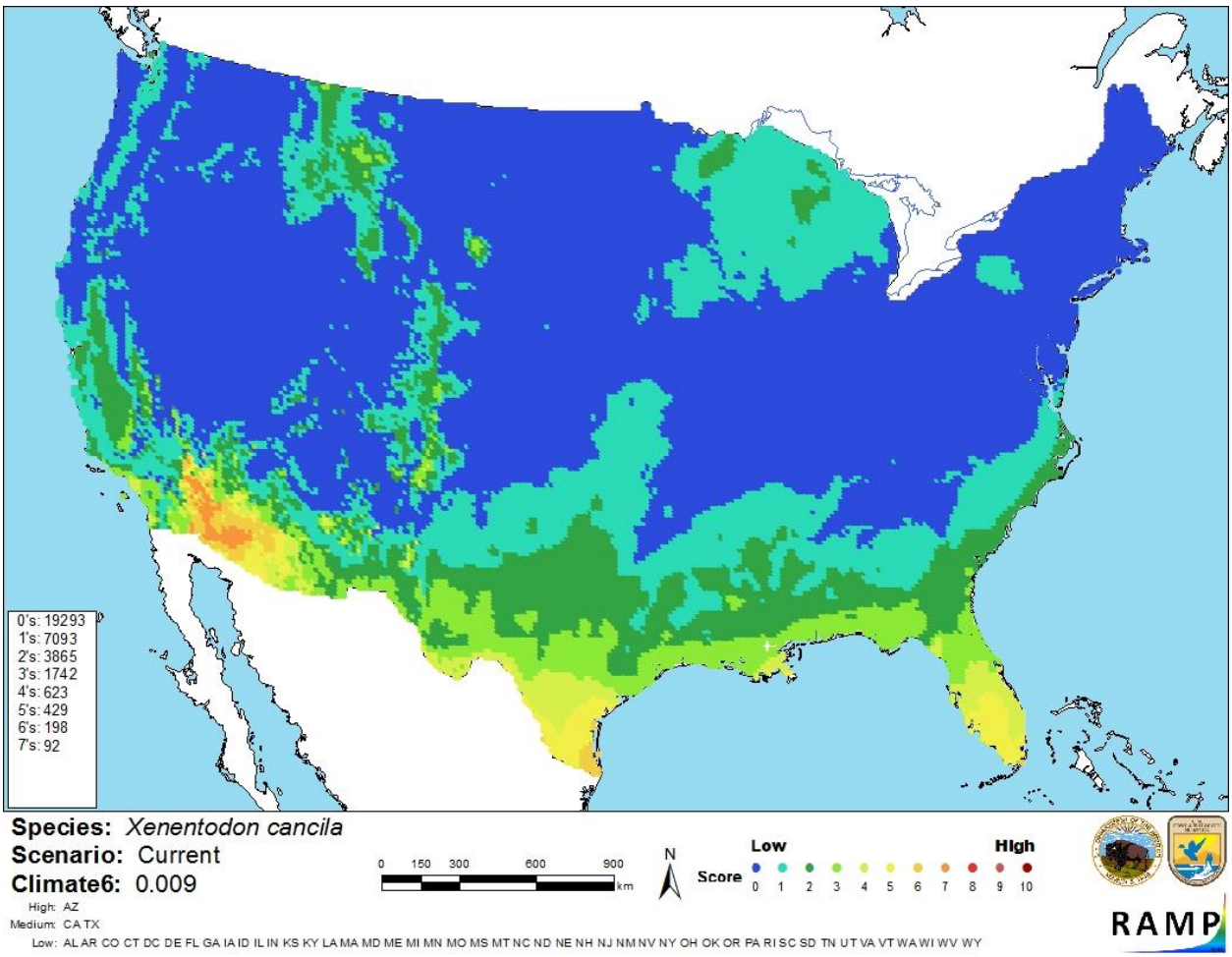

Figure 4. Map of RAMP (Sanders et al. 2014) climate matches for *Xenentodon cancila* in the contiguous United States based on source locations reported by GBIF Secretariat (2018). 0= Lowest match, 10=Highest match.

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

There is adequate information available on the biology and distribution of *Xenentodon cancila*. This species has a well-documented native range. *X. cancila* has been introduced to Hawaii, but little information is available on the impact of this introduction. Certainty of this assessment is low.

8 Risk Assessment

Summary of Risk to the Contiguous United States

Xenentodon cancila, Freshwater Garfish, is a fish native to tropical Asia, from Pakistan to the Mekong River in Southeast Asia. It is used for human consumption in Asia, and in the aquarium trade in the United States. *X. cancila* has been introduced to and become established in Hawaii, likely as a result of the aquarium trade or aquarium releases. There is little information available on the impact of this species' introduction to Hawaii. It may have threatened the non-native largemouth bass fishery there at one time. History of invasiveness is classified as "none documented." *X. cancila* has a medium climate match with the contiguous United States, with the area of highest match located in southern Arizona and southeastern California. Certainty of this assessment is low due to a lack of information on impacts of introduction. The overall risk assessment category is uncertain.

Assessment Elements

- **History of Invasiveness (Sec. 3): None Documented**
- **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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