U.S. Fish & Wildlife Service

Orinoco Sailfin Catfish (*Pterygoplichthys multiradiatus*)
Ecological Risk Screening Summary

U.S. Fish and Wildlife Service, February 2024
Revised, January 2025
Web Version, 4/1/2026

Organism Type: Fish
Overall Risk Assessment Category: High

Photo: Pawel Cieśla. Licensed under: CC BY-SA 4.0. Available: https://commons.wikimedia.org/wiki/File:Liposarcus_multiradiatus_01_ssj_20050321.jpg (January 2025)

1 Native Range and Status in the United States

Native Range

From Froese and Pauly (2026):

"South America: Orinoco River basin [Colombia, Venezuela]."

From Armbruster (2023):

"*Pterygoplichthys multiradiatus* is found throughout the lowlands of the Orinoco River basin (including rivers that drain into the Orinoco Delta) with the exception of Guiana Shield streams."

Armbruster (2023) reports *Pterygoplichthys multiradiatus* as native to Colombia and Venezuela. Additionally, Froese and Pauly (2026) report *Pterygoplichthys multiradiatus* as native to Bahia State in Brazil.

Status in the United States

From Nico et al. (2026):

"Established in Florida and Hawaii. Recent surveys in Florida indicate its range may be expanding (Nico, unpublished data)."

Nico et al. (2026) also list nonnative occurrences with a status of 'established' in Texas.

From Froese and Pauly (2026):

"In Hawaii it was first observed in January 1987 in Wahiawa Reservoir and within two years has become one of the most abundant fishes in the reservoir; also found in Kaukunahua Stream and the various ditches and lower-elevation reservoirs which convey irrigation water to sugar cane fields in Waialua and Hale'iwa […]. Known from O'ahu [Mundy 2005]."

"It [*Pterygoplichthys multiradiatus*] established itself in dams and rivers in Puerto Rico."

"An established population was found in a canal in northeastern Dade County, Florida in June1983. Since 1971, single individuals have been collected in separate areas in Dade County."

From Gestring et al. (2010):

"Orinoco Sailfin occur throughout much of south Florida, although few have been reported from more natural marsh areas associated with Everglades National Park and Water Conservation Areas (Loftus, 2000; Chick et al., 2004). They are present in Lake Okeechobee, Peace River (Polk, Hardee, Desoto, and Charlotte counties; Champeau, 2008 [Florida Fish and Wildlife Conservation Commission, pers. Comm.]), St. Johns River (Brevard County), and Six-Mile Creek (Hillsborough County) where they co-occur with the Vermiculated Sailfin."

Pterygoplichthys multiradiatus in in trade within the United States (e.g., Jason's Plecos & Chiclids 2026).

Regulations

No species-specific regulations on possession or trade were found within the United States.

Means of Introductions within the United States

From Nico et al. (2026):

"This armored catfish has been collected in southeastern Florida since about 1971 (Courtenay et al. 1984). Its presence is most likely the result of escapes or releases from aquarium fish farms

(Courtenay and Stauffer 1990). In Hawaii, introductions are presumably the result of aquarium releases that occurred in the 1980s, possibly as early as 1982 (Devick 1991)."

Remarks

This ERSS was previously published in April 2018. Revisions were completed to incorporate new information and conform to updated standards.

Species delineation within the *Pterygoplichthys* genus can be unclear and is complicated by difficulty in morphological identification of the currently accepted species. This has resulted in confusion in range descriptions and misidentifications of introduced populations. Information is frequently reported at the genus level when confidence in species identification is low. Wherever possible, this risk screening contains information pertinent specifically to *P. multiradiatus* and not generalized to the genus. See below excerpts for more information on these issues.

From Nico et al (2026):

"Many early reports of *Hypostomus* from south Florida, and some from the Tampa area, may have been based on misidentifications of *Pterygoplichthys* (Loftus and Kushlan 1987; Ludlow and Walsh 1991)."

From Bijukumar et al. (2015):

"The species delineation within the genus *Pterygoplichthys* remains in chaos primarily because the four closely related species such as *P. anisitsi*, *P. multiradiatus*, *P. pardalis* and *P. disjunctivus* are separated only based on the nature of their abdominal patterns (Nico et al. 2012)."

"According to Nico et al. (2012) some of the introduced populations of *Pterygoplichthys* show such extensive variations among individuals that they might best be described as "hybrid swarms"."

From Santos (2024):

"The native distribution of *P. multiradiatus* is not clearly defined. [...] Its occurrences in Suriname (Mol, 2012) […] are documented. However, Schmidt and Hugghins (1973) reported a parasite from this fish species in Peru, and despite some sources indicate it is widespread from Orinoco River basin to Argentina, Fish Karyome (2023) indicates that its occurrence in Peru is a misidentification and that reports from Argentina and Guyana are questionable. The presence of *P. multiradiatus* in Argentina has been considered doubtful also by López and Miquelarena (1991). Similarly, Bunkley-Williams et al. (1994) consider this species as native to Venezuela, with records from Bolivia, Brazil, Guyana, Paraguay and Peru being erroneous. Nevertheless, Ribeiro et al. (1992), described parasites from specimens of this catfish species reportedly collected in Estado de Goiás, Brazil."

"Misidentifications are common in the pet trade and often result in the inadvertent importation of invasive organisms (Keller and Lodge, 2007); for example, although the introduction of

Pterygoplichthys spp. into some countries is not permitted, they are possibly imported as one of the allowed *Hypostomus* species (Jones et al., 2013)."

Froese and Pauly (2026) lists the presence of *Pterygoplichthys multiradiatus* in Argentina as questionable as it is outside the species' distributional range and states that further verification is needed. They also list the species' presence in Guyana as questionable and indicate that records of *Pterygoplighthys multiradiatus* in Peru are probably misidentifications.

From Gestring et al. (2010):

"The Vermiculated Sailfin [*Pterygoplichthys disjunctivus*] was first documented in the late 1980s from the Tampa area (reported as *P. multiradiatus* by Ludlow and Walsh, 1991; Page, 1994); […]"

From Wu et al. (2011):

"Based on our morphological identification and molecular data, exotic sailfin catfish in Taiwan should be identified as *P. pardalis*, *P. disjunctivus*, or a mixture between the two. *Pterygoplichthys multiradiatus*, another exotic species commonly recorded in other countries and currently listed in official records, was not found in Taiwanese rivers. Considering records in neighboring regions […], it seems that invasion of this species has not yet occurred in East Asia."

From Rueda-Jasso et al. (2013):

"The first specimens [from the Mezcala River, Mexico] were identified as *Liposarcus multiradiatus*, a synonym of *Pterygoplichthys multiradiatus* (Armbruster, 2004); however, the species is currently identified as *P. disjunctivus* (Armbruster pers. comm.)."

"Armored catfish (*P. disjunctivus*) have been found in El Infiernillo Reservoir, located in the states of Michoacán and Guerrero [Mexico]."

Pterygoplichthys multiradiatus was initially reported from Bangladesh in 2008 (Hossain et al. 2008); however, subsequent work has identified these populations as *P. pardalis* (Hossain et al. 2018).

From Santos (2024):

"Bandara and Kumara (2021) found that suckermouth armoured catfish, previously reported as *P. multiradiatus* from Sri Lanka (e.g. Jinadasa et al., 2014), actually belong to two different species, *P. disjunctivus* (vermiculated sailfin catfish) and *P. pardalis* (Amazon sailfin catfish), and some wild populations probably are hybrids."

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 (2025):

Kingdom Animalia
  Subkingdom Bilateria
    Infrakingdom Deuterostomia
      Phylum Chordata
        Subphylum Vertebrata
          Infraphylum Gnathostomata
            Superclass Actinopterygii
              Class Teleostei
                Superorder Ostariophysi
                  Order Siluriformes
                    Family Loricariidae
                      Subfamily Hypostominae
                        Genus *Pterygoplichthys* Gill, 1858
                          Species *Pterygoplichthys multiradiatus* (Hancock, 1828)

According to Fricke et al. (2025), *Pterygoplichthys multiradiatus* (Hancock, 1828) is the current valid name for this species.

Size, Weight, and Age Range

From Froese and Pauly (2026):

"Maturity: L_m 32.5, range 25 - 40 cm
Max length : 50.0 cm TL [total lentgh] male/unsexed; [Baensch and Riehl 1991]"

From Gestring et al. (2010):

"The largest male Orinoco Sailfin [collected in Florida] measured 504 mm TL and weighed 1005 g. The largest length and weight measures for females were 489 mm TL and 880 g. The smallest mature male measured 234 mm TL and the smallest mature female measured 160 mm TL."

Environment

From Froese and Pauly (2026):

"Freshwater; demersal; pH range: 6.5 - 7.8; dH range: 4 - 20. […]"

"Occurs in streams and lakes [Yamamoto and Tagawa 2000] and in weedy, mud-bottomed canals [Page and Burr 1991]."

From Gestring et al. (2010):

"Orinoco Sailfin Catfish […] had a range of temperatures associated with reduced feeding (19–24℃), but no feeding occurred below 15℃. The low water temperature at which death occurred was 9℃ (range = 9–11℃)."

From Nico et al. (2026):

"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)."

Climate

From Froese and Pauly (2026):

"Tropical; […]; 10°N - 1°N, 68°W - 61°W"

Distribution Outside the United States

Native

From Froese and Pauly (2026):

"South America. Orinoco River basin [Colombia, Venezulea]."

From Armbruster (2023):

"*Pterygoplichthys multiradiatus* is found throughout the lowlands of the Orinoco River basin (including rivers that drain into the Orinoco Delta) with the exception of Guiana Shield streams."

Armbruster (2023) reports *Pterygoplichthys multiradiatus* as native to Colombia and Venezuela.

Additionally, Froese and Pauly (2026) list *Pterygoplichthys multiradiatus* as native to Bahia State in Brazil.

Introduced

From Mogalekar et al. (2017):

"Over the years 13 species of exotic fishes have been introduced to freshwater bodies of the West Bengal [India] and these include species such as […] *Pterygoplichthys multiradiatus* […]"

From Bijukumar et al. (2015):

"The suckermouth armoured catfishes reported from India include […] *P. multiradiatus* from Kerala and Tamil Nadu (Ajithkumar et al. 1998; Daniels 2006; Krishnakumar et al. 2009; Knight 2010), […]"

From Bigueja et al. (2022):

"In terms of the abundance of fish in every stream it was found out that […] *Pterygoplichthys multiradiatus* are abundant in all streams in Bicol River [Philippines] […]"

"The present number of *Pterygoplichthys multiradiatus* (Janitor fish) was alarming since it was considered an invasive species tending to spread prolifically and undesirably in the Bicol River."

From Zworykin and Budaev (2013):

"Serov (2004) reported a capture of a non-indigenous catfish, identified as *Pterygoplichthys multiradiatus*, in southern Vietnam. […] The first of these studies [Serov 2004] reported a naturalised population, while separate individuals were captured in the other cases."

Osimen and Anagha (2020) reported conducting parasitological investigations on three specimens of *Pterygoplichthys multiradiatus* collected from rivers in Nigeria.

From Santos (2024):

"In 2012, *P. multiradiatus* was offered for sale in some numbers as a food fish at the central market of Paramaribo; thus, this species may have established a viable population in Suriname, from where it was not previously known (Mol, 2012)."

Acosta et al. (2017) list parasites present in *Pterygoplichthys multiradiatus* collected in Brazil.

Means of Introduction Outside the United States

From Santos (2024):

"In the Philippines, a typhoon was linked to accidental escapes of *Pterygoplichthys* spp. from commercial farms (Hubilla et al., 2007)."

From Bunkley-Williams et al. (1994):

"In all instances, the presumed mechanism of introduction [of *Pterygoplichthys* spp.] was aquarium release or escape from aquaculture farms."

Short Description

From Santos (2024):

"Once in the adult stage, loricariids are characterized by having large bony plates forming a body armour, a ventral, circular sub-terminal mouth with a pair of maxillary barbels on sucking lips, a spine in front of the adipose fin, and a flat-bottom abdomen (Page and Burr, 1991; Nelson, 2006)."

"The caudal or tail fin is broom shaped with the upper and lower lobes being extended and thread like; bottom tail lobe larger than upper one. In males, the genital papilla is a small yet thick projection on the ventral surface; in females, it is less obvious and not projected (PlanetCatfish, 2023)."

"The available descriptions of *P. multiradiatus* generally lack detail. Descriptions of colouration are diverse and somewhat contradictory. Many sources mention that *P. multiradiatus* is mottled brown/black. Page and Robins (2006) give this species as showing a pattern of uncoalesced dark spots on a light background."

From Wu et al. (2011):

"*P. multiradiatus* has discrete dark spots on the lateral and caudal peduncle, never coalescing or forming chevrons; […]"

From Nico et al. (2026):

"*Pterygoplichthys* is often confused with *Hypostomus*: these genera can be distinguished by the number of dorsal fin rays (7-8 in *Hypostomus* vs. 9-14 in *Pterygoplichthys*)."

Biology

From Santos (2024):

"*P. multiradiatus* inhabits freshwater streams and lakes and in weedy, mud-bottomed canals (Page and Burr, 1991; Yamamoto and Tagawa, 2000). In Hawaii, *P. multiradiatus* is known to inhabit mangroves (Goecke and Carstenn, 2017)."

"*Pterygoplichthys multiradiatus* is considered a nocturnal species (Riehl and Baensch, 1996). Nocturnal behaviour is probably more common among young individuals, as a mode to avoid predation (Nico, 2010)."

From Froese and Pauly (2026):

"Facultative air-breathing [Müller et al. 2022]; […] Benthic [Mundy 2005]. Nocturnal, feeds on algae [Riehl and Baensch 1996], but will also feed on worms, insect larvae, and other bottom-dwelling aquatic animals [Yamamoto and Tagawa 2000]. Spawning period peaks once a year [Liang et al. 2005]. Reproductive behavior includes digging of burrows for egg laying [Nico et al. 2009]. May exhibit male parental care [Liang et al. 2005]."

From Gestring et al. (2010):

"Detritus, algae (*Cladophora* sp. and *Lyngbya* sp.), sand, and plant material were found in 94%, 76%, 65%, and 39% of stomachs, and collectively comprised 99% of the total stomach volume […]. Crustaceans (cladocerans, amphipods, ostracods, copepods, and conchostracans) occurred in 63% of the stomachs containing food, […] and contributed 1% of the total stomach content volume. Aquatic insects (primarily chironomid species) occurred in 35% of the stomachs, but comprised […] <1% by volume of the total stomach content. "Presumed" fish eggs (n = 511) were found in six stomachs (2%) and made up <1% of the total stomach volume. Other identified prey items included snails, clams, spiders and water mites."

"Ripe females were collected every month except in December and February [in Florida]. The mean fecundity estimate of 17 ripe female Orinoco Sailfin (mean = 362 mm TL, range = 241–450 mm TL) was 1,983 eggs (range = 992–3,381)."

Human Uses

From Jinadasa et al. (2014):

"But, [*Pterygoplichthys multiradiatus*] has attracted much attention in the biomonitoring of water pollution due to its special biological characters such as relatively big body size, long life cycle, easy to raise etc. (Qunfang et al., 2008). In this respect *P. multiradiatus* are particularly suited to bioaccumulation studies."

From Mahapatra and Mohanty (2023):

"*P. multiradiatus* is not of interest in the fisheries, but is very important in the aquarium trade."

From Armbruster (2023):

"Species of *Pterygoplichthys* are an important food-fish in many parts of the range of the genus. […] Some fish markets in Venezuela have hundreds of individuals at a time (J.W. Armbruster pers. obs.), and the importance of *Pterygoplichthys* as food is likely due to their abundance and their ability to breathe air that allows them to survive outside of water for up to 40 hours (Armbruster 1998). Species of *Pterygoplichthys* are important in the aquarium industry; however, *P. multiradiatus* appears to be rare as the Common Pleco (likely a hybrid of *P. pardalis* and *P. disjunctivus*) is bred in fish farms (Nico et al. 2009)."

Diseases

No information was found associating *Pterygoplichthys multiradiatus* with any diseases listed by the World Organisation of Animal Health (2024).

Poelen et al. (2014) list the following parasites associated with *Pterygoplichthys multiradiatus*: *Unilatus* sp., *Unilatus unilatus*, and *Gorytocephalus plecostomorum*.

From Froese and Pauly (2026):

"Guyanema Infection (*Guyanema* sp.), Parasitic infestations (protozoa, worms, etc.)"

Osimen and Anagha (2020) report the presence of the tapeworms *Diphyllobothrium dendriticum* and *D. tetumi* in *Pterygoplichthys multiradiatus* collected from rivers in Nigeria.

Threat to Humans

From Gestring et al. (2010):

"We have received complaints from commercial fishers in Florida that loricariid catfishes negatively effect [sic] them economically. The most common complaints are that the bony "scales" and stout pectoral spines physically damage their nets and the fish they are targeting for harvest and sale; however, no good estimates of the actual dollars lost exist at this time."

3 Impacts of Introductions

From Bunkley-Williams et al. (1994):

"One immediate consequence of [*Pterygoplichthys multiradiatus*] introduction has been the deaths of locally endangered, brown pelicans, *Pelecanus occidentals* [sic] (Pelecanidae), in the lower part of the Loiza River […] and in the Gurabo River [Puerto Rico] […]. Twenty mortalities have been reported to us, but we suspect many more have occurred and continue to occur. These birds strangled with sailfin armored catfish lodged in their throats."

From Gestring et al. (2010):

"In Florida, Sailfin Catfish have been implicated as causal agents for a variety of biological and environmental problems that include disruption of aquatic food chains, competition with and displacement of native fish species, ingestion of native fish eggs, and extensive shoreline erosion (Hoover et al., 2004). The absence of negative correlations between biomass estimates of Orinoco Sailfin and principal native fishes individually and collectively suggests Orinoco Sailfin are supplementing rather than competing with or displacing the principal native fishes […] Orinoco Sailfin Catfish are abundant in many southeast Florida canals where native fish biomass fluctuated considerably; however, during this 12-yr study variations in native fish estimates appeared unrelated to the presence of Orinoco Sailfin."

"No significant negative correlations were identified between the catch rates of Orinoco Sailfin and any individual or group of fishes [in Florida canals]."

"There was a strong negative correlation between the catch rates of Orinoco Sailfin and harvestable (≥254 mm TL) Largemouth Bass ($r = -0.693$, $p = 0.026$) [in Boynton Canal, Florida]; […]"

From Froese and Pauly (2026):

"[…] also found in Kaukunahua Stream [Hawaii] and the various ditches and lower-elevation reservoirs which convey irrigation water to sugar cane fields in Waialua and Hale'iwa; one of the impacts of this fish on the reservoir are the numerous spawning tunnels dug out into the banks, thus causing erosion and the build up of silt on the bottom of the reservoir [Yamamoto and Tagawa 2000]."

From Krishnakuma et al (2009):

"*P. multiradiatus* has also established a substantial population in Chackai Canal [Kerala, India], replacing other herbivorous fishes [Baiju 2009]. Apart from biological interactions, *P. multiradiatus* is also known to cause economic losses to fishermen through damage to fishing gears, especially cast and gill nets [Wakida-Kusunoki et al. 2007]."

From Sarkar et al. (2023):

"Caused a significant reduction in the native fish abundance [in Lake Okeechobee, Florida] [Mendoza-Alfaro et al. 2009]"

From Wakida-Kusunoki et al. (2007):

"In Mexico, *P. multiradiatus* also has been implicated in the reduction of the fisheries of carps and tilapias in Infiernillo Reservoir, Michoacan, and damage to fishing gear (La Jornada, 2005)."

From Nico et al. (2009):

"The most significant of these documents [studies on nonnative loricarrid burrows] is Devick's 1988 report containing results of field studies on a large population of *Pterygoplichthys*, identified as *P. multiradiatus*, established in Wahiawa Reservoir (a 141.6-ha impoundment also known as Lake Wilson). […] During late August 1987, when the water level was low, a survey revealed 3,746 exposed nests (above water line) in the reservoir. However, this number was considered to be a low estimate because many burrows hidden in grass or other cover went undetected. Devick (1988) stated that the burrows were present in a variety of clay and mud substrates along the reservoir shoreline. […] Devick (1988) reported that the burrows of *Pterygoplichthys* in the Hawaii reservoir were highly irregular and typically sloped downward."

"Devick (1989), assessing the impact of a large population of *Pterygoplichthys* [*multiradiatus*] in a Hawaiian reservoir (Wahiawa), concluded that the burrows of this catfish, over the long term, were having a significant impact on siltation. Devick noted that there were probably 30,000 or more catfish burrows dug in the reservoir in 1988, which he estimated as representing some 150 tons of additional silt accumulation in the reservoir bottom."

4 History of Invasiveness

The History of Invasiveness for *Pterygoplichthys multiradiatus* is classified as High. *Pterygoplichthys multiradiatus* has been introduced and become established outside of its native range. Its introduction has had many documented negative impacts that include deaths of native shore birds, increasing siltation, and erosion in reservoirs, and damage to fishing equipment.

5 Global Distribution

Figure 1. Reported global distribution of *Pterygoplichthys multiradiatus*. Map from GBIF Secretariat (2023). Observations are reported from northern South America, southeastern United States, Mexico, Hawaii, Puerto Rico, Republic of Korea, and China. The points in China, Republic of Korea, and North Carolina (United States) do not represent established populations and were not used in the climate matching analysis. The observations in Mexico were not used in the climate matching as those populations are currently identified as *P. disjunctivus* (see remarks). Due to the questionability of identification of populations in South America outside the species' native range (see Remarks), only the points found in the Orinoco River Basin were used in the climate matching analysis.

Locations of additional introduced populations were given in Krishnakumar et al. (2009; India) and Bigueja et al. (2022; Philippines); these locations were used in the climate matching analysis.

Georeferenced observations representing the reported population in Vietnam were not available.

6 Distribution Within the United States

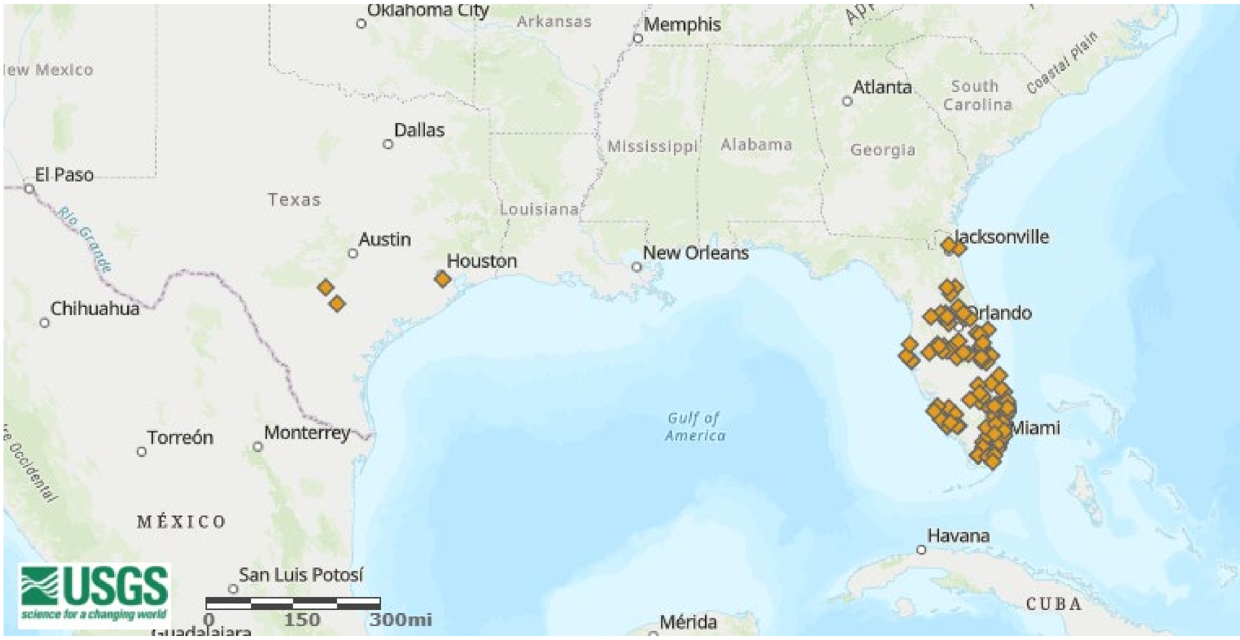

Figure 2. Reported distribution of *Pterygoplichthys multiradiatus* in the contiguous United States. Map from Nico et al. (2026). Observations are reported from Florida and southeastern Texas.

Figure 3. Reported distribution of *Pterygoplichthys multiradiatus* in Puerto Rico. Map from Nico et al. (2026). Observations are reported in eastern and northwestern Puerto Rico.

Figure 4. Reported distribution of *Pterygoplichthys multiradiatus* in Hawaii. Map from Nico et al. (2026). Observations are reported on Oahu and Hawai'i. The point shown on the island of Hawai'i was not used in the climate matching as the coordinates are a state centroid do not represent where the specimen was observed.

7 Climate Matching

Summary of Climate Matching Analysis

The climate matching for *Pterygoplichthys multiradiatus* to the contiguous United States found areas of high match in the southeast, including the Gulf and South Atlantic coastal areas. Areas of medium match extended from southern Arizona and New Mexico to the southern Great Lakes. Most other areas had low climate matches. The overall Climate 6 score (Sanders et al. 2023; 16 climate variables; Euclidean distance) for the contiguous United States was 0.324, 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 *Pterygoplichthys multiradiatus* (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.

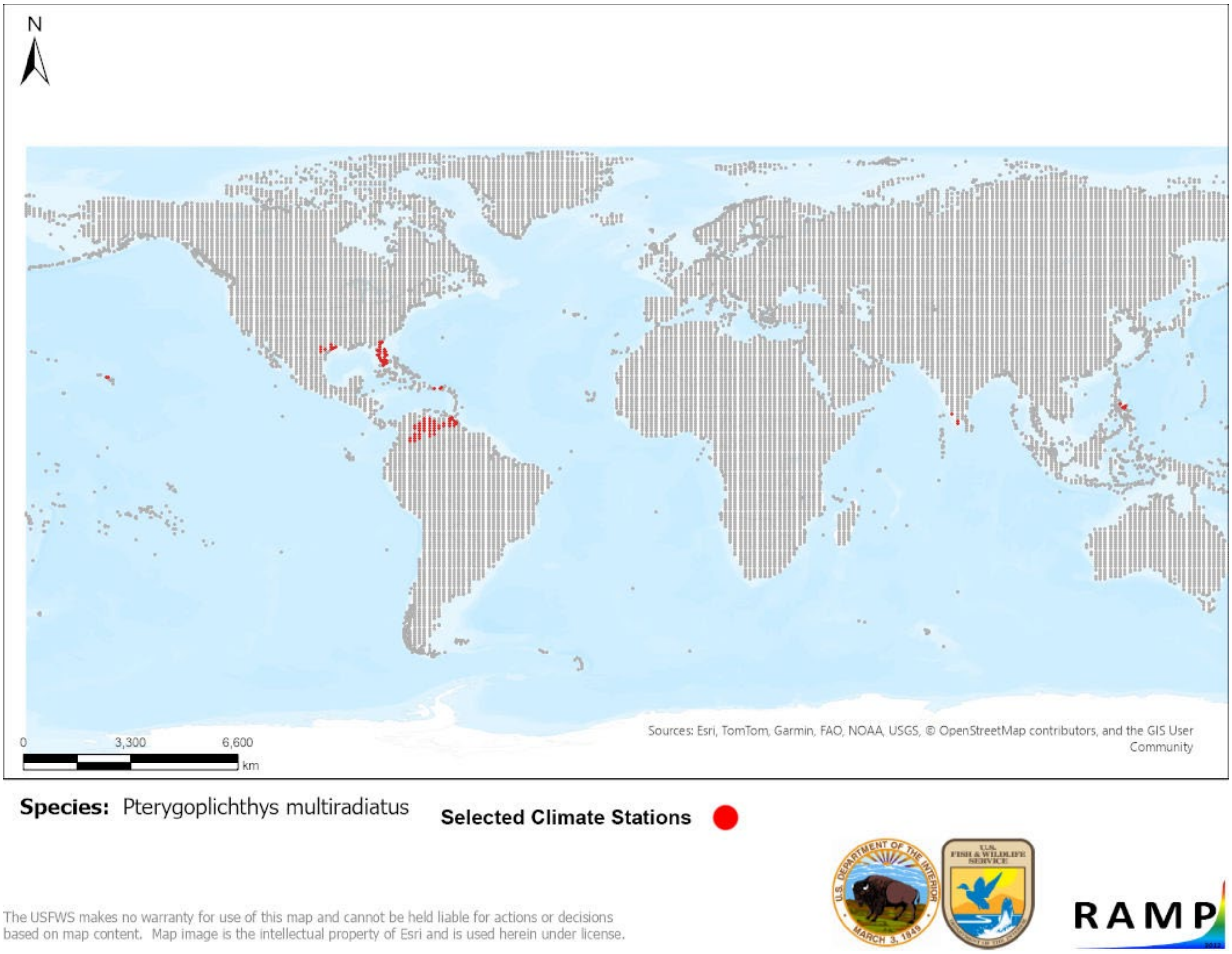

Figure 5. RAMP (Sanders et al. 2023) source map showing weather stations across the world selected as source locations (red; Colombia, India, Philippines, Puerto Rico, United States, and Venezuela) and non-source locations (gray) for *Pterygoplichthys multiradiatus* climate matching. Source locations from Krishnakumar et al. (2009), Bigueja et al. (2022), and 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.

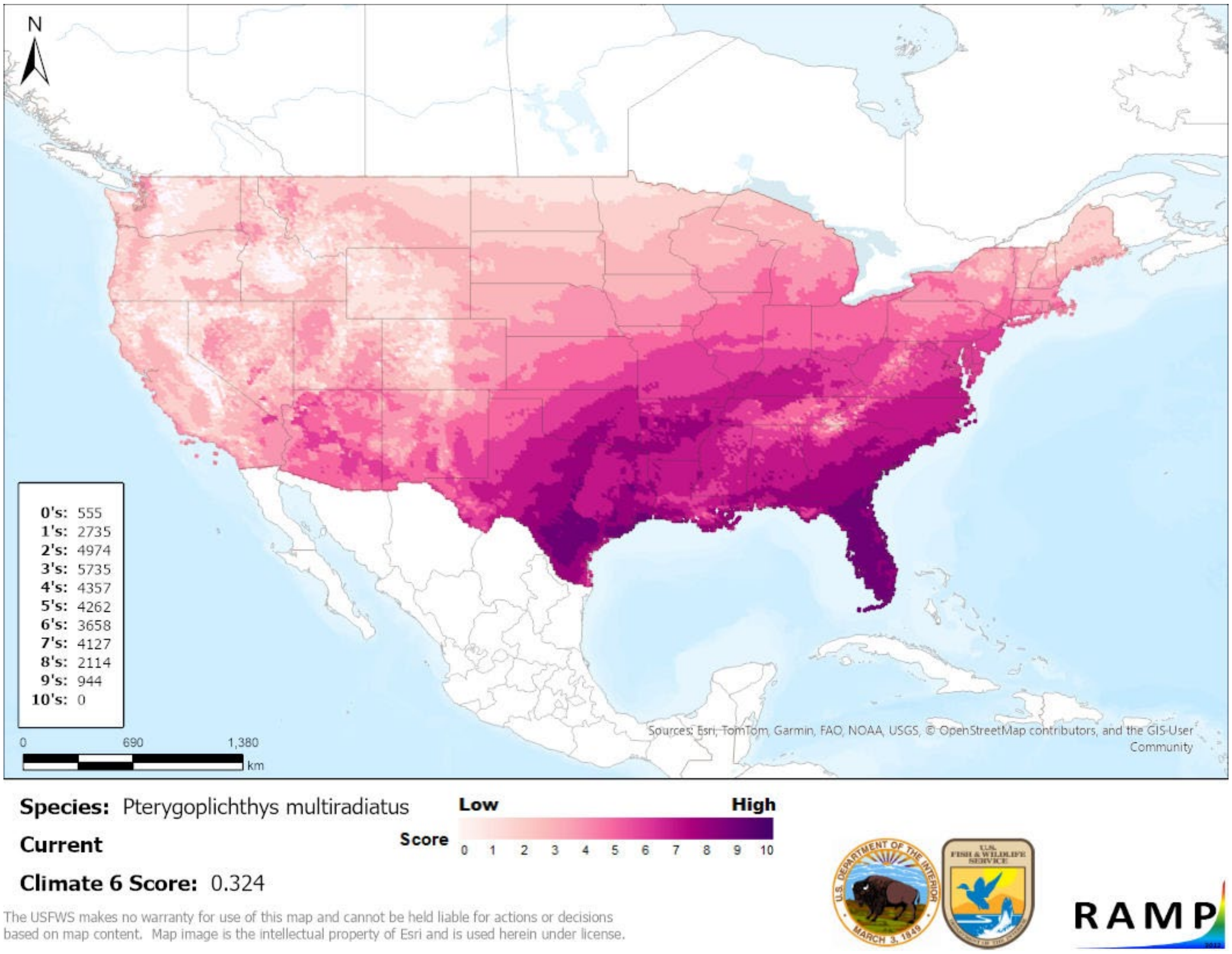

Figure 6. Map of RAMP (Sanders et al. 2023) climate matches for *Pterygoplichthys multiradiatus* in the contiguous United States based on source locations reported by Krishnakumar et al. (2009), Bigueja et al. (2022), and GBIF Secretariat (2023). Counts of climate match scores are tabulated on the left. 0/Pale Pink = Lowest match, 10/Dark Purple = Highest match.

8 Certainty of Assessment

The Certainty of Assessment for *Pterygoplichthys multiradiatus* is classified as Medium. Information regarding the species distribution, biology, and ecology was available. Records of introduction and subsequent establishment with some impacts were also available. However, the taxonomy of the genus is not fully resolved and morphological identification is difficult leading to many misidentifications and information being reported at the genus level when species level identifications cannot be made with confidence. This complicates the understanding of the species native and introduced range, including impacts attributed to introduced populations of *Pterygoplichthys* spp.

9 Risk Assessment

Summary of Risk to the Contiguous United States

Pterygoplichthys multiradiatus, Orinoco Sailfin Catfish, is a fish that is native throughout the Orinoco River basin. *P. multiradiatus* can be found in multiple habitats including streams and lakes. This fish can breathe air and is a general detritivore. This species is a popular source of food in South America and Asia. This species is found in the aquarium industry under multiple common names. *P. multiradiatus* has been introduced to and established populations the United States in Florida, Texas, Hawaii, and Puerto Rico. It has also been introduced to and become established in India, Vietnam, and the Philippines. It is reported from Nigeria and markets in Suriname. The introductions were attributed to either aquaria release or accidental release from aquaculture ponds. *P. multiradiatus* exhibits burrowing behavior during reproduction where the males dig burrows and then guard the eggs until larvae leave. This burrowing behavior in areas where the species has been introduced leads to erosion of banks and increased siltation in reservoirs. Due to these introductions and the documented negative effects, the History of Invasiveness for *Pterygoplichthys multiradiatus* is classified as High. The climate matching analysis for the contiguous United States indicates that there is establishment concern. Areas of high match were found in the Southeast from Texas to southern Virginia. The Certainty of Assessment for this ERSS is classified as Medium. Information was available regarding the biology, ecology, distribution, and history of invasiveness. However, correctly identifying species of *Pterygoplichthys* through morphological means is difficult and misidentifications are common, leading to uncertainty in the understanding of the species' native range and the correct species identity in some introduced populations. The Overall Risk Assessment Category for *Pterygoplichthys multiradiatus* 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): Medium**
- **Remarks, Important additional information: Misidentifications are common within the *Pterygoplichthys* genus.**
- **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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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 Krishnakumar et al. (2009), Bigueja et al. (2022), and GBIF Secretariat (2023).

Under the future climate scenarios (figure A1), on average, high climate match for *Pterygoplichthys multiradiatus* was projected to occur in the Gulf Coast, Southern Atlantic Coast, and Southern Florida regions of the contiguous United States. Areas of low climate match were projected to occur in the Great Basin and Western Mountains regions. The Climate 6 scores for the individual future scenario models (figure A2) ranged from a low of 0.404 (model: IPSL-CM6A-LR, SSP3, 2055) to a high of 0.564 (model: UKESM1-0-LL, SSP5, 2085). 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 (0.324, figure 6) falls below 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 (figure A3). At the 2085 time step, particularly under SSP5, areas within the Colorado Plateau, Great Basin, Great Lakes, Northeast, Northern Plains, and Western Mountains saw a large increase in the climate match relative to current conditions. Additionally, areas within the Appalachian Range, Mid-Atlantic, Northern Pacific Coast, and Southern Plains saw a moderate increase in the climate match relative to current conditions under one or more time step and climate scenarios. Under multiple climate scenarios, areas within the Gulf Coast, Southeast, Southern Atlantic Coast, Southern Florida, and Southwest saw a moderate decrease in the climate match relative to current conditions. No large decreases were observed regardless of time step and climate scenarios. Additional very small areas of large or moderate change may be visible on the maps (figure A3). The magnitude of changes was larger in time step 2085 than 2055 for both SSP scenarios.

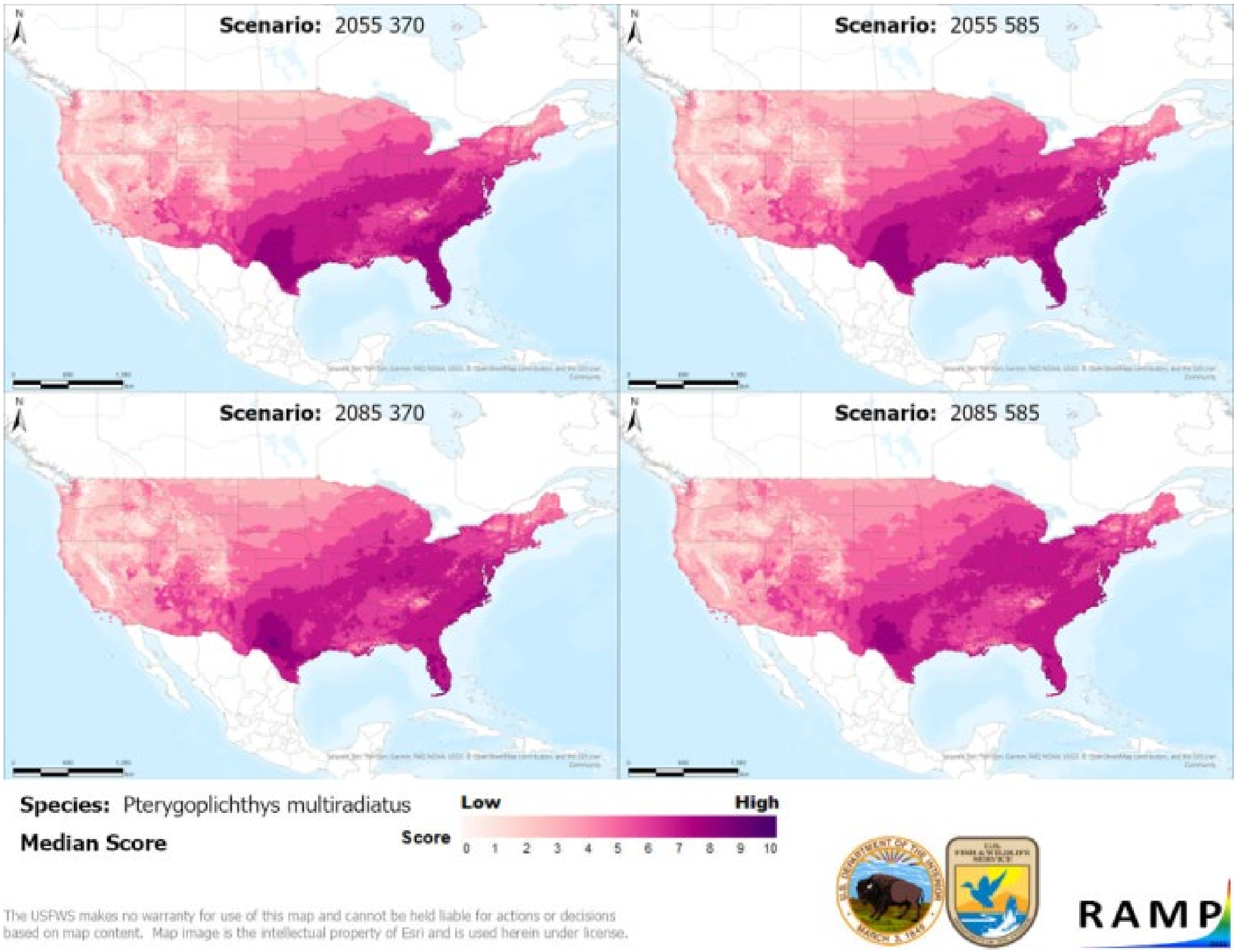

Figure A1. Maps of median RAMP (Sanders et al. 2023) climate matches projected under potential future climate conditions using five global climate models for *Pterygoplichthys multiradiatus* in the contiguous United States. Climate matching is based on source locations reported by Krishnakumar et al. (2009), Bigueja et al. (2022), and 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.

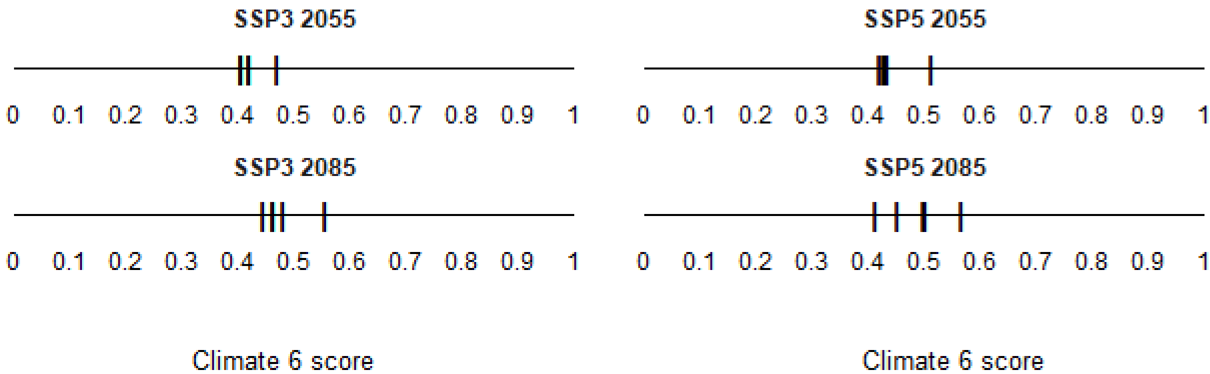

Figure A2. Comparison of projected future Climate 6 scores for *Pterygoplichthys multiradiatus* in the contiguous United States for each of five global climate models under four combinations of Shared Socioeconomic Pathway (SSP) and time step. SSPs used (from left to right): SSP3, SSP5 (Karger et al. 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.

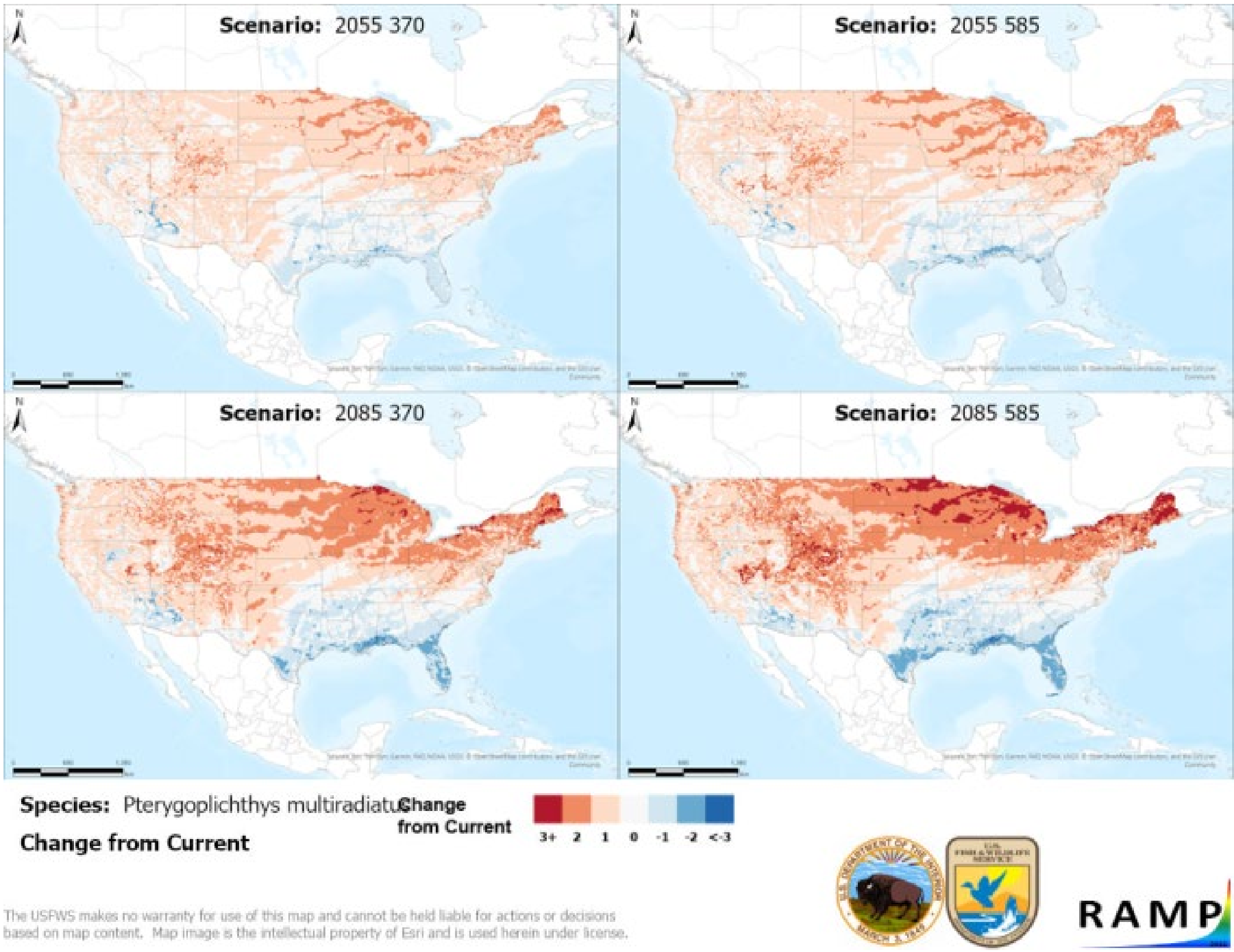

Figure A3. RAMP (Sanders et al. 2023) maps of the contiguous United States showing the difference between the current climate match target point score (figure 6) and the median target point score for future climate scenarios (figure A1) for *Pterygoplichthys multiradiatus* based on source locations reported by Krishnakumar et al. (2009), Bigueja et al. (2022), and 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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