White Perch (*Morone americana*)

Ecological Risk Screening Summary

U.S. Fish and Wildlife Service, November 2023
Revised, February 2025
Web Version, 1/22/2026

Organism Type: Fish
Overall Risk Assessment Category: High

Photo: Wanye Longbottom. Licensed under Creative Commons BY-NC 4.0. Available: https://www.gbif.org/occurrence/4868141102flickr (February 2025).

1 Native Range and Status in the United States

Native Range

From Fuller et al. (2023a):

"Atlantic Slope drainages from St. Lawrence-Lake Ontario drainage, Quebec, south to Pee Dee River, South Carolina (Page and Burr 1991). Populations in the Lake Ontario drainage probably became established following construction of the Erie Canal."

Status in the United States

From Fuller et al. (2023a):

"Established in Illinois, Indiana, Kentucky, Massachusetts, Michigan, Minnesota, Missouri, Nebraska, New Hampshire, New York, North Carolina, Ohio, Pennsylvania, Vermont, and Wisconsin. Current status in Colorado and Kansas is unknown."

Fuller et al. (2025) also report *Morone americana* as established outside its native range in Alabama, Arkansas, Connecticut, Iowa, Kansas, Louisiana, Maine, Oklahoma, South Carolina, Virginia, and West Virginia. The status of a single introduction to Georgia is unknown.

From GISD (2017):

"An excellent panfish highly regarded as a food fish in the Eastern United States, it is not often exploited as a game fish and generally is regarded as undesirable, especially when over-population in fresh waters causes the species to become stunted (Wisconsin Sea Grant, 2002)."

From Fuller et al. (2023b):

"As of 2003, it was estimated that over 500,000 lbs. of White Perch are caught commercially in the U.S. and Canada each year (188,000+ lbs. in the U.S. alone), particularly in lakes Erie and Ontario (Brown et al. 1999; Dann and Schroeder 2003). This provides an estimated value of approximately $107,000 yr-1 in the U.S. and $260,000 yr-1 overall (Dann and Schroeder 2003)."

Regulations

Morone americana is regulated in Arizona (Arizona Game and Fish Commission 2022), California (CDFW 2021), Indiana (Indiana DNR 2022), Kansas (KDWP 2023), Minnesota (Minnesota DNR 2022), Montana (Montana FWP 2023), Ohio (ODNR 2022), and Texas (TPWD 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.

Means of Introductions within the United States

From Fuller et al. (2023a):

"The first report of White Perch in the Great Lakes drainage was from Cross Lake, central New York, in 1950 (Dence 1952). The species apparently gained access to the lake via movement through the Erie Barge Canal in the 1930s and 1950s (Lee et al. 1980 et seq.; Johnson and Evans 1990; Mills et al. 1993). Scott and Christie (1963) stated that the White Perch most likely gained access to Lake Ontario via the Oswego River, as a result of the spread of Hudson River populations northward and westward through the Mohawk River Valley and Erie Barge Canal. Once in Lake Ontario, it gained access to Lake Erie through the Welland Canal in 1953 and

continued to spread to the upper Great Lakes (Johnson and Evans 1990; Mills et al. 1993). The first reports of westward movement through the Great Lakes are as follows: Lake Erie in 1953 (Larsen 1954), Lake St. Clair in 1977, Lake Huron in 1987 (Johnson and Evans 1990), Lake Michigan at Green Bay-Fox River, Wisconsin in May 1988 (Cochran and Hesse 1994), and Illinois waters of Lake Michigan off Chicago in September 1988 (Savitz et al. 1989). One oddity is that the first record from Lake Superior was in 1986 from Duluth Harbor-one year before the fish was found in Lake Huron, and two years before it was seen in Lake Michigan. The Duluth Harbor population may be restricted to that location because it is the warmest part of the lake. This population likely represents a separate introduction because it does not fit the pattern of western dispersal (Johnson and Evans 1990). In this case it is possible that the introduction occurred via ships' ballast water."

"White Perch was brought from New Jersey to Nebraska in 1964, and fry produced that year in a hatchery were accidentally introduced into a reservoir that provided access to the Missouri River (Hergenrader and Bliss 1971). White Perch has been stocked intentionally in other areas for sportfishing."

From Siriwardena (2018):

"Between 1880 and 1950, federal and state hatcheries established inland populations of *M. americana* in Maine, Maryland, Connecticut, New York and Massachusetts, USA ([Zuerlein], 1981). It also has been illegally stocked by individuals in inland lakes in Indiana, USA (Fuller et. al., 2008)."

Remarks

From Fuller et al. (2023a):

"White Perch are visually quite similar to White Bass (*Morone chrysops*)."

"White Perch x White Bass [*Morone chrysops*] hybrids have been reported in western Lake Erie, in Ohio and Michigan, and from the Detroit and St. Clair Rivers in Michigan (Todd 1986)."

"Hybrids of *M. americana* and *M. mississippiensis* [Yellow Bass] were first found in 2000 in the middle Illinois River (Irons et al. 2002)."

M. americana 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 (2025):

Kingdom Animalia
Subkingdom Bilateria
Infrakingdom Deuterostomia
Phylum Chordata
Subphylum Vertebrata
Infraphylum Gnathostomata
Superclass Actinopterygii
Class Teleostei
Superorder Acanthopterygii
Order Perciformes
Suborder Percoidei
Family Moronidae
Genus Morone
Species *Morone americana* (Gmelin, 1789)

According to Fricke et al (2025), *Morone americana* (Gmelin 1789) is the current accepted name for this species.

The following synonyms of *Morone americana* from Fricke et al. (2023) were used to search for information for this report: *Perca americana, Perca immaculata, Perca mucronata, Labrax nigricans, Morone pallida,* and *Morone rufa*.

Size, Weight, and Age Range

From Siriwardena (2018):

"*M. americana* is a demersal and semi-anadromous species, usually reaching a length of 12.7-17.8 cm and weighing from an average of 250 g up to 650 g (Riede, 2004). However, a maximum length of 49.5 cm has been recorded (IGFA, 2001), and a maximum weight of 2200 g (Robins and Ray, 1986). The recorded maximum age is 16 years (Froese and Pauly, 2008)."

Environment

From Froese and Pauly (2023):

"Marine; freshwater; brackish; benthopelagic; anadromous [Riede 2004]; depth range 0 - 10 m [Robins and Ray 1986]. […] 10°C - 33°C [Hall et al 1979]."

From Fuller et al. (2023a):

“White Perch is a euryhaline species, inhabiting fresh, brackish and coastal waters. It is commonly found in estuaries, rivers, and inland lakes. Adults prefer habitats with little cover and muddy/silty/sandy substrate.”

From GISD (2017):

“They have now become very common in shallow portions of inland lakes and rivers (Minnesota Sea Grant 2001; and Wisconsin Sea Grant, 2002).”

Climate

From Froese and Pauly (2023):

“Temperate; […] 50°N - 32°N, 96°W - 59°W”

Distribution Outside the United States

Native

Part of the native range for this species is within the United States, see section 1 for a complete description of the native range.

Fuller et al. (2023a) states that *M. americana* is native to the Atlantic Slope drainages from the St. Lawrence-Lake Ontario drainage, Quebec.

Siriwardena (2018) states that *M. americana* is native to the Canadian provinces of New Brunswick, Nova Scotia, Prince Edward Island, and Quebec.

Introduced

From Eakins (2025):

“Ontario [Canada] Distribution: Great Lakes (except Superior) and tributaries including Thames River, St. Clair River, Detroit River […]”

Means of Introduction Outside the United States

From Eakins (2025):

“[…] gained access to Lakes Ontario and Erie through the Erie Barge Canal”

Short Description

From Fuller et al. (2023a):

“White Perch are a small silvery, greenish-gray fish with a dark, highly domed back. The belley [sic] is whitish, and the lower jaw projects slightly. It has three spines in its anal fin and a deep

notch in the dorsal fin. The tail is also mildly forked. Woolcott (1962); Mansueti (1964); Smith (1985); Page and Burr (1991); Jenkins and Burkhead (1994)."

Biology

From Fuller et al (2023a):

"White Perch is a highly opportunistic forager with a generalist diet, including macroinvertebrates, crustaceans and fish (Couture and Watzin 2008; Jones et al. 2015). Fish eggs (including its own) are also an important part of its diet particularly in the spring (Schaeffer and Margraf 1987). This species is consumed by piscivores including Walleye (*Sander vitreus*), Striped Bass (*M. saxatilis*), Muskellunge (*Esox masquinongy*), and Catfish (Icturlidae [sic]) (Hoyle et al. 2017; Andrews et al. 2018; Schmitt et al. 2019)."

From GISD (2017):

"Walleye or white bass eggs can make up 100% of *M. americana* diet depending on which fish is spawning. *M. americana* also feed heavily on minnows of *Notropis spp*. and zooplankton (Fuller, 2005)."

From Siriwardena (2018):

"In its native estuarine environment, *M. americana* is semi-anadromous and spawns in the spring when water temperatures are between 10 and 16°C (Mansueti, 1961; Jenkins and Burkhead, 1994). It migrates from the saltier bays and coastal areas into tidal, but more freshwater portions of streams and rivers to spawn in spring. In landlocked waters, it spawns in both rivers and reservoirs, and migrates from deep to shallow waters to spawn when temperatures are between 15 and 20°C, but may show no preference for habitat types during spawning and egg deposition (Zuerlein, 1981)."

"Spawning occurs over a period of 10 to 21 days with individual females expelling eggs on more than one occasion (Mansueti, 1961)."

Human Uses

From GISD (2017):

"An excellent panfish highly regarded as a food fish in the Eastern United States, it is not often exploited as a game fish and generally is regarded as undesirable, especially when over-population in fresh waters causes the species to become stunted (Wisconsin Sea Grant, 2002)."

From Fuller et al. (2023b):

"As of 2003, it was estimated that over 500,000 lbs. of White Perch are caught commercially in the U.S. and Canada each year (188,000+ lbs. in the U.S. alone), particularly in lakes Erie and Ontario (Brown et al. 1999; Dann and Schroeder 2003). This provides an estimated value of approximately $107,000 yr-1 in the U.S. and $260,000 yr-1 overall (Dann and Schroeder 2003)."

From Froese and Pauly (2023):

“Fisheries: minor commercial; gamefish: yes; aquarium: public aquariums.”

Diseases

***Morone americana* may carry or be susceptible to viral hemorrhagic septicemia (VHS), a disease listed by the World Organisation for Animal Health (2023).**

According to Thompson et al. (2011), the presence of viral hemorrhagic septicemia virus (VHSV) has been detected in *Morone americana* in the Great Lakes region of the United States and Canada.

According to Poelen et al. (2014), *Morone americana* is a host to the following pathogens and parasites: *Acanthocephalus anguillae*, *Aeromonas salmonicida*, *Apophallus venustus*, *Atlanticoncha ochracea*, *Azygia*, *Bicotylophora*, *Bothrimonus*, *Brachyphallus*, *Camallanus truncatus*, *Cestoda*, *Clinostomum*, *Clinostomum marginatum*, *Crepidostomum cooperi*, *Cucullanellus cotylophora*, *Cucullanus*, *Dichelyne*, *Diclidophora denticulata*, *Diplocotyle olrikii*, *Diplostomum huronense*, *Diplostomum spathaceum*, *Distomum*, *Dollfusentis chandleri*, *Echinorhynchus*, *Erpocotyle incertae sedis mavori*, *Erpocotyle mavori*, *Eustrongylides tubifex*, *Fasciola*, *Globoporum moronis*, *Gnathostoma*, *Goezia*, *Goezia sinamora*, *Gonocercella trachinoti*, *Homalometron pallidum*, *Lampsilis cariosa*, *Largemouth Bass virus*, *Lecithochirium rufoviride*, *Lepocreadium areolatum*, *Lepocreadium californianum*, *Lepocreadium setiferoides*, *Lepocreadium trullaforme*, *Leptorhynchoides thecatus*, *Metabronema*, *Microcotyle*, *Microcotyle eueides*, *Microcotyle macroura*, *Mycobacterium pseudoshottsii*, *Mycobacterium shottsii*, *Neochasmus sogandaresi*, *Neoechinorhynchus agilis*, *Neoechinorhynchus cylindratus*, *Onchocleidus mimus*, *Onchocleidus nactus*, *Oncorhynchus*, *Opecoeloides vitellosus*, *Paratenuisentis*, *Paratenuisentis ambiguous*, *Pauciconfibula subsolana*, *Pedocotyle morone*, *Philometra*, *Philometra rubra*, *Photobacterium damselae*, *Podocotyle*, *Pomphorhynchus bulbocolli*, *Pomphorhynchus rocci*, *Posthodiplostomum minimum*, *Proteocephalus ambloplitis*, *Serratia*, *Spinitectus*, *Spinitectus carolini*, *Stephanostomum tenue*, *Tanaorhamphus*, *Trematoda*, *Triaenophorus nodulosus*, *Trilobovarium truncatum*, *Tylodelphys scheuringi*, *Urocleidus*.

According to Froese and Pauly (2025), *Morone americana* is a host for the following additional pathogens and parasites: *Ergasilus arthrosis*, *Ergasilus confusus*, *Ergasilus labracis*, *Ergasilus luciopercarum*, *Lebouria truncata, Lernaea cruciata*, *Lernaeenicus affixus*, *Lernaeenicus radiatus*, *Lernanthropus leidyi*, *Neolebouria truncata*, *Plagioporus truncatus*, *Plectanocotyle elliptica*, *Podocotyle olssoni*.

Threat to Humans

From Fuller et. al (2023a):

“White Perch may pose a health threat to animals that consume it. It can accumulate the cyanotoxin microcystin in concentrations exceeding the WHO guidelines for human consumption (Wituszynski et al. 2017). Of fish tested for microcystin, White Perch accumulated the second highest concentration (37 ng MC/g wet weight) relative to Walleye (71 ng MC/g) and Yellow Perch (8.1 ng MC/g).”

3 Impacts of Introductions

From Hergenrader and Bliss (1971):

"The species became established in the reservoir [in southeast Nebraska] where it made very rapid growth and achieved sexual maturity one to two years sooner than in its natural range. Over a three year period the white perch completely displaced the native black bullhead as the dominant species in the reservoir. This dominance is being maintained and the white perch population is becoming stunted."

"Concomitant with the increase in abundance of the white perch, the black bullhead in 1966 declined some 12% from the previous year in the gill net catch […] and some 27% in the fyke net catch […]. In 1967 bullheads suffered a drastic decline in numbers, being reduced by some 63% in the gill net catch and by 40% in the fyke net catch from the previous year. At the same time the white perch increased by 61% in the gill net catch and by 19% in the fyke net catch."

From Kuklinski (2007):

"Following an unintentional introduction of white perch (*Morone americana*) into Kaw Reservoir, Oklahoma, questions were raised about the potential impacts this new species may have on resident sport fish populations. White perch, white crappie (*Pomoxis annularis*), and white bass (*Morone chrysops*) were collected from 2001 through 2004 using a variety of sampling techniques. White perch catch rates were low with all sampling methods. White crappie and white bass catch rates have remained within or exceeded historical ranges. White perch growth rates were slow, especially for fish reaching age-2+ […] White crappie mean length-at-age for age-1, age-2, and age-3 fish was significantly less during this study than historical samples prior to white perch introduction. Little diet overlap between the white perch and the other two target species was observed. Moderate diet overlap (0.544) was observed between white perch and white bass less than 200 mm total length. It appears that the current white perch population in Kaw Reservoir has not negatively affected the white crappie or white bass populations."

From Couture and Watzin (2008):

"White perch (*Morone americana*) became established in Missisquoi Bay, Lake Champlain in the mid 1990s. Since that time, cyanobacteria blooms have become common in summer. […] In this study, we examined the extent of zooplanktivory exhibited by adult white perch in Missisquoi Bay. […] Couture (2006) found that *Daphnia* was the only zooplankton group that was significantly reduced by white perch feeding in a laboratory mesocosm study using Lake Champlain plankton communities, suggesting that white perch can change zooplankton communities by their foraging choices. Our results show white perch diet in Missisquoi Bay consisted of large numbers of *Daphnia*, and *Daphnia* were positively selected for over other zooplankton groups on a number of dates. By extension, we suggest that the presence of large numbers of white perch in Missisquoi Bay could lead to a shift in the zooplankton assemblage with many fewer daphnids in the summer zooplankton community."

“It is likely that adult white perch grazing in Missisquoi Bay has contributed to a reduction in *Daphnia* density which in turn may be contributing to summertime cyanobacteria dominance in this bay.”

The following quotations detail **potential, anecdotal,** or **highly generalized** information on impacts of introduction from *Morone americana*.

From Siriwardena (2018):

“Invasion *by M. americana* can have a negative impact on resident fish populations (Harris, 2006), which in turn could cause degradation in fishing quality and subsequent economic impacts. Drops in abundance of native fishes have often followed white perch invasions (Hergenrader and Bliss, 1971; [Zuerlein], 1981; Boileau, 1985; Gopalan et al., 1998; Wong et al., 1999; Madenjian et al., 2000).”

From Fuller et al. (2023a):

“Feiner et al. (2013a, b) found significant overlap in trophic niche and resource use between White Perch and Walleye, Largemouth Bass (*Micropterus salmoides*), Bluegill (*Lepomis macrochirus*), Striped Bass (*M. saxatilis*), and White Bass in three lakes in North Carolina, suggesting the potential for resource competition.”

“Invasion of the Great Lakes brought White Perch into sympatric distribution with White Bass, a closely related but previously allopatric species, allowing hybridization to occur. […] Because these hybrids are capable of backcrossing with the parental species, and possibly producing F2 hybrids by crossing amongst themselves (Todd 1986), they dilute the gene pool of each parent species.”

“Pothoven and Höök (2015) found overlap in standard diet assemblages of age-0 White Perch and White Bass in Saginaw Bay, Lake Huron, indicating that complete trophic separation was not a requirement for long-term stable coexistence.”

Morone americana is regulated in eight U.S. States. See section 1.

4 History of Invasiveness

The History of Invasiveness for *Morone americana* is classified as High. *M. americana* has been widely established outside of its native range, including in over a dozen U.S. States and one Canadian province. *M. americana* replaced a native black bullhead population in a Nebraska reservoir, although its impacts on white bass and white crappie in an Oklahoma reservoir appear to be modest. There are numerous other potential impacts of *M. americana* introductions reported, but more information is needed to confirm these impacts.

5 Global Distribution

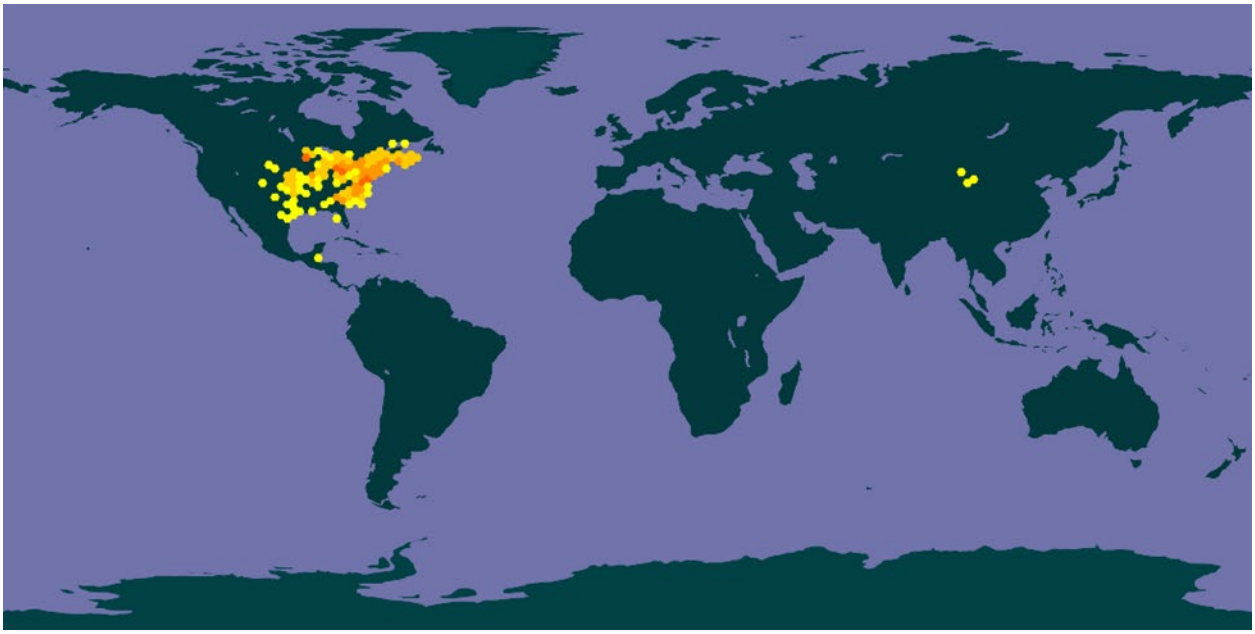

Figure 1. Reported global distribution of *Morone americana*. Map from GBIF Secretariat (2023). Observations are reported from the United States, Canada, China, and Guatemala. Occurrences in China, Guatemala, and the U.S. States of Colorado and Texas were not known to represent established populations and were therefore not used to select climate matching source points.

6 Distribution Within the United States

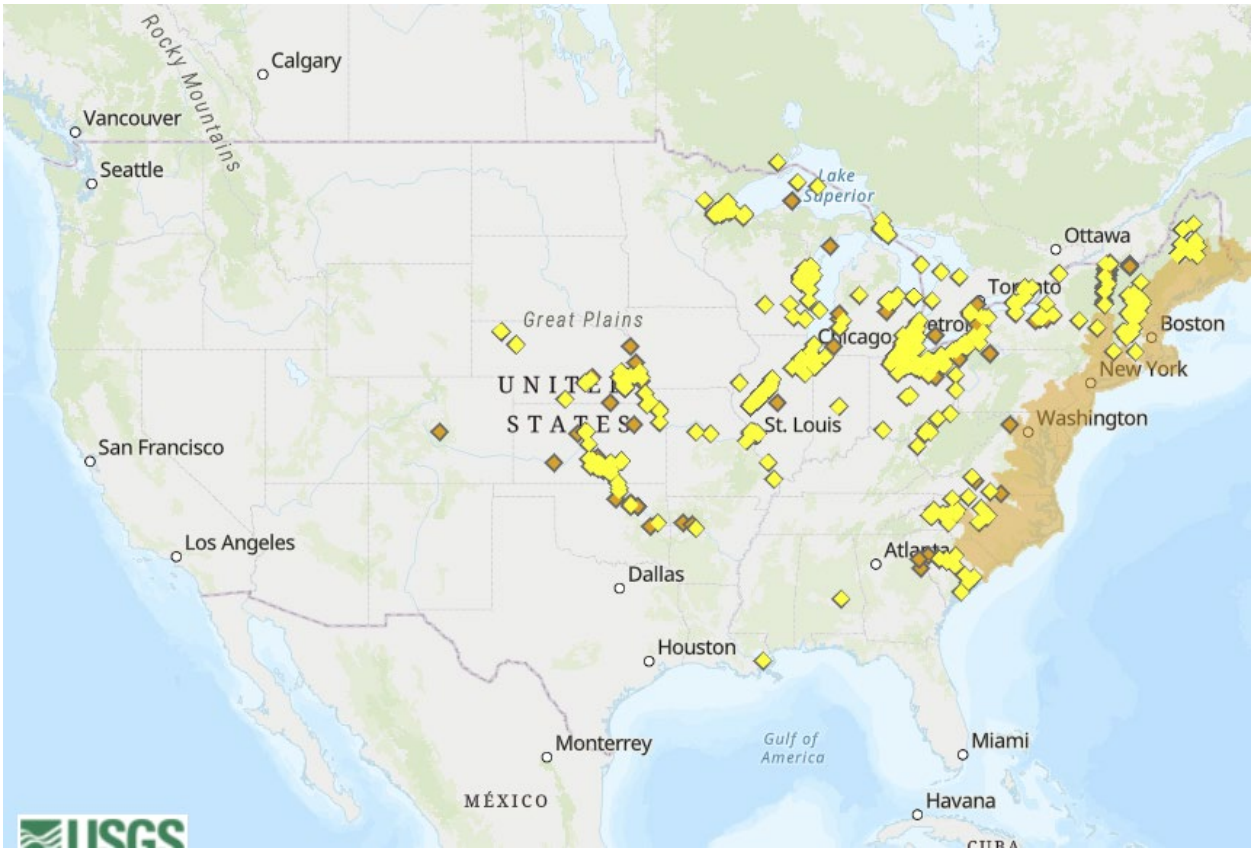

Figure 2. Reported distribution of *Morone americana* in the United States. Map from Fuller et al. (2025). Orange shading along the Atlantic coast represents the native range of *M. americana*. Yellow points represent established nonnative populations of *M. americana* and orange points represent other reported nonnative occurrences. Only established populations and points in the native range were used to select source locations for the climate matching analysis.

7 Climate Matching

Summary of Climate Matching Analysis

The climate match for *Morone americana* was high across nearly all of the eastern and central United States, including the native range of the species. The Rocky Mountains, Rio Grande basin in Texas, and central Florida all had medium climate matches. Low climate matches were predicted for much of the Great Basin and Pacific coast. The overall Climate 6 score (Sanders et al. 2023; 16 climate variables; Euclidean distance) for the contiguous United States was 0.807, 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 *Morone americana* (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.

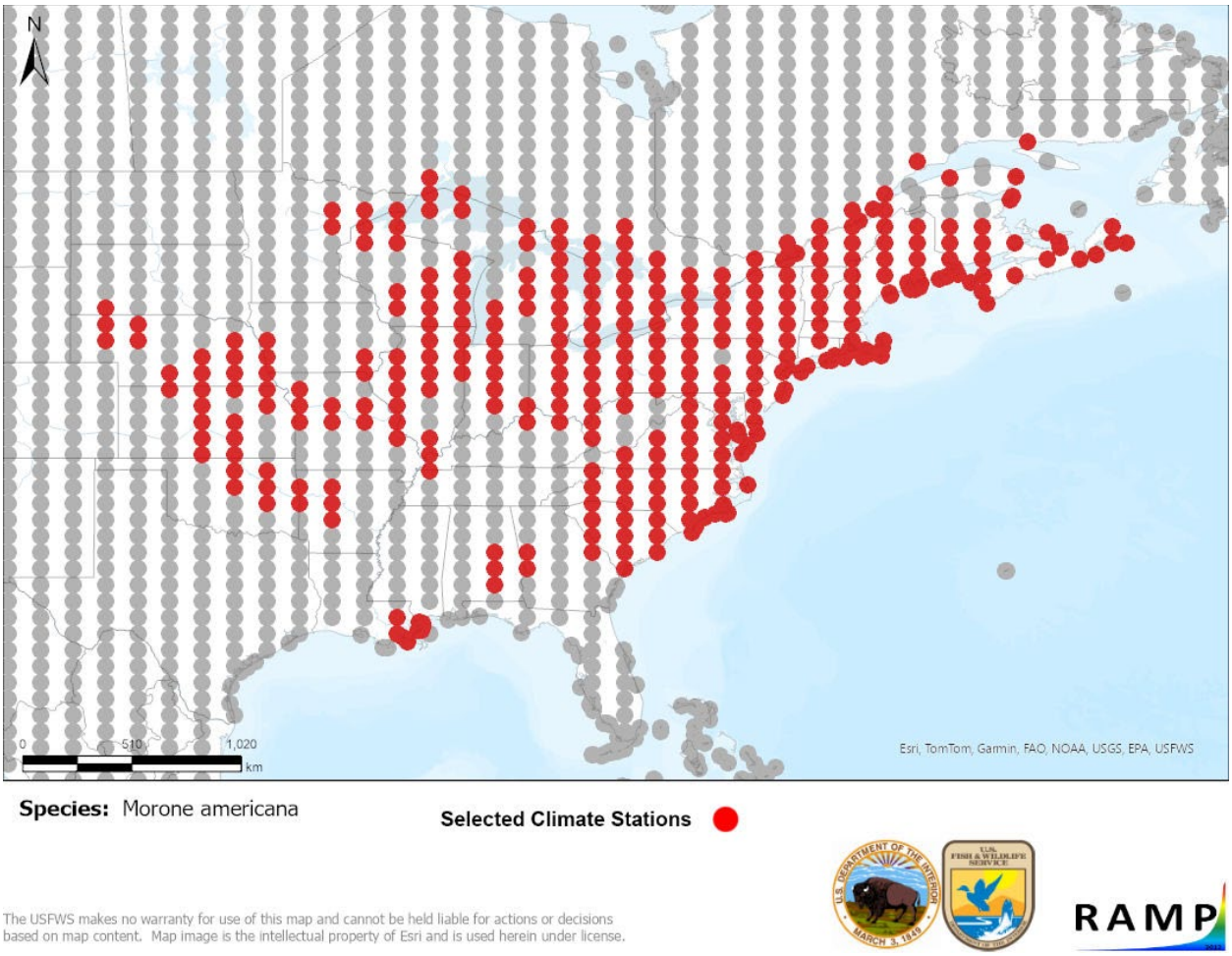

Figure 3. RAMP (Sanders et al. 2023) source map showing weather stations in North America selected as source locations (red; Canada, United States) and non-source locations (gray) for *Morone americana* climate matching. Source locations from GBIF Secretariat (2023) and Fuller et al. (2025). Selected source locations are within 100 km of one or more species occurrences, and do not necessarily represent the locations of occurrences themselves.

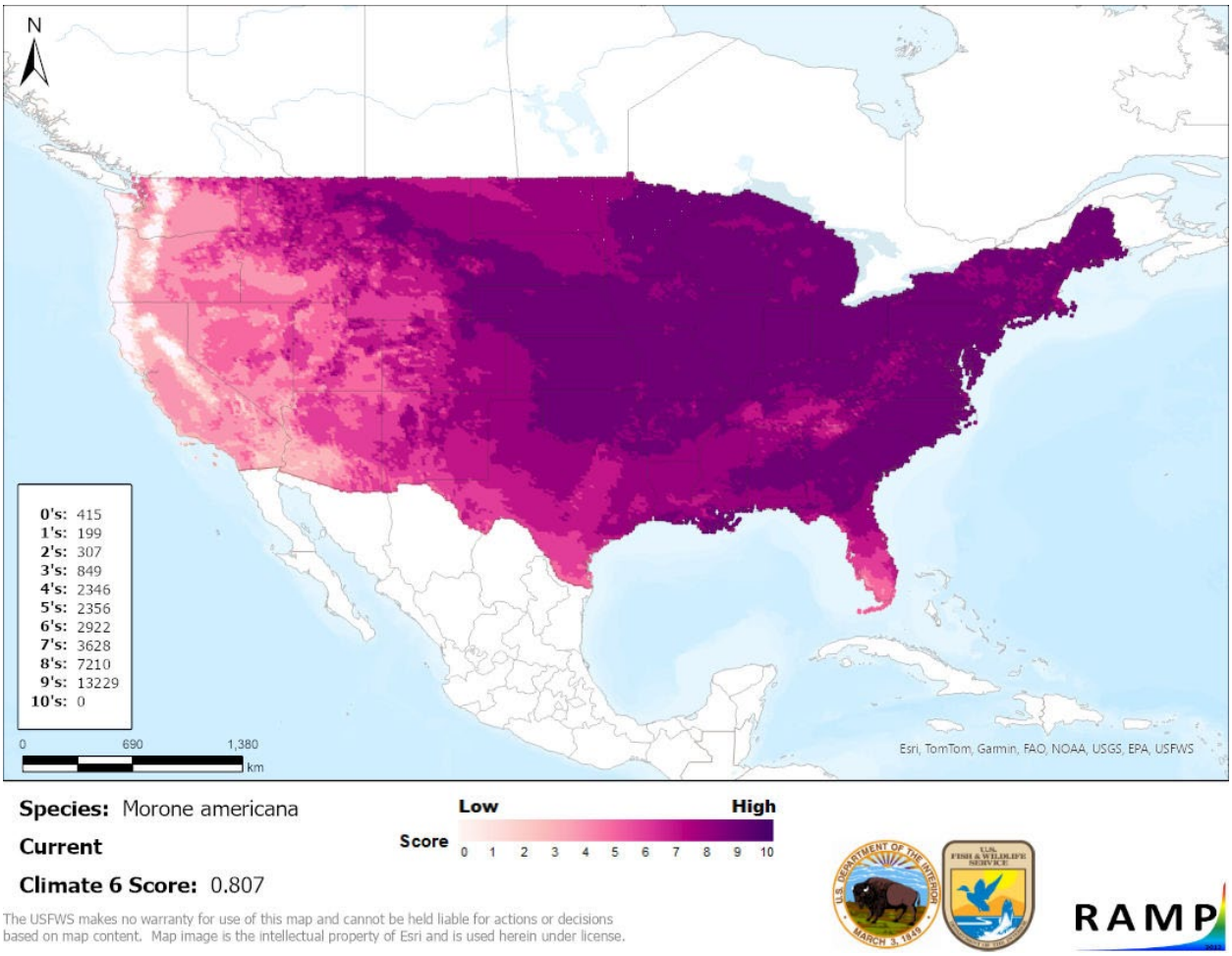

Figure 4. Map of RAMP (Sanders et al. 2023) climate matches for *Morone americana* in the contiguous United States based on source locations reported by GBIF Secretariat (2023) and Fuller et al. (2025). Counts of climate match scores are tabulated on the left. 0/Pale Pink = Lowest match, 10/Dark Purple = Highest match.

8 Certainty of Assessment

The Certainty of Assessment for *Morone americana* is classified as High. Adequate information is available on the biology, ecology, and distribution of this species. *M. americana* is an adaptable species with negative impacts of introduction documented in the literature.

9 Risk Assessment

Summary of Risk to the Contiguous United States

Morone americana, white perch, is a fish that is native to the Atlantic coast of the United States and Canada. *M. americana* inhabits fresh, brackish, and coastal waters. This species is a highly opportunistic forager and consumes a large quantity of fish eggs, macroinvertebrates, crustaceans, and fish. *Morone americana* is regulated in eight U.S. States. The History of Invasiveness for *M. americana* is classified as High. They have become established across the eastern and central United States due to intentional stocking and fish movement through man-

made hydrological connections. In some cases, introductions have been associated with substantial declines in native species. Additional potential impacts include contribution to cyanobacteria blooms and dilution of the gene pool of *Morone chrysops* via hybridization with *M. americana*. The climate matching analysis for the contiguous United States indicates establishment concern for this species outside its native range. The eastern and central United States have the highest climate matches for *M. americana*, while the lowest match is along the Pacific Coast. The Certainty of Assessment for this ERSS is classified as High due to ample documentation of *M. americana* biology, distribution, and history of invasiveness. The Overall Risk Assessment Category for *M. americana* 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): High**
- **Remarks, Important additional information:** This species may carry or be susceptible to viral hemorrhagic septicemia (VHS), a disease listed by the World Organisation for Animal Health.
- **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 GBIF Secretariat (2023) and Fuller et al. (2025).

Under the future climate scenarios (figure A1), on average, high climate match for *Morone americana* was projected to occur in much of the eastern and central contiguous United States, including the Appalachian Range, Great Lakes, Mid-Atlantic, Northeast, Northern Plains, Southeast, Southern Atlantic Coast, and Southern Plains regions. These areas include the native range of the species. Areas of low climate match were projected to occur in California and the Northern Pacific Coast region. The areas of highest match shifted northeastward and became smaller at the 2085 time step than at the 2055 time step, particularly under SSP5. The Climate 6 scores for the individual future scenario models (figure A2) ranged from a low of 0.659 (model: UKESM1-0-LL, SSP5, 2085) to a high of 0.792 (model: IPSL-CM6A-LR, SSP3, 2055). 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 (0.807, figure 4) falls above 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 all time step and climate scenarios only minor or no increases in the climate match relative to the current match were observed. Under the SSP5, 2085 scenario, areas within the Northern Plains saw a large decrease in the climate match relative to current conditions. Under one or more time step and climate scenarios, all other regions except the Northern Pacific Coast and Southern Florida saw a moderate decrease in the climate match relative to current conditions. The moderate declines in climate match were more widespread in 2085 than in 2055, especially under SSP5. Additional, very small areas of large or moderate change may be visible on the maps (figure A3).

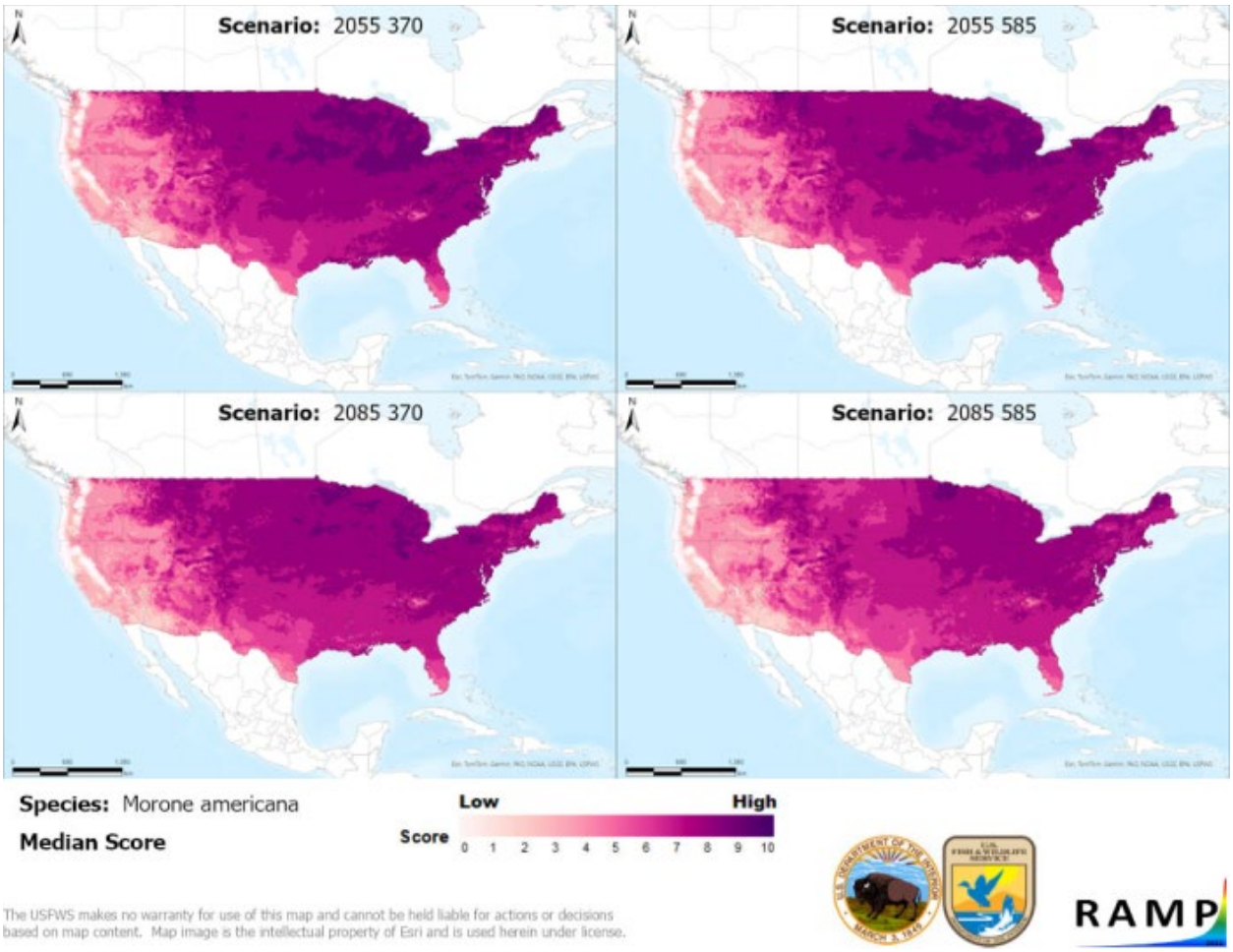

Figure A1. Maps of median RAMP (Sanders et al. 2023) climate matches projected under potential future climate conditions using five global climate models for *Morone americana* in the contiguous United States. Climate matching is based on source locations reported by GBIF Secretariat (2023) and Fuller et al. (2025). 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.

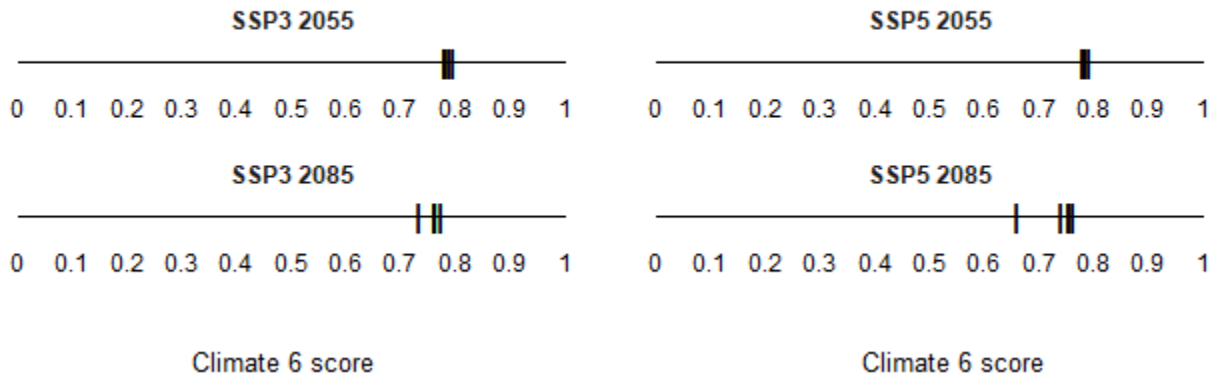

Figure A2. Comparison of projected future Climate 6 scores for *Morone americana* in the contiguous United States for each of five global climate models under four combinations of Shared Socioeconomic Pathway (SSP) and time step. SSPs used (from left to right): SSP3, SSP5 (Karger et al. 2017, 2018; IPCC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

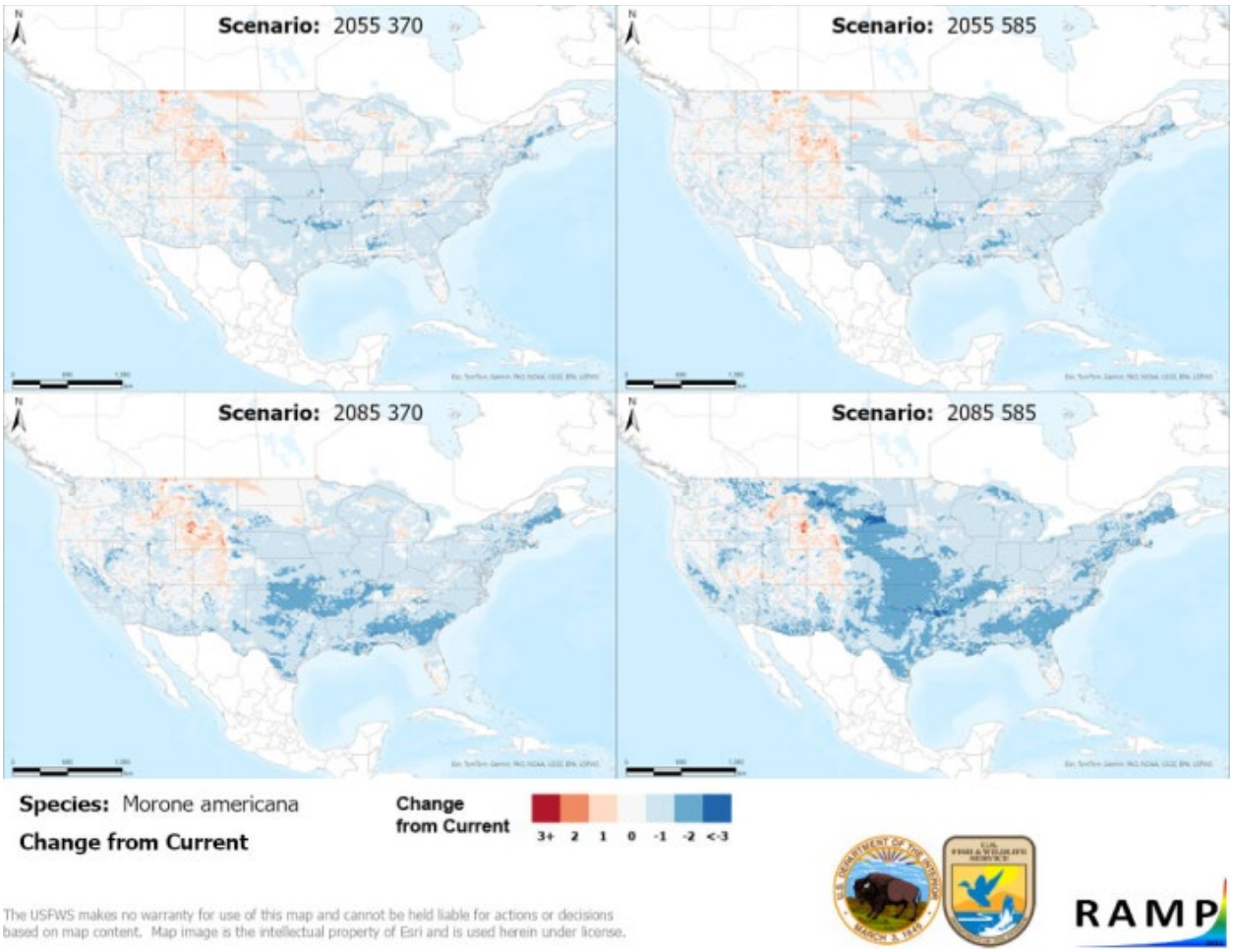

Figure A3. RAMP (Sanders et al. 2023) maps of the contiguous United States showing the difference between the current climate match target point score (figure 4) and the median target point score for future climate scenarios (figure A1) for *Morone americana* based on source locations reported by GBIF Secretariat (2023) and Fuller et al. (2025). 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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