

Black Buffalo (*Ictiobus niger*)

Ecological Risk Screening Summary

U.S. Fish and Wildlife Service, April 2023
Revised, May 2023
Web Version, 4/1/2024

Organism Type: Fish
Overall Risk Assessment Category: Uncertain



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<https://www.inaturalist.org/observations/104947462> (April 2023).

1 Native Range and Status in the United States

Native Range

From Fuller and Hopper (2024):

“Native Range: Mississippi River basins from Ohio to South Dakota and south to Louisiana; on Gulf Slope in Sabine Lake, Brazos River, and Rio Grande drainages in Louisiana, Texas, New Mexico, and Mexico (Page and Burr 1991).”

Status in the United States

From Fuller and Hopper (2024):

“Native Range: Mississippi River basins from Ohio to South Dakota and south to Louisiana; on Gulf Slope in Sabine Lake, Brazos River, and Rio Grande drainages in Louisiana, Texas, New Mexico, and Mexico (Page and Burr 1991).”

“Status [of nonnative introductions]: The status of the Saguaro Lake [Arizona] and Canyon Lake [Texas] populations is unknown. They are established in Apache Lake [Arizona] and were extirpated from Roosevelt Reservoir [Arizona] by a drought (Minckley 1973). Extirpated from Lac La Belle, Wisconsin (Becker 1983). The species is frequently reported, not likely but possibly not established in the Great Lakes (Cudmore-Vokey and Crossman 2000).”

According to Fuller and Hopper (2023a), nonindigenous occurrences of *Ictiobus niger* have been reported in the following States. Range of observation years, watersheds, and population status where reported (one or more watersheds) in parentheses.

- Alabama (2009; Middle Chattahoochee-Lake Harding; established)
- Arizona (1918-2004; Lower Colorado Region, Lower Salt, Upper Salt (extirpated); established)
- Ohio (1986; Lake Erie; collected)
- Wisconsin (1983-2000; Lake Michigan, Upper Rock; unknown)

No individuals of *Ictiobus niger* were found for sale in the aquarium trade the United States.

Regulations

Ictiobus niger is listed as an approved commercial aquaculture species and requires appropriate permits for importing, trading within the state, and use for commercial aquaculture purposes (Arkansas Game and Fish Commission 2022).

Ictiobus niger is listed as a species that requires a permit to import, possess, or sell (Virginia Department of Wildlife Resources 2022).

California (Department of Fish and Wildlife 2022) restricts all species within the *Ictiobus* genus.

While every effort has been made to list all applicable State laws and regulations pertaining to this species, this list may not be comprehensive.

Means of Introductions within the United States

From Fuller and Hopper (2024):

“Accidental introduction in Arizona in 1918 as stock contamination with bigmouth buffalo *I. cyprinellus* (Minckley 1973; Rinne 1994). Wisconsin introduction likely the result of

transplant associated with fish rescue operations from the Mississippi River in the 1930s (Becker 1983).”

Remarks

From Fuller and Hopper (2024):

“In the early 1900s all three species of buffalofishes were stocked; *I. bubalus*, *I. cyprinellus*, and *I. velifer* (Leach 1921, 1923). However, when the stockings were reported they were lumped together as "buffalofish" and it is not possible to determine which species were planted. Stocking of buffalofishes occurred outside their native ranges in Lake Erie in Ohio, the Pee Dee and Catawba drainages in North Carolina, and in unknown locations in Massachusetts (Leach 1921, 1923).”

From Fuller and Hopper (2023):

“Common hybridization among buffalo species has caused difficulty in identifying individual species (Dahline 2014). Current genetic analyses methods cannot consistently distinguish Black Buffalo from other buffalo species (Underhill and Schmidt 2016).”

“All ‘Black Buffalo’ caught in the Great Lakes (as of 2017) have been hybrids with Bigmouth Buffalo (*Ictiobus niger* x *cyprinellus*) [personal communication Mandrak 2017].”

Ictiobus niger has been intentionally stocked outside its native range within the United States by State fishery managers to achieve fishery management objectives. State fish and wildlife management agencies are responsible for balancing multiple fish and wildlife management objectives. The potential for a species to become invasive is now one important consideration when balancing multiple management objectives and advancing sound, science-based management of fish and wildlife and their habitat in the public interest.

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From ITIS (2023):

Kingdom Animalia
Subkingdom Bilateria
Infrakingdom Deuterostomia
Phylum Chordata
Subphylum Vertebrata
Infraphylum Gnathostomata
Superclass Actinopterygii
Class Teleostei
Superorder Ostariophysi
Order Cypriniformes
Superfamily Cobitoidea
Family Catostomidae

Subfamily Ictiobinae
Genus *Ictiobus*
Species *Ictiobus niger* (Rafinesque, 1819)

According to Fricke et al. (2023), *Ictiobus niger* is the current valid name for this species.

Size, Weight, and Age Range

From Froese and Pauly (2024):

“Max length: 123 cm TL [total length] male/unsexed; [IGFA 2001]; common length: 52.0 cm TL male/unsexed; [Hugg 1996]; max. published weight: 28.7 kg [IGFA 2001]; max. reported age: 24 years [Quinn 2001]”

Environment

From NatureServe (2023):

“Habitat includes pools and backwaters small to large rivers; reservoirs; lakes (Page and Burr 2011). This species is often in strong currents of large rivers (Lee et al. 1980).”

Climate

From Froese and Pauly (2024):

“Subtropical”

Distribution Outside the United States

Native

The native range of *Ictiobus niger* includes the Rio Grande drainage in Mexico, see Native Range in Section 1.

Introduced

According to Grabowska et al. (2010), *Ictiobus niger* found in Poland are kept in isolated ponds at research institutions and have never been found in the wild.

Froese and Pauly (2024) list *Ictiobus niger* as introduced and established in the wild in Uzbekistan, Bulgaria, and Cuba; and as introduced and probably established through natural reproduction in Romania.

From Froese and Pauly (2024):

“Known from fish farms of Syr-Darya [Uzbekistan] [Kamilov and Urchinov 1995]. Introduced to the Balykchi fish farm but have disappeared in 2000 (E. Khurshut, pers. comm.).”

“This [*Ictiobus niger*] has been introduced to areas within the country [Russia] for aquaculture and stocking in open waters however, it failed to establish self-sustaining populations [Bogutskaya and Naseka 2002].”

“Artificially maintained in aquaculture installations only [in Hungary].”

“First introduced in the Ovcharitza and Kardzhali reservoirs [Bulgaria] [Uzunova and Zlatanova 2007].”

“Reintroduced in 1980 and 1993 [in Romania]. Aquaculture was attempted in the Danube Delta lakes.”

“Introduced [to the Czech Republic] for experimental purposes [Lusk et al. 2010] and aquaculture [Welcomme 1988]. Artificially maintained in aquaculture installations only.”

Means of Introduction Outside the United States

According to Grabowska et al. (2010), *Ictiobus niger* in Poland were introduced for agricultural purposes and stocked in isolated ponds at research institutions.

Froese and Pauly (2024) list aquaculture as a means of introduction for *Ictiobus niger*.

Short Description

From Fuller and Hopper (2024):

“The body of the Black Buffalo is slightly compressed, nearly round, and more slender than other *Ictiobus* spp. The back is slate to bronze, with a greenish overcast, sides are bronze, and the belly is lighter in color. Fins are dark olive to slate. The head and snout are broadly rounded. The mouth is small and contains short, narrow, and fragile pharyngeal teeth. There are approximately 195 teeth per arch. The dorsal fin is sickle shaped with 27-31 rays, the anal fin has 8-9 rays, and pelvic fin 9-11 rays. Breeding males will have minute tubercles (small bumps) on the sides of its head. Breeding males can also be blackish in color and without tubercles (Becker 1983).”

Biology

From NatureServe (2023):

“Spawns in spring. Sexually mature at age II in south (Becker 1983).”

From Froese and Pauly (2024):

“Oviparous [Breder and Rosen 1966]. Breed in streams and ponds with rapid flow, on sand and gravel, or in weedy places [Breder and Rosen 1966]. One female may mate with several males [Breder and Rosen 1966].”

From Fuller and Hopper (2023):

“Spawning most likely occurs in April and May (Becker 1983). [...] Spawning is not well studied but fish have been observed to aggregate in large numbers to spawn, post-spawning large amounts of eggs were found in the vegetation at the spawning site (Becker 1983). [...] This species will hybridize with Bigmouth Buffalo (*Ictiobus cyprinellus*).

“Reportedly the introduced Asiatic clam is the largest part of its diet in addition to small amounts of algae, diatoms, crustaceans, and presumably native mollusk species (Etnier and Starnes 1993). Becker (1983) also notes that insects and water plants including duckweed have been observed to be a part of this species’ diet.”

Human Uses

From Froese and Pauly (2024):

“Fisheries: minor commercial; aquaculture: commercial; gamefish: yes”

Diseases

No information was found associating *Ictiobus niger* with any diseases listed by the World Organisation of Animal Health (2023).

From Fuller and Hopper (2023):

“The Black Buffalo is a known host of the parasite *Lernaea cyprinacea* (Demaree 1967).”

From Scholz and Pérez-Ponce de León (2021):

“*Pseudoglaridacris confusa* has been reported from several buffaloes, such as bigmouth buffalo (*Ictiobus cyprinellus* [Valenciennes]), Usumacinta buffalo (*Ictiobus meridionalis*), and black buffalo (*Ictiobus niger* [Rafinesque]), [...]”

Threat to Humans

From Froese and Pauly (2024):

“Harmless”

3 Impacts of Introductions

Although *Ictiobus niger* has been reported as introduced and established beyond its native range, the impacts of these introductions are uncertain.

From Fuller and Hopper (2023):

“Introduced populations do not seem to compete with native species in Texas (Dahline 2014). Hybridization among *Ictiobus spp.* is common (Dahline 2014).”

“Great Lakes Impacts: Current research on the environmental impact of *Ictiobus niger* in the Great Lakes is inadequate to support proper assessment.”

“There is little or no evidence to support that *Ictiobus niger* has significant socioeconomic impacts in the Great Lakes.”

Howeth et al. (2016) surveyed experts in the Great Lakes region regarding the impact of *Ictiobus niger* in addition to 36 other introduced species. The responses to the survey were input into the author’s invasive risk model which classified *I. niger* as being in the ‘low’ impact class with only 58% of respondents stating they had high confidence in their response.

Ictiobus niger is regulated in the states of Arkansas and Virginia while the genus *Ictiobus* is regulated in California. Further detail on regulations can be found in Section 1.

4 History of Invasiveness

The History of Invasiveness for *Ictiobus niger* is classified as Data Deficient. Although established populations of *I. niger* have been found outside of its native range, there was no information found regarding actual impacts of introduction. A model based on expert input classified *I. niger* as having low impact but the specific information on impacts was not available. *I. niger* is sold and used for commercial and sport fish stocking; there were no records found quantifying the duration or number of individuals in-trade.

5 Global Distribution

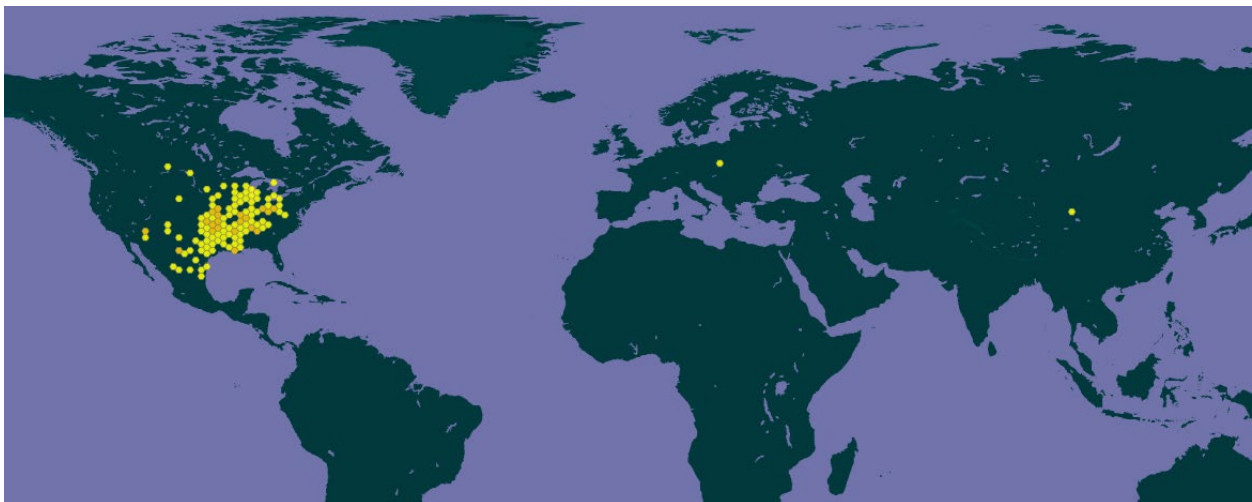


Figure 1. Known global distribution of *Ictiobus niger*. Observations are mainly in the Lower Great Lakes and Mississippi River basin, from Ohio to South Dakota, south to the Gulf coast of Louisiana, and Rio Grande basin from New Mexico to Texas and Mexico. Map from GBIF Secretariat (2022). The point in China was the result of incorrect coordinates and was not used in the climate matching analysis. The points in the Great Lakes, Montana, North Dakota, northwest Nebraska, southeast Wisconsin, Michigan, Virginia, and Poland were not found to be indicative of established populations and were excluded from the climate matching analysis.

No georeferenced observations were available to represent the reported established populations in Uzbekistan, Bulgaria, and Cuba (Froese and Pauly 2024).

6 Distribution Within the United States

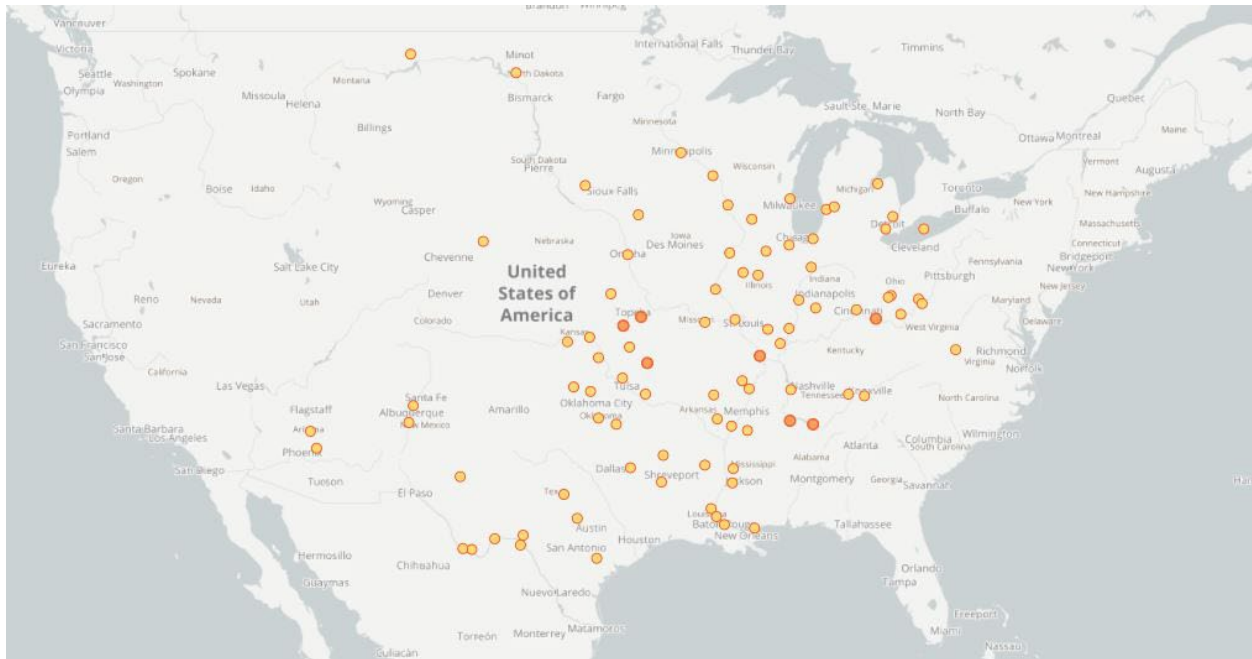


Figure 2. Reported distribution of *Ictiobus niger* in the United States. Map from GBIF-US (2023). Observations are mainly in the Lower Great Lakes and Mississippi River basin, from Ohio to South Dakota, south to the Gulf coast of Louisiana, and Rio Grande basin from New Mexico to Texas. Observations are also found in the states of Montana, North Dakota, northwest Nebraska, southeast Wisconsin, Michigan, and Virginia, but were not found indicative of established populations and were not included in the climate matching analysis.

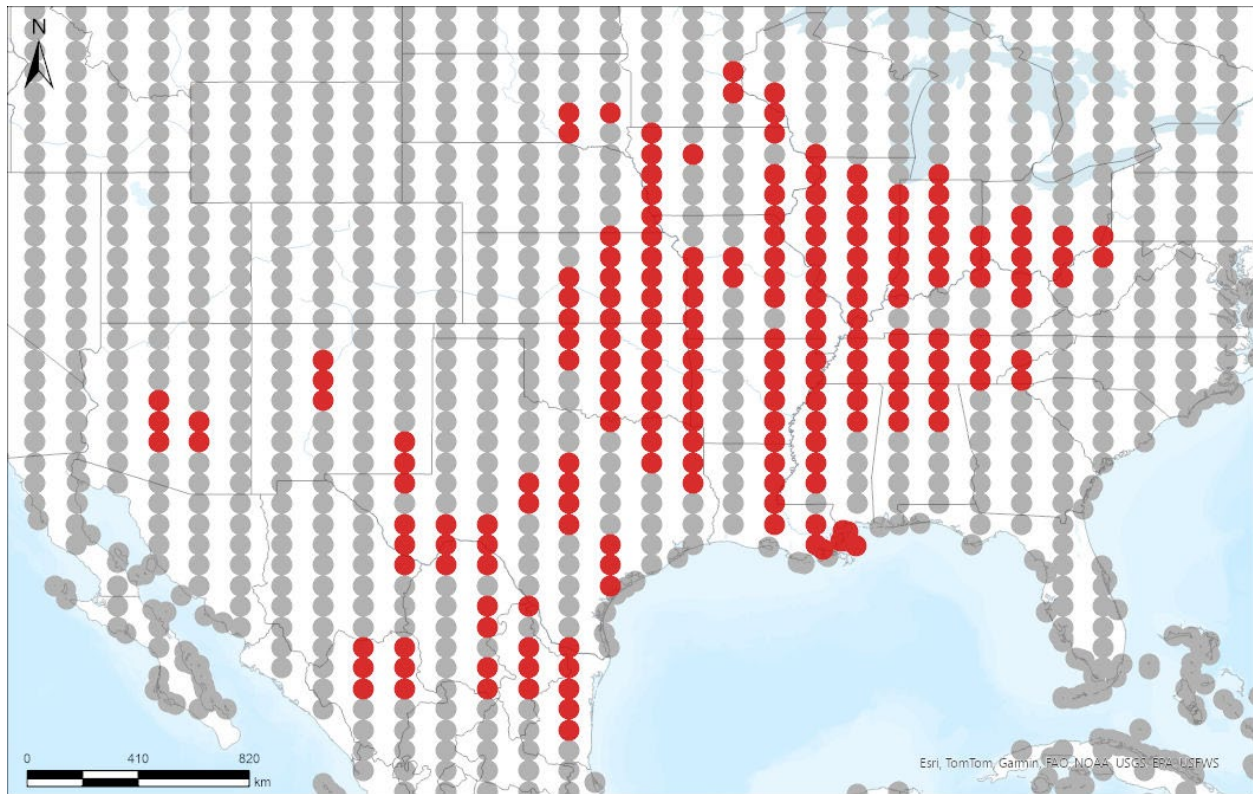
7 Climate Matching

Summary of Climate Matching Analysis

The climate match for *Ictiobus niger* in the contiguous United States was generally high east of the Rocky Mountains and highest in regions surrounding the Mississippi River and Rio Grande Basins, including the Great Plains and the Midwest. Much of this area overlaps the native range of the species. There was another area of high match in the Southwest. Medium matches were found in the Rocky Mountains as well as the Northeast and in Florida. Low matches were restricted to the coastal Pacific Northwest and Cascade-Sierra Mountains, and some small, scattered patches in the Rocky Mountains. The overall Climate 6 score (Sanders et al. 2023; 16 climate variables; Euclidean distance) for the contiguous United States was 0.864, indicating that Yes, there is establishment concern for this species outside its native range. The Climate 6 score is calculated as: $(\text{count of target points with scores} \geq 6) / (\text{count of all target points})$. 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 *Ictiobus niger* (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.



Species: *Ictiobus niger*

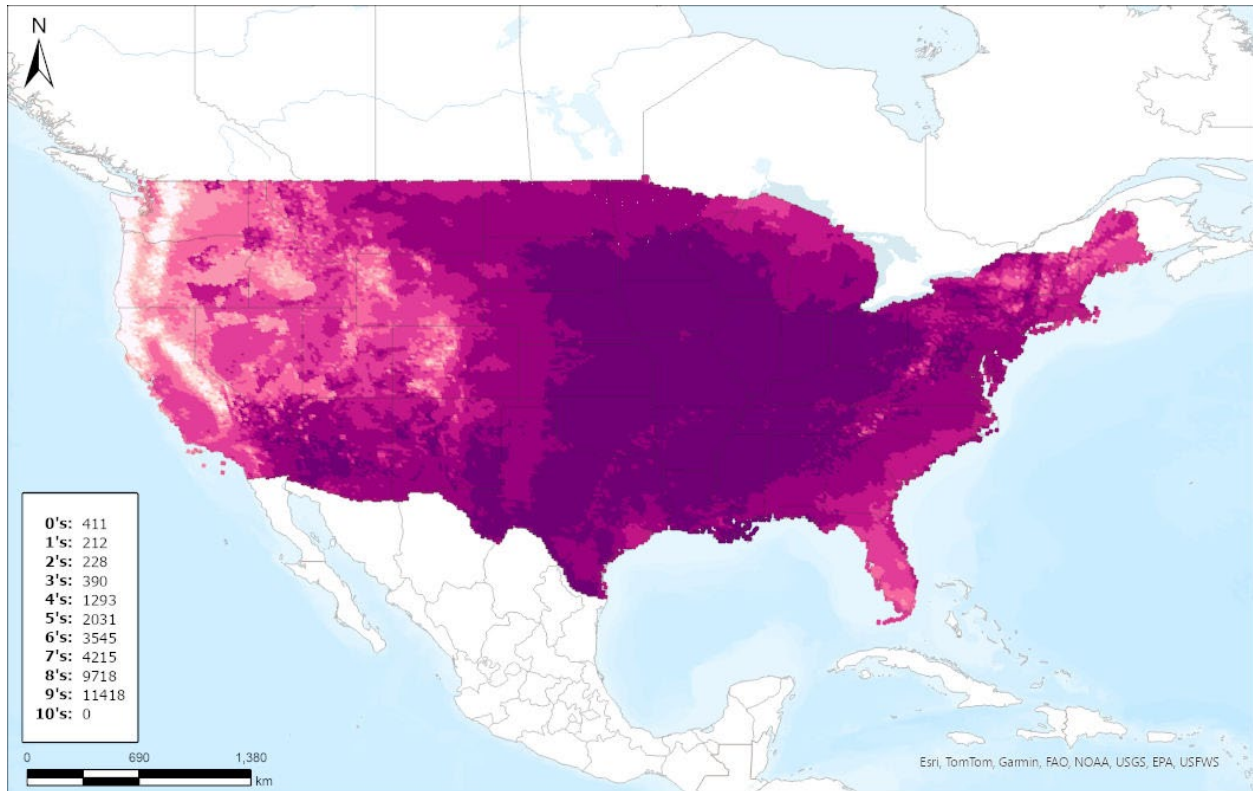
Selected Climate Stations ●



RAMP

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Figure 3. RAMP (Sanders et al. 2023) source map showing weather stations in North America (red; Alabama, Arizona, Arkansas, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Michigan, Minnesota, Mississippi, Missouri, Nebraska, New Mexico, North Carolina, Ohio, Oklahoma, South Dakota, Tennessee, Texas, West Virginia, and Wisconsin; Chihuahua, Coahuila, Durango, and Nuevo León, Mexico) and non-source locations (gray) for *Ictiobus niger* climate matching. Source locations are 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.



Species: *Ictiobus niger*

Current

Climate 6 Score: 0.864



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Figure 4. Map of RAMP (Sanders et al. 2023) climate matches for *Ictiobus niger* 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 *Ictiobus niger* is classified as Low. Information is available on the biology, ecology, and distribution of *I. niger*; however, the information available on impacts of introduction is very limited and general. *I. niger* is sold and used for commercial and sport fish stocking, there were no records found quantifying the duration or number of individuals in-trade.

9 Risk Assessment

Summary of Risk to the Contiguous United States

Ictiobus niger, Black Buffalo, is a freshwater fish that is native to the Mississippi River basin from Ohio to South Dakota and south to the Gulf coast of Louisiana, as well as the Rio Grande basin from New Mexico to Texas and Mexico. *I. niger* is commonly found in ponds, lakes, reservoirs, and impoundments as well as backwaters and pools of small to large rivers. They are

often targeted by anglers, stocked for sport and aquaculture purposes, but are known to be found in the aquarium trade. *I. niger* has been introduced outside of its native range, and some introductions have resulted in established populations. The History of Invasiveness is classified as Data Deficient due to minimal information regarding impacts of introduction. Arkansas and Virginia restrict this species while California restricts all species within the genus *Ictiobus*. The climate matching analysis for the contiguous United States indicates establishment concern for this species outside its native range. High matches were found in most areas east of the Rocky Mountains except for the Northeast and Florida. In the Rocky Mountains and to the west it was a mix of medium and low matches. The Certainty of Assessment for this ERSS is classified as Low due to lack of information regarding impacts of introduction. The Overall Risk Assessment Category for *Ictiobus niger* 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: None**
- **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 *Ictiobus niger* was projected to occur in the Appalachian Range, Colorado Plateau, Great Lakes, Gulf Coast, Mid-Atlantic, Northeast, Northern Plains, Southeast, Southern Plains, and Southwest regions of the contiguous United States. Areas of low climate match were projected to occur in the Northern Pacific Coast region and along the Sierra-Nevada Range with small, scattered areas of low match in the Rocky Mountains. Areas of high match became smaller with time and from SSP3 to SSP5. The Climate 6 scores for the individual future scenario models (figure A2) ranged from a low of 0.871 (model: MPI-ESM1-2-HR, SSP3, 2055) to a high of 0.917 (model: IPSL-CM6A-LR, 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 (0.864, figure 4) 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). Under one or more time step and climate scenarios, areas within the Colorado Plateau, Great Basin, Great Lakes, Northeast, Southwest, and Western Mountains saw a moderate increase in the climate match relative to current conditions. Small areas of large increase were found in the Rocky Mountain and Great Basin areas in time step 2085. Under one or more time step and climate scenarios, areas within the Appalachian Range, Great Basin, Gulf Coast, Mid-Atlantic, Northern Plains, Southeast, Southern Plains, and Southwest saw a moderate decrease in the climate match relative to current conditions. There was a small area of moderate decrease in north-central California in time step 2085 SSP3. Small areas of large decreases were found in the Northern Plains and Gulf Coast in time step 2085 SSP5. 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.

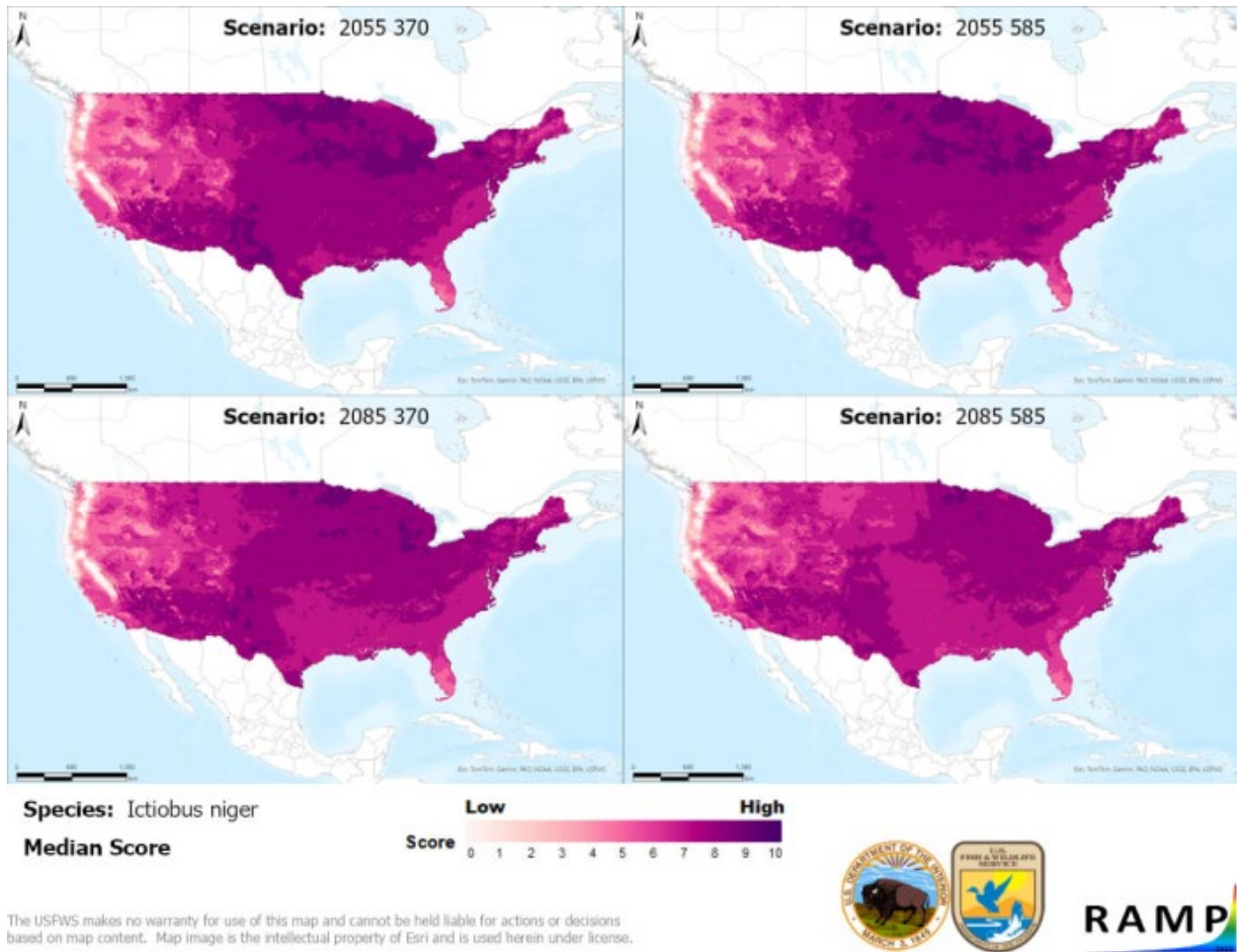


Figure A1. Maps of median RAMP (Sanders et al. 2023) climate matches projected under potential future climate conditions using five global climate models for *Ictiobus niger* in the contiguous United States. Climate matching is based on source locations reported by GBIF Secretariat (2022). Shared Socioeconomic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

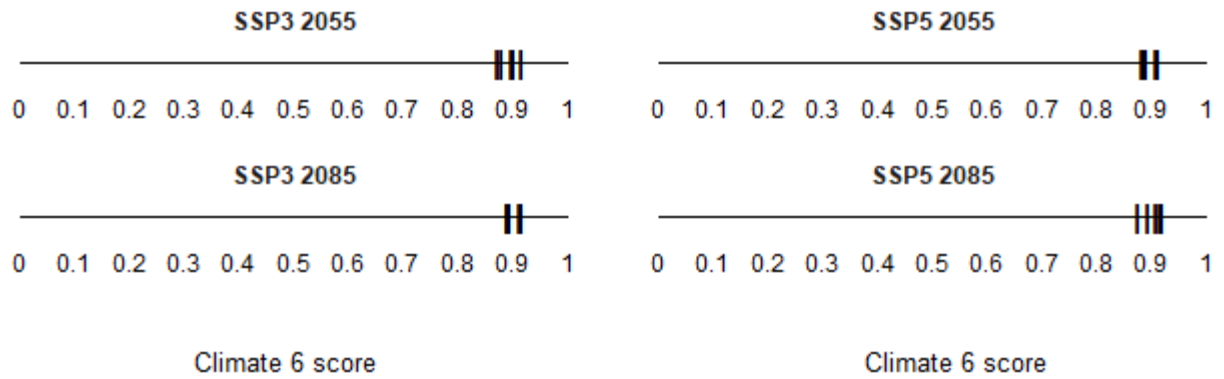
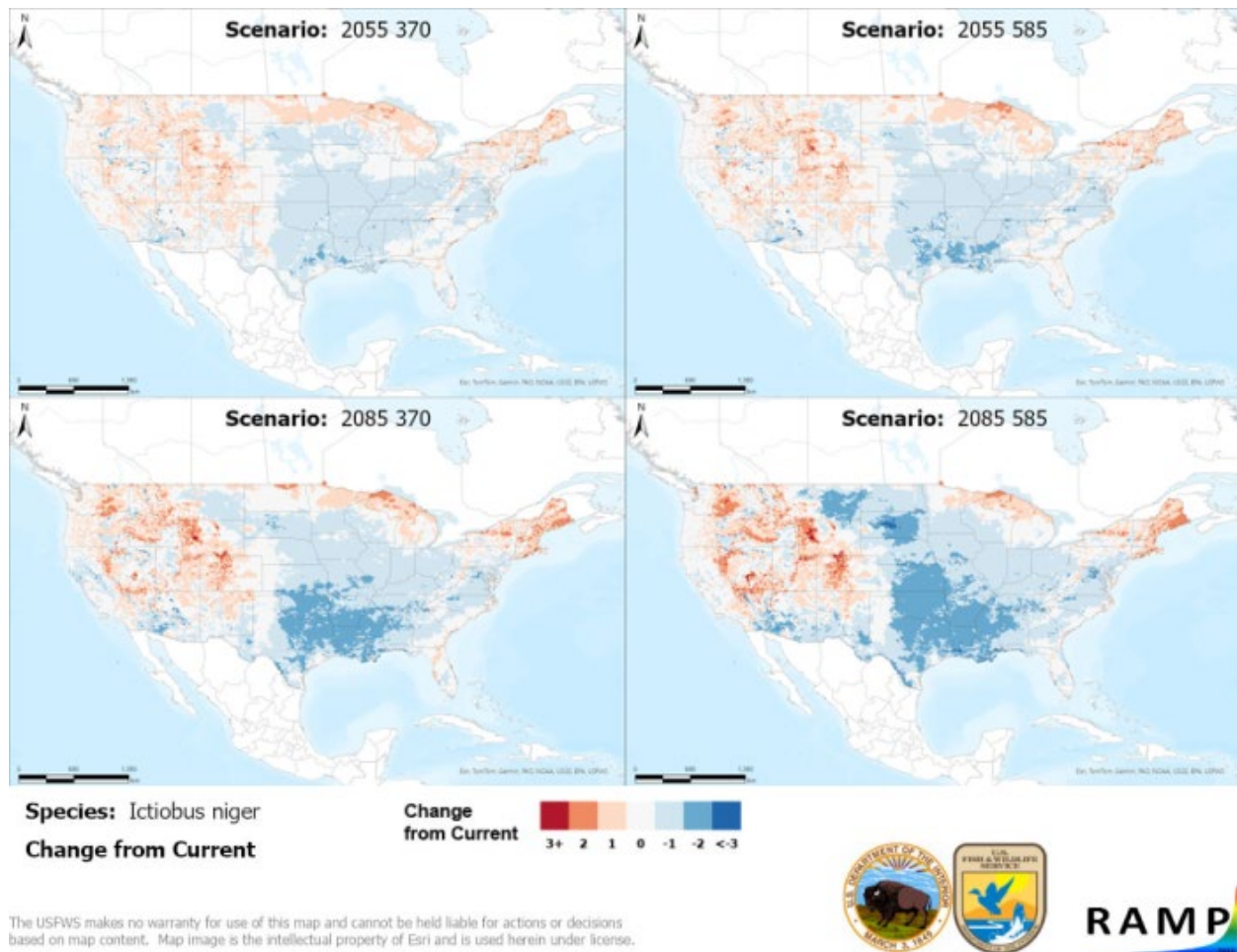


Figure A2. Comparison of projected future Climate 6 scores for *Ictiobus niger* in the contiguous United States for each of five global climate models under four combinations of Shared Socioeconomic Pathway (SSP) and time step. SSPs used (from left to right): SSP3, SSP5 (Karger et al. 2017, 2018; IPCC 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.



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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 *Ictiobus niger* 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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