Stellate Sturgeon (*Acipenser stellatus*)

Ecological Risk Screening Summary

U.S. Fish & Wildlife Service, February 2021
Revised, February 2021
Web Version, 9/30/2021

Organism Type: Fish
Overall Risk Assessment Category: Uncertain

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1 Native Range and Status in the United States

Native Range

From Qiwei (2010):

"The species was known from the Caspian, Black and Aegean Seas. It is now extirpated from the Aegean Sea, and in the Black Sea basin the last natural population migrates up the Danube where it is heavily overfished. Only very few spawners remain in the rest of the Black Sea basin."

"Extant (resident)
Azerbaijan; Bulgaria; Iran, Islamic Republic of; Kazakhstan; Moldova; Romania; Russian Federation; Serbia; Turkey; Turkmenistan; Ukraine

Possibly Extinct
Greece

Presence Uncertain
Georgia"

From Bloesch et al. (2005):

"The last known specimen from the Slovakian section [of the Danube River] was taken at Komarno on 20 February 1926, and the last from the Hungarian stretch was reported at Mohacs in 1965."

From Chebanov and Galich (2013):

"The Volga, Ural, Terek, Sulak, Kura, Danube, Don and Kuban rivers are the major spawning rivers. The length of the spawning migration route in the Volga River is up to the cascade of dams at Rybinsk; in the Ural, it ascends to Uralsk; in the Don – to Pavlovsk; in the Kuban – to Armavir; in the Middle and Upper Danube – as far as Bratislava and even Strasbourg; in the Dnestr – up to the mouth of the Zbruch River. It also entered the South Bug, the Dnepr and the Desna for spawning. The highest natural abundance and biomass of stellate sturgeon remain in the Caspian Sea."

The following sections refer to reintroductions within the native range for *A. stellatus*.

From Qiwei (2010):

"Overfishing has prevented hatcheries catching enough mature individuals to maintain the necessary broodstock (Artyukhin 1997 in CITES 2000), and stocking has severely decreased in the Caspian Sea as the stocking process relies upon wild individuals (unlike other sturgeon species they are difficult to keep mature individuals in ponds, Nikolai pers. comm.)."

From Chebanov and Galich (2013):

"In 2009, 14 000 juveniles weighing 700–800 grammes (g) were released in the Kuban River by the South Branch Federal Center of Selection and Genetics for Aquaculture. A few attempts to introduce Caspian stellate sturgeon fertilized eggs to sturgeon hatcheries were tried starting from 1960; however, these proved to be ineffective and were terminated (Chebanov et al., 2002)."

Status in the United States

No records of *Acipenser stellatus* in trade or in the wild in the United States were found.

From USFWS (2021):

"To ensure the species' continued survival, all species of sturgeon and paddlefish are listed in the Appendices of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). As a result, all international trade in sturgeon and paddlefish caviar is regulated. In addition, a resolution was passed at the 14th Meeting of the Conference of the Parties (CoP14) urging conservation of sturgeon and paddlefish through increased scientific research, enforcement against illegal fishing and coordination between range states."

Possession or importation of *Acipenser stellatus* has been prohibited or regulated in the following States. Every effort has been made to list all applicable State laws and regulations pertaining to this species, but this list may not be comprehensive.

From Alabama Department of Conservation and Natural Resources (2019):

"No person, firm, corporation, partnership, or association shall possess, sell, offer for sale, import, bring, release.,_ or cause to be brought or imported into the State of Alabama any of the following live fish or animals: […]

Any species of sturgeon not native to Alabama;"

From Arizona Office of the Secretary of State (2013):

"Fish listed below are considered restricted live wildlife:
1. All species of the family Acipenseridae. Common name: sturgeon."

From Connecticut Secretary of State (2016):

"Live fish or live fish eggs of the following species, genera or families shall not be imported into the state or possessed except that, when it is in the public interest, permits for the importation or possession of specimens may be issued, at the discretion of the Commissioner, for research or public display purposes or as provided for in section 26-40d-1 of the Regulations of Connecticut State Agencies: […]

Sturgeon (including all members of the family Acipenseridae, genera Acipenser [*sic*], Huso [*sic*], Scaphirhyncus [*sic*] and Pseudoscaphihryncus [*sic*] and their hybrids)."

Acipenser stellatus is on Hawaii's Restricted Animal List (part A) (Hawaii Department of Agriculture 2019).

Means of Introductions in the United States

No records of *Acipenser stellatus* in the wild in the United States were found.

Remarks

This ERSS was previously published in August 2018. Revisions were completed to incorporate new information and conform to updated standards.

Acipenser stellatus can survive in fresh, brackish, and marine waters. The conclusions of this ERSS are valid for only fresh and brackish water areas.

Information for this assessment was searched for using the valid name *Acipenser stellatus* and the synonyms *Acipenser stellatus danubialis, Acipenser stellatus donensis*, *Acipenser helops, Acipenser stellatus illyricus, Acipenser stellatus ponticus, Acipenser ratzeburgii,* and *Acipenser seuruga*.

This species is also commonly referred to as Starry Sturgeon and Star Sturgeon. Stellate Sturgeon is the common name accepted by American Fisheries Society (Froese and Pauly 2021).

From Qiwei (2010):

"Red List Category & Criteria: Critically Endangered A2cde"

"The Caspian populations are under massive pressure from overfishing (including poaching) and loss of spawning sites and the stocks are declining very fast. Almost all migrating spawners are poached below the Volgograd dam. Overfishing will soon cause extinction of the natural populations. In the immediate future, survival can only depend on stocking and effective fisheries management and combating illegal fishing. […]"

"In the early 1990s it was estimated that nearly 100% of the Sea of Azov population and 30% of the Caspian Sea population were from stocking. Recent estimations are that more than 50% of the Caspian Sea populations are from stocking (Pourkazemi pers. comm.)."

"Overfishing has prevented hatcheries catching enough mature individuals to maintain the necessary broodstock (Artyukhin 1997 in CITES 2000), and stocking has severely decreased in the Caspian Sea as the stocking process relies upon wild individuals (unlike other sturgeon species they are difficult to keep mature individuals in ponds, Nikolai pers. comm.)."

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

According to Fricke et al. (2021), *Acipenser stellatus* (Pallas 1771) is the current valid name for this species. It has the following synonyms: *Acipenser stellatus danubialis, Acipenser stellatus donensis*, *Acipenser helops, Acipenser stellatus illyricus, Acipenser stellatus ponticus, Acipenser ratzeburgii,* and *Acipenser seuruga*.

From ITIS (2021):

Kingdom Animalia
  Subkingdom Bilateria
    Infrakingdom Deuterostomia
      Phylum Chordata
        Subphylum Vertebrata

Infraphylum Gnathostomata
Superclass Actinopterygii
Class Chondrostei
Order Acipenseriformes
Suborder Acipenseroidei
Family Acipenseridae
Subfamily Acipenserinae
Genus *Acipenser*
Species *Acipenser stellatus* Pallas, 1771

Size, Weight, and Age Range

From Froese and Pauly (2021):

"Maturity: L_m ?, range 120 - ? cm
Max length : 250 cm TL male/unsexed; [Mousavi and Ghafor 2014]; common length : 125 cm TL male/unsexed; [Bauchot 1987]; max. published weight: 80.0 kg [Frimodt 1995]; max. reported age: 27 years [Birstein 1993]"

Environment

From Froese and Pauly (2021):

"Marine; freshwater; brackish; demersal; anadromous [Riede 2004]; depth range 10 - 100 m. […] 10°C - 20°C [Baensch and Riehl 1991; assumed to be recommended aquarium temperature range]; […]"

Climate

From Froese and Pauly (2021):

"Temperate; […] 61°N - 36°N, 22°E - 54°E"

Distribution Outside the United States

Native

From Qiwei (2010):

"The species was known from the Caspian, Black and Aegean Seas. It is now extirpated from the Aegean Sea, and in the Black Sea basin the last natural population migrates up the Danube where it is heavily overfished. Only very few spawners remain in the rest of the Black Sea basin."

"Extant (resident)
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Possibly Extinct
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"The last known specimen from the Slovakian section [of the Danube River] was taken at Komarno on 20 February 1926, and the last from the Hungarian stretch was reported at Mohacs in 1965."

From Chebanov and Galich (2013):

"The Volga, Ural, Terek, Sulak, Kura, Danube, Don and Kuban rivers are the major spawning rivers. The length of the spawning migration route in the Volga River is up to the cascade of dams at Rybinsk; in the Ural, it ascends to Uralsk; in the Don – to Pavlovsk; in the Kuban – to Armavir; in the Middle and Upper Danube – as far as Bratislava and even Strasbourg; in the Dnestr – up to the mouth of the Zbruch River. It also entered the South Bug, the Dnepr and the Desna for spawning. The highest natural abundance and biomass of stellate sturgeon remain in the Caspian Sea."

The following sections refer to reintroductions within the native range for *A. stellatus*.

From Qiwei (2010):

"Overfishing has prevented hatcheries catching enough mature individuals to maintain the necessary broodstock (Artyukhin 1997 in CITES 2000), and stocking has severely decreased in the Caspian Sea as the stocking process relies upon wild individuals (unlike other sturgeon species they are difficult to keep mature individuals in ponds, Nikolai pers. comm.)."

From Chebanov and Galich (2013):

"Since the 1970s, reproduction of stellate sturgeon in the Azov basin has been performed only via hatchery stock enhancement. The production volume has decreased considerably due to the lack of wild breeders. The last mass release of stellate sturgeon juveniles in the Sea of Azov was in 2007 when over 100 000 individuals of average weight 2–2.5 g were stocked. In 2009, 14 000 juveniles weighing 700–800 grammes (g) were released in the Kuban River by the South Branch Federal Center of Selection and Genetics for Aquaculture. A few attempts to introduce Caspian stellate sturgeon fertilized eggs to sturgeon hatcheries were tried starting from 1960; however, these proved to be ineffective and were terminated (Chebanov et al., 2002)."

Introduced

From Qiwei (2010):

"The annual release (over the past 10 years) of sturgeon juveniles from sturgeon hatcheries in Russia amounts to from 3 to 20 million specimens; in Kazakhstan - from 2.5 to 4.1 million specimens; in Azerbaijan - from 2.5 to 6.8 million specimens; in Islamic Republic of Iran - from 0.2 to 1.3 million specimens. This quantity of stocks recruitment of Stellate Sturgeon from

industrial sturgeon culture is not enough to supply the population at an optimum level (Khodorevskaya et al. 2009)."

According to Froese and Pauly (2021), *A. stellatus* has been introduced to Estonia from an unknown location, and to Uzbekistan from Kazakhstan, but those introductions did not result in established populations. An introduction to China from Russia is reported as probably established, and the result of an introduction to Czech Republic is reported as unknown.

From Aladin et al. (2004):

"The fist [*sic*] introductions of exotic species into the Aral Sea occurred at the end of the 1920's , when *Alosa caspia* (Caspian shad) [and] *Acipenser stellatus* (starred sturgeon) were introduced from the Caspian Sea. This introduction cannot be considered as successful because these fishes did not naturalize in Aral Karpevich, 1975) [sic]."

"After the Second World War attempts to settle exotic species in the Aral Sea continued. The main basis of these actions was the idea that because there were few plankton-eating fishes and sturgeons in the Aral Sea, introduction of new consumers of plankton and benthos would increase fish productivity (Karpevich, 1947, 1948, 1953, 1960, 1975). On the basis of these considerations, from the Caspian Sea again starred sturgeon (*Acipenser stellatus*) was again introduced in 1948-1963, and in 1958 a subspecies of thorn sturgeon (*A. nudiventris derjavini*) from Ural river was introduced. These sturgeon introductions were again unsuccessful. Both species failed to persist and only in 1958 were some individuals of starred sturgeon caught (Karpevich, 1975)."

Means of Introduction Outside the United States

From Qiwei (2010):

"[…] annual release (over the past 10 years) of sturgeon juveniles from sturgeon hatcheries […]"

From Froese and Pauly (2021):

"aquaculture"

"Introduced for food and sale [Ma et al. 2003]."

"Introduced for experimental purposes [Lusk et al. 2010]. Also [Lusk et al. 2011]."

Short Description

From Froese and Pauly (2021):

"Dorsal spines (total): 0; Dorsal soft rays (total): 40-46; Anal soft rays: 24 - 29. Snout long, pointed at tip. Lower lip not continuous, interrupted at center. Barbels short not reaching mouth but nearer to it than to tip of snout. Five rows of scutes, dorsal 11-14, lateral 30-36 on each side, ventral 10-11 on each side, with small bony stellate plates and smaller grains between main scute rows. Back dark grey to almost black, flanks lighter, belly white."

Biology

From Qiwei (2010):

"This species is found at sea, coastal and estuarine zones, where it forages on clayey sand bottoms, as well as intensively in middle and upper water layers. It spawns in strong-current habitats in the main course of large and deep rivers, on stone or gravel bottoms. It is also known to spawn on flooded river banks, on sand or sandy clay. Juveniles inhabit shallow riverine habitats during their first summer (Khodorevskaya et al. 2009).

This species is anadromous (spending at least part of its life in salt water and returning to rivers to breed). Caspian fish first mature at 6-7 years for males, and 7-8 years for females, with a generation length not less than 10 years. Females reproduce every 3-4 years and males every 2-3 years in April-September. It spawns only under relatively constant hydrological conditions, as fluctuating hydrological conditions lead to high egg mortality. This species migrates upriver at higher temperatures and therefore later than other sturgeons, with two peaks, in spring and in autumn. Males remain at spawning sites no longer than six weeks and females only 10-12 days. Spent individuals migrate directly back to sea. Yolk-sac larvae are pelagic for 2-3 days and drift with current. Juveniles migrate to sea during their first summer and remain there until maturity. At sea, this species feeds on a wide variety of crustaceans, molluscs and benthic as well as pelagic fish (Khodorevskaya et al. 2009).

The main habitat in the Caspian Sea of the Stellate Sturgeon in the winter is the middle part of the sea (Legeza 1970). In the spring they migrate to the north, with its maximum density being observed off the mid-west coast in shallow water rich in food organisms (Legeza 1970). In late spring they move to the north-west coast. In autumn Stellate Sturgeons begin migrating to the south of the Caspian Sea (earlier than other species), concentrating at the mid-western coast and the south-eastern coast (Legeza 1970).

The spawning migration starts in April. Spawning occurs at temperatures from 9 to 16 °C in the channel and spring flooded spawning grounds at the current speed of 0.8-1.2 m / sec. The greatest number of Stellate Sturgeon migrate to the Ural River (Peseridi et al. 1986, Dovgopol et al. 1992). Stellate Sturgeon stop eating after the beginning of the spawning migration. After spawning, they return downstream into the sea, where they begin actively feeding. The juveniles of Stellate Sturgeon also do not delay in the river and migrate for feeding into the sea."

From Bloesch et al. (2005):

"For the Black Sea and the Danube River both spring and winter forms have been described. There are two phases of the spawning migration. First, fish move from the open sea onto the continental shelf close to a river mouth. Secondly, they run upstream along the river bed, guided principally by the flow of water.

This species prefers warmer habitats than other Danube sturgeons and its spawning runs into the river occur at water temperatures higher that those prevailing during the migrations of the other species and take place immediately after those of *Huso huso* and *Acipenser gueldenstaedti*."

"Benthic invertebrates are the main food source for adults, but plankton may play an important role in the nutrition of the early larval stages."

Human Uses

From Qiwei (2010):

"Skin and as a leather. Caviar is also used as cosmetic and medicinal purposes. Cartilage used medicinal use. Intestine use as sauce (food) and to produce gelatine. Swim bladder used as glue."

"Restocking measures are ongoing. However, although aquaculture contributes considerably to the maintenance of the stocks, it cannot compensate for the damage caused to natural reproduction by overfishing (CITES 2000)."

"To preserve the commercial importance of Stellate Sturgeon population it is necessary to protect the recruitment from natural spawning and increase the industrial sturgeon aquaculture. Considering the state of stocks of the Caspian Sea it is necessary for all Caspian Sea states to suspend its harvest for commercial purposes (in Russia, the ban on Stellate Sturgeon commercial harvesting has been introduced since 2005).

Stellate Sturgeon has no commercial value in the basins of the Black and Azov Seas."

From Froese and Pauly (2021):

"One of the three most important species for caviar; also utilized fresh and frozen; eaten pan-fried, broiled and baked [Frimodt 1995]. Overfishing at the sea for meat and caviar will soon cause extinction of the natural populations and their survival can only depend on stocking [Kottelat and Freyhof 2007]."

"Fisheries: commercial; aquaculture: commercial; aquarium: public aquariums"

Diseases

No records of OIE-reportable diseases (OIE 2021) were found for *Acipenser stellatus.*

From Aladin et al. (2004):

"[…] parasites of starred sturgeon roe (*Polypodium hydriforme*) and gills (*Nitzschia sturionis*) passed onto aboriginal thorn sturgeon and caused strong epizooties."

From Bauer et al. (2002):

"[…] [*Cryptobia*] *acipenseris* (Joff, Lewashow, Boschenko 1926), has been reported to occur within the watersheds of the Don, Volga and Yenisei rivers, namely in *Huso huso*, *A. gueldenstaedtii*, *A. stellatus*, *A. nudiventris,* and *A. ruthenus*."

"Several species of the order Spathebothriidea have been found in sturgeons of Russia and adjacent countries, among them is *Bothriomonus fallax* Liihe 1900, which is documented from *H. huso*, *A. nudiventris*, *A. ruthenus*, *A. gueldenstaedtii*, *A. sturio* and *A. stellatus* in the basins of the Black, Azov and Caspian seas."

"Only one species of this group has been described (*Zschokkella sturionis* Tripathi 1948). It was found in *A. sturio*, caught in the Channel La Manch. This parasite was also later found in the gall bladders of *A. gueldenstaedtii*, *A. stellatus* […]"

"One species of flagellates (Polymastigota) *Hexamita truttae* was found in the gall bladders of *A. ruthenus* from the Ob River, as well as in *A. gueldenstaedtii*, *A. stellatus*, […]"

Bauer et al. (2002) reports that *Nitzschia sturionis* was a known common parasite of *A. stellatus* historically.

Poelen et al. (2014) lists the following as parasites of *Acipenser stellatus*: *Leptorhynchoides plagicephalus, Eubothrium acipenserinum, Bothrimonus sturionis, Caryophyllaeus fimbriceps, Proteocephalus skorikowi, Diclybothrium armatum, Anisakis schupakovi, Contracaecum aduncum, Truttaedacnitis sphaeracephala, Contracaecum bidentatum, Contracaecum squali, Hysterothylacium gadi, Ascaris helopis, Cucullanus sphaerocephalus, Cystoopsis acipenseris, Capillospirura argumentosa, Ascarophis ovotrichuria, Capillaria tuberculata, Piscicapillaria tuberculata, Deropristis inflate, Skrjabinopsolus semiarmatus, Lecithochirium rufoviride, Deropristis hispida, Bothrimonus fallax, Eustrongylides excisus, Glanitaenia osculata, Hysterothylacium bidentatum, Khawia japonensis, Khawia sinensis, Amphilina foliacea, Diplostomum spathaceum, Caryophyllaeides fennica,* and *Caryophyllaeus laticeps.*

In addition to the parasites listed about, Bailly (2008) lists *Acipenser stellatus* as a host to the following parasites: *Corynosoma capsicum*, *Dichelesthium oblongum*, *Diplostomum chromatophorum*, *Diplostomum paraspathaceum*, *Leptorhynchoides polycristatus*, and *Pseudotracheliastes stellatus*.

Threat to Humans

From Froese and Pauly (2021):

"Harmless"

3 Impacts of Introductions

The following section refers to potential, not documented impacts of *Acipenser stellatus*.

From Froese and Pauly (2021):

"Potentially invasive via predation and competition [NOBANIS 2013]."

Acipenser stellatus is regulated in multiple States.

The following information pertains to impacts of a parasite, *Nitzschia sturionis*, which was introduced to the Aral Sea via the introduction of *Acipenser stellatus*.

From Bauer et al. (2002):

"In 1935-1936 a tragic event caused significant mortality of [*Acipenser nudiventris*]; a quick population decline resulted (Dogiel and Lutta, 1937; Lutta 1937, 1941). Witnesses of this mortality reported that large, diseased fish jumped on to the beaches and perished. An investigation led to the discovery that in the year prior to this specific incident (in 1934), about 90 specimens of mature Caspian Sea *A. stellatus* had been transferred to the Aral Sea in an attempt to acclimate the species there. No prophylactic measures had been employed to prevent disease transfer although [*Nitzschia*] *sturionis* was known to be a common parasite of the species. It is therefore obvious that the parasite was introduced along with *A. stellatus* to the Aral Sea, severely infecting the local population of *A. nudiventris* because the native fish exhibited no immunity against this parasite."

"The mortality of *A. nudiventris* was also observed in 1970 with a maximum number of 80 worms on one fish (Osmanov, 1975)."

From Aladin et al. (2004):

"[…] parasites of starred sturgeon [*Acipenser stellatus*] roe (*Polypodium hydriforme*) and gills (*Nitzschia sturionis*) passed onto aboriginal thorn sturgeon [*Acipenser nudiventris*] and caused strong epizooties. Thorn sturgeon before introduction of starred sturgeon did not suffer from these parasites because they were absent from the Aral Sea (Dogel, Byhowsky, 1934; Dogel, Lutta, 1937). Thus, the first attempt of exotic species introduction to the Aral Sea can be considered extremely unsuccessful."

4 History of Invasiveness

Acipenser stellatus has been introduced in Azerbaijan, China, the Czech Republic, Estonia, Iran, Kazakhstan, and Uzbekistan. It is possible that the introduction in China did result in an established population. All other introductions failed to establish a population, or the status is unknown. This species is in trade as a commercial species, but no information was available giving actual volumes of international trade or the duration of trade. No records of impacts caused by *A. stellatus* as a result of those introductions were found. Therefore, the history of invasiveness is classified as Data Deficient. It is important to note that *A. stellatus* is a host for the parasite *Nitzschia sturionis* which did have an impact on sturgeon species native to the Aral Sea when *N. sturionis* was introduced via the introduction of *A. stellatus* in the 1930s.

5 Global Distribution

Figure 1. Known global distribution of *Acipenser stellatus*. Locations are in western Asia and eastern Europe in the Black and Caspian Seas, along the Danube River, and in northern Europe. Map from GBIF Secretariat (2021). Locations in Czech Republic were excluded from climate matching because they do not represent wild, established populations. Locations in Germany, Belgium, The Netherlands, and Montenegro were excluded because they were not within the described native or introduced ranges for this species.

Although there have been introductions to the Aral Sea basin historically, there are no established populations there currently, and therefore no georeferenced locations were available.

Because the climate matching analysis is not valid for marine waters, no marine occurrences were used in the climate matching analysis.

6 Distribution Within the United States

No records of *Acipenser stellatus* in the wild in the United States were found.

7 Climate Matching

Summary of Climate Matching Analysis

The climate match for *Acipenser stellatus* was generally medium to high throughout the contiguous United States with small areas of low climate match. The areas with highest match were along the Rocky Mountain region, and Midwest plains surrounding Lakes Erie, Michigan, and Huron. The lowest climate match was in the Pacific Northwest, along the Gulf Coast, a small, isolated patch in Appalachia, and in the Desert Southwest. Everywhere else had medium match. The overall Climate 6 (Sanders et al. 2018; 16 climate variables; Euclidean distance) score was 0.261, high (scores equal to or greater than 0.103 are classified as high). The following States had high individual Climate 6 scores: Arizona, California, Colorado, Idaho, Illinois,

Indiana, Kansas, Maryland, Michigan, Missouri, Nebraska, New Mexico, Nevada, New York, Ohio, Oregon, Pennsylvania, South Dakota, Utah, Virginia, Washington, Wisconsin, West Virginia, and Wyoming. The following States had medium individual Climate 6 scores: Arkansas, Iowa, Montana, Oklahoma, Texas, and Vermont. All other States had a low individual Climate 6 score.

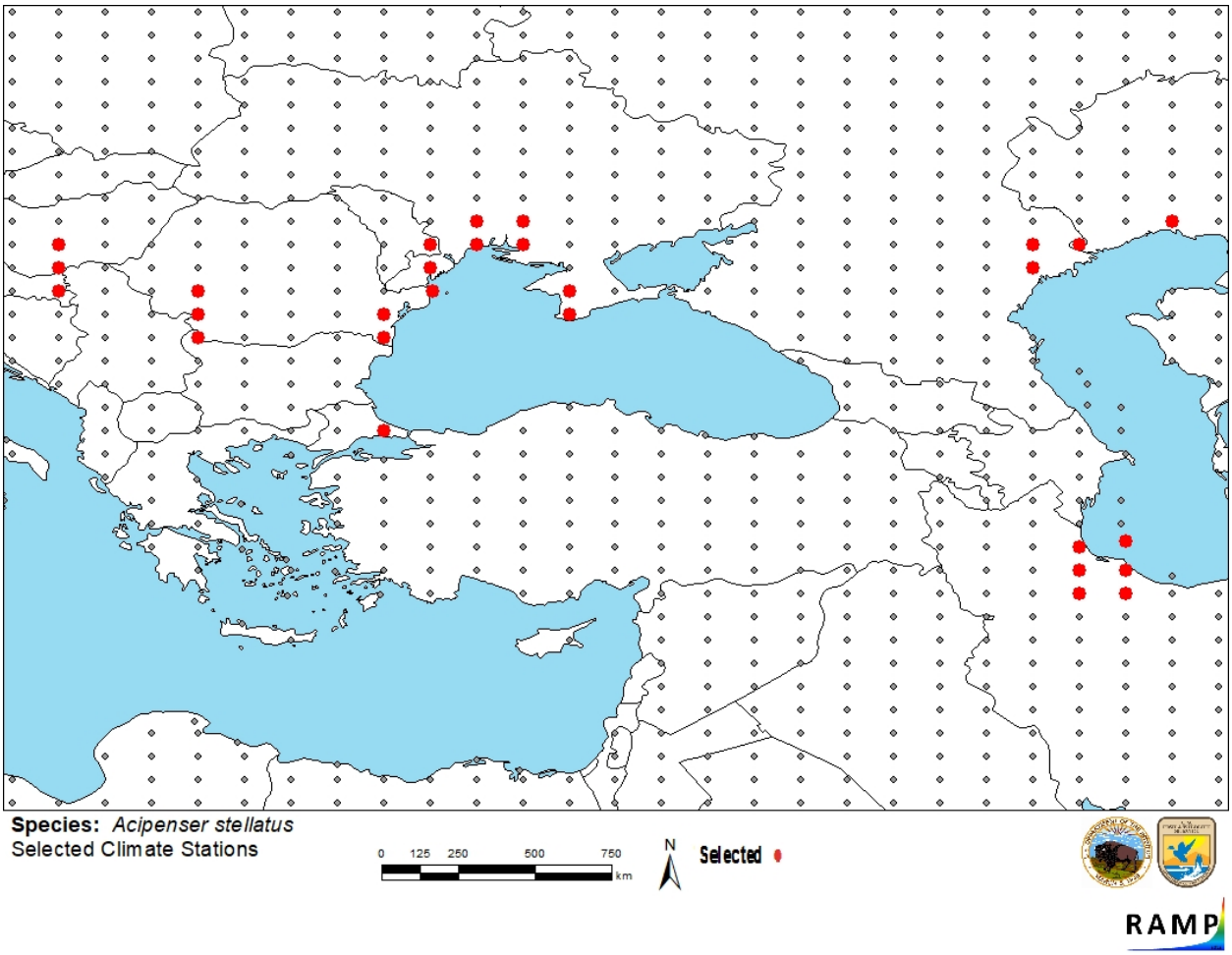

Figure 2. RAMP (Sanders et al. 2018) source map showing weather stations in the Black and Caspian Seas, and along the Danube River selected as source locations (red; Russia, Kazakhstan, Iran, Turkey, Romania, Bulgaria, Moldova, Ukraine, Croatia, Hungary) and non-source locations (gray) for *Acipenser stellatus* climate matching. Source locations from GBIF Secretariat (2021). Selected source locations are within 100 km of one or more species occurrences, and do not necessarily represent the locations of occurrences themselves.

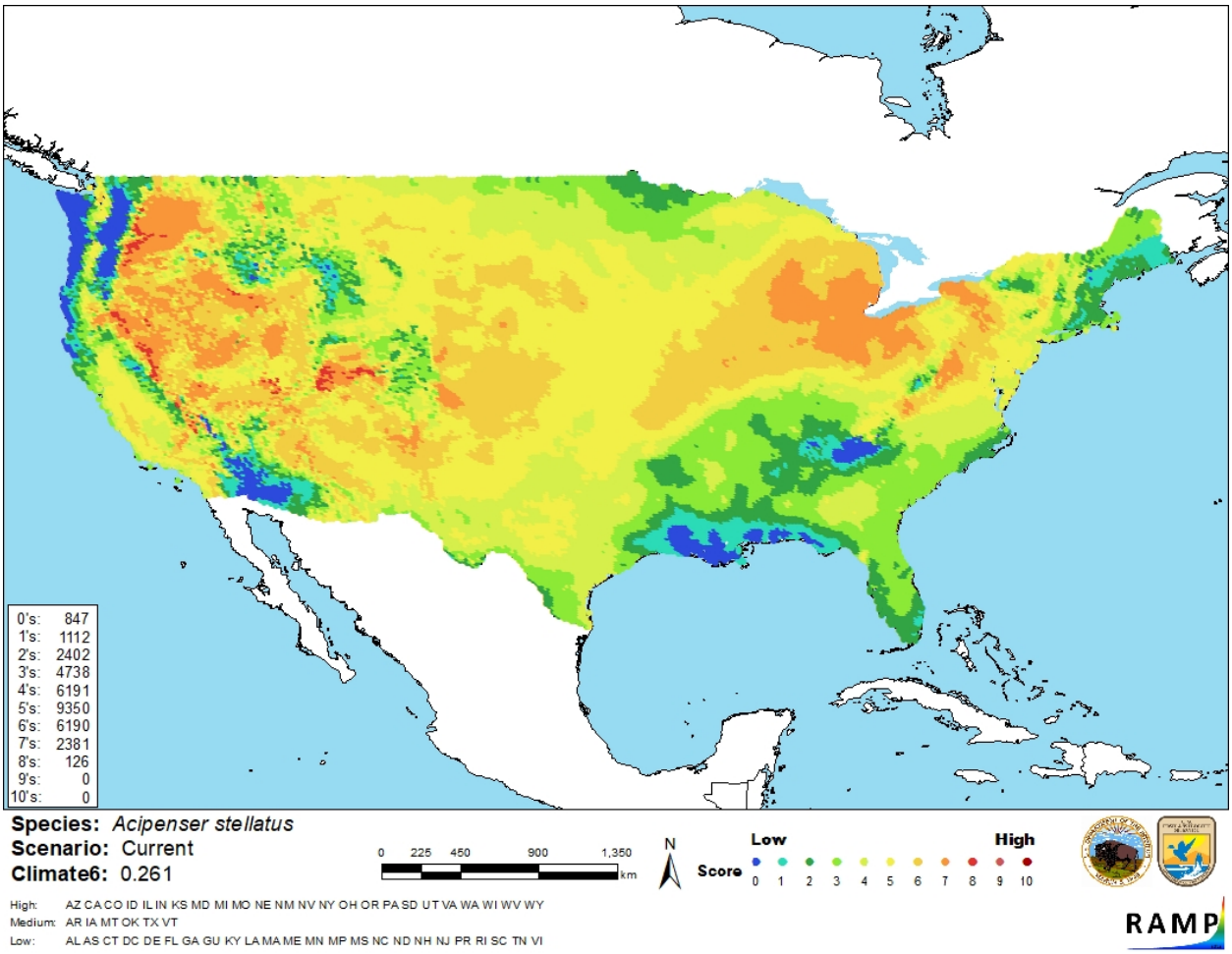

Figure 3. Map of RAMP (Sanders et al. 2018) climate matches for *Acipenser stellatus* in the contiguous United States based on source locations reported by GBIF Secretariat (2021). Counts of climate match scores are tabulated on the left. 0/Blue = Lowest match, 10/Red = Highest match.

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

Climate 6: (Count of target points with climate scores 6-10)/ (Count of all target points)	Overall Climate Match Category
0.000≤X≤0.005	Low
0.005<X<0.103	Medium
≥0.103	High

8 Certainty of Assessment

There is quality information available about the biology and ecology of *Acipenser stellatus*. Records of introduction were found, along with one record of a possibly established population. Information on impacts was not available for *A. stellatus* directly, instead there was information

regarding impacts of a parasite that was introduced to the Aral Sea with the introduction of *A. stellatus*. The Certainty of Assessment is Low.

9 Risk Assessment

Summary of Risk to the Contiguous United States

Acipenser stellatus is a temperate diadromous fish native to the Caspian, Black and Aegean Seas, where it currently only remains in the Black Sea, Caspian Sea, and Danube River. This species has historically been stocked into introduced locations in the Aral and Azov basins; however natural recruitment did not occur and those populations only persist due to continual stocking efforts. It has also been stocked within its native range in the Caspian Sea and Kuban River. Despite stocking efforts, the species is critically endangered globally due to illegal poaching, overfishing, and dam impediments in the rivers required for its reproductive phase. It has also been introduced in China and possibly established a population there. *A. stellatus* is regulated in multiple States. There is a lack of information regarding impacts from the sturgeon in the introduced locations. Therefore, the History of Invasiveness is classified as Data Deficient. It is important to note that a parasite was introduced to the Aral Sea with the introduction of *A. stellatus* and the parasite had negative impacts on the native sturgeon population. The overall Climate 6 score for the contiguous United States was High, with areas of high match mainly found in the southern Great Lakes, Appalachian, and Rocky mountain areas. The overall certainty of assessment is Low due to the lack of information on impacts directly from *A. stellatus*. The overall risk assessment category is Uncertain.

Assessment Elements

- **History of Invasiveness (Sec. 4): Data Deficient**
- **Overall Climate Match Category (Sec. 7): High**
- **Certainty of Assessment (Sec. 8): Low**
- **Remarks/Important additional information:** Considered Critically Endangered by IUCN. Carrier of the parasite *Nitzschia sturionis*, which can be harmful to other sturgeon species.
- **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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