Shortnose Gar (*Lepisosteus platostomus*)

Ecological Risk Screening Summary

U.S. Fish & Wildlife Service, December 2022
Revised, December 2022
Web Version, 3/5/2025

Organism Type: Fish
Overall Risk Assessment Category: Uncertain

Image: USFWS. Public Domain. Available: https://commons.wikimedia.org/wiki/File:Lepisosteus_platostomus_drawing.jpg (December 2022).

1 Native Range and Status in the United States

Native Range

From Froese and Pauly (2022):

"North America: USA in Mississippi River basin from south central Ohio, north Indiana, and Wisconsin to Montana and south to north Alabama and Louisiana; […]; Calcasieu and Mermentau rivers on Louisiana Gulf Coast."

From Priegel (1963):

"The shortnose gar, *Lepisosteus platostomus* Rafinesque, occurs from South Dakota to the Ohio Valley and south to Alabama and Texas."

Status in the United States

From Froese and Pauly (2022):

"North America: USA in Mississippi River basin from south central Ohio, north Indiana, and Wisconsin to Montana and south to north Alabama and Louisiana; […]; Calcasieu and Mermentau rivers on Louisiana Gulf Coast."

From Fuller et al. (2019a):

"Established in Wisconsin (Becker 1983; Page and Burr 1991)."

According to Fuller (2019a), nonindigenous occurrences of *Lepisosteus platostomus* were reported in Wisconsin between 1962-2000, including in the following watersheds (population status in parentheses): Fox (established), Lake Michigan (established), Lake Winnebago (failed), Lower Fox (established), Upper Fox (established), Wolf (established)

No records of *Lepisosteus platostomus* in trade in the United States were found.

Regulations

Lepisosteus platostomus is regulated in Arkansas (AGFC 2022). Please refer back to state agency regulatory documents for details on the regulations, including restrictions on activities involving this species. While effort was made to find all applicable regulations, this list may not be comprehensive. Notably, it does not include regulations that do not explicitly name this species or its genus or family, for example, when omitted from a list of authorized species with blanket regulation for all unnamed species.

From Fuller et al. (2019b):

"In **Ohio**, a class B aquaculture permit is required to engage in propagation, culture, or sale of Shortnose Gar, and two levels of escapement prevention are required if cultured in the Lake Erie drainage basin (Ohio Admin. Code § 1501:31-39-01)."

Means of Introductions within the United States

From Fuller et al. (2019a):

"This species likely reached Lake Winnebago [Wisconsin] via the Wisconsin-Fox Canal, a canal connection from the Mississippi River basin to the Fox River in the Great Lakes basin (Priegel 1963)."

Remarks

The following synonyms of *Lepisosteus platostomus* from Fricke et al. (2022) were used to search for information for this assessment: *Lepisosteus albus*, *Lepidosteus platystomus*, *Cylindrosteus rafinesquii*, and *Cylindrosteus scabriceps*.

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

According to Fricke et al. (2022), *Lepisosteus platostomus* Rafinesque 1820 is the current valid name for this species.

From ITIS (2022):

Kingdom Animalia
Subkingdom Bilateria
Infrakingdom Deuterostomia
Phylum Chordata
Subphylum Vertebrata
Infraphylum Gnathostomata
Superclass Actinopterygii
Class Holostei
Order Lepisosteiformes
Family Lepisosteidae
Genus *Lepisosteus*
Species *Lepisosteus platostomus* Rafinesque, 1820

Size, Weight, and Age Range

From Froese and Pauly (2022):

"Max length : 88.0 cm TL [total length] male/unsexed; [IGFA 2001]; common length : 62.5 cm TL male/unsexed; [Hugg 1996]; max. published weight: 2.6 kg [IGFA 2001]; max. reported age: 20 years [Hugg 1996]"

Environment

From Froese and Pauly (2022):

"Freshwater; demersal. […] 10°C - 18°C [Baensch and Riehl 1985; assumed to be the recommended aquarium water temperature]; […]"

From Fuller et al. (2019a):

"Gar have the ability to survive in environments with very little oxygen and especially turbid conditions […]"

Climate

From Froese and Pauly (2022):

"Subtropical; […] 46°N - 31°N"

Distribution Outside the United States

Native

The native range of *Lepisosteus platostomus* is entirely within the United States, see Native Range in section 1.

Introduced

No records were found for introduction of *Lepisosteus platostomus* in the wild outside the United States.

Means of Introduction Outside the United States

No records were found of introduction of *Lepisosteus platostomus* in the wild outside the United States.

Short Description

From Fuller et al. (2019a):

"*Lepisosteus platostomus* is a long, slender fish with rows of interlocking rhomboidal ganoid scales. It is brown or olive green along its back, which fades to yellowish sides and a whitish belly. The dorsal fin is located to the posterior, almost directly above the anal fin, and is close to the large caudal fin. Shortnose gar can be discerned from other gar species in that they lack the upper jaw of the alligator gar, the long snout of the longnose gar, and the markings of the spotted gar."

Biology

From Froese and Pauly (2022):

"Facultative air-breathing [Müller et al. 2022]; Inhabit quiet pools and backwaters of creeks and small to large rivers, swamps, lakes and overflow areas of large streams. Often occur near vegetation and submerged logs. Feed on other fishes and insects. Spawning occurs over vegetation or other submerged objects [Etnier and Starnes 1993]."

From NatureServe (2022):

"Open slow silty or clear-water rivers, wave-washed shoals of large lakes, quiet creek pools and river backwaters. Usually at water surface, often near vegetation and submerged logs. Larvae attach to vegetation or debris. Spawns in shallow grassy sloughs (Becker 1983)."

From Fuller et al. (2019a):

"Shortnose gar typically spawn in the spring during April, May and June, when water temperatures are between 16 and 21 °C. Females scatter large, yellowish-green eggs in quiet, shallow water among submerged vegetation or other underwater structures. A sticky adhesive holds the eggs together in clumps where they hatch after eight to nine days. The eggs are poisonous to birds and mammals, including humans (Montana Field Guide, 2019). The young

remain in the yolk sac for another week, where they feed on insect larvae and small crustaceans. Young gar typically lead solitary lives and sexual maturity is achieved around three years of age when the gar reaches about 15 in (380 mm) in length (Montana Field Guide, 2019)."

"The diet of the shortnose gar is primarily composed of fish, though crayfish and insects are also utilized (Brown 1971). Young gar are known to feed on small insects and zooplankton, with fish entering the diet when gar are 1.25 inches in length. Gar are known as fierce predators of smaller fish, using ambush as a primary hunting technique."

"Gar have the ability to survive in environments with very little oxygen and especially turbid conditions because of their specialized gas bladder, which have the ability to function like a lung to extract and use oxygen from swallowed air in addition to regulating buoyancy (Montana Field Guide, 2019)."

From NatureServe (2022):

"Adults move in large schools before and after spawning (Becker 1983)."

Human Uses

From Froese and Pauly (2022):

"Gamefish: yes; aquarium: public aquariums"

Diseases

No information was found associating *Lepisosteus platostomus* with any diseases listed by the World Organisation for Animal Health (December 2022).

According to Poelen et al. (2014) *Lepisosteus platostomus* can be the host to the following diseases or parasites: *Alloglossidium* sp., *Anallocreadium* sp., Parasitic Flatworms, *Macroderoide*s sp., *Macroderoides typicus*, *Macroderoides spiniferus*, *Paramacroderoides pseudoechinus*, *Paramacroderoides echinus*, *Proteocephalus singularis*, *Proteocephalus ambloplitis*, *Proteocephalus* sp., and *Proteocephalus perplexus*.

In addition to the parasites listed by Poelen et al. (2014), Bailly (2017) states that *Lepisosteus platostomus* can also be the host to the following parasites: *Argulus lepidostei*, *Argulus mississippiensis*, *Ergasilus versicolor*, *Lernaea variabilis*, and *Macroderoides typicus*.

Threat to Humans

From Froese and Pauly (2022):

"Harmless"

From Fuller et al. (2019a):

"The eggs are poisonous to birds and mammals, including humans (Montana Field Guide, 2019)."

3 Impacts of Introductions

No information available on documented impacts of introductions. The following quotations describe potential impacts of introduction of *Lepisosteus platostomus*.

From Fuller et al. (2019b):

"Anecdotal evidence has suggested that *L. platostomus* may have a negative effect on other fish species, including bluegill (*L. macrochirus*), green sunfish (*L. cyanellus*), young bass, and muskellunge (Becker 1983, Evermann and Goldsborough 1902). If it expands its range in the Great Lakes, it has the potential to hybridize with the spotted gar (*L. oculatus*), which is present in Lake Michigan tributaries and Lake Erie proper, and considered nationally threatened in Canada, endangered in Ohio, and of special concern in Michigan."

"Shortnose gar may adversely affect recreationally important fishes (e.g., young bass and muskellunge (*Esox masquinongy*)) (Evermann and Goldsborough 1902)."

From Lyons and Sipiorski (2020):

"Longnose Gar X Shortnose Gar hybrids may be distributed widely throughout the zone of sympatry of the two parental species, with reports from the Fox River drainage and Green Bay of the Lake Michigan basin (Sipiorski, 2011; Farley et al., 2018; this study), the Upper Mississippi Basin (Schmidt, 2016; Hrabik, pers. comm.; this study), and the Missouri River Basin (Hrabik et al., 2015; Hrabik, pers. comm.). However, only in the Fox River drainage do hybrids appear to be common, comprising nearly half of all gars examined."

Lepisosteus platostomus is regulated in Arkansas (AGFC 2022) and Ohio (Fuller et al. 2022b). See section 1.

4 History of Invasiveness

The history of invasiveness for *Lepisosteus platostomus* is Data Deficient. *Lepisosteus platostomus* has been documented as established outside of its native range in the Fox and Wolf Rivers in Wisconsin and in Lake Michigan. Although there is evidence of establishment in these areas there are no documented impacts of these introductions. There are a few sources that suggest potential impacts of these introductions, including predation on native species and hybridization with native congeners.

5 Global Distribution

Figure 1. Reported global distribution of *Lepisosteus platostomus*. Map from GBIF Secretariat (2022). Observations are reported from eastern half of the contiguous United States, Cuba, and central China. Points in Florida, Maryland, southern and western Texas, Michigan, northern Ohio, New Mexico, Cuba, and China were not included in the climate matching analysis (see section 7) as there was no evidence to support that these observations represent wild populations of *Lepisosteus platostomus*. Points in those areas appear to be from museum collections, misidentifications, or were collected in the 1800's and no further research has documented the species being in those areas since.

6 Distribution Within the United States

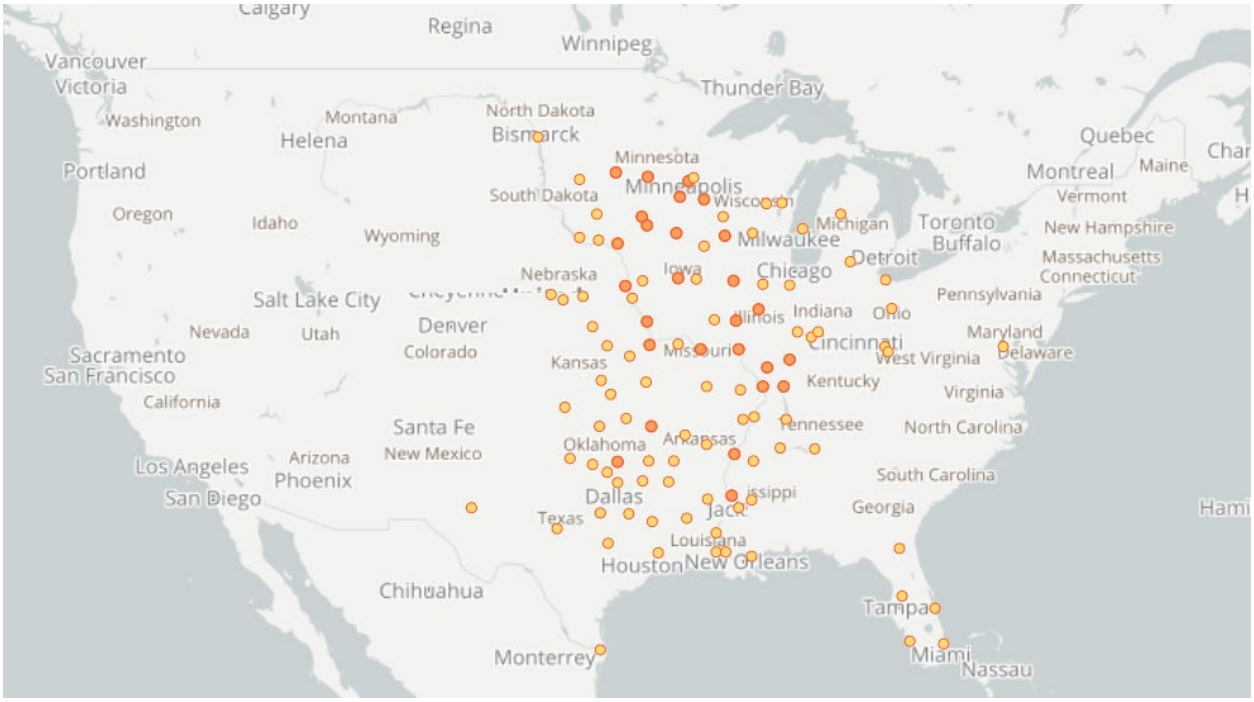

Figure 2. Reported distribution of *Lepisosteus platostomus* in the United States. Map from GBIF-US (2022). Observations are reported from the Atlantic coast, throughout the Midwest, and into Texas. Points in Florida, Maryland, southern and western Texas, Michigan, and northern Ohio were not included in the climate matching analysis (see section 7) as there was no evidence to support that these observations represent wild populations of *Lepisosteus platostomus*. All points in those locations appear to be from museum collections or were collected in the 1800's and no further research has documented the species being in those areas.

7 Climate Matching

Summary of Climate Matching Analysis

The majority of the contiguous United States had a high climate match. Areas of high match could be found from the Atlantic and Gulf coasts, throughout the Midwest (where this species is native), and towards the western Plains. Areas of low match were found throughout the Pacific Coast States. The overall Climate 6 score (Sanders et al. 2023; 16 climate variables; Euclidean distance) for the contiguous United States was 0.784, indicating that Yes, there is establishment concern for this species outside its native range. 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 *Lepisosteus platostomus* (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.

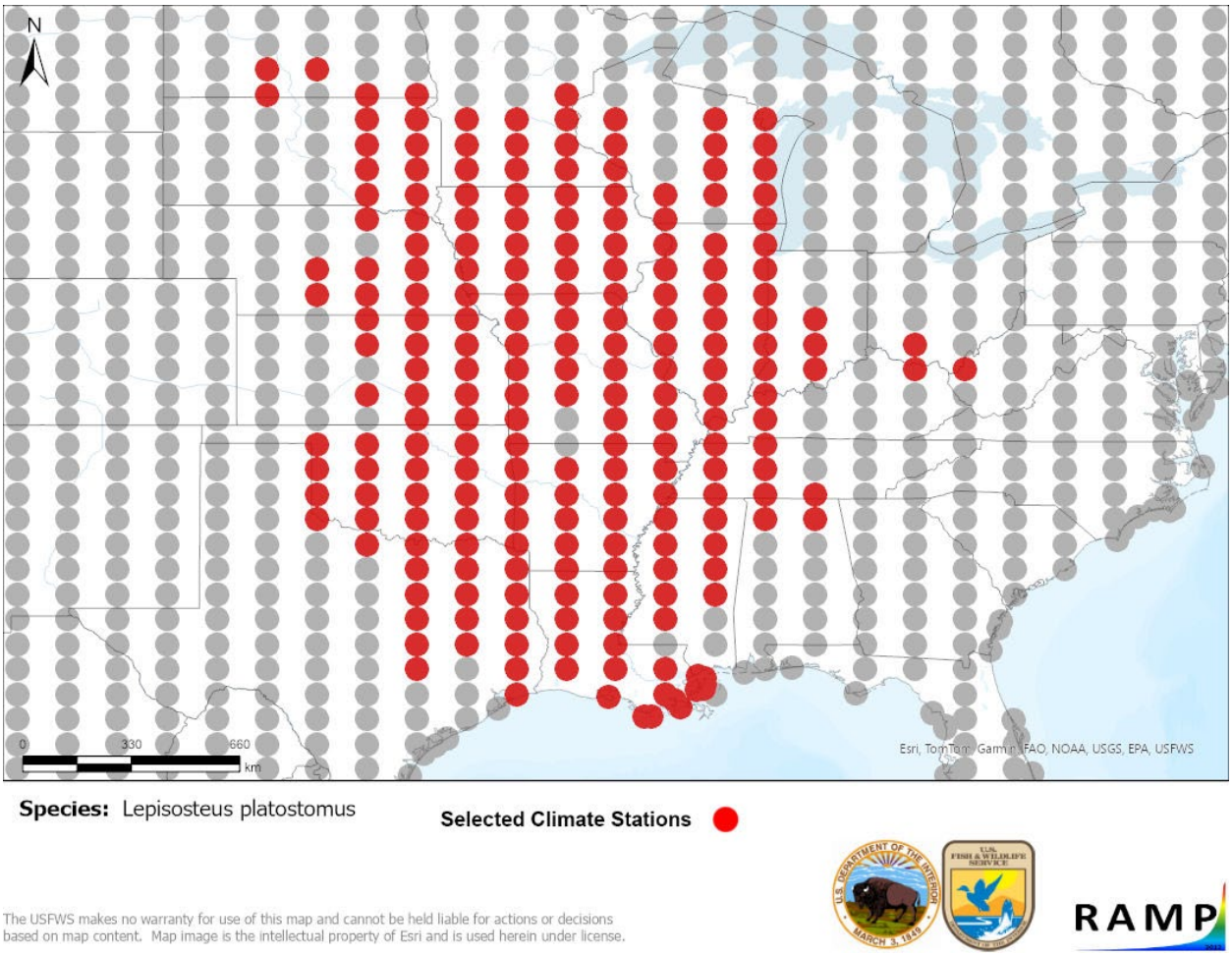

Figure 3. RAMP (Sanders et al. 2023) source map showing weather stations in the United States from the Midwest into Texas selected as source locations (red; United States) and non-source locations (gray) for *Lepisosteus platostomus* climate matching. Source locations from GBIF Secretariat (2022). Selected source locations are within 100 km of one or more species occurrences, and do not necessarily represent the locations of occurrences themselves.

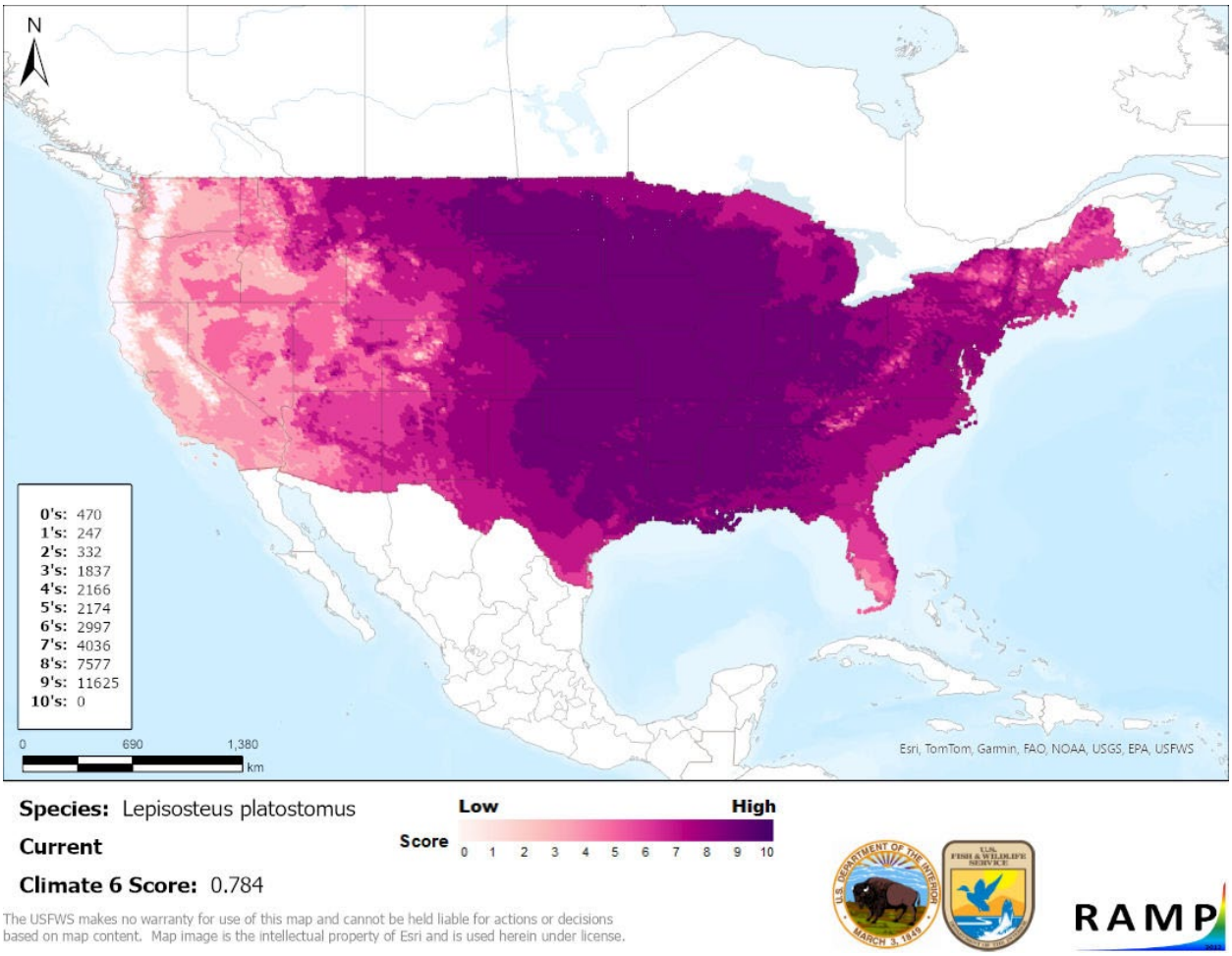

Figure 4. Map of RAMP (Sanders et al. 2023) climate matches for *Lepisosteus platostomus* in the contiguous United States based on source locations reported by GBIF Secretariat (2022). Counts of climate match scores are tabulated on the left. 0/Pale Pink = Lowest match, 10/Dark Purple = Highest match.

8 Certainty of Assessment

The Certainty of Assessment for *Lepisosteus platostomus* is classified as Low. There are records of introductions and establishment of *Lepisosteus platostomus* outside of its native range in Wisconsin but there are no documented impacts (or documented lack of impacts) of those introductions.

9 Risk Assessment

Summary of Risk to the Contiguous United States

Lepisosteus platostomus, Shortnose Gar, is a freshwater fish that is native to portions of the contiguous United States from South Dakota to the Ohio River Valley and south to Alabama and Texas. *Lepisosteus platostomus* are facultative air breathers that prefer backwater or slow-moving water habitat. *Lepisosteus platostomus* prefer to spawn over vegetation or other submerged structures and are known to have eggs that are poisonous to birds and mammals. This

species has been introduced and established populations outside of its native range in Wisconsin and Michigan. The History of Invasiveness for *Lepisosteus platostomus* is classified as Data Deficient due to the lack of information on documented impacts of the introductions. The climate matching analysis for the contiguous United States indicates establishment concern for this species outside its native range. A large area of high match was found from the Atlantic Coast to the Intermountain West which includes the native range. The Certainty of Assessment for this ERSS is classified as Low due to the lack of information available on impacts of introductions. The Overall Risk Assessment Category for *Lepisosteus platostomus* in the contiguous United States is Uncertain.

Assessment Elements

- **History of Invasiveness (see section 4): Data Deficient**
- **Establishment Concern (see section 7): Yes**
- **Certainty of Assessment (see section 8): Low**
- **Remarks, Important additional information: No additional remarks**
- **Overall Risk Assessment Category: Uncertain**

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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11 Literature Cited in Quoted Material

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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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 GBIF Secretariat (2022).

Under the future climate scenarios (figure A1), on average, high climate match for *Lepisosteus platostomus* was projected to occur in the Appalachian Range, Great Lakes, Mid-Atlantic, Northeast, Northern Plains, Southeast, and Southern Plains regions of the contiguous United States. Areas of low climate match were projected to occur in California and the Northern Pacific Coast regions. The Climate 6 scores for the individual future scenario models (figure A2) ranged from a low of 0.770 (model: MPI-ESM1-2-HR, SSP5, 2085) to a high of 0.804 (model: IPSL-CM6A-LR, SSP5, 2055). All future scenario Climate 6 scores were above the Establishment Concern threshold, indicating that Yes, there is establishment concern for this species outside of its native range under future scenarios. The Climate 6 score for the current climate match (0.784, figure 4) falls within 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. Under one or more time step and climate scenarios, areas within the Colorado Plateau, Great Basin, Northeast, and Western Mountains saw a moderate increase in the climate match relative to current conditions. No large increases were observed regardless of time step and climate scenarios. Under one or more time step and climate scenarios, areas within the Northern Plains saw a large decrease in the climate match relative to current conditions. Additionally, areas within the Appalachian Range, Great Basin, Gulf Coast, Mid-Atlantic, Southeast, Southern Plains, and Southwest saw a moderate decrease in the climate match relative to current conditions. Additional, very small areas of large or moderate change may be visible on the maps (figure A3). The degree of change increased with time and from SSP3 to SSP5.

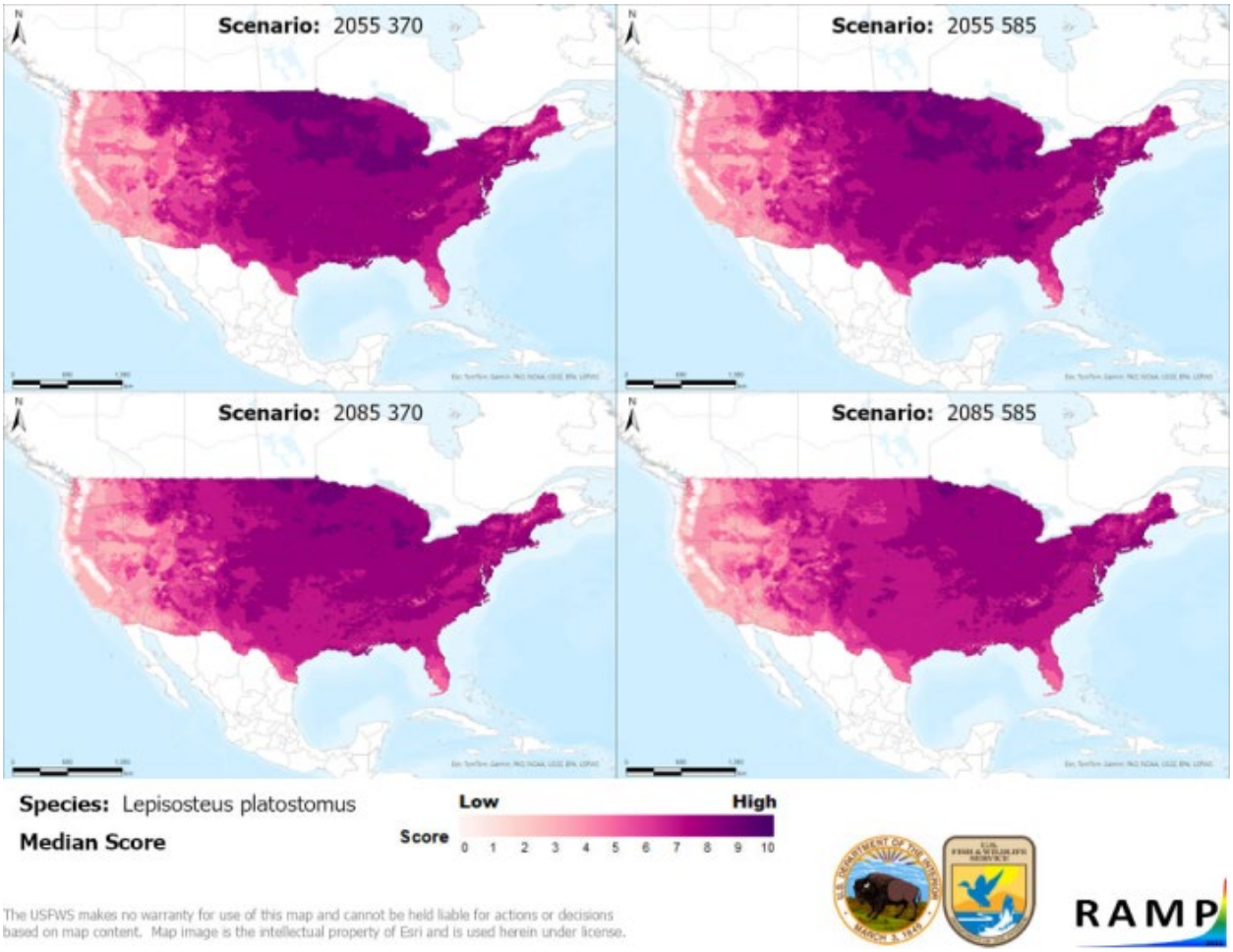

Figure A1. Maps of median RAMP (Sanders et al. 2023) climate matches projected under potential future climate conditions using five global climate models for *Lepisosteus platostomus* in the contiguous United States. Climate matching is based on source locations reported by GBIF Secretariat (2022). Shared 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.

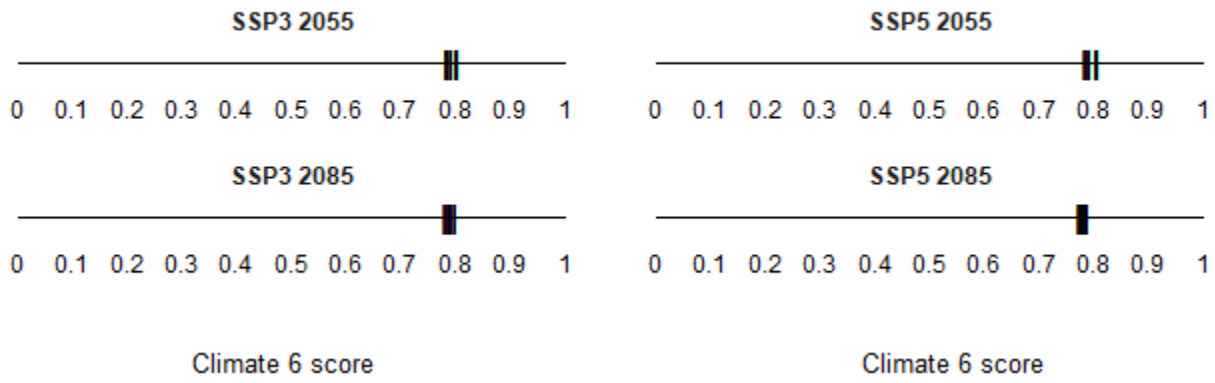

Figure A2. Comparison of projected future Climate 6 scores for *Lepisosteus platostomus* in the contiguous United States for each of five global climate models under four combinations of Shared Socioeconomic Pathway (SSP) and time step. SSPs used (from left to right): SSP3, SSP5 (Karger et al. 2017, 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.

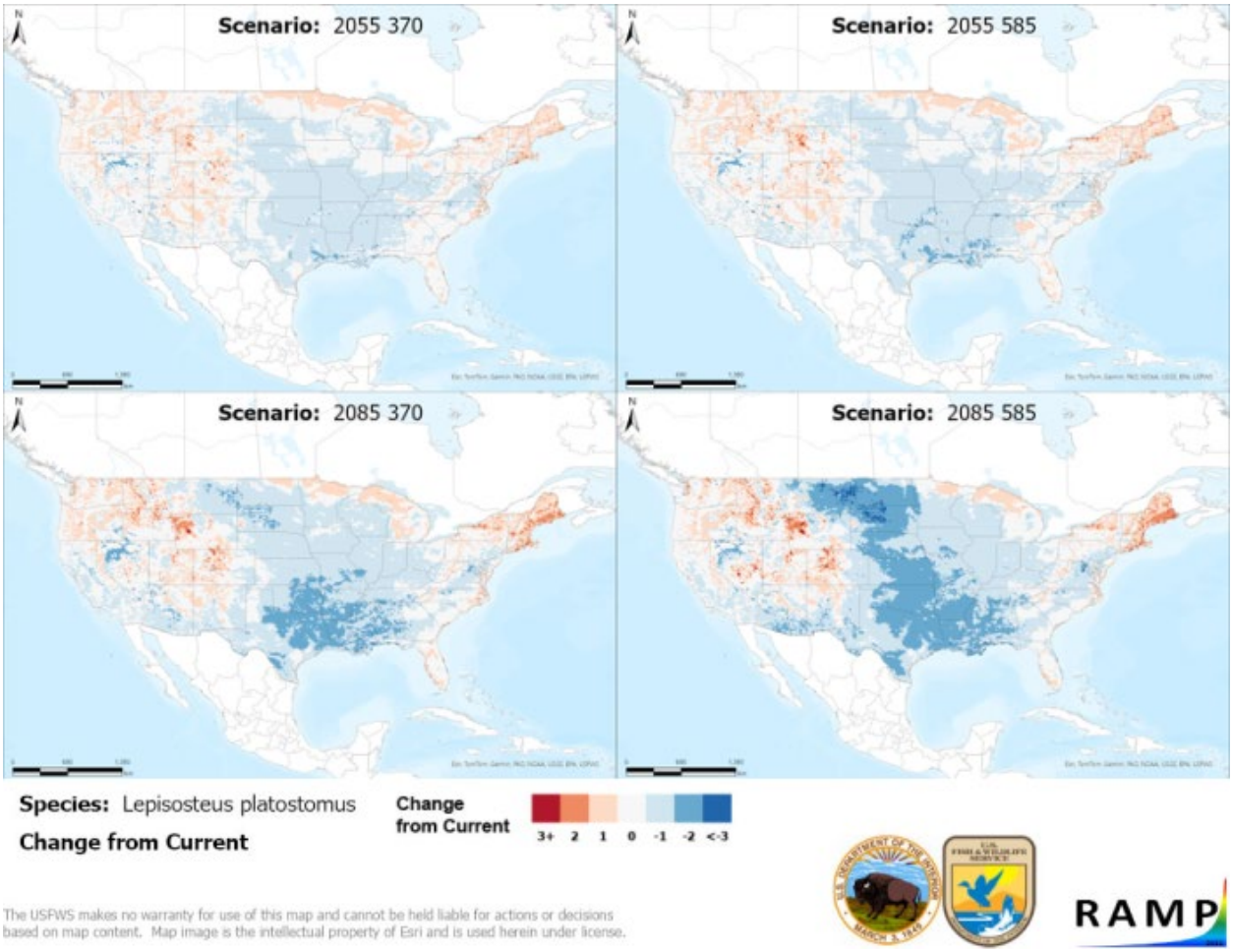

Figure A3. RAMP (Sanders et al. 2023) maps of the contiguous United States showing the difference between the current climate match target point score (figure 4) and the median target point score for future climate scenarios (figure A1) for *Lepisosteus platostomus* based on source locations reported by GBIF Secretariat (2022). 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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