Peacock Eel (*Macrognathus siamensis*)

Ecological Risk Screening Summary

U.S. Fish and Wildlife Service, January 2013
Revised, February 2018 and August 2018
Web Version, 8/3/2018

Photo: U.S. Geological Survey. From Fuller (2018).

1 Native Range and Status in the United States

Native Range

From Froese and Pauly (2017):

"Asia: Mekong, Chao Phraya [Kottelat 2001], Maeklong, Peninsular and Southeast Thailand river systems [Vidthayanon et al. 1997]."

Froese and Pauly (2018) report *M. siamensis* as native to Cambodia, Laos, Thailand, and Vietnam.

From Fuller (2018):

"Mekong basin in Laos, Thailand, Cambodia, and Vietnam; Chao Phraya basin [Thailand] (Rainboth 1996; Kottelat 2001)."

Status in the United States

From Fuller (2018):

"Established in Everglades National Park [Florida] and sections of adjacent freshwater canals (Shafland et al. 2008; Kline et al. 2013)."

This species appears to be commonly available in trade in the United States. It is listed for sale from several online aquarium retailers, including Arizona Aquatic Gardens (2018), AquariumFishSale (2018), and PetSmart (2018).

Means of Introductions in the United States

From Fuller (2018):

"Presumed aquarium release."

Remarks

From Ferriter et al. (2008):

"Since the discovery of nonnative eels in Florida, USGS scientists have studied aspects of swamp eel biology, including changes in distribution and abundance, diet and reproduction, genetics, environmental tolerances, and ecological effects. Given the abundance and wide distribution of swamp eels in Florida's canals, elimination is probably impossible; however, various control methods are currently under investigation. The USFWS conducted a swamp eel removal project utilizing electrofishing techniques in 2006. In addition to the Asian swamp eel, the project also focused on removing exotic spotfinned spiny eels (*Macrognathus siamensis*, aka peacock eels) which occur at bottom depths in slower moving water than Asian swamp eels. The project was conducted on C-111 and C-113 canals and resulted in an average 53 percent efficiency with the removal of 905 Asian swamp eels and 82 peacock eels (J. Galvez, USFWS, personal communication). This project continues during the summer of 2007."

From Fuller (2018):

"Common name: Spotfin Spiny Eel"

"Synonyms and Other Names: peacock eel, peacock spiny eel."

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 Synbranchiformes
Suborder Mastacembeloidei
Family Mastacembelidae
Subfamily Mastacembelinae
Genus Macrognathus (Lacepède, 1800)
Species *Macrognathus siamensis* (Günther, 1861)"

"Current Standing: Valid"

Size, Weight, and Age Range

From Froese and Pauly (2017):

"Max length : 30.0 cm SL male/unsexed; [Baird et al. 1999]"

From Fuller (2018):

"To 200 mm SL (Kottelat 2001)"

Environment

From Froese and Pauly (2017):

"Freshwater; benthopelagic."

Climate/Range

From Froese and Pauly (2017):

"Tropical"

Distribution Outside the United States

From Froese and Pauly (2017):

"Asia: Mekong, Chao Phraya [Kottelat 2001], Maeklong, Peninsular and Southeast Thailand river systems [Vidthayanon et al. 1997]."

Froese and Pauly (2018) report *M. siamensis* as native to Cambodia, Laos, Thailand, and Vietnam.

From Fuller (2018):

"Mekong basin in Laos, Thailand, Cambodia, and Vietnam; Chao Phraya basin [Thailand] (Rainboth 1996; Kottelat 2001)."

Introduced

Froese and Pauly (2018) report that *M. siamensis* was introduced to the Philippines, but the establishment status of the species there is unknown.

Means of Introduction Outside the United States

From Froese and Pauly (2018):

"ornamental"

Short Description

From Froese and Pauly (2018):

"Dorsal spines (total): 13 - 19; Dorsal soft rays (total): 53; Anal soft rays: 49; Vertebrae: 75. Distinguishable by its dorsal spine count of 13-19 and a series of 3-6 conspicuous ocelli along the base of the soft dorsal fin [Kottelat 1998]. The ocelli along the base of the dorsal fin are much larger than those in *M. aral* and the dorsal and caudal fins lack the fine striations seen in *M. aral* and *M. meklongensis* [Roberts 1986]. Dorsal, caudal and anal fins not fused [Kottelat 2001]."

From Fuller (2018):

"Elongate, eel-like fish with a compressed tail and a row of small spines along the back anterior to a soft-rayed dorsal fin; pectoral and anal fins present; no pelvic fins; snout is extended into a proboscis with anterior nostrils at the side (Kottelat 2001); 4-5 dark round spots on dorsal fin. Roberts (1980, 1986) provided keys to the genus. The elongated snout (or rostrum) containing tooth-bearing bony plates (Roberts 1980, 1986) distinguishes this genus from all others found in North America."

Biology

From Froese and Pauly (2017):

"Found at bottom depths in slow-moving or standing waters. Often lies buried in the silt, sand, or fine gravel with only a portion of its head protruding from the bottom [Rainboth 1996]. Enters flooded forest [Roberts 1993]. Emerges at dusk to forage for food. Feeds on benthic insect larvae, crustaceans, and worms [Rainboth 1996]. Marketed fresh and often seen in the aquarium trade [Rainboth 1996]."

From Fuller (2017):

"Occurs in benthic habitats in slow-moving streams and canals, standing pools or reservoirs, or in freshwater wetlands. Diet includes benthic crustaceans, annelids, and insect larvae (Rainboth 1996)."

Human Uses

From Froese and Pauly (2018):

"Fisheries: commercial; aquarium: commercial"

Diseases

From Rojekittikhun et al. (2002):

"Gnathostomiasis is a helminthic disease most frequently occurring in Thailand. Human infections are usually found to be caused by *Gnathostoma spinigerum*, although five species of the genus *Gnathostoma* exist in Thailand, and three of these are capable of infecting man."

Rojekittikhun et al. (2002) include *M. siamensis* among the 20 species of fish in Thailand that serve as intermediate hosts of *G. spinigerum*.

From Wanlop et al. (2017):

"In Thailand, the metacercariae of *C. formosanus* have been reported in several fish species, such as *Macrognathus siamensis* […]"

Wongsawad et al. (2004) report *M. siamensis* as a host for trematode (*Acanthostomum* sp (metacercaria), *Allocreadium* sp I, *Centrocestus caninus* (metacercaria), *Gauhatiana* sp, *Haplorchoides* sp (metacercaria), *Transversotrema patialense*) and nematode (*Rhabdochona* sp I, *Rhabdochona* sp II) parasites.

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

Threat to Humans

From Froese and Pauly (2017):

"Harmless"

3 Impacts of Introductions

From Fuller (2018):

"Unknown."

4 Global Distribution

Figure 1. Known global distribution of *Macrognathus siamensis.* Map from GBIF Secretariat (2018). Occurrences shown in the South China Sea do not represent established populations and were not included in the climate matching analysis.

5 Distribution Within the United States

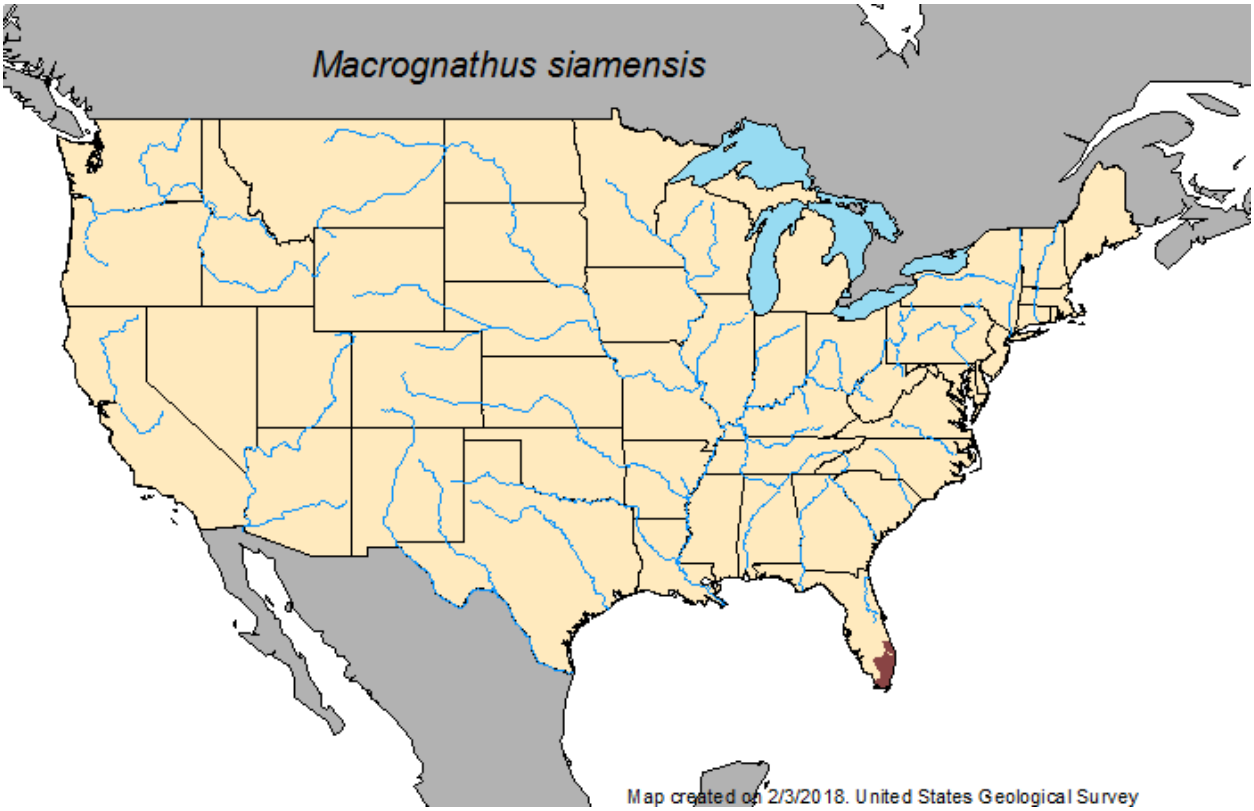

Figure 2. Distribution map of *Macrognathus siamensis* in the contiguous United States. Map from Fuller (2018).

6 Climate Matching

Summary of Climate Matching Analysis

The climate match (Sanders et al. 2014; 16 climate variables; Euclidean distance) was high for most of peninsular Florida, and medium for northern Florida and the coasts of Georgia, South Carolina, and Texas. The remaining area of the United States has a low climate match. The Climate 6 score indicated a medium climate match for the contiguous United States. Scores between 0.005 and 0.103 are classified as a medium match. Climate 6 score for *Macrognathus siamensis* was 0.014.

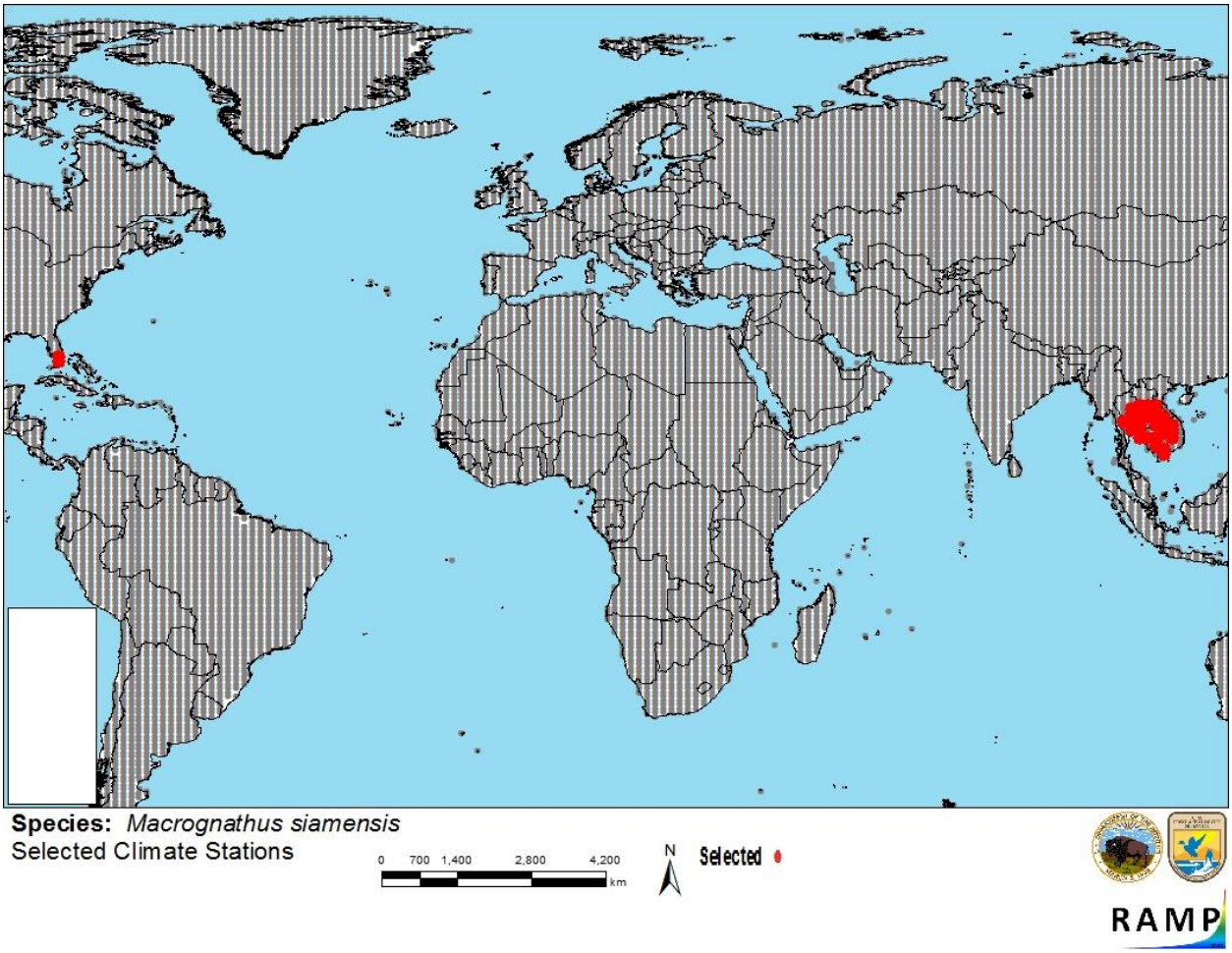

Figure 3. RAMP (Sanders et al. 2014) source map showing weather stations selected as source locations (red; United States (Florida), Cambodia, Laos, Thailand, Vietnam) and non-source locations (gray) for *Macrognathus siamesis* climate matching. Source locations from GBIF Secretariat (2018).

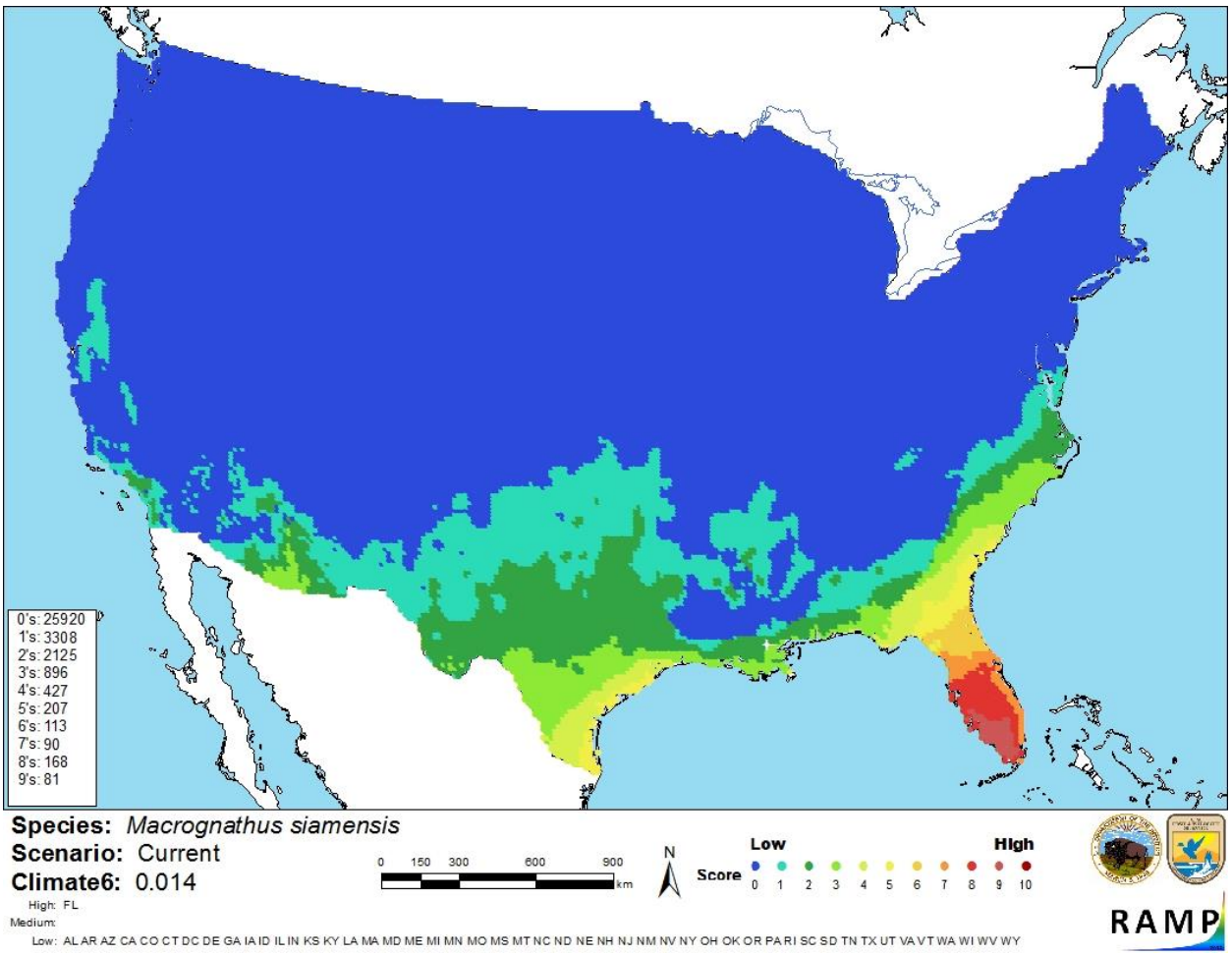

Figure 4. Map of RAMP (Sanders et al. 2014) climate matches for *Macrognathus siamesis* in the contiguous United States based on source locations reported by GBIF Secretariat (2018). 0= Lowest match, 10=Highest match.

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

Peer-reviewed literature on the biology, ecology and distribution associated with *Macrognathus siamensis* is available. Established populations occur in Florida but information on impacts from introductions is lacking. Additional information and research on this species will be needed to increase certainty of this assessment. The certainty of this assessment is low due to lack of information on impacts of introduction.

8 Risk Assessment

Summary of Risk to the Contiguous United States

Peacock Eel (*Macrognathus siamensis*) is native to southeast Asia. *M. siamensis* is used in commercial fisheries and the aquarium trade. Established populations of *M. siamensis* occur in southern Florida. The source of the populations in Florida is believed to be an aquarium release. Impacts from the established population in Florida have not been documented. Introduction to the Philippines has also been reported, but it is unknown whether *M. siamensis* is now established there. Certainty of assessment is low because no studies of impacts were found. The climate match with the contiguous United States is medium. The overall risk for *M. siamensis* is uncertain.

Assessment Elements

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