Pterygoplichthys spp. **System:** Freshwater

Kingdom	Phylum	Class	Order	Family
Animalia	Chordata	Actinopterygii	Siluriformes	Loricariidae

Common name janitor fish (English), sailfin catfish (English), suckermouth armored catfish (English), radiated ptero (English), catfish (English)

Synonym

Similar species

Summary *Pterygoplichthys* spp. are popular aquarium catfish native to South America that have established in locations throughout the world as a result of aquarium trade and their release or escape. Invasive populations of *Pterygoplichthys* spp. have been reported from Mexico, Puerto Rico, India, the Philippines, Taiwan, Panamá, Trinidad, Guyana, Japan, Peru, Singapore, Sumatra, Malaysia, Java, Hawai'i, Florida, and Texas with impacts including competition and displacement of native fish, alteration food webs, increasing siltation and bank erosion, damage fishing equipment, and reduction of fishing yields.

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Species Description
Pterygoplichthys spp. are medium to moderately large catfish generally measuring from 30-55 cm long but may exceed 70 cm (Nico *et al*, 2009b). They have a distinct dorsal sailfin with 9-14 rays, a ventral mouth modified into a sucking disk, and are covered in bony plates which comprise a body armor. Coloration varies among species but most have dark, vermiculated patterns (Nico & Martin, 2001).

Notes
This profile pertains to invasive species in the genus *Pterygoplichthys*. General impacts and distribution include annotations at both the generic and species level. Distribution information includes invasive members of the genus with species level data in the species location notes. Additional species level profiles have been created, please follow these links to view them *Pterygoplichthys anisitsi*; *P. disjunctivus*; *P. pardalis*; *P. multiradiatus* and *Glyptoperichthys gibbiceps (=Pterygoplichthys gibbiceps)*.

Lifecycle Stages
Growth of *Pterygoplichthys* is rapid during the first two years of life, with total lengths of many sailfin catfishes exceeding 300 mm by age 2. Specimens in aquaria may live more than 10 years. The size range for most of the adult species in the Loricariid family is 30–50 cm, but individuals have been observed to reach 70 cm. *Pterygoplicthys* spp. start reproducing at approximately 25 cm (Mendoza *et al*, 2009).

Uses
Pterygoplichthys spp. are very popular aquarium fish commonly used to control algae in tanks and are sold throughout the world. Nearly all introductions are attributed to aquarium trade and aquarist release (Hossain *et al*, 2008).

Habitat Description
Pterygoplichthys spp. can be found in a wide variety of habitats, ranging from relatively cool, fast-flowing and oxygen-rich highland streams to slow-flowing, warm lowland rivers and stagnant pools poor in oxygen. They are tropical fish and populations are typically limited only by their lower lethal temperature which has been found to be about 8.8-11°C in some species (Gestring, 2006). They can thrive in a range of acidic to alkaline waters in a range of about (pH 5.5.0 to 8.0) (Mendoza *et al*., 2009). They are often found in soft waters, but can adapt very quickly to hard waters. *Pterygoplichthys* spp. are also highly tolerant to poor water quality and are commonly found in polluted waters (Chavez *et al*., 2006). They are known to use outflow from sewage treatment plants as thermal refugia and can readily adapt to changing water quality (Nico & Martin, 2001). *Pterygoplichthys* spp. may be found in from lowlands to elevations of up to 3,000 m (Wakida-Kusunki, 2007). Some species are salt tolerant (Mendoza *et al*., 2009).

Reproduction
Pterygoplichthys spp. reproduce sexually and have high fecundancy (Gibbs *et al*, 2008). Males construct horizontal burrows in banks that are about 120-150 cm long extend downward. The burrows are used as nesting tunnels and eggs are guarded by males until the free-swimming larvae leave. Females may lay between 500-3,000 eggs per female depending on size and species. Their reproductive season peaks in the summer and usually lasts several months but may be year-long in certain locations (Mendoza *et al*, 2009).

Nutrition
Pterygoplichthys spp. feed primarily on benthic algae and detritus (Ozedilek, 2007). They may also consume worms, insect larvae, fish eggs and other bottom-dwellers but the vast majority of its diet consists of detritus, algae, and various plant matter (Mendoza *et al*., 2009).

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. \r\n
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*, 2009b). *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. have also been found to ingest eggs of *Etheostoma fonticola*, also listed as vulnerable (Cook-Hildreth, 2009).\r\n
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 Hawai'i. Because of their abundance in Hawai'i, *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*, 2009a).

Management Info
Preventative measures: Efforts to prevent the establishment of *Pterygoplichthys* spp. are recommended in potential habitats. Educating the public, especially aquarists, to avoid releasing their unwanted fishes into open waters may reduce their introductions (Mendoza *et al*, 2009).
Physical: It may be possible to reduce abundance in some locations, but based on the Hillsborough River studies, eradication is not feasible. Environmental management would only be useful in highly modified habitats located in urban areas. It is doubtful that it is possible to control populations over large areas. Shoreline hardening/barriers are effective, but expensive. A larger, commercial fish market for *Pterygoplicthys* coupled with intense egg collection could reduce their abundance. Some researchers recommend visiting nesting colonies during the breeding season and capturing and removing adults and any eggs and young. This method may be mostly effective in areas where breeding habitats are limited (Medoza *et al*, 2009).

Pathway
Accidental release of *Pterygoplichthys* spp. has been documented, such as when typhoon Rosing struck the Philippines resulting in escape of the fish from commercial farms (Hubilla *et al*., 2007).*Pterygoplichthys* spp. are very common aquarium fish throughout the world. Nearly all of their introduced populations are believed to be the result of pet release or aquaculture escape (Page & Robins, 2006).While no substantial trade in catfish is thought to occur, the live food trade cannot be discounted completely as a potential mechanism for spread to new locations (Mendoza *et al*., 2009).

Principal source: Mendoza, R.E.; Cudmore, B.; Orr, R.; Balderas, S.C.; Courtenay, W.R.; Osorio, P.K.; Mandrak, N.; Torres, P.A.; Damian, M.A.; Gallardo, C.E.; Sanguines, A.G.; Greene, G.; Lee, D.; Orbe-Mendoza, A.; Martinez, C.R.; and Arana, O.S. 2009. Trinational Risk Assessment Guidelines for Aquatic Alien Invasive Species. Commission for Environmental Cooperation. 393, rue St-Jacques Ouest, Bureau 200, Montréal (Québec), Canada. ISBN 978-2-923358-48-1.
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ALIEN RANGE

[1] BANGLADESH
[1] GUATEMALA
[3] INDONESIA
[1] MALAYSIA
[1] PHILIPPINES
[1] SINGAPORE
[1] THAILAND
[9] UNITED STATES
[1] COSTA RICA
[1] INDIA
[1] JAPAN
[1] MEXICO
[1] PUERTO RICO
[1] TAIWAN
[1] TURKEY
[1] VIET NAM

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Summary: In 1993, Canada, Mexico and the United States signed the North American Agreement on Environmental Cooperation (NAAEC) as a side agreement to the North American Free Trade Agreement (NAFTA). The NAAEC established the Commission for Environmental Cooperation (CEC) to help the Parties ensure that improved economic efficiency occurred simultaneously with trinational environmental cooperation. The NAAEC highlighted biodiversity as a key area for trinational cooperation. In 2001, the CEC adopted a resolution (Council Resolution 01-03), which created the Biodiversity Conservation Working Group (BCWG), a working group of high-level policy makers from Canada, Mexico and the United States. In 2003, the BCWG produced the –Strategic Plan for North American Cooperation in the Conservation of Biodiversity.– This strategy identified responding to threats, such as invasive species, as a priority action area. In 2004, the BCWG, recognizing the importance of prevention in addressing invasive species, agreed to work together to develop the draft CEC Risk Assessment Guidelines for Aquatic Alien Invasive Species (hereafter referred to as the Guidelines). These Guidelines will serve as a tool to North American resource managers who are evaluating whether or not to introduce a non-native species into a new ecosystem. Through this collaborative process, the BCWG has begun to implement its strategy as well as address an important trade and environment issue. With increased trade comes an increase in the potential for economic growth as well as biological invasion, by working to minimize the potential adverse impacts from trade, the CEC Parties are working to maximize the gains from trade while minimizing the environmental costs. Available from: English version: http://www.cec.org/Storage/62/5516_07-64-CEC%20invasives%20risk%20guidelines-full-report_en.pdf [Accessed 15 June 2010]
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