

Huchen (*Hucho hucho*)

Ecological Risk Screening Summary

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1 Native Range and Status in the United States

Native Range

From Froese and Pauly (2019):

“Europe: Danube drainage [Austria, Bosnia and Herzegovina, Bulgaria, Croatia, Germany, Hungary, Italy, Romania, Serbia, Slovakia, Slovenia, Switzerland, and Ukraine].”

“Population has declined [in Slovenia] due to pollution and river regulation. Conservation measures include artificial propagation and stocking [Povz 1996]. Status of threat: Regionally extinct [Bianco and Ketmaier 2016].”

“Considered locally extinct (extirpated) in 1990 [in Switzerland] [Vilcinskas 1993].”

“Extinct in the wild in 2000 [in Czech Republic] [Lusk and Hanel 2000]. This species is a native species in the basin of the Black Sea (the rivers Morava and Dyje). At present, its local and time-limited occurrence depends on the stocking material from artificial culture. Conditions that will facilitate the formation of a permanent population under natural conditions are not available [Lusk et al. 2004]. [...] Status of threat: extinct in the wild [Lusk et al. 2011].”

From Freyhof and Kottelat (2008):

“The species is severely fragmented within the Danube drainage, where most populations exclusively depend on stocking and natural reproduction is very limited due to habitat alterations and flow regime changes.”

From Grabowska et al. (2010):

“The exceptional case is huchen (or Danubian salmon), *Hucho hucho*. The huchen’s native range in Poland was restricted to two small rivers (Czarna Orawa and Czadeczka) of the Danube River basin, [...]”

Status in the United States

Froese and Pauly (2019) report an introduction to the United States between 1870 and 1874 that did not result in an established population. No records were found of trade in the United States.

Means of Introductions in the United States

No introductions have been reported in the United States.

Remarks

Hucho hucho is listed as Endangered by the IUCN Red List (Freyhof and Kottelat 2008).

From Freyhof and Kottelat (2008):

“The species has undergone a massive decline starting over 100 years ago. More recently the majority of the stocks rely upon re-introductions (from farmed stock and ranches) for angling and conservation. It is almost impossible to identify if any stocks are self sustaining.”

From Holcik (1990):

“About 50 years ago the huchen occupied almost 2,000 km of river in Europe but it is now common in only about 33% of its former distribution, is rare in 28% and has disappeared from 39%.”

From Froese and Pauly (2019):

“Considered critically endangered in 1992 [in Austria] [Vilcinskas 1993].”

“Considered critically endangered in Germany in 1984 [Gerstmeier and Romig 1998] and 1992 [Vilcinskas 1993].”

“Status of threat [in Slovakia]: critically endangered [Holcik 1996].”

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From Fricke et al. (2019):

“**Current status:** Valid as *Hucho hucho* (Linnaeus 1758).”

From ITIS (2019):

“Kingdom Animalia
Subkingdom Bilateria
Infrakingdom Deuterostomia
Phylum Chordata
Subphylum Vertebrata
Infraphylum Gnathostomata
Superclass Actinopterygii
Class Teleostei
Superorder Protacanthopterygii
Order Salmoniformes
Family Salmonidae
Genus *Hucho*
Species *Hucho hucho* (Linnaeus, 1758)”

Size, Weight, and Age Range

From Holcik (1995):

“Large salmonid and one of the biggest freshwater fishes of the world, attaining a length of over 2m and weight of over 100 kg.”

From Froese and Pauly (2019):

“[...]; max. reported age: 20 years [Kottelat and Freyhof 2007]”

Environment

From Froese and Pauly (2019):

“Freshwater; benthopelagic; potamodromous [Kottelat and Freyhof 2007].”

From Freyhof and Kottelat (2008):

“Montane and submontane reaches of large streams and swift rivers with gravel beds, well oxygenated, fast-flowing water and temperatures rarely above 15°C. Prefers deep pools and shady water under overhanging vegetation.”

From Holcik (1995):

“European population prefers submontane rivers at altitudes above 200m a.s.l., where the summer water temperature is around 15°C, the dissolved oxygen is not below 5mg l⁻¹ [...]”

Climate/Range

From Froese and Pauly (2019):

“Temperate; [...]; 50°N - 44°N, 8°E - 21°E”

Distribution Outside the United States

Native

From Froese and Pauly (2019):

“Europe: Danube drainage [Austria, Bosnia and Herzegovina, Bulgaria, Croatia, Germany, Hungary, Italy, Romania, Serbia, Slovakia, Slovenia, Switzerland, and Ukraine].”

“Population has declined [in Slovenia] due to pollution and river regulation. Conservation measures include artificial propagation and stocking [Povz 1996]. Status of threat: Regionally extinct [Bianco and Ketmaier 2016].”

“Considered locally extinct (extirpated) in 1990 [in Switzerland] [Vilcinskis 1993].”

“Extinct in the wild in 2000 [in Czech Republic] [Lusk and Hanel 2000]. This species is a native species in the basin of the Black Sea (the rivers Morava and Dyje). At present, its local and time-limited occurrence depends on the stocking material from artificial culture. Conditions that will facilitate the formation of a permanent population under natural conditions are not available [Lusk et al. 2004]. [...] Status of threat: extinct in the wild [Lusk et al. 2011].”

From Freyhof and Kottelat (2008):

“The species is severely fragmented within the Danube drainage, where most populations exclusively depend on stocking and natural reproduction is very limited due to habitat alterations and flow regime changes.”

From Grabowska et al. (2010):

“The exceptional case is huchen (or Danubian salmon), *Hucho hucho*. The huchen’s native range in Poland was restricted to two small rivers (Czarna Orawa and Czadeczka) of the Danube River basin, [...]”

Introduced

From Froese and Pauly (2019):

“Introduced into one locality in the Atlas Mountains near Meknes [Morocco] [Lever 1996]. Disappeared although some individuals were recaptured in 1954-1955.”

“Established in the drainage of the Douro river [*sic*] [Spain] [Lever 1996]. Introduced also in Tagus drainage [Spain] but maintained only by stocking [Kottelat and Freyhof 2007].”

“Introduced in Lake Constance [in Germany, outside of native range in Germany] but maintained only by stocking [Kottelat and Freyhof 2007].”

“Introduced into the Rhine River [France] [Billard 1997] and Rhône drainage [France] maintained only by stocking [Kottelat and Freyhof 2007].”

“Introduced in the early 20th century [in the United Kingdom] [Lever 1996]. Introduction was unsuccessful (Gordon Copp, pers. comm., Oct. 18, 2006).”

“Reintroduced in 1960 [in Belgium, original introduction 1954]. Introduced also for the control of *Chondrostoma nasus* but the species had completely disappeared.”

“Introduction [to Sweden] was not successful. Not established [NOBANIS 2013].”

“Young individuals from 30,000 eggs were released in the St. Lawrence River, Richelieu River, Rivière du Nord and Lake Mandeville in the Laurentians [Quebec, Canada]. Considered to be extinct.”

From Grabowska et al. (2010):

“In the 1950s it [*H. hucho*] was translocated for conservation purposes to some tributaries of the upper stretch of the Vistula River [Poland] where it established self-sustained populations (Witkowski 1996). Currently huchen is being stocked also into water courses of the Oder River catchment [Poland].”

Means of Introduction Outside the United States

From Froese and Pauly (2019):

“Introduced into other European river basins when their numbers declined due to ecological changes in the Danube.”

“angling/sport”

From Freyhof and Kottelat (2008):

“More recently the majority of the stocks rely upon re-introductions (from farmed stock and ranches) for angling and conservation.”

Short Description

From Froese and Pauly (2019):

“Dorsal spines (total): 3 - 5; Dorsal soft rays (total): 8-14; Anal spines: 3-5; Anal soft rays: 7 - 14; Vertebrae: 66 - 72. Distinguished from other species of Salmonidae in central and eastern Europe by the following combination of characters: lateral line with 180-200 scales; no red spots and white fin margins; head dorsally flattened and long (22-24% SL); body roundish; caudal fin deeply emarginate; large size (in undisturbed areas); usually 13-19 gill rakers [Kottelat and Freyhof 2007].”

From Holcik (1995):

“Teeth on OS vomere form a continuous, horseshoe-shaped band with the palatal teeth. The shaft of vomere lacks teeth. Adipose fin large, the length of its base is over 50% of anal fin base. Skull broad, head compressed, mouth large. Jaws have strong conical teeth. Body cylindrical, prolonged, covered with small scales. Lateral line scales have a form of a narrow and thick osseous plate with an imperfectly closed canal on the medial side, and they have no circular ridges. Number of transverse scale rows exceeds considerably that of pored lateral line scales (141-288 versus 107-194).”

Biology

From Froese and Pauly (2019):

“Usually solitary, inhabits deeper regions of swift flowing streams with oxygen rich waters. Adults are territorial but not solitary [Holcik 1995]. Carnivore. Juveniles feed mainly on invertebrates and adults mostly on fishes, but also prey on amphibians, reptiles, small mammals and waterfowl [Holcik 1995] [...] Territorial, but migrates short distances upstream for spawning [Muus and Dalhstrom 1968].”

“Sexually mature fish migrate upstream into smaller and shallower (0.3-1.5 m deep) streams [Holcik 1995], usually in upper reaches of tributaries [Kottelat and Freyhof 2007]. Males arrive first at spawning sites. Males defend females against other individuals. Spawning usually occurs during daytime [Kottelat and Freyhof 2007]. Spawns on gravelly bottom where female makes a shallow hole where the eggs are laid and covered with gravel [Muus and Dalhstrom 1967]. Both sexes covered the eggs with substrate. They both defend the spawning site up to 2 weeks after spawning. Eggs usually hatch after 25-40 days. Larvae stay in gravel until yolk sac is absorbed after 8-14 days [Kottelat and Freyhof 2007]. Young remain near spawning area feeding on bottom fauna. Spawns with snow melt, in shallow water in Danube or affluents [Muus and Dalhstrom 1967].”

From Jungwirth (1978):

“First spawning takes place when fish are 4 or 5 years old (3--4 kg).”

Human Uses

From Froese and Pauly (2019):

“Fisheries: commercial; aquaculture: commercial; gamefish: yes”

“Important sport fish with minimum size of catch from 50-55 cm.”

“Introduced also for the control of *Chondrostoma nasus* [...]”

Diseases

Infection with *Gyrodactylus salaris* is an OIE-reportable disease (OIE 2019). Popiołek et al. (2013) does not specify which species of *Gyrodactylus* can infect *Hucho hucho*.

According to CABI (2019), *Hucho hucho* can carry the following diseases: infectious pancreatic necrosis, *Renibacterium salmoninarum*, bacterial kidney disease, whirling disease and lernaeopdid infection of fish.

Popiołek et al. (2013) report *Hucho hucho* as a host for *Chilodonella cyprini*, *Ichthyobodo necatrix*, *Ichthyophthirius multifiliis*, *Myxonema cerebralis*, *Trichodina* spp., *Gyrodactylus* spp., *Asymphylodora imitans*, *A. markewitschi*, *A. tincae*, *Azygia lucii*, *A. mirabilis*, *A. robusta*, *Crepidostomum metoecus*, *Nicolla proaviatum*, *Phyllodistomum simile*, *Cyathocephalus truncatus*, *Eubothrium crassum*, *E. salvelini*, *Triaenophorus nodulosus*, *Cucullanus truttae*, *Cystidicola farionis*, *Cystidicoloides ephemeridarum*, *Raphidascaaris acus*, *R. denudata*, *R. gnedini*, *Neoechinorhynchus rutili*, *Pomphorhynchus laevis*, *Piscicola respirans*, *Argulus coregoni*, and *Basanistes huchonis*.

Threat to Humans

From Froese and Pauly (2019):

“Harmless”

3 Impacts of Introductions

From Holčík (1984):

“In one stretch of the Hornád River, Czechoslovakia, a transplanted and naturalized population of huchen had to be eradicated because the abundance of the brown trout and the grayling (*Thymallus thymallus*) significantly decreased (Skácel, 1976). [...] On the other hand, in the Tormes River, the population of the native *Chondrostoma cyclolepis* (the only fish inhabiting

this stretch of the river) did not display any negative changes after the introduction of the hucho (Lobon-Cervia, pers.comm.).”

4 Global Distribution



Figure 1. Known global distribution of *Hucho hucho*. Map from GBIF Secretariat (2019).

The record information for the location in Mongolia (Figure 1) indicates that the observation may have been for the related species *Hucho taimen* and not *H. hucho*. It was not used to select source points for the climate match.

The locations in Slovenia and the Czech Republic (Figure 1) were not used to select source locations for the climate match. *Hucho hucho* is extirpated in those countries (Froese and Pauly 2019).

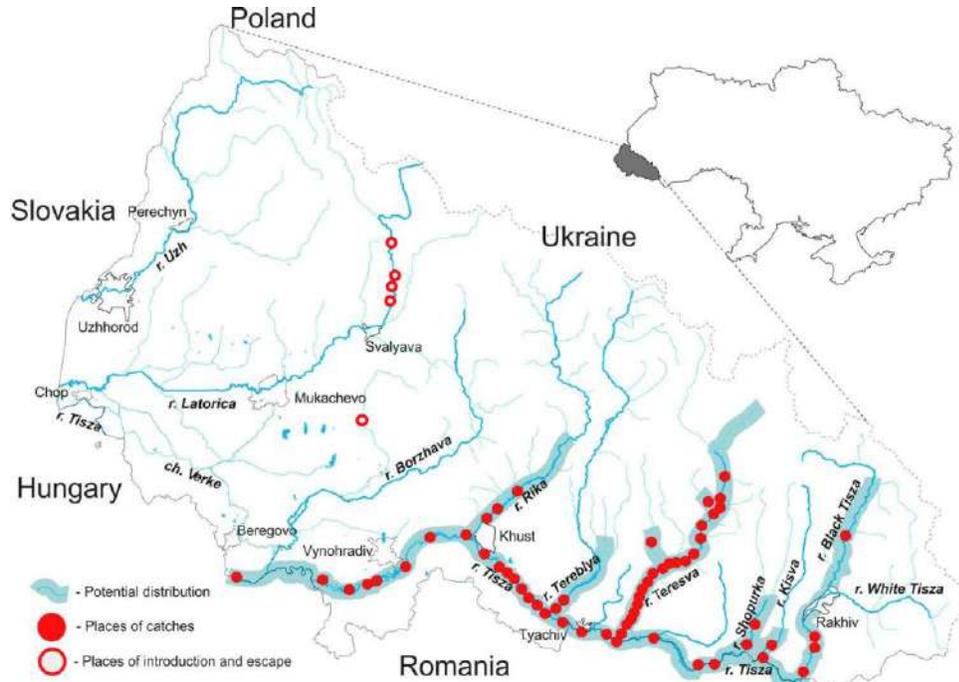


Figure 2. Known distribution of *Hucho hucho* in Ukraine as reported in Didenko et al. (2018). Publication licensed under Creative Commons BY-NC-ND.

Hucho hucho is native to the Danube River drainage in Bulgaria, Hungary, and Italy (Froese and Pauly 2019) but no georeferenced observations were available in those countries.

5 Distribution Within the United States

An introduction to the United States in the 1800s was reported but a specific locality was not given and it did not result in an established population (Froese and Pauly 2019).

6 Climate Matching

Summary of Climate Matching Analysis

A majority of the contiguous United States had a medium climate match for *Hucho hucho*. The areas of highest match occur in the southern Northeast down through the Appalachian Mountains, and around the Great Lakes. There are also scattered, small areas of high match across the West. The lowest areas of match to occur in the contiguous United States are found near the southern Atlantic Coast, Gulf of Mexico, along the southern border to Arizona, in Washington, and the upper Great Plains. The Climate 6 score (Sanders et al. 2018; 16 climate variables; Euclidean distance) for the contiguous United States was 0.213, a high climate score. Scores of 0.103, or higher, are a high match. Most States had high individual climate scores. Arkansas, Georgia, Iowa, Idaho, North Carolina, Oklahoma, South Dakota, Tennessee, Utah, and Wyoming had medium scores; Alabama, Florida, Kansas, Louisiana, Minnesota, Mississippi, North Dakota, Nebraska, South Carolina, and Texas had low individual scores.

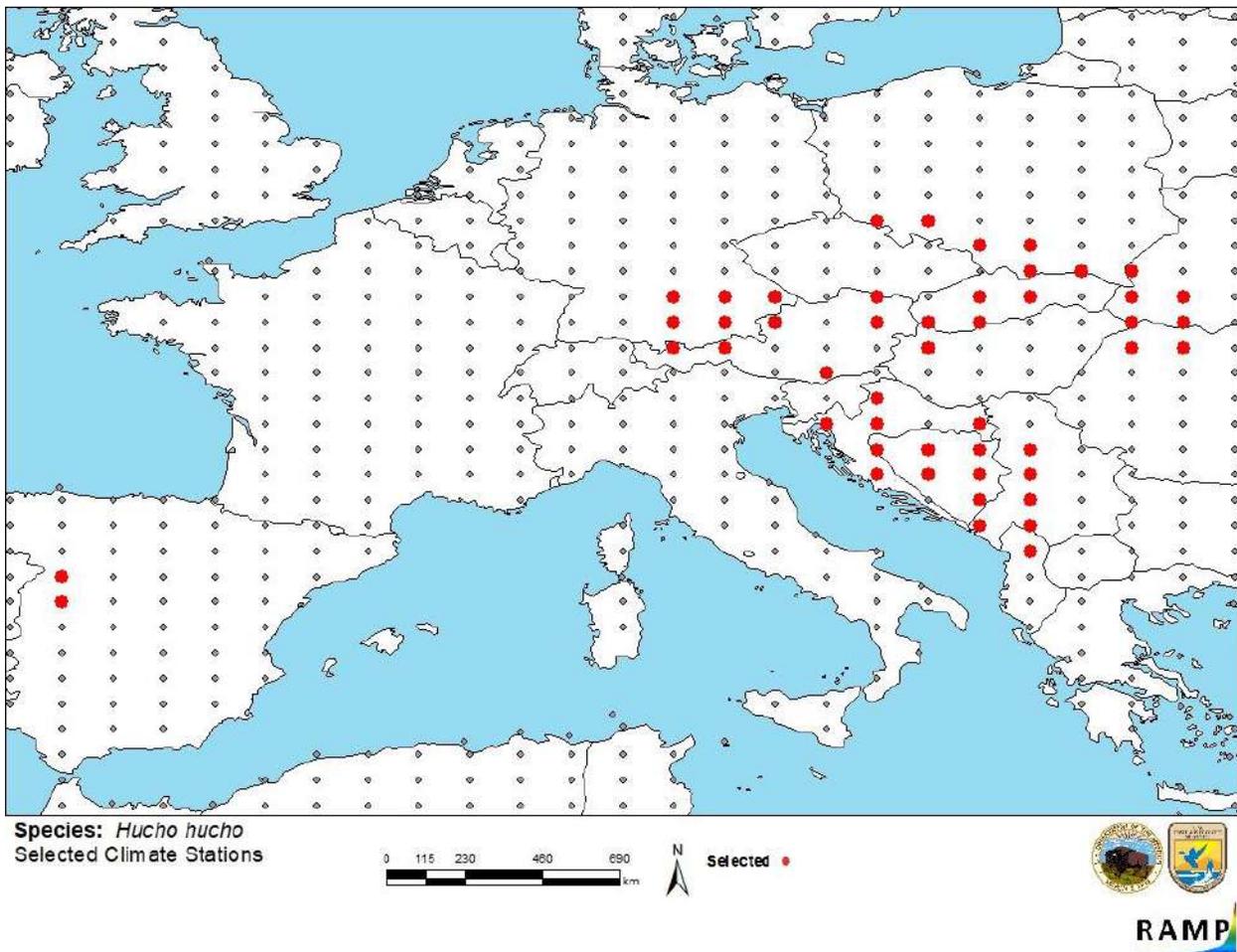


Figure 3. RAMP (Sanders et al. 2018) source map showing weather stations in Europe selected as source locations (red; Spain, Germany, Austria, Poland, Slovakia, Croatia, Bosnia and Herzegovina, Serbia, Ukraine, Romania, Albania) and non-source locations (gray) for *Hucho hucho* climate matching. Source locations from Didenko et al. (2018) and GBIF Secretariat (2019).

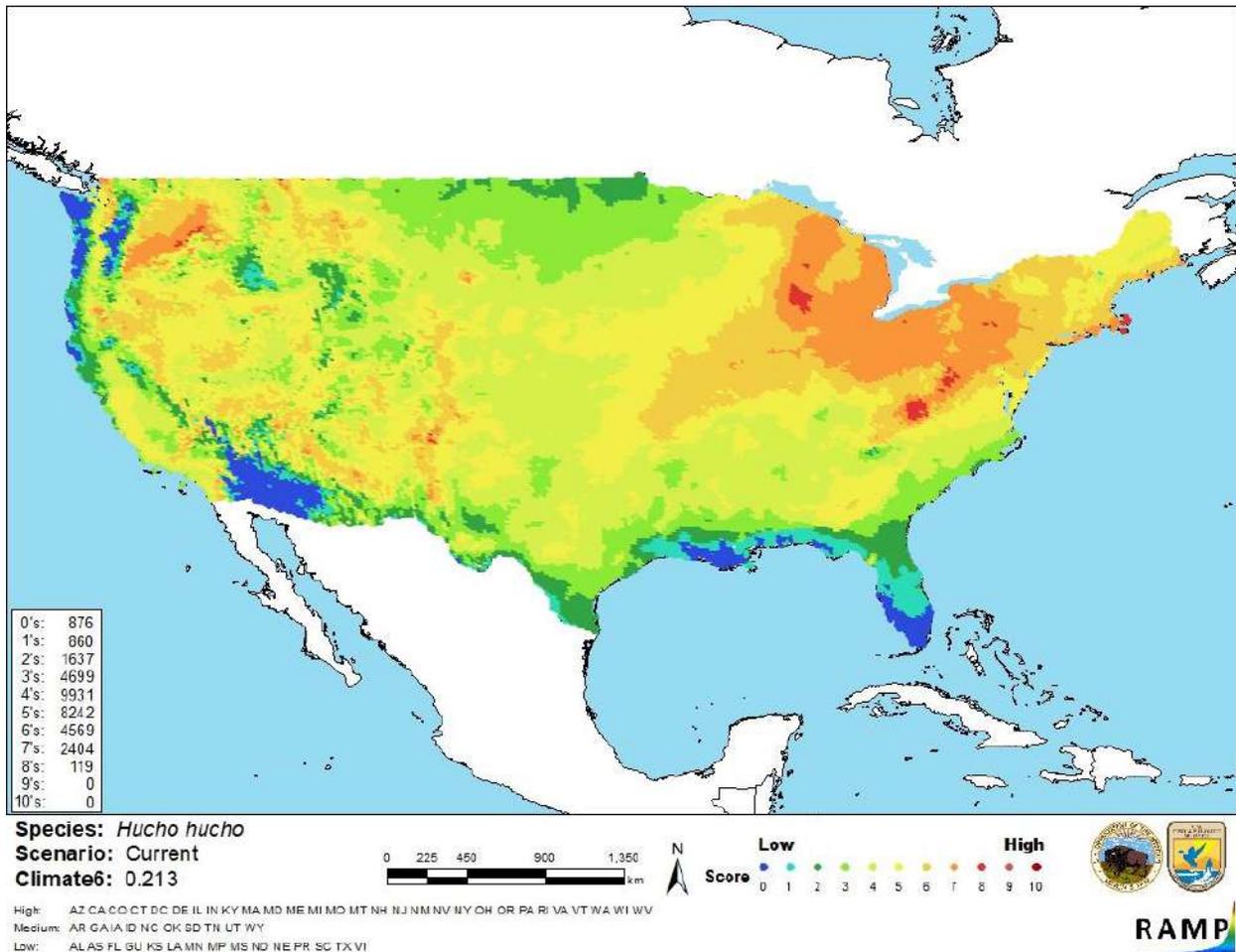


Figure 4. Map of RAMP (Sanders et al. 2018) climate matches for *Hucho hucho* in the contiguous United States based on source locations reported by Didenko et al. (2018) and GBIF Secretariat (2019). 0 = Lowest match, 10 = Highest match.

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
≥ 0.103	High

7 Certainty of Assessment

The certainty of assessment is medium. There is peer-reviewed information on the biology and ecology of this species. Its distribution is well-documented as it has been researched in light of the species declining and becoming a species of concern in the native range. Many introductions have occurred, mainly intentional, with a few outside the native range resulting in self-sustaining established populations. Some information is available from a peer-reviewed source regarding impacts of introduction but the information available to the assessor was not detailed. The source cited in the accessed document was not available to the assessor in English.

8 Risk Assessment

Summary of Risk to the Contiguous United States

Hucho hucho, the Huchen, is a large salmonid native to the Danube River drainage. The species is reared via aquaculture and caught both commercially and recreationally. This species was once found throughout much of the Danube River drainage, but populations have drastically declined over the past 100 years causing *H. hucho* to become endangered. The history of invasiveness is high. This species has been purposely introduced in both its native and non-native ranges in an attempt to preserve the species. Introductions of this species do not often become established and many areas rely on continuous restocking. However, a few introductions outside of the native range have resulted in self-sustaining established populations. There has been a documented negative impact associated with one of those populations, the decline of other large sport fish. The climate match with the contiguous United States is high. The highest areas of match for the contiguous United States occur in the Northeast, around the Great Lakes, and west of the Rocky Mountains in the Northwest. The certainty of assessment is medium. The overall risk assessment of *Hucho hucho* is high.

Assessment Elements

- **History of Invasiveness (Sec. 3): High**
- **Climate Match (Sec. 6): High**
- **Certainty of Assessment (Sec. 7): Medium**
- **Remarks/Important additional information:** This species is endangered and locally extinct in some places.
- **Overall Risk Assessment Category: High**

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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