Amazon Sailfin Catfish (*Pterygoplichthys pardalis*)
Ecological Risk Screening Summary

Web Version – 8/29/12

Photo: Scotcat.com

1 Native Range and Nonindigenous Occurrences

Native Range
From Nico et al. (2012):

"Tropical America. Amazon River basin."

Nonindigenous Occurrences
From Nico et al. (2012):

"Pterygoplichthys pardalis has been present in the thermally polluted Julian Lake, North Carolina since 1997 (Bryn, T., personal communication). A single specimen was taken in Cherokee County, South Carolina, from the Broad River at 99 Island Dam in 1992 (museum specimen). Recently established in California (C. Swift, personal communication) and Puerto Rico."

Means of Introductions

From Nico et al. (2012):

"Probable aquarium release."

Remarks

From Nico et al. (2012):

"Sailfin suckermouth catfishes (Pterygoplichthys spp.) are capable of surviving mesohaline conditions (up to 10 ppt) for extended periods of time, allowing for the use of estuarine and coastal areas for dispersal (Capps et al. 2011)."

"L. Page examined the specimen from South Carolina … and confirmed its identification as *Pterygoplichthys pardalis*."

2 Biology and Ecology

Taxonomic Heirarchy

From ITIS (2012):

"Kingdom Animalia
Phylum Chordata
Subphylum Vertebrata
Superclass Osteichthyes
Class Actinopterygii
Subclass Neopterygii
Infraclass Teleostei
Superorder Ostariophysi
Order Siluriformes
Family Loricariidae
Subfamily Hypostominae – armored catfishes
Genus Pterygoplichthys
Species Pterygoplichthys pardalis – Amazon sailfin catfish"

Taxonomic status: "valid"

Size, Weight, Age

From Froese and Pauly (2010):

"Max length : 42.3 cm SL male/unsexed (Chavez et al. 2006)"

Environment

From Froese and Pauly (2010):

"Freshwater; demersal; pH range: 7.0 - 7.5; dH range: 10 – 20"

Climate/Range
From Froese and Pauly (2010):

"Tropical; 23°C - 28°C (Baensch and Riehl 1997)"

Distribution
From Froese and Pauly (2010):

"South America: Lower, middle and upper Amazon River basin. Introduced to countries outside its native range."

Biology
From Froese and Pauly (2010):

"Facultative air breather."

Human uses
From Froese and Pauly (2010):

"Fisheries: minor commercial; aquarium: commercial"

Diseases
None reported

Threat to humans
None reported

3 Impacts of Introductions

From Nico et al. (2012):

"Male members of the genus *Pterygoplichthys* dig out river banks to create burrows in which an attracted female will lay and guard her eggs. In large numbers, this burrowing behavior by *Pterygoplichthys* contributes to problems with siltation. In addition, the burrows potentially destabilize the banks, leading to an increased rate of erosion (Nico et al. 2009)."

From Global Invasive Species Database (2010a):

General impacts
"Potential effects of *Pterygoplichthys* spp. include alteration of bank structure and erosion, disruption of aquatic food chains, competition with native species, mortality of endangered shore birds, changes in aquatic plant communities, and damage to fishing gear and industry. "

"Environmental impacts of *Pterygoplichthys* spp. are not fully understood, but in locations where they are introduced and abundant, their feeding behaviours and burrowing activities can cause considerable disturbance. Their burrows have been reported as contributing to siltation problems and bank erosion and instability (Hoover et al. 2004; Nico et al. 2009). *Pterygoplichthys* spp. forage along the bottoms of streams and lakes, occasionally burying their heads in the substrate and lashing their tails. These behaviours can uproot or shear aquatic plants and reduce the abundance of beds of submersed aquatic vegetation, creating floating mats that shade the benthos from sunlight. By grazing on benthic algae and detritus, they may alter or reduce food availability and the physical cover available for aquatic insects eaten by other native and non-native fishes where they are introduced (Mendoza et al. 2009; Hossain et al. 2008). *Pterygoplichthys* spp. may also compete with native fish. They are believed to displace several species of minnow in Texas including the Federally threatened and 'Vulnerable (VU)' Devils River minnow (see *Dionda diaboli*) (Cohen 2008; Mendoza et al. 2009)."

"Pterygoplichthys spp. are thought to create large, novel nutrient sinks in invaded streams of southern Mexico. They sequester the majority of nitrogen and phosphorus of systems in their body armor. These impacts on nutrient systems may also exacerbate the nutrient limitation of primary productivity in invaded streams (Capps et al. 2009). "

"Thousands of nesting tunnels excavated by *P. multiradiatus* have contributed to siltation problems in Hawaii. Because of their abundance in Hawaii, *P. multiradiatus* may compete with native stream species for food and space (Nico 2006). The burrowing behaviour and overpopulation of *P. multiradiatus* may also displace native fish in Puerto Rico where they have been reported as detrimental to reservoir fishes (Bunkley-Williams et al. 1994). In Lake Okeechobee, Florida *P. multiradiatus* feeds and burrows at the bottom and destroys submerged vegetation, essentially displacing native fishes that would otherwise use the aquatic vegetation for spawning and refuge and interfering with their reproduction (Mendoza et al. 2009). *P. multiradiatus* is known to cause economic losses to fisherman by damaging equipment such as cast and gill nets in India and displacing native fish (Krishnakumar et al. 2009). *P. multiradiatus* and *P. pardalis* damage fishing gear and gill nets in various locations of Mexico (Wakida-Kusunoki et al. 2007)."

"P. disjunctivus and *P. pardalis* are reportedly destroying cages and nets and causing a decline in native, more desirable fish in Laguna de Bay, Philippines (Chavez et al. 2006). *P. disjunctivus* attaches to the skin of the 'Endangered (EN)' native Florida manatee (see *Trichechus manatus* ssp. *latirostris*) and feeds on their epibiota. In some instances dozens of *P. disjunctivus* and manatees appeared agitated. This interaction may be detrimental to manatee but remains unclear (Nico et al. 2009)."

From Global Invasive Species Database (2010b):

"*Pterygoplichthys* spp. have also been found to ingest eggs of *Etheostoma fonticola*, also listed as vulnerable (Cook-Hildreth 2009)."

From Simonovic (2010):

"The sailfin catfish genus *Pterygoplichthys* already has the invasive history, since species *P. multiradiatus*, *P. pardalis* and *P. disjunctivus* have been so far recorded as exotic in Mesoamerica – Puerto Rico and Mexico (Bunkley-Williams et al. 1994, Guzman and Barragan 1997); in North America: southern United States – Florida, Texas, Washington and North Carolina, as well as at Hawaii islands (Edwards 2001, Fuller et al. 1999, Nico And Fuller 2010, Ludlow and Walsh 1991, Nico and Martin 2001; in Philippines and south-eastern Asia: peninsular Malaysia, Singapore, Taiwan, Java and Sumatra (Page and Robins 2006). In all those recipient areas recorded so far, the aquarists were assigned responsible for their releasing into natural ecosystems and subsequent establishment."

Location Specific Impacts

From Global Invasive Species Database (2010b):

Florida

"Modification of natural benthic communities: *Pterygoplichthys* spp. are believed to be causing significant changes in food web structure and competing with native species for food and space (Nico & Martin 2001)."

Texas

"Competition: Gut content assessments of *Pterygoplichthys* spp. and of Guadeloupe roundnose minnow (*Dionda nigrotaeniata*) and two additional *Dionda* species suggest high dietary overlap between the *Dionda* complex and *Pterygoplichthys*."
"Threat to endangered species: *Pterygoplichthys* spp. is believed to endanger the Federally threatened and 'Vulnerable (VU)' Devils River minnow (see *Dionda diaboli*) in Texas (Mendoza et al. 2009). *Pterygoplichthys* spp. have also been found to ingest eggs of *Etheostoma fonticola*, also listed as vulnerable (Cook-Hildreth 2009)."

Mexico

"Human nuisance: *Pterygoplichthys multiradiatus* and *P. pardalis* damage fishing gear and gill nets in various locations of Mexico (Wakida-Kusunoki et al. 2007)."
"Modification of nutrient regime: *Pterygoplichthys* spp. create large, novel nutrient sinks in invaded streams of southern Mexico. They also sequester the majority of nitrogen and phosphorus of systems in their body armor. These impacts on nutrient systems may also exacerbate the nutrient limitation of primary productivity in invaded streams (Capps et al. 2009)."

4 Global Distribution

Summary

Figure 1. Global distribution of *P. pardalis*. Map from GBIF (2010).

5 Distribution within the United States

Figure 2. Distribution of *P. pardalis* in the U.S. Map from Nico et al. (2012).

6 CLIMATCH

Summary of Climate Matching Analysis

The climate match (Australian Bureau of Rural Sciences 2010; 16 climate variables; Euclidean Distance) was high in southern California, Virginia, and parts of the states bordering Virginia. Medium matches were present in southern California and most of the South- and Northeast, except for the northernmost states, which had low matches. Low matches predominated in the West and Midwest. Climate 6 match indicated that the US has a high climate match. The range for a high climate match is 0.103 and greater, climate match of *P. paradalis* is 0.2.

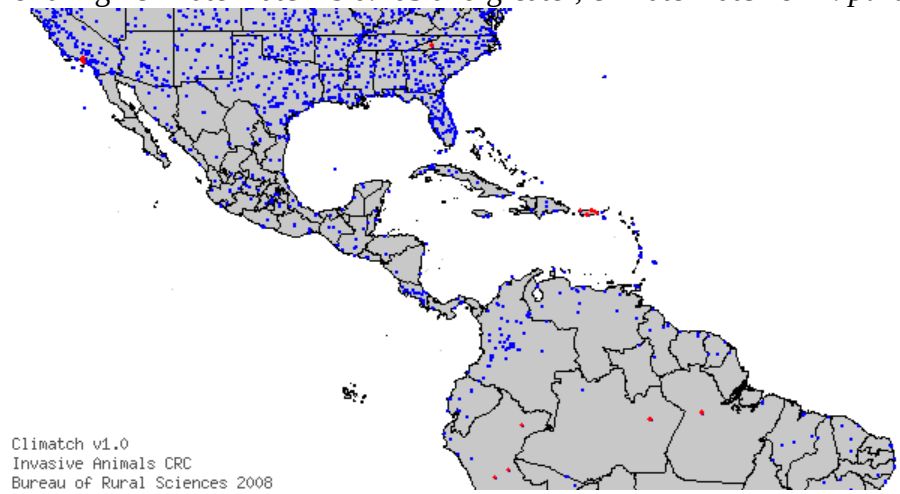

Figure 3. CLIMATCH (Australian Bureau of Rural Sciences 2010) source map showing weather stations selected as source locations (red) and non-source locations (blue) for *P. paradalis* climate matching. Source locations from GBIF (2010) and Nico et al. (2012). Only established locations were used.

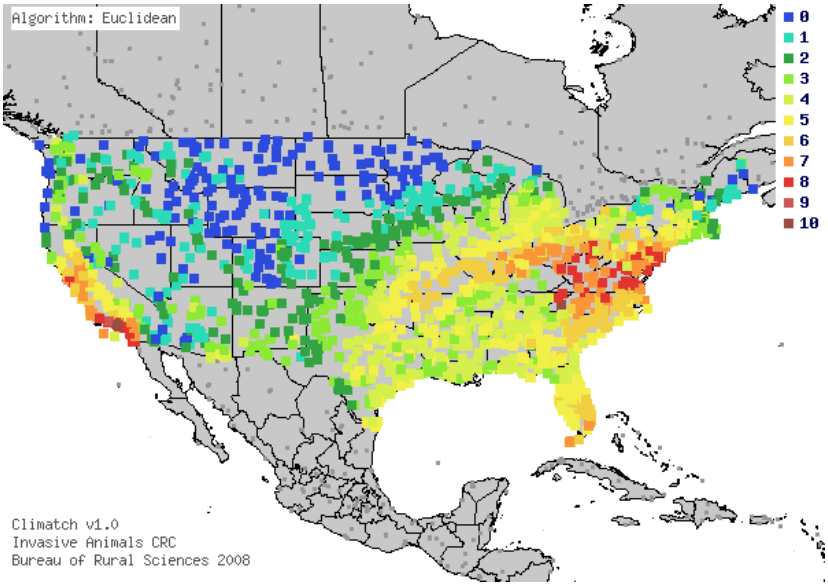

Figure 4. Map of CLIMATCH (Australian Bureau of Rural Sciences 2010) climate matches for *P. paradalis* in the continental United States based on source locations reported by GBIF (2010) and Nico et al. (2012). 0= Lowest match, 10=Highest match.

Table 1. CLIMATCH (Australian Bureau of Rural Sciences 2010) climate match scores

CLIMATCH Score	0	1	2	3	4	5	6	7	8	9	10
Count	189	199	236	276	373	310	191	120	71	4	10
Climate 6 Proportion = 0.2 (High)											

7 Certainty of Assessment

Information on this species is fairly abundant, both on its biology and on the impacts caused by introduction of this species. Certainty of this assessment is high.

8 Risk Assessment

Summary of Risk to the Continental United States

While ecological impacts are still not fully understood, several sources describe this species as highly invasive and potentially causing negative impacts. Other types of negative impacts were also described, like increased sedimentation and siltation (Nico et al. 2009). This species is also currently established in the U.S. and has a high climate match.

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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