

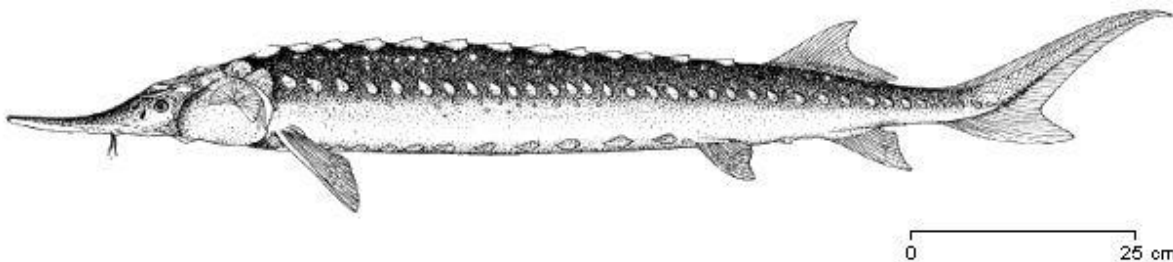
Stellate Sturgeon (*Acipenser stellatus*)

Ecological Risk Screening Summary

U.S. Fish and Wildlife Service, March 2011

Revised, June 2018

Web Version, 8/29/2018



FAO

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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.”

Status in the United States

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

Means of Introductions in the United States

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

Remarks

From Qiwei (2010):

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

“Based on catch data, and number of individuals migrating into the Volga and Ural rivers it is estimated that the species has undergone a population decline of at least 80% (possibly close to 100%) in the past three generations (minimum estimate of 30 years, possibly up to 40), which is expected to continue. Catch data shows massive declines across the species range with a 98% decline between 1980 and 2007 in the Caspian Sea, and a 72.5% in four years (2002-2005) in Romania (Danube).”

“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.).”

2 Biology and Ecology

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 stellatus* Pallas, 1771”

From Eschmeyer et al. (2018):

“Current status: Valid as *Acipenser stellatus* Pallas 1771. Acipenseridae.”

Size, Weight, and Age Range

From Froese and Pauly (2018):

“Max length : 220 cm TL male/unsexed; [Frimodt 1995]; common length : 125 cm TL male/unsexed; [Bauchot 1987]; max. published weight: 80.0 kg [Frimodt 1995]; max. reported age: 27 years [Birstein 1991]”

Environment

From Froese and Pauly (2018):

“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/Range

From Froese and Pauly (2018):

“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.”

Introduced

From Froese and Pauly (2018):

“Introduced in Aral Sea.”

Means of Introduction Outside the United States

From Aladin et al. (2004):

“The first [*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. nudipectus 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)."

Short Description

From Froese and Pauly (2018):

"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.”

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.”

From Froese and Pauly (2018):

“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].”

Diseases

From Aladin et al. (2004):

“The first [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]. Furthermore parasites of starred sturgeon roe (*Polypodium hydriforme*) and gills (*Nitzschia sturionis*) passed onto aboriginal thorn sturgeon and caused strong epizooties.”

Poelen et al. (2014) lists the following as parasites of *Acipenser stellatus*: *Leptorhynchoides plagicephalus*, *Eubothrium acipenserinum*, *Bothrimonus sturionis*, *Caryophyllaeus fimbriceps*, *Proteocephalus skorikowi*, *Nitzschia sturionis*, *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 inflata*, *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* (Strona et al. 2013, Smithsonian Institution no date, Benesh et al. 2017).

No OIE-reportable diseases have been documented for this species.

Threat to Humans

From Froese and Pauly (2018):

“Harmless”

3 Impacts of Introductions

From Balz (1991):

“Attempts to introduce a sturgeon *Acipenser stellatus* and a clupeid *Caspialosa caspia* into the Aral Sea were unsuccessful and had the negative effect of introducing a gill parasite on the native sturgeon *Acipenser nudiventris* (Rosenthal, 1980).”

4 Global Distribution

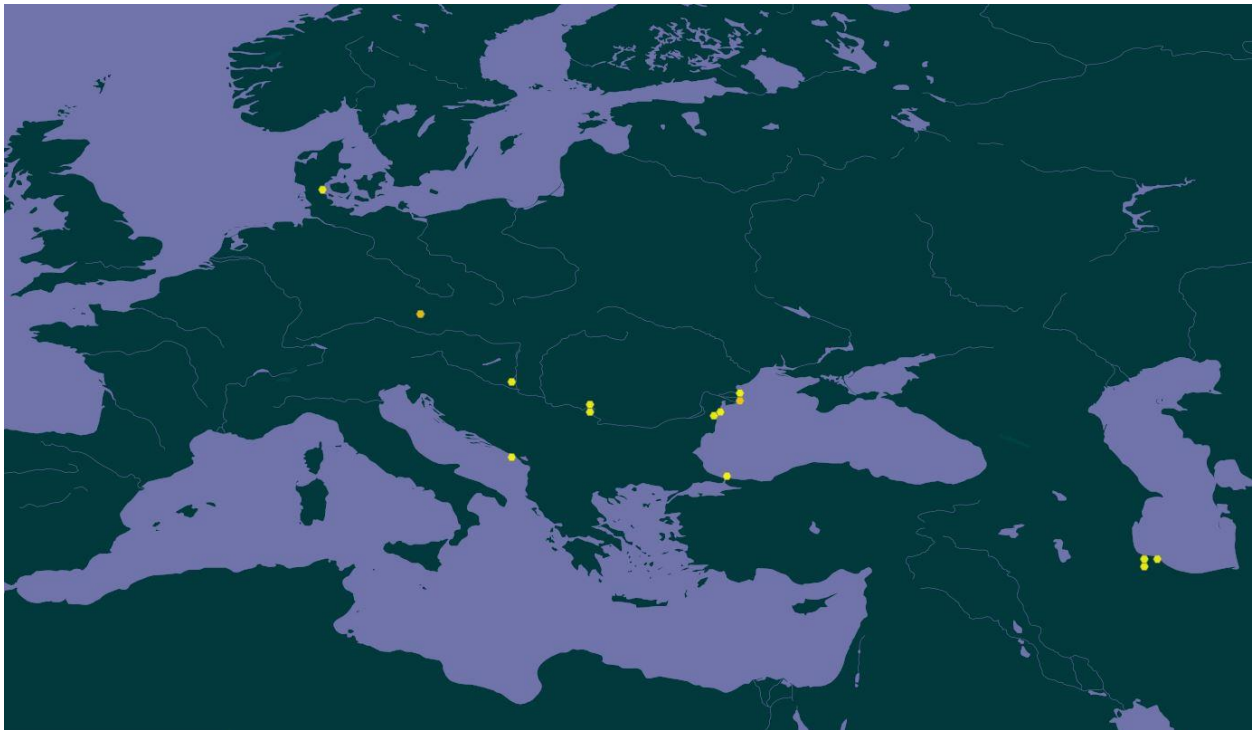


Figure 1. Known global distribution of *Acipenser stellatus*, reported from Europe and southwestern Asia. Map from GBIF Secretariat (2017). A point in northern Russia was excluded from the extent of this map and from climate match analysis because of imprecise coordinates. Points in the Czech Republic and Denmark were excluded from climate matching as outliers inconsistent with the known range of this species.

Because the climate matching analysis is not valid for marine waters, no marine occurrences were used in the climate matching analysis. Fresh and brackish water occurrences were located in Iran, Turkey, Romania, and Serbia.

5 Distribution Within the United States

This species has not been reported as introduced or established in the U.S.

6 Climate Matching

Summary of Climate Matching Analysis

The climate match presented here refers only to where *A. stellatus* can survive in fresh and brackish water environments and not in the marine environments where *A. stellatus* lives until it is ready to reproduce.

The Climate 6 score (Sanders et al. 2018; 16 climate variables; Euclidean distance) for the contiguous United States was 0.179, which is a high climate match. Scores of 0.103 or higher are classified as high match. The climate match was highest in the Western U.S., the Great Lakes Basin, and Ohio River Basin. Much of the contiguous United States had a medium climate match. The areas of lowest climate match were located in the Pacific Northwest, the Southwest, and the Gulf Coast.

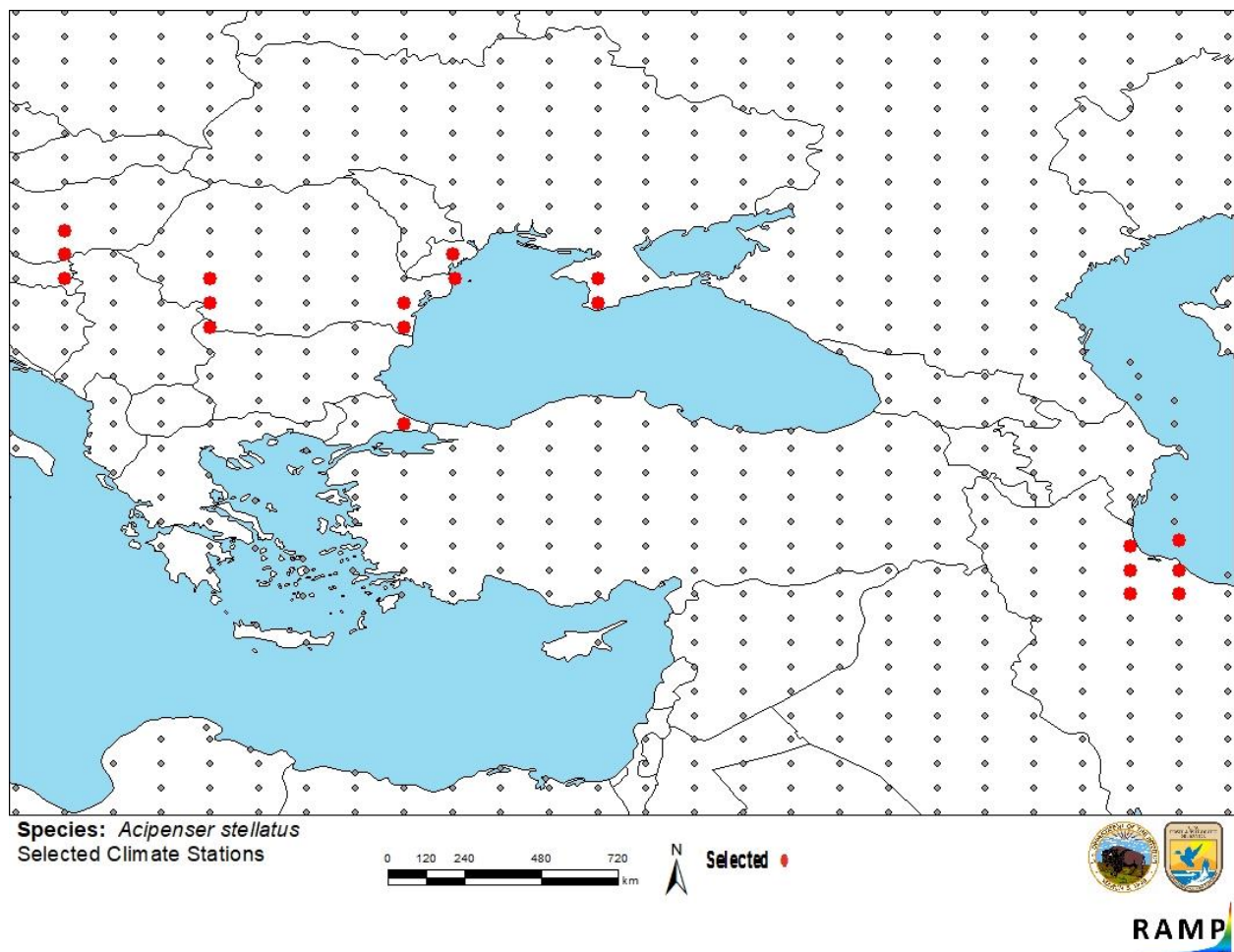


Figure 2. RAMP (Sanders et al. 2018) source map showing weather stations in southeastern Europe and southwestern Asia selected as source locations (red; Iran, Turkey, Romania, Ukraine, Croatia, Austria) and non-source locations (gray) for *Acipenser stellatus* climate matching. Source locations from GBIF Secretariat (2017).

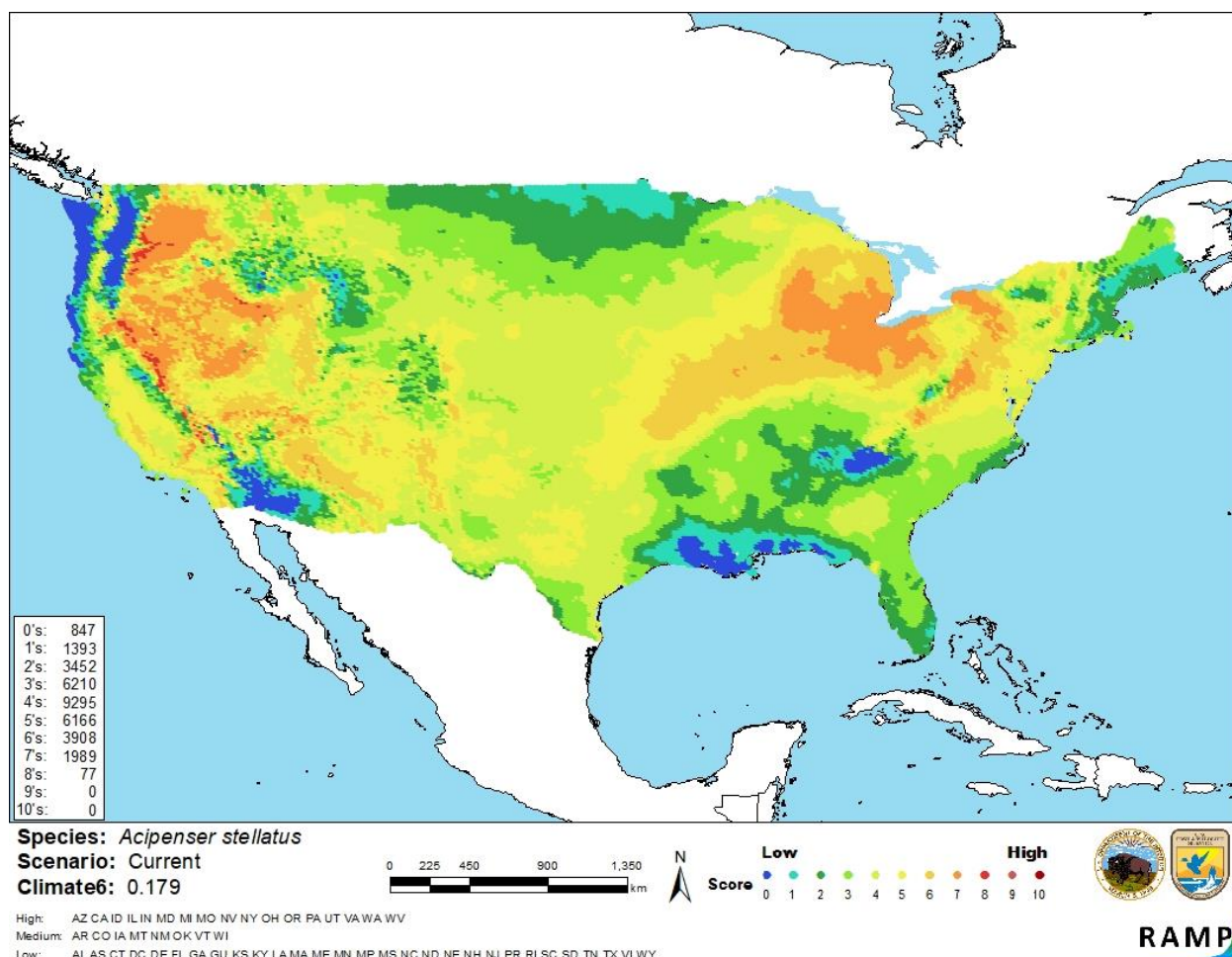


Figure 3. Map of RAMP (Sanders et al. 2018) climate matches for *Acipenser stellatus* in the contiguous United States based on source locations reported by GBIF Secretariat (2017). 0= Lowest match, 10= Highest match. Counts of climate match scores are tabulated on the left.

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
$0.000 < X \leq 0.005$	Low
$0.005 < X < 0.103$	Medium
≥ 0.103	High

7 Certainty of Assessment

There is adequate information available about the biology of *Acipenser stellatus*. Its native range has been well-documented. This species has never become established where introduced outside of its native range, so information is lacking on impacts of introductions of this species. Additionally, *A. stellatus* spends much of its life in marine environments, and climate match in a marine environment cannot be assessed with an ERSS. Because of this, the certainty of this assessment is low.

8 Risk Assessment

Summary of Risk to the Contiguous United States

Acipenser stellatus, the Stellate Sturgeon, is an anadromous species native to the Caspian, Black, and Aegean Seas. It is listed as Critically Endangered by the IUCN, and it has been extirpated from the Aegean Sea. *A. stellatus* has been deliberately introduced to the Aral Sea, but the population failed. This species has a high climate match with the contiguous United States. However, RAMP (Sanders et al. 2018) was not developed for use in assessing climate match for marine species so the climate match in a marine environment, where *A. stellatus* matures, cannot be assessed with an ERSS. Because of a lack of establishment outside its native range, the certainty of this species' risk assessment is low. The overall risk assessment category is therefore uncertain.

Assessment Elements

- **History of Invasiveness (Sec. 3): Uncertain**
- **Climate Match (Sec. 6): High**
- **Certainty of Assessment (Sec. 7): Low**
- **Overall Risk Assessment Category: Uncertain**

9 References

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

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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