

# Atlantic sturgeon (*Acipenser oxyrinchus*)

## Ecological Risk Screening Summary

U.S. Fish and Wildlife Service, web version – 03/29/2018



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## 1 Native Range and Status in the United States

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### Native Range

From Froese and Pauly (2014):

“Western Atlantic: Hamilton River, Labrador, Newfoundland, Canada to northeastern Florida, USA. Occurs occasionally in Bermuda and French Guiana [Robins and Ray 1986]. Northern Gulf of Mexico [Smith 1997]. In Europe: Baltic Sea. Landlocked populations in Lakes Ladoga and Onega (Russia), both now extirpated. Occasionally recorded from Great Britain and North Sea in Elbe drainage [Kottelat and Freyhof 2007]. Recent research revealed that this species existed in the Baltic Sea, but is now extirpated [Ludwig et al. 2002, 2008].”

## Status in the United States

From Froese and Pauly (2014):

“USA: native”

From NOAA Fisheries (2016):

“Historically, Atlantic sturgeon were present in approximately 38 rivers in the United States from St. Croix, ME to the Saint Johns River, FL, of which 35 rivers have been confirmed to have had a historical spawning population. Atlantic sturgeon are currently present in approximately 32 of these rivers, and spawning occurs in at least 20 of them.”

GBIF Secretariat (2014) contains a record in California that is assumed to be a misidentification as it is from 1956 and not substantiated elsewhere.

## Means of Introductions in the United States

No records of non-native *Acipenser oxyrinchus* introductions in the United States were found.

## Remarks

From Froese and Pauly (2014):

“Near threatened globally, but extirpated in Europe [Kottelat and Freyhof 2007]. International trade restricted [CITES II, since 28.6.79].”

From St. Pierre and Parauka (2006):

“Near Threatened ver 3.1”

According to NOAA Fisheries (2015, 2016) there are two subspecies of *Acipenser oxyrinchus*: *Acipenser oxyrinchus oxyrinchus* and *Acipenser oxyrinchus desotoi*.

# 2 Biology and Ecology

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## Taxonomic Hierarchy and Taxonomic Standing

From ITIS (2014):

“Kingdom Animalia  
Subkingdom Bilateria  
Infrakingdom Deuterostomia  
Phylum Chordata  
Subphylum Vertebrata  
Infraphylum Gnathostomata  
Superclass Osteichthyes

Class Actinopterygii  
 Subclass Chondrostei  
 Order Acipeneriformes  
 Suborder Acipenseroidae  
 Family Acipenseridae  
 Subfamily Acipenerinae  
 Genus *Acipenser*  
 Species *Acipenser oxyrinchus* Mitchill, 1815”

From Eschmeyer et al. (2017):

“***oxyrinchus*, *Acipenser*** Mitchill [S. L.] 1815:462 [...] [Transactions of the Literary and Philosophical Society of New-York v. 1 (art. 5) (for 1814)] New York, U.S.A. No types known. Commonly misspelled; *oxyrinchus* is the correct spelling. Declared a nomen protectum by Kottelat & Freyhof 2009:75 [...] on Art. 23.9.1 for reversal of precedence over *Sturio accipenser* Strøm 1784 and *Acipenser lichtensteinii* Bloch & Schneider 1801. •Valid as *Acipenser oxyrinchus* Mitchill 1815 [often misspelled *oxyrhynchus*] -- (Lee et al. 1980:41 [...], Smith 1986:47 [...], Robins & Ray 1986:44 [...], Scott & Scott 1988:68 [...], McAllister 1990:42 [...], Burkhead & Jenkins 1991:344 [...], Page & Burr 1991:27 [...], Boschung 1992:28 [...], Musick et al. in Jenkins & Burkhead 1994:187 [...], Knight & Hastings 1994:149 [...], Artyukhin 1995:7 [...], Ong et al. 1996:464 [...], Chereshev 1996:599 [...], Bemis et al. 1997:37 [...], Murdy et al. 1997:53 [...], Birstein & Bemis 1997:159 [...], McEachran & Fechhelm 1998:198 [...], Scott & Crossman 1998:92 [...], Smith-Vaniz et al. 1999:125 [...], Musick et al. 2000:10 [...], Scott 2003:671 [...], Nelson et al. 2004:58 [...], Fricke 2007:25 [...], Kottelat & Freyhof 2007:53 [...], Page et al. 2013:58 [...]). •Valid as *Acipenser oxyrinchus* Mitchell 1815, subspecies *oxyrinchus* Mitchell 1815 -- (Ross et al. 2001:76 [...], Musick in Collette & Klein-MacPhee 2002:85 [...], Boschung & Mayden 2004:105 [...], Scharpf 2005:7 [...], Miller 2006:81 [...], Kottelat & Freyhof 2009:78 [...], Mecklenburg et al. 2011:117 [...], Page & Burr 2011:137 [...] with 2 subspecies, Hilton et al. 2011:136 [...], Parin et al. 2014:43 [...]). **Current status:** Valid as *Acipenser oxyrinchus* Mitchill 1815. Acipenseridae.”

## Size, Weight, and Age Range

From Froese and Pauly (2014):

“Maturity: L<sub>m</sub> 190.0, range 183 - 243.8 cm  
 Max length: 403 cm TL male/unsexed; [Smith 1997]; 430.0 cm TL (female); common length: 250 cm TL (female); max. published weight: 0.00 g; max. reported age: 60 years [Magnin 1964]”

From NOAA Fisheries (2016):

“Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*)”

“Weight: up to 800 pounds (370 kg)  
 Length: up to 14 feet (4.3 m)”

From NOAA Fisheries (2015):

“Gulf Sturgeon (*Acipenser oxyrinchus desotoi*)”

“Weight: up to 200 pounds (90 kg)

Length: 4-8 feet (1-2.5 m)”

## **Environment**

From Froese and Pauly (2014):

“Marine; freshwater; brackish; [...] [Riede 2004]; depth range ? - 46 m [Jones et al. 1978].”

From NOAA Fisheries (2015):

“[...] an average water temperature of 60-72° F.”

## **Climate/Range**

From Froese and Pauly (2014):

“Subtropical; 56°N - 10°S, 102°W - 33°W [Matallanas 2005]”

## **Distribution Outside the United States**

Native

From Froese and Pauly (2014):

“Western Atlantic: Hamilton River, Labrador, Newfoundland, Canada to northeastern Florida, USA. Occurs occasionally in Bermuda and French Guiana [Robins and Ray 1986]. Northern Gulf of Mexico [Smith 1997]. In Europe: Baltic Sea. Landlocked populations in Lakes Ladoga and Onega (Russia), both now extirpated. Occasionally recorded from Great Britain and North Sea in Elbe drainage [Kottelat and Freyhof 2007]. Recent research revealed that this species existed in the Baltic Sea, but is now extirpated [Ludwig et al. 2002, 2008].”

Introduced

No records of *Acipenser oxyrinchus* introductions were found.

## **Means of Introduction Outside the United States**

No records of *Acipenser oxyrinchus* introductions were found.

## **Short Description**

From Froese and Pauly (2014):

“Dorsal spines (total): 0; Dorsal soft rays (total): 30-46; Anal spines: 0; Anal soft rays: 22 - 32. Elongate fish, pentagonal in cross section and shark-like fins [Smith 1997]. Double row of pre anal shields. Presence of a soft fontanelle. Bony shields are oval. Carina on dorsal shields do not

have a conspicuous hook. Head and back bluish-black and lower surface whitish [Bigelow et al. 1963]. Snout long, sharply V-shaped. 2 pairs of short, slender barbels in transverse line midway between end of snout and anterior edge of mouth [Jones et al. 1978]. Viscera pale [Robins and Ray 1986]. Presence of 4 small scutes, usually as 2 pairs between anal fin and caudal fulcrum [Page and Burr 2011].”

From NatureServe (2014):

“Snout shovel-shaped, long, and sharply V-shaped, with large fleshy barbels (snout upturned in young); mouth ventrally located; large bony scutes on the head and among the back and sides (white spines on scutes contrast with dark skin); tail heterocercal; 2 pairs of preanal scutes; 4 small scutes, usually as 2 pairs, between anal fin and caudal fulcrum (first pair may overlap anal fin base, second pair may look like one scute); 6-9 scutes, mostly in pairs, behind dorsal fin; blue-black above, white below; fins blue-black to gray; paired fins, lower lobe of caudal fin, and anal fin have white leading edge; 26-28 anal rays; 15-27 gill rakers; 7-16 scutes on back; 24-35 scutes along side; maximum length about 4.3 m (Page and Burr 1991).

Differs from the shortnose sturgeon in having a longer, more sharply V-shaped snout, a larger number of scutes between the anal and caudal fins (4 vs. 1), preanal scutes in two rows rather than in one row, and a large number of scutes behind the dorsal fin (6-9 vs. 2). Differs from the white sturgeon in having scutes between the anal and caudal fins and between the dorsal and caudal fins (obvious scutes are absent in these locations in white sturgeon). Differs from green sturgeon in being blue-black above rather than green, and in having two rows of preanal scutes (vs. 1) and 4 (vs. 1) large scutes between the anal and caudal fins. See Page and Burr (1991).”

## **Biology**

From Froese and Pauly (2014):

“Feeds on bottom plants, insect larvae, small crustaceans and molluscs when in fresh water, while molluscs, annelid worms, crustaceans and small fishes such as sand lance are consumed in the sea [Kottelat and Freyhof 2007].”

“Anadromous species. Occurs solitarily or in small groups; inhabits shallow waters of continental shelves. At the sea, it occurs in coastal and estuarine areas on soft bottom [Kottelat and Freyhof 2007] down to a depth of 50 m [Fricke 2007]. Adults are highly migratory while at sea [Miller 2005] and make long migrations along the coast [Kottelat and Freyhof 2007]. They forage mainly in brackish waters [Kottelat and Freyhof 2007]. Ascend large rivers to spawn [Kottelat and Freyhof 2007]. Juveniles may remain in fresh or brackish water until 2-5 years of age or 76-91.5 cm long [Jones et al. 1978, Kottelat and Freyhof 2007]. Today most individuals do not exceed 250 cm length. Tagging studies have shown that this species may move distances up to 1,450 km [Dovel and Berggren 1983].”

“Matures at increasing ages with increasing latitude [Narberhaus et al. 2012]. Both sexes do not spawn yearly and spawning intervals may vary according to area. In the St. Lawrence River, males spawn every 1-5 years, females every 3-5 years [Billard and Lecointre 2001]. Adults from the sea begin to ascend the lower reaches of large rivers in spring with the majority ascending

immediately prior to spawning. Spawning occurs between March and August [Kottelat and Freyhof 2007], when water temperature is 13.3-17.8 °C [Borodin 1925]. Spawning occurs over bedrock, boulders or gravel bottoms, in depths exceeding 10 m at current velocities of 0.5-0.8 m/s [Billard and Lecointre 2001, Kottelat and Freyhof 2007]. Exact time of spawning depends on temperature [Smith 1997]. Per female 0.4-8 million eggs may be spawned [Smith et al. 1982, Van Eenennaam and Doroshov 1998, Dadswell 2006]. Eggs demersal, sticking to stones, measuring 2.55 mm in diameter and hatching in 1 week at 17.8 °C [Vladykov and Greeley 1963, Jones et al. 1978]. Adults return to the sea after spawning [Kottelat and Freyhof 2007]. Sturgeons in general have a high capacity for hybridization and most species are able to cross-breed [Holcik et al. 1989, Billard and Lecointre 2001].”

From NatureServe (2014):

“Spawns as early as February-March in the south, April-May in Chesapeake Bay tributaries, May-July in north, at water temperatures of 13-21 °C. Eggs hatch in about a week. Females first breed at about 11 years (mean) in South Carolina, 18-19 years in the Hudson River, about 27-28 years in the St. Lawrence River; generally matures at a younger age in the south than in the north (as early as 7 years or as late as 34 years). Successive spawnings may be separated by intervals of a few to several years. May live several decades. See Gilbert (1989) for much further information on reproduction.”

From NOAA (2010):

“Atlantic sturgeon are "anadromous"; adults spawn in freshwater in the spring and early summer and migrate into "estuarine" and marine waters where they spend most of their lives. In some southern rivers a fall spawning migration may also occur. They spawn in moderately flowing water (46-76 cm/s) in deep parts of large rivers. Sturgeon eggs are highly adhesive and are deposited on bottom substrate, usually on hard surfaces (e.g., cobble). It is likely that cold, clean water is important for proper larval development. Once larvae begin migrating downstream they use benthic structure (especially gravel matrices) as refuges. Juveniles usually reside in estuarine waters for months to years.

Subadults and adults live in coastal waters and estuaries when not spawning, generally in shallow (10-50 m depth) nearshore areas dominated by gravel and sand substrates. Long distance migrations away from spawning rivers are common.”

## **Human Uses**

From Froese and Pauly (2014):

“Used smoked and fresh [Bigelow et al. 1963]. Near threatened globally, but extirpated in Europe due to massive overfishing, damming, river regulation and pollution [Kottelat and Freyhof 2007].”

“Fisheries: commercial”

## Diseases

No records of OIE reportable diseases were found.

From Bailly (2008):

“Host of *Dichelesthium oblongum* (Abildgaard, 1794) [via synonym] (parasitic: ectoparasitic)”

## Threat to Humans

From Froese and Pauly (2014):

“Harmless”

## 3 Impacts of Introductions

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No records of *Acipenser oxyrinchus* introductions were found.

## 4 Global Distribution

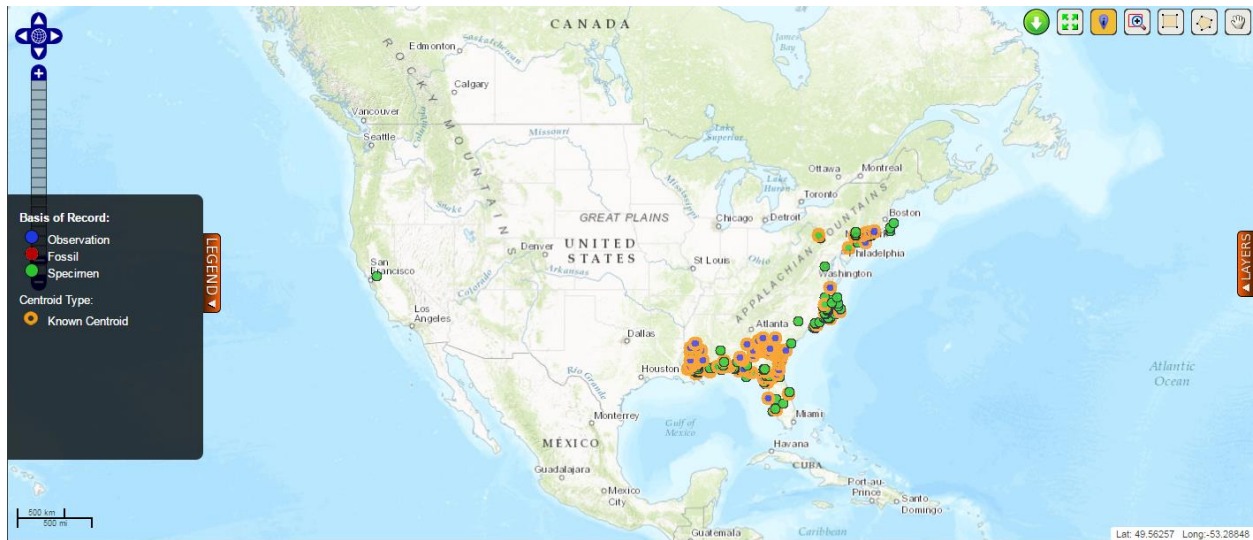
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**Figure 1.** Known global distribution of *Acipenser oxyrinchus*. Map from GBIF Secretariat (2014).

Record in California assumed to be a misidentification as it is from 1956 not substantiated elsewhere. It was not used as a source point for the climate match.

## 5 Distribution Within the United States



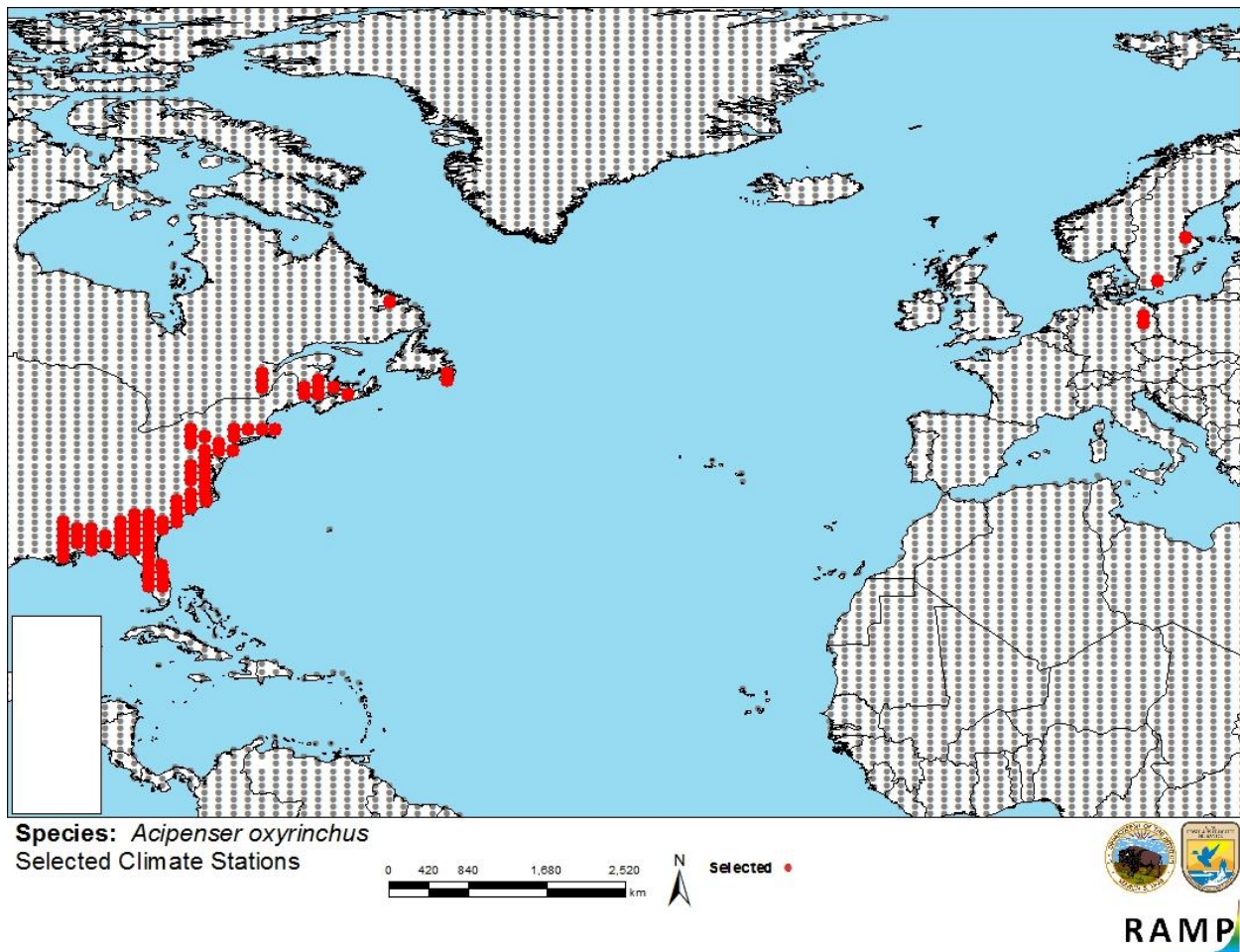
**Figure 2.** Known distribution of *Acipenser oxyrinchus* in the United States. Map from BISON (2017).



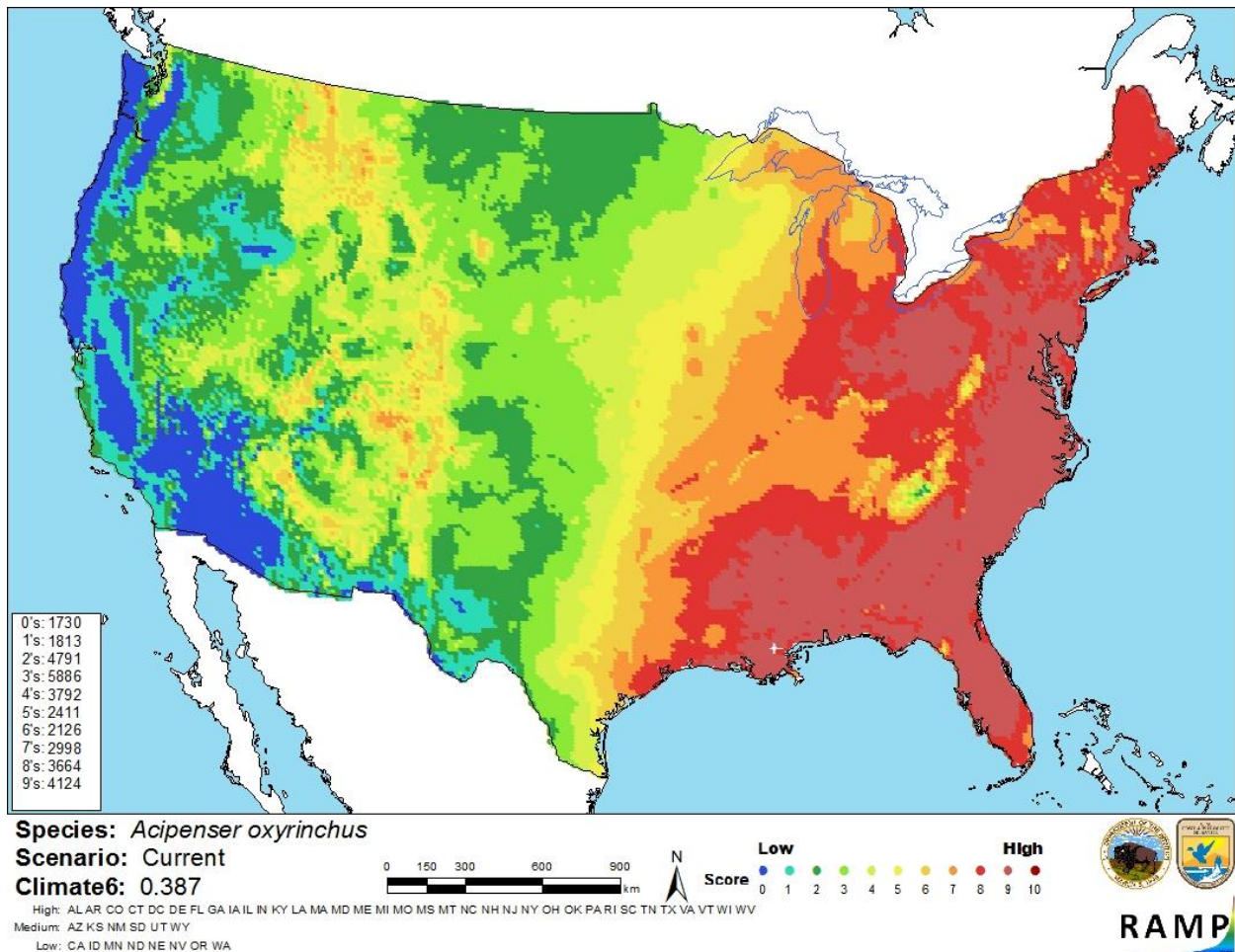
## 6 Climate Matching

### Summary of Climate Matching Analysis

The climate match was high east of the Mississippi River and ranged from medium to low west of the Mississippi River. The majority of the areas with a high climate match are in the native range of the species. The Climate 6 score (Sanders et al. 2014; 16 climate variables; Euclidean Distance) for the contiguous United States was 0.387, high.



**Figure 3.** RAMP (Sanders et al. 2014) source map showing weather stations selected as source locations (red) and non-source locations (grey) for *Acipenser oxyrinchus* climate matching. Source locations from GBIF Secretariat (2014) and BISON (2017).



**Figure 4.** Map of RAMP (Sanders et al. 2014) climate matches for *Acipenser oxyrinchus* in the contiguous United States based on source locations reported by GBIF Secretariat (2014) and BISON (2017). 0= Lowest match, 10=Highest match. Counts of climate match scores are tabulated on the left.

The High, Medium, and Low Climate match Categories are based on the following table:

Climate 6: Proportion of (Sum of Climate Scores 6-10) / (Sum of total Climate Scores)	Climate Match Category
$0.000 \leq X < 0.005$	Low
$0.005 < X < 0.103$	Medium
$\geq 0.103$	High

## 7 Certainty of Assessment

The certainty of assessment is medium. There was a large quantity of quality biological and ecological information available about *Acipenser oxyrinchus*. However, there were no records of introductions found. The lack of a documented history of invasiveness and the high climate

match, mainly in its native range, lead to uncertainty about any risk *A. oxyrinchus* might pose to areas of the United States outside its native range.

## 8 Risk Assessment

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### Summary of Risk to the Contiguous United States

The history of invasiveness is uncertain. There were no records of introductions of *Acipenser oxyrinchus*. The climate match was high. However, those areas that constitute the highest match are part of the species' native range. The majority of the rivers draining to the Atlantic and Gulf Coasts either currently or in the past supported native populations of *A. oxyrinchus*. Certainty of assessment is medium. The areas of high climate match were to the east of the Mississippi River. Most of this area may be part of the historical native range of *A. oxyrinchus* and any expansion into these areas may be part of a population recovery. However, there are high matches in the Great Lakes basin, which is outside of the current or historical native range of *A. oxyrinchus*. The overall risk assessment is Uncertain.

### Assessment Elements

- **History of Invasiveness (Sec. 3): Uncertain**
- **Climate Match (Sec. 6): High**
- **Certainty of Assessment (Sec. 7): Medium**
- **Remarks/Important additional information** No additional remarks.
- **Overall Risk Assessment Category: Uncertain**

## 9 References

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**Note: The following references were accessed for this ERSS. References cited within quoted text but not accessed are included below in Section 10.**

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**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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