

# Russian Sturgeon (*Acipenser gueldenstaedtii*)

## Ecological Risk Screening Summary

U.S. Fish and Wildlife Service, March 2011

Revised, June 2018

Web Version, 8/15/2018



Photo: D. Döhne. Licensed under CC BY-SA 3.0. Available: [https://commons.wikimedia.org/wiki/File:Waxdick\\_\(Acipenser\\_gueldenstaedtii\\_.jpg](https://commons.wikimedia.org/wiki/File:Waxdick_(Acipenser_gueldenstaedtii_.jpg). (June 2018).

## 1 Native Range and Status in the United States

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### Native Range

From Froese and Pauly (2018):

“Eurasia: Black Sea, Sea of Azov and Caspian Sea, entering all main rivers that empty into them (Don, Kuban, Danube, Dnieper (rare), Dniester) [Sokolov and Berdicheski 1989].”

From Gesner et al. (2010):

“It is currently only known from the Caspian Sea, where it spawns in the rivers Ural and Volga, and the Black Sea where spawning occurs in the lower Danube and Rioni rivers (last recorded in the Rioni in 1999 (Kolman & Zarkua 2002)). There is no native spawning population remaining in the Sea of Azov, only introduced (stocked) individuals. The species reproduction within the Kura is debated (Vecsei 2001).”

“Native:

Azerbaijan; Bulgaria; Georgia; Iran, Islamic Republic of; Kazakhstan; Moldova; Romania; Russian Federation; Serbia; Turkey; Turkmenistan; Ukraine”

## Status in the United States

This species has not been documented as introduced or established in the United States.

## Means of Introductions in the United States

This species has not been documented as introduced or established in the United States.

## Remarks

This species is commonly misspelled as “*A. gueldenstaedti*,” so this name was also used when conducting literature and database searches.

From Gesner et al. (2010):

“Red List Category & Criteria: Critically Endangered [...]”

“It is estimated that the species' wild native population has undergone a massive population decline of over 90% in the past three generations (estimated at 45 years).”

“This decline is predicted to continue as illegal fishing at sea, and in rivers, for caviar will soon result in the extinction of the remaining natural wild population. In the immediate future, survival can only depend on stocking.”

## 2 Biology and Ecology

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### Taxonomic Hierarchy and Taxonomic Standing

From ITIS (2018):

“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 gueldenstaedtii* Brandt and Ratzeburg, 1833”

From Eschmeyer et al. (2018):

“Current status: Valid as *Acipenser gueldenstaedtii* Brandt & Ratzeburg 1833. Acipenseridae.”

## **Size, Weight, and Age Range**

From Froese and Pauly (2018):

“Max length : 236 cm TL male/unsexed; [Kottelat and Freyhof 2007]; common length : 145 cm TL male/unsexed; [Chugunova 1959]; max. published weight: 115.0 kg [Birstein 1993]; max. reported age: 46 years [Chugunova 1959]”

## **Environment**

From Froese and Pauly (2018):

“Marine; freshwater; brackish; demersal; anadromous [Riede 2004]; depth range 2 - 100 m, usually 10 - 25 m. [...] 10°C - 20°C [Baensch and Riehl 1991; assumed to be recommended aquarium temperature range]”

From Olenin et al. (2010):

“Salinity in native habitats: Limnetic to Polymixohaline [salinity of 18-30 ppt] (Fisher et al. 1987)”

## **Climate/Range**

From Froese and Pauly (2018):

“Temperate; [...] 61°N - 35°N, 26°E - 54°E”

## **Distribution Outside the United States**

Native

From Froese and Pauly (2018):

“Eurasia: Black Sea, Sea of Azov and Caspian Sea, entering all main rivers that empty into them (Don, Kuban, Danube, Dnieper (rare), Dniester) [Sokolov and Berdicheski 1989].”

From Gesner et al. (2010):

“It is currently only known from the Caspian Sea, where it spawns in the rivers Ural and Volga, and the Black Sea where spawning occurs in the lower Danube and Rioni rivers (last recorded in the Rioni in 1999 (Kolman & Zarkua 2002)). There is no native spawning population remaining in the Sea of Azov, only introduced (stocked) individuals. The species reproduction within the Kura is debated (Vecsei 2001).”

“Native:

Azerbaijan; Bulgaria; Georgia; Iran, Islamic Republic of; Kazakhstan; Moldova; Romania; Russian Federation; Serbia; Turkey; Turkmenistan; Ukraine”

## Introduced

From Froese and Pauly (2018):

“Introduced throughout Europe.”

From Olenin et al. (2010):

“Distribution in the Baltic Sea: Curonian Lagoon, Gulf of Finland, Gulf of Riga, Vistula Lagoon  
Species status: not established”

DAISIE (2018) reports *A. gueldenstaedtii* from Estonia (Alien/Extinct), European part of Russia (Alien), Germany – Baltic Sea (Alien/Not established), Greece (Alien/Unknown), Israel (Alien), Latvia (Alien/Extinct), and Netherlands – North Sea (Cryptogenic/Unknown).

## Means of Introduction Outside the United States

From Gesner et al. (2010):

“Aquaculture has resulted in intentional and accidental introductions throughout Europe.”

From Maurakis and Economidis (2003):

“*Acipenser baeri*, *Acipenser gueldenstaedtii*, *Acipenser ruthenus*, and *Polyodon spathula* have been introduced in Greece where they are reared in closed tank systems, and then released into open waters (Lake Pamvotis and Kalamas River)(Economidis et al., 2000).”

From Arndt et al. (2000):

“There were reports of sturgeons escaping from aquaculture facilities in the estuary of the Odra River [Poland] in 1992 and 1995 (*A. gueldenstaedtii* and *A. baerii*), [...]”

## Short Description

From Froese and Pauly (2018):

“Dorsal spines (total): 0; Dorsal soft rays (total): 27-48; Anal soft rays: 16 - 35. Under the name *A. g. colchicus*. Lower lip not continuous, interrupted at center. Five rows of scutes: dorsal 7-19, lateral 24-44 on each side, ventral 6-13 on each side, with lines of smaller stellate bony plates between the dorsal and ventral rows. Color of back olivaceous grey, flanks lighter, and belly white.”

## Biology

From Froese and Pauly (2018):

“Anadromous and freshwater populations exist. At the sea, it occurs in shallow coastal and estuarine zones. In freshwaters, it inhabits deep parts of large rivers with moderate to swift current [Kottelat and Freyhof 2007]. Found mainly near the shore over sand and mud. Usually solitary, but swarms when hibernating or during spawning migrations. Occasionally forms schools [Svetovidov 1979]. Feeds on benthic molluscs, crustaceans and small fishes. Spawns on stone or gravel bottom in large and deep rivers with strong current, 1-1.5 m/s [Kottelat and Freyhof 2007]. Mainly propagated through artificial reproduction.”

From Gesner et al. (2010):

“Males reproduce for the first time at 8-13 years, females at 10-16. Generation length (average age of parents of current cohort) is estimated to be 15 years under natural circumstances, but due to the impacts this species is facing the generation length ranges from between 12 years in the Caspian Sea to over 20 in the Danube. Females reproduce every 4-6 years and males every 2-3 years in April-June, when the temperature rises above 10°C. Larvae drift on currents; juveniles then move towards shallower habitats, before migrating to the sea during their first summer. They remain at sea until maturity.”

## Human Uses

From Froese and Pauly (2018):

“Fisheries: commercial; aquaculture: commercial; aquarium: public aquariums”

From Gesner et al. (2018):

“This is an aquarium species (250,000 exported from Hungary annually (Gessner [*sic*] pers com.)). Skin and as a leather. Caviar is used as cosmetic and medicinal purposes. Cartilage used medicinal use. Intestine use [*sic*] as sauce (food) and to produce gelatine. Swim bladder used as glue.”

## Diseases

From Kempter et al. (2009):

“A total of 29 sturgeons (two species; length 8–37 cm) originating from fish farms in northern Poland with a known KHV [koi herpes virus] history in common carp or koi in the area were examined: 15 Russian sturgeons, *Acipenser gueldenstaedtii*, with clinical signs of a disease and 14 asymptomatic Atlantic sturgeons, *A. oxyrinchus*.”

“KHV genome parts were found in nine Russian sturgeons and four Atlantic sturgeons.”

“This preliminary study shows that sturgeons can be carriers of KHV.”

OIE (2018) lists “Koi herpesvirus disease” in its list of “OIE-Listed diseases, infections and infestations in force in 2018”.

From Righetti et al. (2014):

“In July 2011, a dead *A. gueldenstaedtii* was sent to the Fish Diseases Laboratory of the Istituto Zooprofilattico Sperimentale del Piemonte, Liguria e Valle d’Aosta, Turin, from a commercial fish farm in NW Italy.”

“The necropsy showed the presence of several nodular lesions in the liver and kidney [...]”

“In this study, we have described for the first time a severe *M. salmoniphilum* infection in Acipenseridae, in general, and in the Russian sturgeon in particular.”

Sattari and Mokhayer (2005) report the following parasites collected in *Acipenser gueldenstaedtii* in the southwest Caspian Sea: *Cucullanus sphaerocephalus*, *Eustrongylides excisus*, *Skrjabinopsolus semiarmatus*, *Corynosoma strumosum*, *Leptorhynchoides plagicephalus*, and *Anisakis* sp.

From Sattari and Mokhayer (2005):

“Of all acipenserid species, the Russian sturgeon has the best known parasite fauna. The complete list of parasites found in *A. gueldenstaedti* includes 46 species; of these, parasitic worms are the largest group and, at the present time, there are records of 36 helminth parasite species [Moravek 1994].

From Zhokhov et al. (2006):

“[...] snails of the genus *Lithoglyphus* invaded the Volga through the Volga–Don canal and dispersed upstream to the Kuibyshev Reservoir and downstream to the delta. Following the snail, the trematode *Nicolla skrjabini* populated the Volga. In the new area, the range of its hosts gradually broadens. It already includes *Ballerus ballerus*, *Alburnus alburnus*, *Sander luciopercae*, *Gymnocephalus cernuus*, *Acipenser gueldenstaedtii*, and *A. stellatus*.”

## Threat to Humans

From Froese and Pauly (2018):

“Harmless”

## 3 Impacts of Introductions

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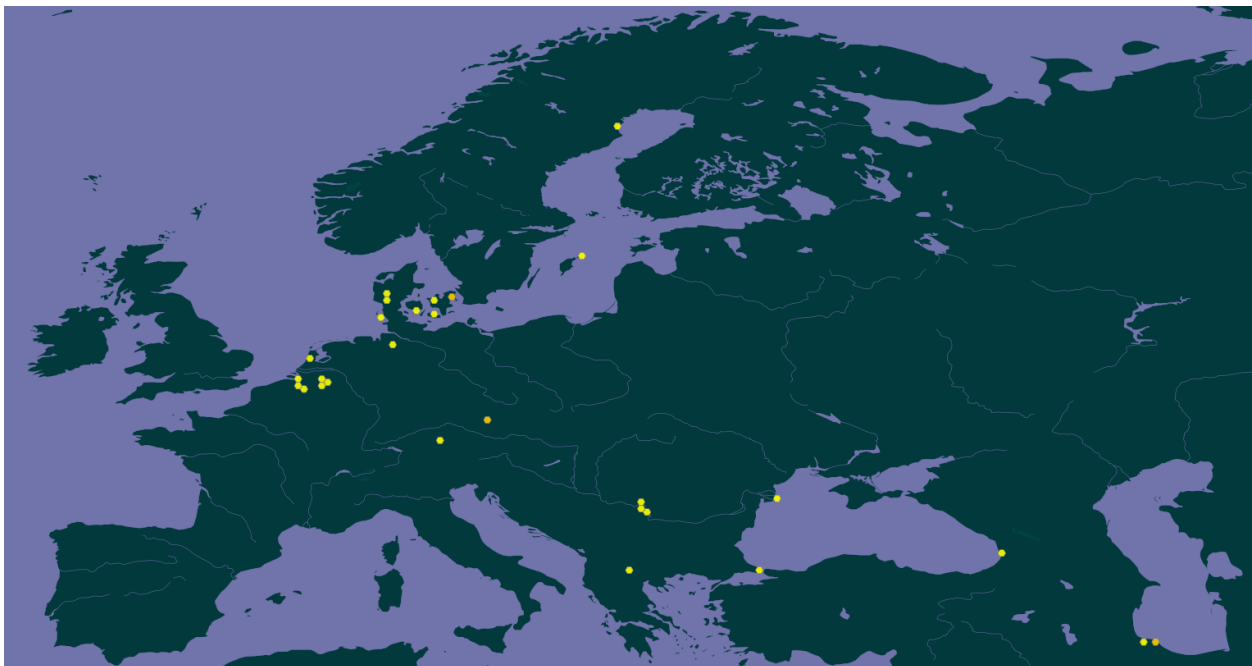
From Britton and Davies (2006):

“Introductions of non-native fishes into new environments can provoke unpredictable and irreversible ecological consequences that are often only realised long after the introduction (Hickley & Chare 2004). This is likely to be the case for *Acipenser* species, given their

potentially long life span [...]. As yet, there is no evidence of their natural dispersal or naturalization [in the UK], implying species have yet to become invasive. Furthermore, as their presence is predominantly restricted to lakes, any adverse ecological impacts may be contained therein. Nevertheless, a number of these fisheries are located in floodplains or have connections to a river [...], providing potential for fluvial dispersal, for example, during flood events. Should this occur, the risks to native fish fauna may include the adverse impacts of increased competition for resources, increased depredation on eggs and juvenile fish, and the transfer of novel parasites. This is because their natural diet consists of zooplankton, fish eggs, larvae and benthic invertebrates, and they host non-native parasites, including the nematode *Cystoopsis acipenseris* Wagner (Berg 1962).”

## 4 Global Distribution

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**Figure 1.** Known global distribution of *Acipenser gueldenstaedtii*, reported from Denmark, Belgium, the Czech Republic, Germany, Sweden, Georgia, Macedonia, Serbia, Romania, and Iran. Map from GBIF Secretariat (2018).

Because the climate matching analysis is not valid for marine waters, no marine occurrences were used in the climate matching analysis. Freshwater and brackish water occurrences were reported in Belgium, The Netherlands, Germany, Denmark, Czech Republic, Serbia, Romania, Macedonia, Georgia, and Iran. Only marine occurrences were reported in Sweden and Turkey.

## 5 Distribution Within the United States

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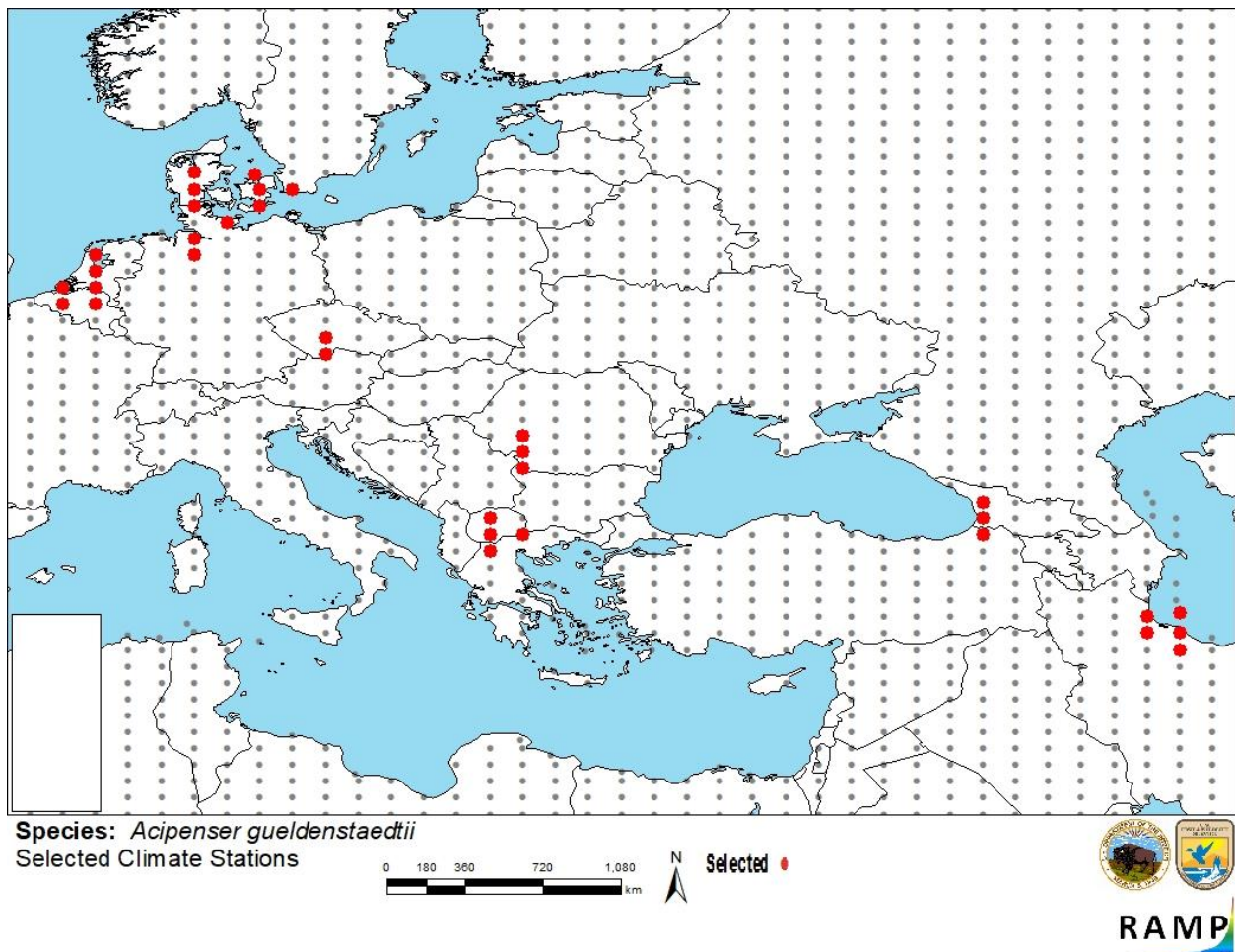
This species has not been documented as introduced or established in the United States.

## 6 Climate Matching

### Summary of Climate Matching Analysis

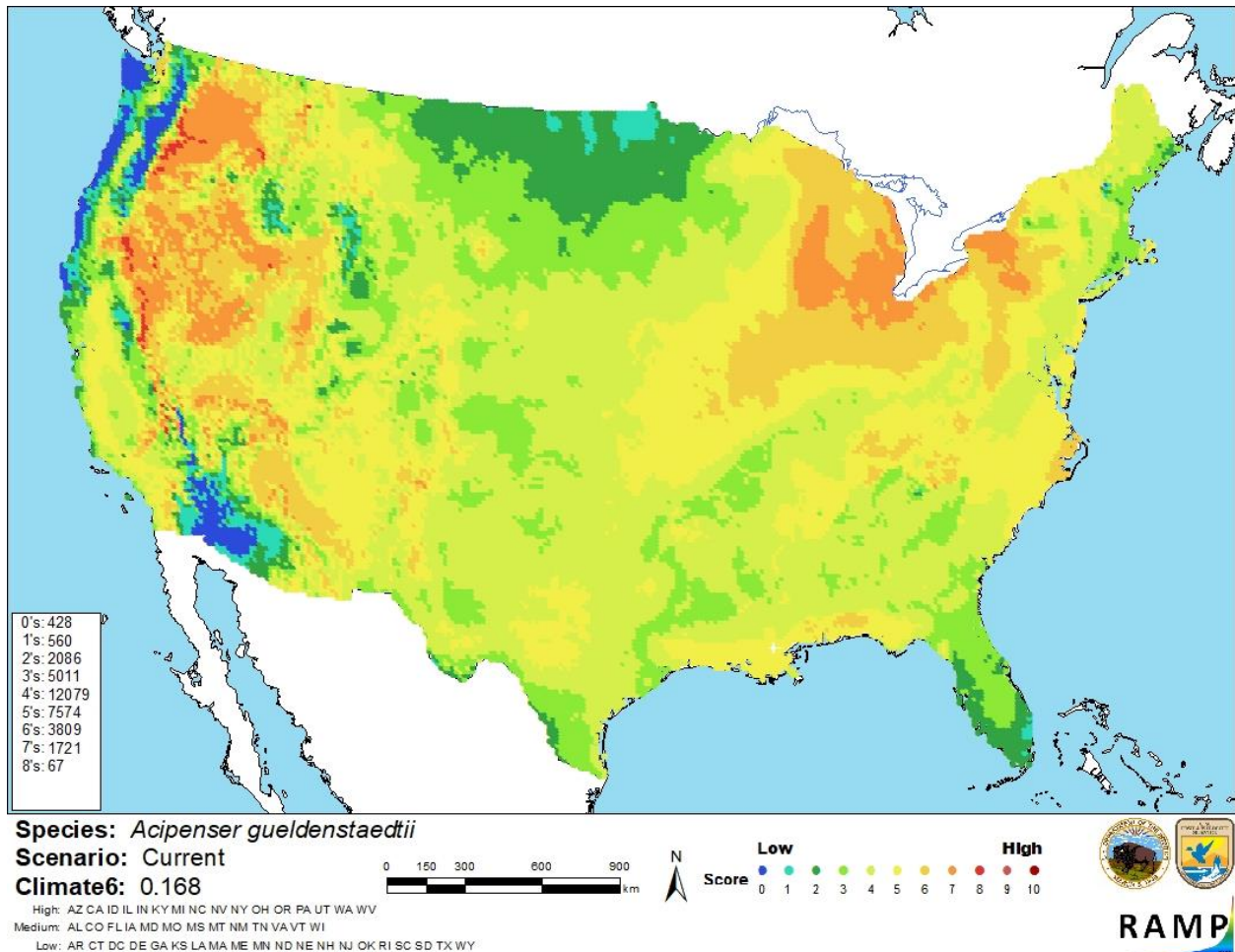
The climate match presented here refers only to where the species can survive in freshwater and brackish environments and not where it can survive in marine environments.

The Climate 6 score (Sanders et al. 2014; 16 climate variables; Euclidean distance) for the contiguous United States was 0.168, which is a high climate match. Scores of 0.103 and greater are classified as high match. The climate match was highest in the Western United States and in the Great Lakes region. Much of the rest of the contiguous United States had a medium to medium-low climate match. The areas of lowest climate match were located in southern Florida, the Southwest, and the Pacific Northwest.



**Figure 2.** RAMP (Sanders et al. 2014) source map showing weather stations selected as source locations (red; Belgium, Netherlands, Germany, Denmark, Sweden, Czech Republic, Romania, Bulgaria, Macedonia, Greece, Georgia, Turkey, Iran) and non-source locations (gray) for *Acipenser gueldenstaedtii* climate matching. Source locations from GBIF Secretariat (2018). Source locations are selected when they are within 100 km of a species occurrence and do not necessarily represent the exact location of an occurrence.





**Figure 3.** Map of RAMP (Sanders et al. 2014) climate matches for *Acipenser gueldenstaedtii* in the contiguous United States based on source locations reported by GBIF Secretariat (2018). 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
$0.000 < X < 0.005$	Low
$0.005 < X < 0.103$	Medium
$\geq 0.103$	High

## 7 Certainty of Assessment

There is adequate information available on the biology and distribution of *Acipenser gueldenstaedtii*. Multiple introductions of this species outside of its native range have been documented. Despite this, there is no information available on impacts of these introductions. Further information is needed to adequately assess the risk this species poses to the contiguous United States. Certainty of this assessment is therefore low.

## 8 Risk Assessment

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### Summary of Risk to the Contiguous United States

*Acipenser gueldenstaedtii*, the Russian Sturgeon, is a sturgeon native to the Black, Azov, and Caspian Sea basins, although it has been extirpated from much of its native range. It has been deliberately introduced widely in Europe because of its value in caviar production. A.

*gueldenstaedtii* has a high climate match with freshwater environments in the contiguous United States. Climate match to marine environments cannot be assessed with the climate matching analysis employed here. Despite multiple documented introductions of this species outside of its native range, no information is available on any negative impacts from this species. Certainty of this assessment is therefore low because further information is needed to adequately assess the risk this species poses to the United States. The overall risk assessment category is Uncertain.

### Assessment Elements

- **History of Invasiveness (Sec. 3): None Documented**
- **Climate Match (Sec. 6): High**
- **Certainty of Assessment (Sec. 7): Low**
- **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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## 10 References Quoted But Not Accessed

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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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