U.S. Fish & Wildlife Service

Cherry Salmon (*Oncorhynchus masou*)

Ecological Risk Screening Summary

U.S. Fish & Wildlife Service, May 2011
Revised, May 2019
Web Version, 9/30/2020

Organism Type: Fish
Overall Risk Assessment Category: Uncertain

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1 Native Range and Status in the United States

Native Range

From Froese and Pauly (2019):

"Northwest Pacific: Japan and adjacent waters."

Froese and Pauly (2019) lists *Oncorhynchus masou* as native to China, Japan, North Korea, South Korea, and Russia.

From Crawford and Muir (2008):

"The cherry or masu salmon is the only Pacific salmonine that is exclusively native to the western Pacific. It ranges south from Kamchatka, through the Sea of Okhotsk along the Russian mainland to the Japan sea, including Hokkaido and Honshu ([…]; Berg 1948; Augerot 2004)."

Status in the United States

Fuller et al. (2019) reports *Oncorhychus masou* was introduced in Michigan (1929) and Washington (1974) but both introductions failed and there was no wild established population.

All species in the family Salmonidae are listed as injurious species under 18 U.S.C. 42 (a) due to the risk of carrying certain pathogens, thus prohibiting their importation unless imported live with a health certification or are dead and eviscerated (USFWS 1967).

Means of Introductions in the United States

From Fuller et al. (2019):

"Two hundred 18-month old fingerlings were intentionally stocked in Michigan by the Michigan Department of Conservation (Parsons 1973); however, Westerman (1930) listed a total of 2,000 stocked in Michigan. Stocked in Washington for use in fisheries enhancements studies (Mighell 1978)."

Remarks

Literature searches were conducted using the valid name *Oncorhynchus masou* and the subspecies name *Oncorhynchus masou masou*.

Oncorhynchus masou has been intentionally stocked within the United States by State fishery managers to achieve fishery management objectives. State fish and wildlife management agencies are responsible for balancing multiple fish and wildlife management objectives. The potential for a species to become invasive is now one important consideration when balancing multiple management objectives and advancing sound, science-based management of fish and wildlife and their habitat in the public interest.

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From Fricke et al. (2019):

"**Current status:** Valid as *Oncorhynchus masou* (Brevoort 1856)."

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
                      Subfamily Salmoninae
                        Genus *Oncorhynchus*
                          Species *Oncorhynchus masou* (Brevoort, 1856)

Size, Weight, and Age Range

From Froese and Pauly (2019):

"Max length : 79.0 cm TL male/unsexed; [Fadeev 2005]; max. published weight: 10.0 kg [Frimodt 1995]"

Environment

From Froese and Pauly (2019):

"Marine; freshwater; brackish; benthopelagic; anadromous [Riede 2004]; depth range 0 - 200 m [Frimodt 1995]."

Climate

From Froese and Pauly (2019):

"Temperate; 65°N - 34°N, 127°E - 158°E"

Distribution Outside the United States

Native

From Froese and Pauly (2019):

"Northwest Pacific: Japan and adjacent waters."

Froese and Pauly (2019) lists *Oncorhynchus masou* as native to China, Japan, North Korea, South Korea, and Russia.

From Crawford and Muir (2008):

"The cherry or masu salmon is the only Pacific salmonine that is exclusively native to the western Pacific. It ranges south from Kamchatka [Russia], through the Sea of Okhotsk along the Russian mainland to the Japan sea, including Hokkaido and Honshu ([…]; Berg 1948; Augerot 2004)."

Introduced

From Fuller et al. (2019):

"Cherry salmon were also introduced to Westward Lake in Algonquin Park, Ontario in 1966 in an experimental stocking to evaluate potential new sportfishes. Few individuals were caught during sampling in 1967-68, and none have been found in sampling since 1970 (Christie 1970; Crossman 1974)."

Froese and Pauly (2019) lists *Oncorhynchus masou* as introduced from Japan to Chile with a probably established population. Also, Froese and Pauly (2019) lists *O. masou* as introduced from Japan to China with an unknown population status.

From Crawford and Muir (2008):

"A single report exists for masu salmon being introduced to European waters, and that is a 1976 unsuccessful attempt to establish a recreational fishery in Germany using fish from Japan ([…]; Welcomme 1988; Holcik 1991)."

"A single record of masu introductions to South America exists […]. Citing Nagasawa and Aguilera 1974, Machidori and Kato (1984) reported that approximately 85, 000 juvenile masu salmon were released in the Clara River, a tributary of the Simpson River in Aisen province of Chile in 1973. It is likely that these seed introductions were unsuccessful, because no recovery of adult fish was ever recorded."

"During the decade 1975– 1985, there were several unsuccessful attempts to seed masu salmon from its native distribution in Japan to Nepal (Shrestha 1994) and Thailand (Welcomme 1988; Piyakarnchana 1989)."

From Sakai (1992):

"Salmon introduction has also been tried in Chilean Patagonia since 1973. Trials over a number of years [Nagasawa and Aguilera 1974; Asai and Araya 1984] resulted in the first spawning run from Lake General Carrera in 1989. These results made a big step forward in establishing a self supporting population, though some problems still exist."

Means of Introduction Outside the United States

From Fuller et al. (2019):

"Cherry salmon were also introduced to Westward Lake in Algonquin Park, Ontario in 1966 in an experimental stocking to evaluate potential new sportfishes."

From Froese and Pauly:

"About 5,500 young were released in Westward Lake in Algonquin Provincial Park. However, the attempted introduction for the restoration of the Great Lakes fisheries failed [Crossman 1984]."

From Crawford and Muir (2008):

"Masu or cherry salmon are not native to any North or Central America watersheds […] and according to available records, there have only been a few attempts to seed this species outside of its native Asian distribution."

"A single report exists for masu salmon being introduced to European waters, and that is a 1976 unsuccessful attempt to establish a recreational fishery in Germany using fish from Japan ([…]; Welcomme 1988; Holcik 1991)."

Short Description

A short description of *Oncorhynchus masou* was not found.

Biology

From Froese and Pauly (2019):

"The fluviatile form generally inhabits headwaters and often maintains a territory; it feeds mainly on insects but also on small crustaceans and fishes. The sea-run form [which reproduces in freshwater] goes downstream forming schools, and after a short stay in the brackish zone enters the sea where it feeds on small fishes and pelagic crustaceans. Oviparous [Breder and Rosen 1966]. Eggs are buried in unguarded nests [Breder and Rosen 1966]."

"Distinct pairing [Breder and Rosen 1966]. Reproductive strategy: synchronous ovarian organization, determinate fecundity [Murau and Saborido-Rey 2003]."

From Tamate and Maekawa (2000):

"Like other salmonids, the life history pattern of masu salmon varies considerably, with sea-run, lake-run and fluvial forms (Kiso 1995). In Japan, sea-run forms are found from Hokkaido to Ibaraki Prefecture along the Pacific coast and from Hokkaido to Yamaguchi Prefecture along the Sea of Japan coast."

Poelen et al. (2014) states that *Oncorhynchus masou* preys on North Atlantic daggertooth *(Anotopterus pharao)* and *Thysanoessa longipes.*

Human Uses

From Froese and Pauly (2019):

"Fisheries: commercial; aquaculture: commercial; gamefish: yes"

"Marketed fresh and frozen; eaten broiled and baked [Frimodt 1995]."

From Fuller et al. (2019):

"Cherry salmon were also introduced to Westward Lake in Algonquin Park, Ontario in 1966 in an experimental stocking to evaluate potential new sportfishes."

From Yamazaki et al. (2005):

"Masu salmon *Oncorhynchus masou masou* constitute one of the most valuable fisheries resources in and around Japan."

Diseases

No OIE-reportable diseases (OIE 2019) were found to be associated with *Oncorhynchus masou*.

Poelen et al. (2014) states that *Oncorhynchus masou* is a host to *Aeromonas salmonicida, Aphanomyces frigidophilus, Ancanthocephalus echigoensis, A. minor, A. dirus,* herring worm (*Anisakis simplex*), *A. salaris, Ascarophis skrjabini, Baylisiella tecta, Bolbosoma caenoforme, Brachyphallus crenatus, Camallanus lacustris, C. cotti, Capilaria* sp., *Contracaecum tridentatum, C. osculatum, Corynosoma strumosum, Crepidostomum uchimii, C. metoecus, Cyathocephalus truncates, Cystidicoloides ephemeridarum, Dimerosaccus oncorhynchi,* fish tapeworm (*Diphyllobothrium latum*), *D. nihonkaiense, Diplocotyle olrikii, Diplostomulum huronense, Echinorhynchus cotti, E. cryophilus,* proboscis worm (*E. gadi*), *Encotyllabe masu, Eubothrium crassum, E. salvelini, Genarchopsis mulleri, Gnathostoma nipponicum, G. doloresi, Gyrodactylus* sp., *Hemiurus levinseni, Hysterothylacium aduncum, Lecithaster gibbosus, Metagonimus yokogawai, Myxobolus arcticus, Nanophyetus salmincola, Neoechinorhynchus salmonis, Neoplagioporus zacconis, Nybelinia lingualis, N. surmenicola, Oswaldocruzia filicollis, O. filiformis Parahemiurus merus, Pelichnibothrium speciosum, Philometra agubernaculum, Philometroides masu, Philonema oncorhynchi, Phyllobothrium caudatum, P. salmonis, Plagioporus imanensis, Prosorhynchoides gracilescens, Proteocephalus plecoglossi, Psedudolepidapedon kobayashii, Pseudocapillaria salvelini,* sealworm (*Pseudoterranova decipiens*), *Rhabdochona oncorhynchi, Raphidascaris gigi, Salvelinema salmonicola, Scolex pleuronectis, Sterliadochona ephemeridarum, Tetraonchus awakurai, T. oncorhynchi, Truttaedacnitis truttae, Tubulovesicula lindbergi,* and *Urochis acheillognathi*.

Threat to Humans

From Froese and Pauly (2019):

"Harmless"

3 Impacts of Introductions

From Fuller et al. (2019):

"The impacts of this species are currently unknown, as no studies have been done to determine how it has affected ecosystems in the invaded range. The absence of data does not equate to lack of effects. It does, however, mean that research is required to evaluate effects before conclusions can be made."

All species in the family Salmonidae are listed as injurious species in the United States due to the risk of carrying certain pathogens, thus prohibiting their importation unless imported live with a health certification or are dead and eviscerated.

4 History of Invasiveness

Oncorhynchus masou has been intentionally stocked within the United States, Canada, Chile, Germany, Nepal, and Thailand to support a sport fishery. All introductions are noted as failed with no evidence of establishment except possibly for the introduction in Chile. Froese and Pauly (2019) list the status of *O. masou* in Chile as "probably established". Sakai et al. (1992) showed evidence of naturally occurring reproduction in southern Chile but were unsure about the long term viability of the population. The information was entered and verified by two experts but no reference is given for the species' status. There was no information on impacts of introduction found. Since there is a possibility of an established population in Chile the history of invasiveness is Data Deficient.

5 Global Distribution

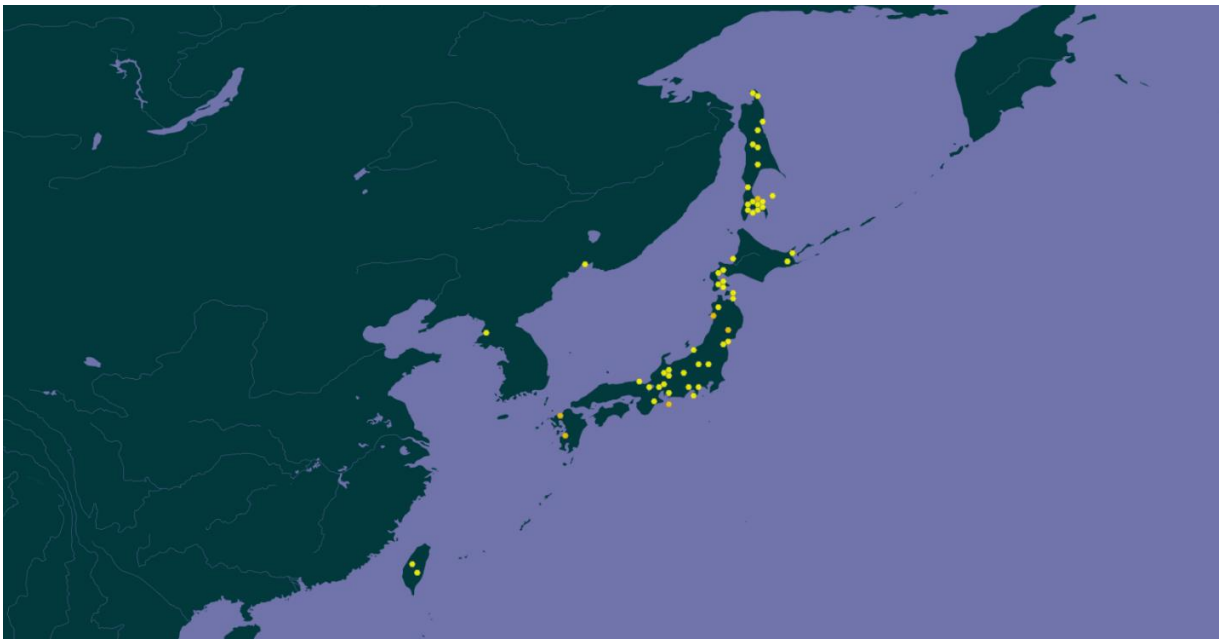

Figure 1. Known global distribution of *Oncorhynchus masou*. Observations are reported from the Northwest Pacific. Map from GBIF Secretariat (2019).

6 Distribution Within the United States

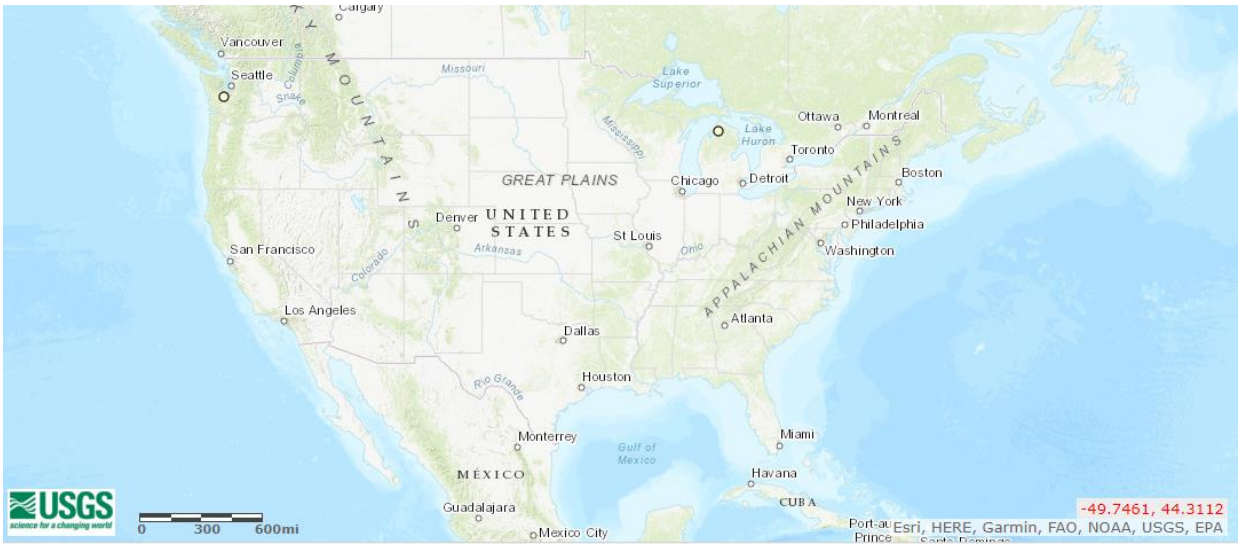

Figure 2. Known distribution of *Oncorhynchus masou* in the United States. Map from Fuller et al. (2019). The locations Michigan and Washington do not represent established populations and were not used to select source points for the climate match.

7 Climate Matching

Summary of Climate Matching Analysis

The climate match for the contiguous United States was high across the majority of eastern and north-central United States. Areas west of the Rocky Mountains had low matches as well as areas in southern Arizona and Texas. Everywhere else had medium matches. The Climate 6 score (Sanders et al. 2018; 16 climate variables; Euclidean distance) for the contiguous United States was 0.304, high (scores 0.103 and greater are classified as high). Most States had high individual Climate 6 scores except for Alabama, Arkansas, Georgia, Kansas, New Mexico, Oklahoma, and Wyoming, which had medium scores and Arizona, California, Idaho, Louisiana, Mississippi, Nevada, Oregon, Rhode Island, Texas, Utah, and Washington, which had low scores.

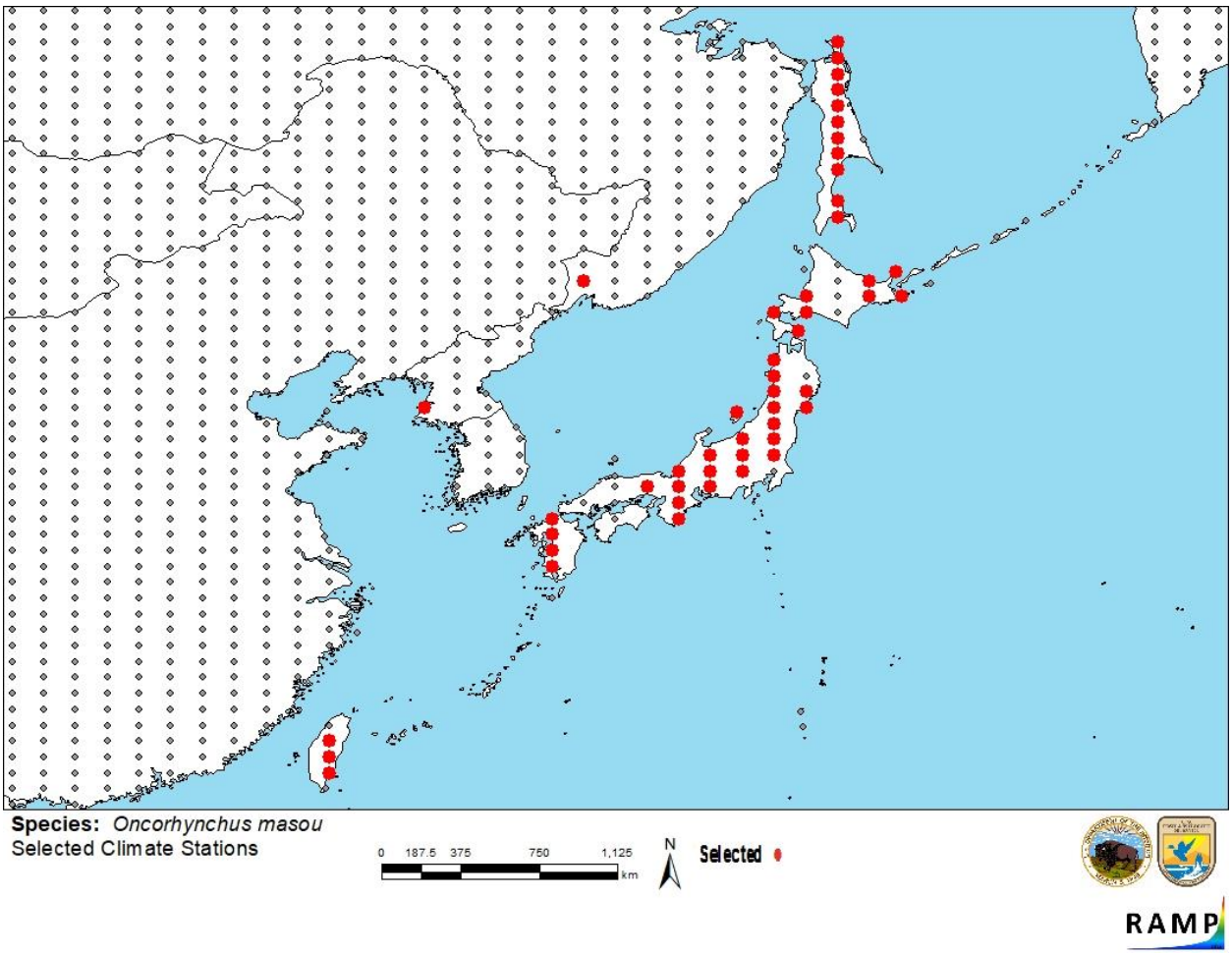

Figure 3. RAMP (Sanders et al. 2018) source map showing weather stations in the Northwest Pacific selected as source locations (red; China, Japan, North Korea, and Russia) and non-source locations (gray) for *Oncorhynchus masou* climate matching. Source locations from GBIF Secretariat (2019). Selected source locations are within 100 km of one or more species occurrences, and do not necessarily represent the locations of occurrences themselves."

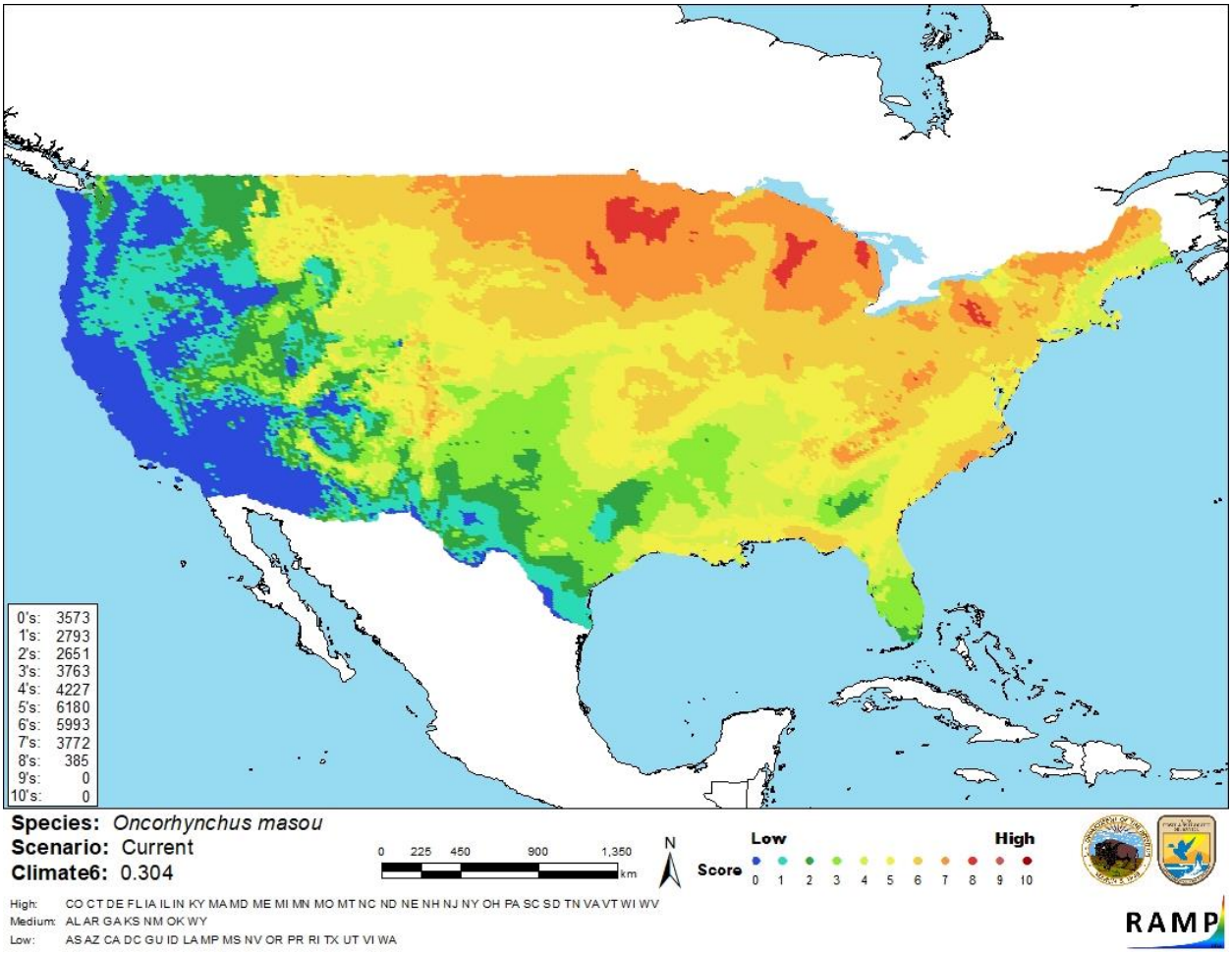

Figure 4. Map of RAMP (Sanders et al. 2018) climate matches for *Oncorhynchus masou* in the contiguous United States based on source locations reported by GBIF Secretariat (2019). Counts of climate match scores are tabulated on the left. 0 = Lowest match, 10 = Highest match.

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

Limited information is available for *Oncorhynchus masou.* Crawford and Muir (2008) lists *Oncorhynchus masou* as introduced in Michigan, Washington, Ontario, Germany, Chile, Nepal, and Thailand for experimental stocking for a potential new sportfish. These introductions have failed and do not indicate an established population. Two other sources, Sakai et al. (1992) and

Froese and Pauly (2019) indicate that there may be an established population in Chile. No information on impacts of introductions was found. The certainty of assessment is low.

9 Risk Assessment

Summary of Risk to the Contiguous United States

Cherry Salmon (*Oncorhynchus masou*) is a fish native to China, Japan, North Korea, South Korea, and Russia. *O. masou* is a gamefish and is eaten in the native range. The history of invasiveness is data deficient. *O. masou* has been introduced in the United States, Canada, Germany, Chile, Nepal, and Thailand through experimental stocking for a potential new sportfish. Most introductions have failed and did not result in an established population, however there is a possibility of an established population in Chile. No information on impacts of introductions was found. All species in the family Salmonidae are listed as injurious species in the United States due to the risk of carrying certain pathogens, thus prohibiting their importation unless imported live with a health certification or are dead and eviscerated. The climate match for the contiguous United States is high. The majority of the upper Midwest and eastern United States had patches of high match and areas west of the Rocky Mountains mainly had low matches. The certainty of assessment is low due to some disagreement on the status of introduced populations and a lack of information on impacts of introductions. The overall risk assessment category for *Oncorhynchus masou* 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:** This species had been deliberately stocked for fishery management.
- **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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11 Literature Cited in Quoted Material

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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