Sauger (*Sander canadensis*)
Ecological Risk Screening Summary

U.S. Fish and Wildlife Service, January 2024
Revised, December 2024
Web Version, 8/14/2025

Organism Type: Fish
Overall Risk Assessment Category: Uncertain

Photo: Sam Stukel, U.S. Fish and Wildlife Service. Public domain. Available: https://digitalmedia.fws.gov/digital/collection/natdiglib/id/32025/rec/8 (August 2025).

1 Native Range and Status in the United States

Native Range

From Froese and Pauly (2023):

"North America: St. Lawrence-Great Lakes, Hudson Bay, and Mississippi River basins from Quebec to Alberta in Canada, and south to northern Alabama and Louisiana in the USA."

Status in the United States

From Froese and Pauly (2023):

"Found in St. Lawrence-Great Lakes and Mississippi River basin from Vermont and New York south to northern Alabama and Louisiana. Introduced into Atlantic, Gulf and southern Mississippi River drainages [Page and Burr 2011]."

From Fuller and Cannister (2024):

"Established in Arkansas, Georgia, Idaho, Oklahoma, Pennsylvania, Mississippi, North Dakota, South Carolina, Texas, and Wisconsin. Reported from Colorado, Florida, Georgia, Louisiana, and Nebraska. Extirpated in North Carolina. Unknown in other areas."

Fuller and Cannister (2024) report at least one established nonnative population in Louisiana. They also report *S. canadensis* establishment outside its native range in Illinois, Indiana, Kansas, Missouri, Ohio, and South Dakota, and failed *S. canadensis* introductions to Alabama.

No records of *Sander canadensis* in live trade in the United States were found.

Regulations

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

Means of Introductions within the United States

According to Fuller and Cannister (2024):

"Intentionally stocked for sportfishing in most areas. Introductions in the Lake Michigan drainage of Wisconsin are likely due to an [sic] canal connection linking the Wisconsin drainage to the Fox drainage."

Remarks

Other common names for *S. canadensis* reported by Froese and Pauly (2023) include: Pike Perch, Sand Pickerel, and Sand Pike.

From Ohio Department of Natural Resources (no date):

"Saugeye are created by crossing walleye eggs with sperm from a sauger. The result is a fast growing fish that has excellent survival abilities. […] Occasionally this hybrid naturally occurs where both parent species are found but it is rare. A small percentage of saugeye can reproduce and will do so with one another or either parent species if they are present in the same water body."

This ERSS does not cover the biology, ecology, distribution, or impacts of introduction of Saugeye.

S. canadensis 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 Acanthopterygii
Order Perciformes
Suborder Percoidei
Family Percidae
Genus *Sander*
Species *Sander canadensis* (Griffith and Smith, 1834)

According to Fricke et al. (2023), *Sander canadensis* (Griffith & Smith 1834) is the current valid name for this species. The following synonyms and previous names were used to search for information for this report: *Stizostedion canadense, Lucioperca borea,* and *Lucioperca canadensis*.

Size, Weight, and Age Range

From Froese and Pauly (2023):

"Maturity: L_m [length at maturity] 32.0 range ? - ? cm
Max length : 76.0 cm TL [total length] male/unsexed; [Page and Burr 2011]; common length : 35.8 cm TL male/unsexed; [Hugg 1996]; max. published weight: 4.0 kg [International Game Fish Association 1991]; max. reported age: 18 years [Hart 1928]"

From Becker (1983):

"Length 305-330 mm (12-13 in)."

From NatureServe Explorer (2024):

“In the north, males sexually mature in 2-3 years, females in 4-6 years (Scott and Crossman 1973). In Virginia, both sexes mature at 2-3 years.”

Environment

From Froese and Pauly (2023):

“Freshwater; demersal; depth range 5 - ? m [Collette et al. 1977] […] ? - 30°C [Eaton et al. 1995]; […].”

From NatureServe Explorer (2024):

“Sand and gravel runs, sandy and muddy pools and backwaters, of small to large rivers; less often in lakes and impoundments (Page and Burr 1991). Typical of large, cool or warm, often turbid, slow-flowing rivers. Often in clear water in the south. Rarely descends to brackish water in the St. Lawrence River.”

From Becker (1983):

“Gammon (1973) suggested a preferred water temperature of about 25.5°C (78°F). The preferred temperatures of saugers in the Norris Reservoir, Tennessee, were 18.6-19.2°C (65.5-66.6°F) (Ferguson 1958).”

Climate

From Froese and Pauly (2023):

“Subtropical; […] 57°N - 31°N, 120°W - 71°W [Page and Burr 2011]”

Distribution Outside the United States

Native

From Froese and Pauly (2023):

“North America: St. Lawrence-Great Lakes, Hudson Bay […] basins from Quebec to Alberta in Canada, […]”

“Alberta (native), Manitoba (native), Ontario (native), Quebec (native), Saskatchewan (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.

Introduced

No records were found of introduction of *S. canadensis* in the wild outside the United States.

Means of Introduction Outside the United States

No records were found of introduction of *S. canadensis* in the wild outside the United States.

Short Description

From Becker (1983):

"Body elongate, almost cylindrical but slightly compressed laterally. […] Mouth large, almost horizontal, upper jaw reaching back of eye, […] Dorsal fins 2; first or spiny dorsal fin with 12 (10-13) spines; second dorsal fin with 1-2 spines 18 (17-19) rays. Anal fin with 2 spines and 11-13 rays. […] Dorsal region of head and back brown to gray; sides paler, ventral region of head and belly white. Sides and back variously speckled with dusky spots; 4 dark saddles across back, some of which expand horizontally on sides. Eyes silvery in life; […] Membranes on the spiny dorsal fin with definite horizontal rows of spots, and last few membranes not solid black; second dorsal and caudal fins with dark spots in regular rows; ventral lobe of caudal fin sometimes white edged. Pectoral fins lightly speckled, and with a strong, black blotch at base; pelvic and anal fins clear to lightly speckled."

Biology

From NatureServe Explorer (2024):

"Most active in evening and early morning in clear water, period of activity increased in more turbid water (Scott and Crossman 1973). Adapted to night activity (Burkhead and Jenkins 1991)."

"Larvae eat microcrustaceans. Young eat zooplankton, immature and adult aquatic insects, and fish fry; adults eat small fishes and various invertebrates (Scott and Crossman 1973), or are almost exclusively piscivorous (Burkhead and Jenkins 1991). Sight feeder, adapted to low light."

"In lakes, spawns along sandy and rocky shores and over rocky reefs at depths of 0.6-3.6 m. In rivers, spawns in deep rocky runs (Burkhead and Jenkins 1991). May leave lake to spawn upstream in river."

"Spawns over 2-week period in spring, from as early as mid-March in Alabama to late June in North Dakota, at water temperatures of 4 C in North Dakota to 14 C in Tennessee (see Burkhead and Jenkins 1991). Eggs hatch in about 3-4 weeks at 5-13 C."

Human Uses

From Froese and Pauly (2023):

"Gamefish: yes"

From Montana Natural Heritage Program and Montana Fish, Wildlife, and Parks (2024):

"Sauger are a highly prized sport fish and in some areas […] are also commercially fished."

From Schmalz et al. (2011):

"Aboriginal […] sauger fisheries currently exist in a number of states and provinces in the United States and Canada."

"Europeans settling in North America established commercial fisheries for […] sauger on the Great Lakes by the late 1700s and those fisheries developed throughout the 1800s (Regier et al. 1969; Colby et al. 1979; Nielsen 1999). […] Commercial […] sauger harvest in North America still occurs in Canadian waters of the Great Lakes and other large inland lakes including Lakes Winnipeg, Winnipegosis, and Manitoba, Lake of the Woods, Rainy Lake, Eagle Lake, Lake Nipigon, and others."

"The vast majority of […] sauger fisheries in North America are strictly recreational in nature […]"

Diseases

No information was found associating *S. canadensis* with any diseases listed by the World Organisation for Animal Health (December 2024).

According to Poelen et al. (2014), *S. canadensis* is a host for the following pathogens and parasites: *Bothriocephalus sp., Triaenophorus nodulosus*, *Proteocephalus ambloplitis*, *Centrovarium sp.*, *Neoechinorhynchus cylindratus*, *Dibothriocephalus latus*, *Bothriocestus cuspidatus*, *Neoechinorhynchus tenellus*, *Phyllodistomum superbum*, *Prosorhynchoides pusillus*, *Bothriocephalus claviceps*, *Ichthyocotylurus platycephalus*, *Azygia sp.*, *Proteocephalus sp., Bothriocephalus sp.*, *Clinostomum marginatum*, *Triaenophorus crassus*, *Crepidostomum sp.*, Tapeworms, *Echinorhynchus salmonis*, *Gyrodactylus sp.*, *Bucephalus sp.*, *Macrovestibulum sp.*, *Yersinia ruckeri*, *and* Largemouth Bass Virus.

Threat to Humans

From Froese and Pauly (2023):

"Harmless"

3 Impacts of Introductions

No information available on impacts of reported introductions.

4 History of Invasiveness

The History of Invasiveness for *S. canadensis* is classified as Data Deficient. *S. canadensis* is established outside of its native range. However, there is no clear, convincing, reliable evidence of impacts of its introductions, or lack thereof.

5 Global Distribution

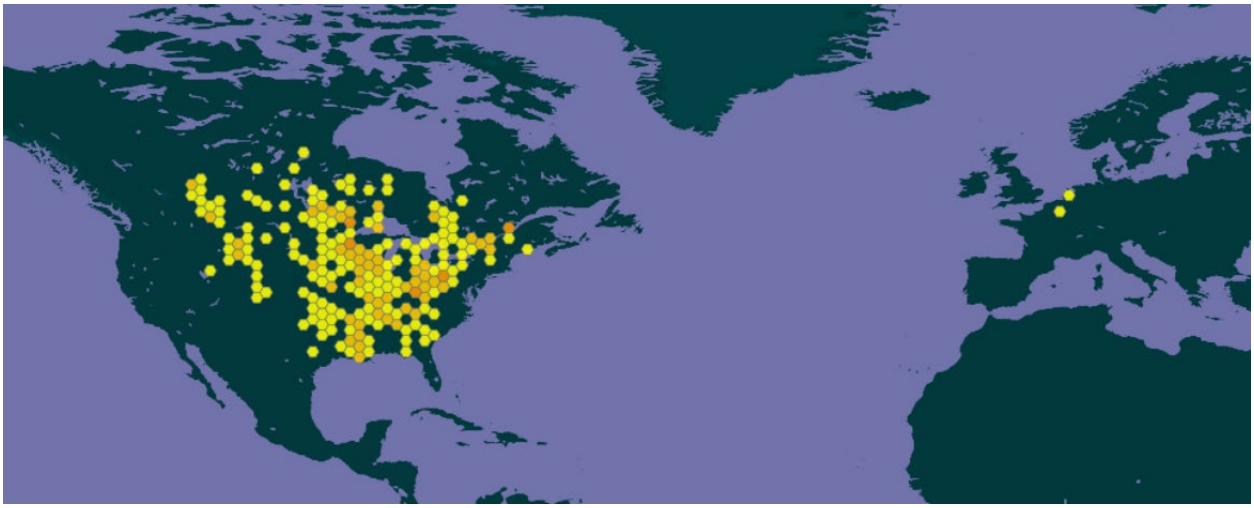

Figure 1. Reported global distribution of *Sander canadensis*. Map from GBIF Secretariat (2023). Observations are reported from the United States and Canada. The occurrences in Europe (in Belgium and the Netherlands) were tagged with "coordinate reprojection suspicious," and no other scientific literature corroborates the presence of *S. canadensis* in these locations, so they were not used to select source locations for the climate matching analysis. The occurrences in the United States in Colorado, Florida, and South Carolina do not represent established populations (see section 6) and therefore were not used to select source locations for the climate matching analysis.

6 Distribution Within the United States

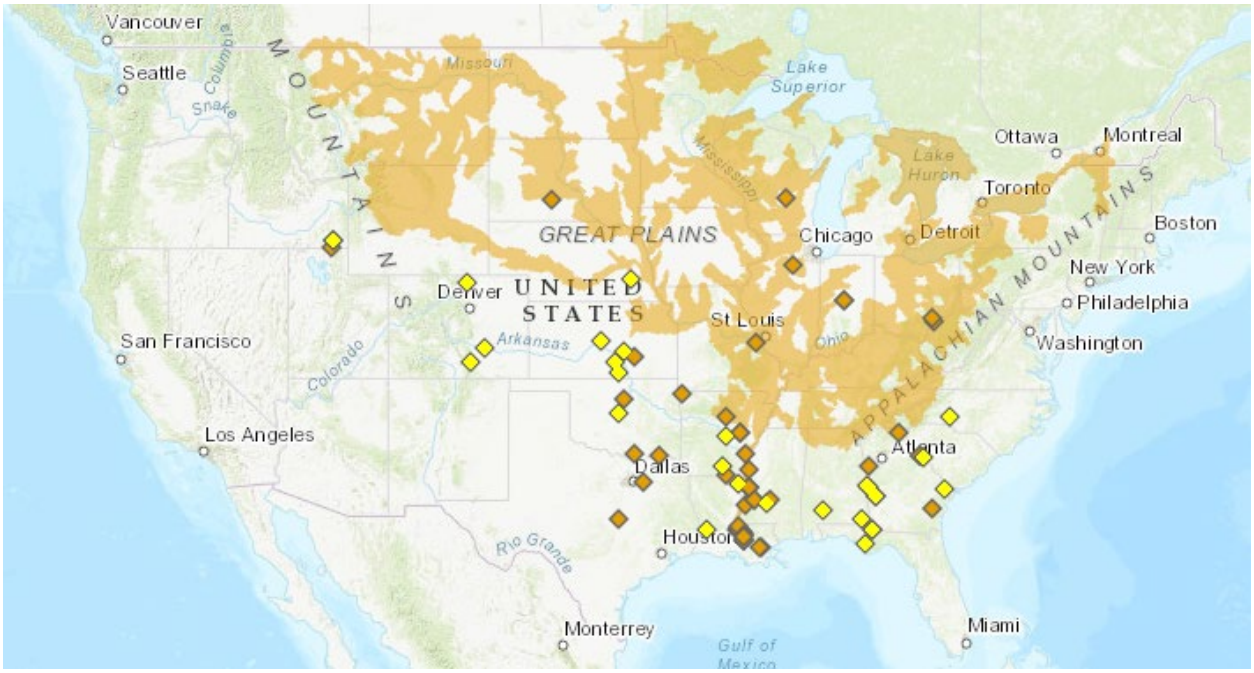

Figure 2. Reported distribution of *Sander canadensis* in the United States. Map from Fuller and Cannister (2024). The native range of *S. canadensis* occurs in the majority of the Mississippi River Basin (Upper and Lower Mississippi River Basins, Missouri River Basin, Ohio River Basin, Arkansas River Basin), the Great Lakes-St. Lawrence River Basin, and the U.S. portions of the Hudson Bay Basin. Nonnative observations (represented by diamonds) are reported from Alabama, Arkansas, Colorado, Florida, Georgia, Idaho, Illinois, Indiana, Kansas, Louisiana, Mississippi, Missouri, Nebraska, North Carolina, Ohio, Oklahoma, South Carolina, South Dakota, Texas, and Wisconsin. Orange points represent established populations of *S. canadensis* and yellow points represent other reported occurrences of *S. canadensis*. Only established populations and points in the native range of *S. canadensis* were used to select source locations for the climate matching analysis.

7 Climate Matching

Summary of Climate Matching Analysis

The climate match for *Sander canadensis* to the contiguous United States was very high in its native range in the Great Lakes and Mississippi River Basins. However, the climate match was also high in the Southeast, South Atlantic and Gulf Coasts into central Florida; and in parts of the Great Basin and Southwest regions. Areas of medium match were found in southern Florida, southern Texas, southwest New Mexico, and the majority of Arizona, Idaho, Washington, and California. Areas of low match were found along the Pacific Coast and in the Cascade and Sierra Nevada ranges. The overall Climate 6 score (Sanders et al. 2023; 16 climate variables; Euclidean distance) for the contiguous United States was 0.914, indicating that 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 *Sander canadensis* (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.

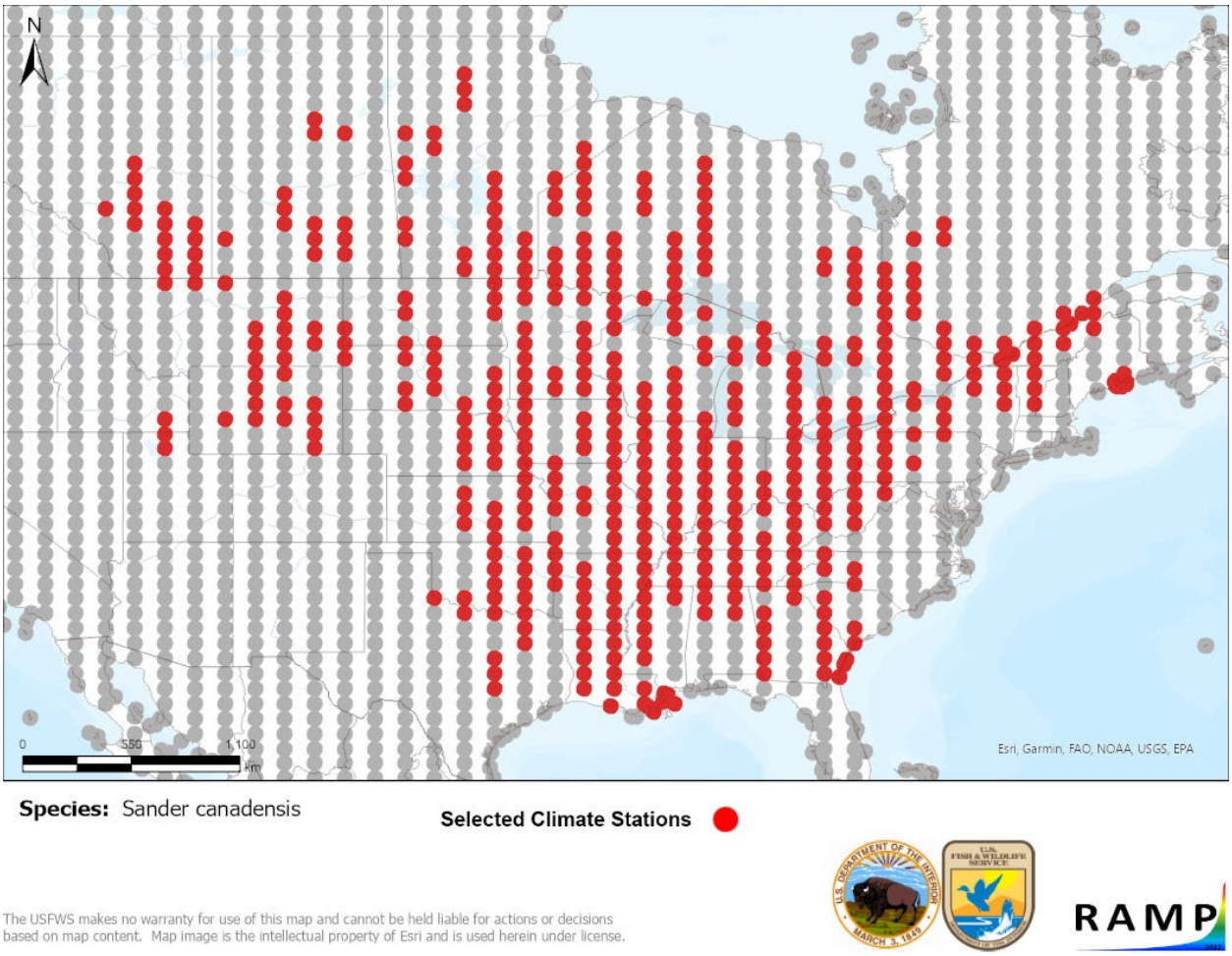

Figure 3. RAMP (Sanders et al. 2023) global source map showing weather stations selected as source locations (red; United States and Canada) and non-source locations (gray) for *Sander canadensis* climate matching. Source locations from GBIF Secretariat (2023). Selected source locations are within 100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

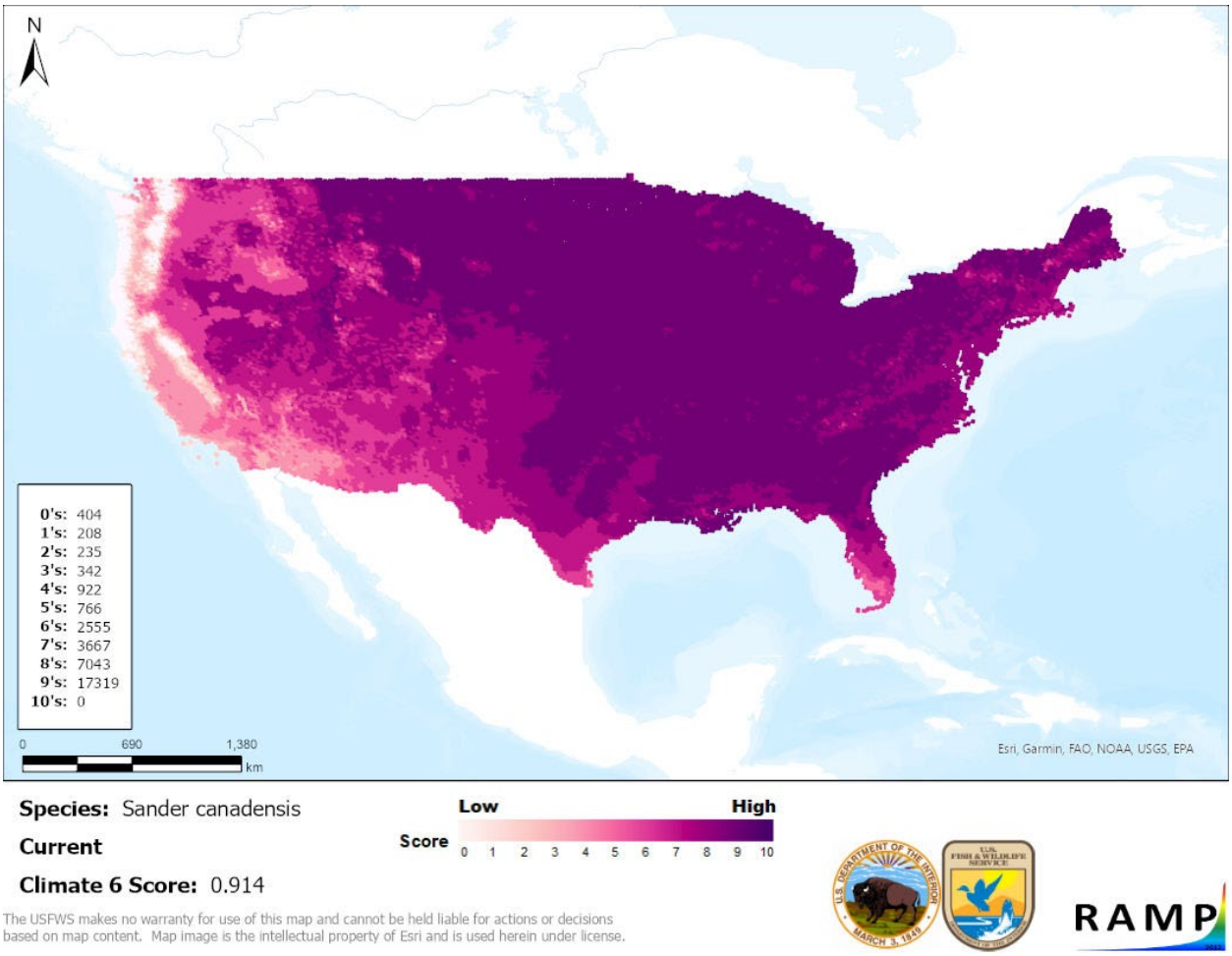

Figure 4. Map of RAMP (Sanders et al. 2023) climate matches for *Sander canadensis* in the contiguous United States based on source locations reported by GBIF Secretariat (2023). Counts of climate match scores are tabulated on the left. 0/Pale Pink = Lowest match, 10/Dark Purple = Highest match.

8 Certainty of Assessment

The Certainty of Assessment for *Sander canadensis* is classified as Low. There is sufficient information regarding the species distribution, biology, and ecology. However, there is a lack of information regarding the history of invasiveness. There are no documented impacts of introductions of *S. canadensis* outside of its native range, nor documentation of a lack of impacts.

9 Risk Assessment

Summary of Risk to the Contiguous United States

Sander canadensis, Sauger, is a fish that is native from the St. Lawrence River and Lake Champlain through the Mississippi River Basin, parts of the southeastern United States, and in Canada from Quebec to Alberta. *S. canadensis* has been introduced via stocking in many bodies of water across the United States and has become established outside of its native range. There

are recreational, commercial, and indigenous fisheries for this species in North America. *S. canadensis* may hybridize with walleye, *S. vitreus*, producing the Saugeye. The History of Invasiveness for *S. canadensis* is classified as Data Deficient due to it being established outside of its native range but there being no clear, convincing, reliable evidence of impacts of its introduction. The climate matching analysis for the contiguous United States indicates establishment concern for this species outside its native range. The highest matches occurred from Maine south to central Florida and west to Texas and Montana. The Certainty of Assessment for this ERSS is classified as Low due to the lack of information regarding impacts of introductions. The Overall Risk Assessment Category for *Sander canadensis* 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: Stocked in many areas throughout the United States.**
- **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 (2023).

Under the future climate scenarios (figure A1), on average, high climate match for *Sander canadensis* was projected to occur in the eastern two-thirds of the contiguous United States, including the Appalachian Range, Colorado Plateau, Great Lakes, Mid-Atlantic, Northeast, Northern Plains, Southeast, Southern Atlantic Coast, and Southern Plains regions. Areas of low climate match were projected to occur in California and the Northern Pacific Coast regions. Although the general categorization of these areas as high or low climate match remained stable across scenarios, the climate match was projected to be lower at the 2085 time step than at the 2055 time step and lower under SSP5 than under SSP3. The Climate 6 scores for the individual future scenario models (figure A2) ranged from a low of 0.808 (model: UKESM1-0-LL, SSP5, 2085) to a high of 0.913 (model: GFDL-ESM4, 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 (0.914, 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. Additionally, areas within the Appalachian Range, California, Colorado Plateau, Great Basin, Gulf Coast, Mid-Atlantic, Northeast, Southeast, Southern Atlantic Coast, Southern Plains, and Southwest saw a moderate decrease in the climate match relative to current conditions. These moderate decreases in climate match occurred mostly at the 2085 time step. Additional, very small areas of large or moderate change may be visible on the maps (figure A3).

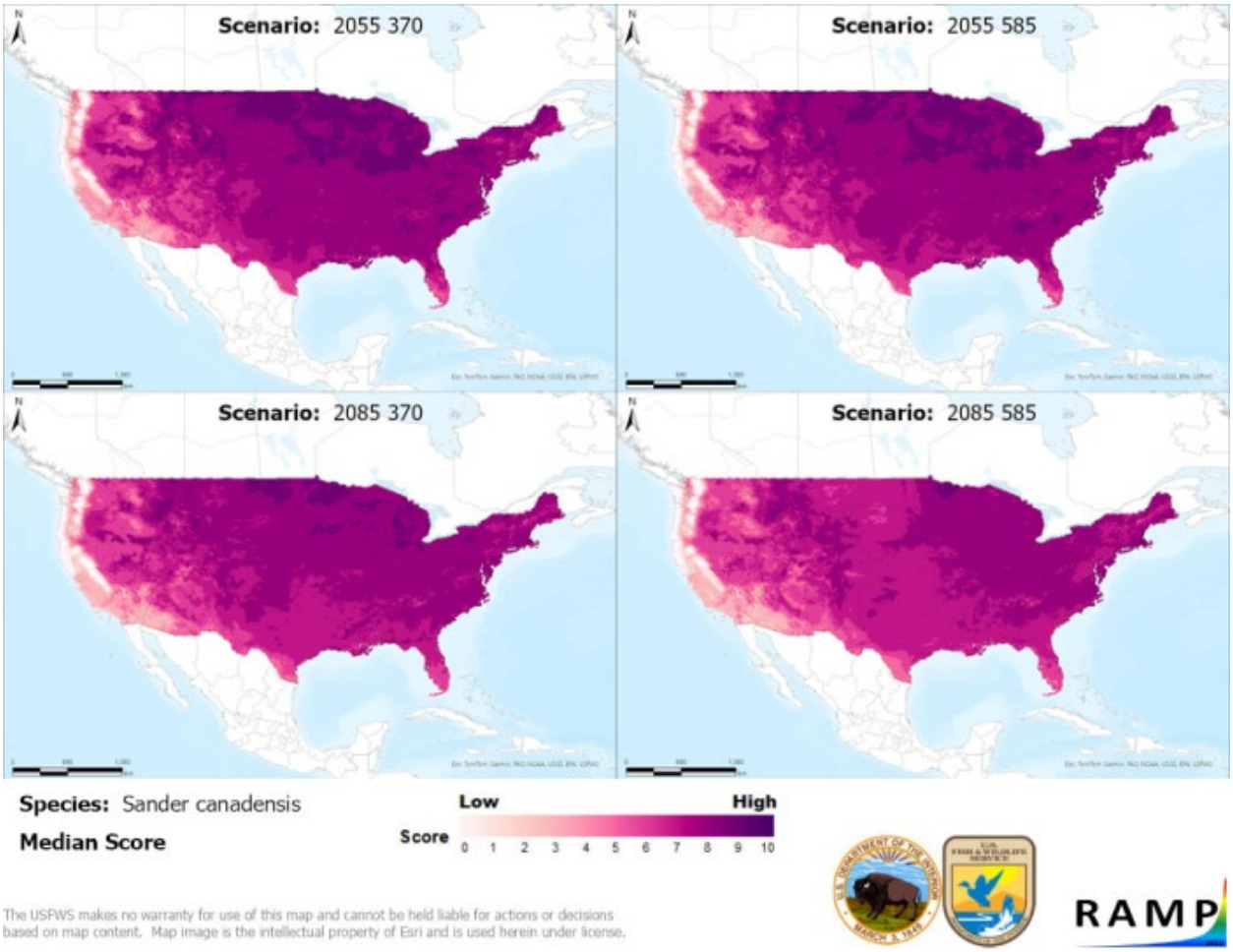

Figure A1. Maps of median RAMP (Sanders et al. 2023) climate matches projected under potential future climate conditions using five global climate models for *Sander canadensis* in the contiguous United States. Climate matching is based on source locations reported by GBIF Secretariat (2023). Shared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

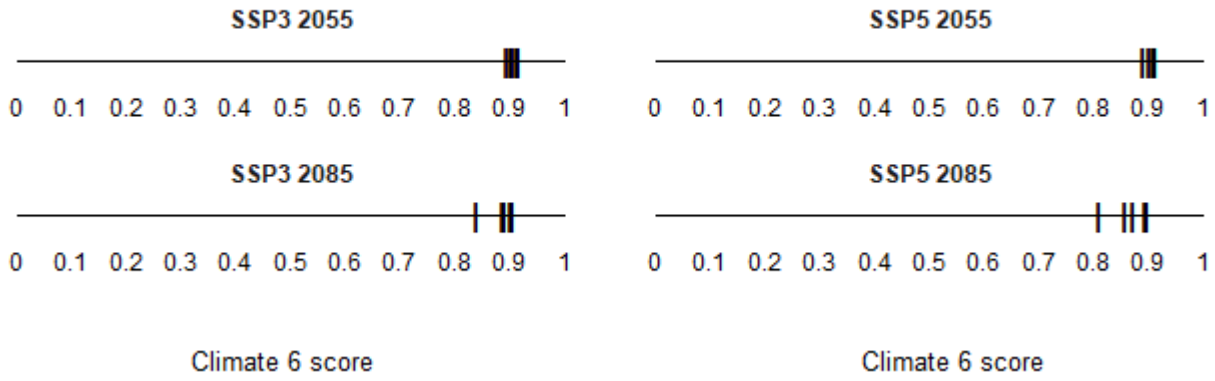

Figure A2. Comparison of projected future Climate 6 scores for *Sander canadensis* in the contiguous United States for each of five global climate models under four combinations of Shared Socioeconomic Pathway (SSP) and time step. SSPs used (from left to right): SSP3, SSP5 (Karger et al. 2017, 2018;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

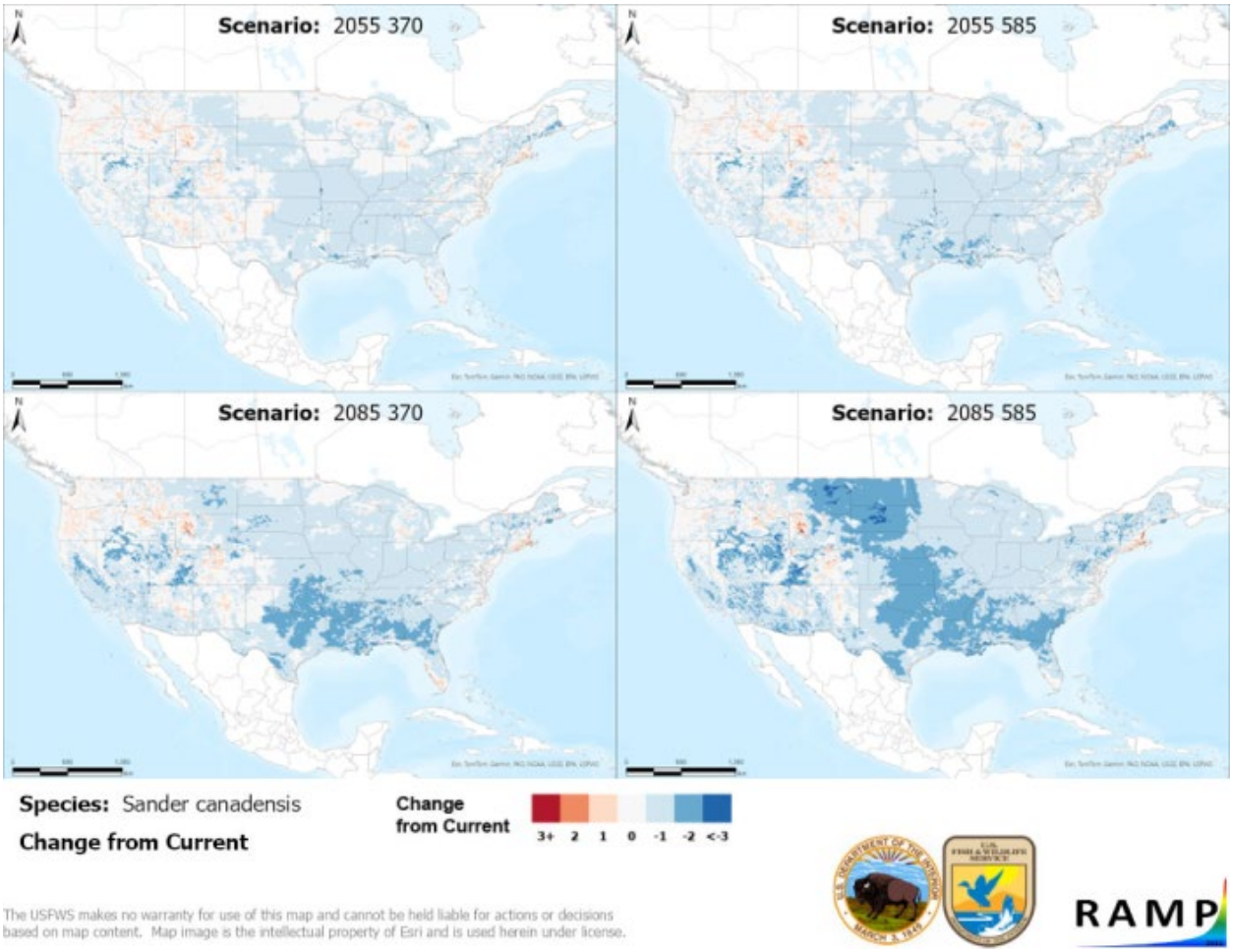

Figure A3. RAMP (Sanders et al. 2023) maps of the contiguous United States showing the difference between the current climate match target point score (figure 4) and the median target point score for future climate scenarios (figure A1) for *Sander canadensis* based on source locations reported by GBIF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