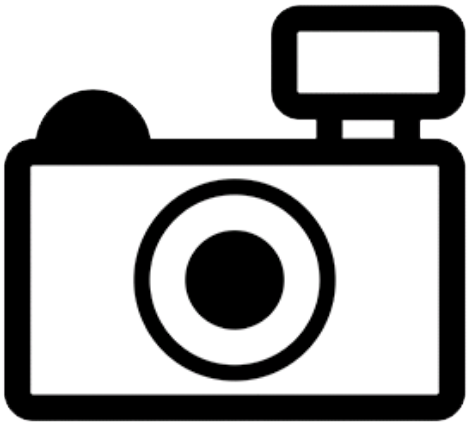
Omul (*Coregonus migratorius*)

Ecological Risk Screening Summary

U.S. Fish and Wildlife Service, February 2022
Revised, March 2022
Web Version, 5/19/2023

Organism Type: Fish
Overall Risk Assessment Category: Uncertain



1 Native Range and Status in the United States

Native Range

From Froese and Pauly (2023):

"Asia: Lake Baikal in northern Siberia. Also enters the tributaries Kichera, Verkhnyaya Anagara, Chivyrkui, Barguzin and Selenga."

"Occurs only in Lake Baikal basin [in Mongolia] and migrates into its tributaries for spawning. A migratory species in Selenge, Delgermurun and Egiin Rivers [Kottelat 2006]."

Status in the United States

No records of *Coregonus migratorius* in trade or in the wild in the United States were found.

According to USFWS (2020), salmonids in the genera *Coregonus* are listed as injurious wildlife under 18 U.S.C. 42(a) of the Lacey Act. This is due to the risk of pathogens that can be transmitted from salmonid species.

Means of Introductions in the United States

No records of *Coregonus migratorius* in the wild in the United States were found.

Remarks

From Tyagun et al. 2011:

"Baikal omul (*Coregonus migratorius* Georgi) is a typical representative of the coregonid fishes with a complicated intraspecific structure consisting of several large and many small populations and three eco-morphotypes. Therefore, it is difficult to identify intraspecific groups from a mixed catch. Despite basic identification characteristics being well-studied, it is still necessary to identify diagnostic characters for the different intraspecific groups."

From Sukhanova et al. (2004):

"At present, Baikal omul actively hybridizes with the genetically-remote Baikal pidschian (Skryabin 1969)."

Information for this assessment was searched for using the valid name *Coregonus migratorius* and the synonyms: *Salmo migratorius* Georgi 1775 and *Alburnus nasreddini* (Georgi 1775).

Additional information for *Coregonus migratorius* was found during this assessment in languages other than English.

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

According to Fricke et al. (2022), *Coregonus migratorius* (Georgi 1775) is the current valid name for this species. *C. migratorius* has the following synonyms: *Salmo migratorius* Georgi 1775, *Alburnus nasreddini* (Georgi 1775), and *Coregonus autumnalis migratorius* (Georgi 1775).

From ITIS (2022):

Kingdom Animalia
  Subkingdom Bilateria
    Infrakingdom Deuterostomia
      Phylum Chordata
        Subphylum Vertebrata
          Infraphylum Gnathostomata
            Superclass Actinopterygii
              Class Teleostei

Superorder Protacanthopterygii
Order Salmoniformes
Family Salmonidae
Subfamily Coregoninae
Genus *Coregonus*
Species *Coregonus migratorius* (Georgi, 1775)

Size, Weight, and Age Range

From Froese and Pauly (2023):

"Maturity: L_m 36.5, range 34 - 39 cm
Max length : 56.0 cm TL male/unsexed; [Baensch and Riehl 1991]"

Environment

From Froese and Pauly (2023):

"Freshwater; demersal; pH range: 7.0 - 7.5; dH range: 20 - ? […] 4°C - 16°C [Baensch and Riehl 1991; assumed to be recommended aquarium temperature]"

From Sukhanova et al. (2004):

"The Baikal omul [*Coregonus migratorius*] inhabits the pelagic zone of Lake Baikal up to the depths of 350-400m, […]"

Climate

From Froese and Pauly (2023):

"Boreal; […]"

Distribution Outside the United States

Native

From Froese and Pauly (2023):

"Asia: Lake Baikal in northern Siberia. Also enters the tributaries Kichera, Verkhnyaya Anagara, Chivyrkui, Barguzin and Selenga."

"Occurs only in Lake Baikal basin [in Mongolia] and migrates into its tributaries for spawning. A migratory species in Selenge, Delgermurun and Egiin Rivers [Kottelat 2006]."

Introduced

From Dulmaa et al. (2016):

"At the same time [in the early 1980s] larvae of two other *Coregonus* species—Baikal omul *C. migratorius* (Georgi) and least cisco *C. sardinella* Valenciennes—had also been released into the lake [Lake Ulaagchny Khar, Mongolia]. Baikal omul was then reported as a naturalized species."

From Ahrenstorff et al (2012):

"Interestingly, omul were introduced to Lake Hovsgol [Mongolia] from Lake Baikal in 1956–1957 (Sideleva 2006) but we found no evidence of their presence."

From Kottelat (2006):

"Introduced in 1956–1957 in Lake Khuvsgul [Mongolia] (Dulmaa, 1973: 61), where it is now established."

"*Coregonus peled* and *C. migratorius* were introduced [to the Darkhad Depression, Mongolia] from Ulan Ude in Russia, reportedly in 1985. *Coregonus migratorius* apparently did not establish; the last known observation (three individuals) was in 1997 (information obtained by Erdenebat M.)."

From Froese and Pauly (2023):

"This [fish] has been translocated to areas within the country [Russia] for stocking in open waters where they have [sic] locally established self-sustaining populations [Bogutskaya and Naseka 2002]."

Froese and Pauly (2023) list *Coregonus migratorius* as introduced and established in Lake Issykul-kul in Kyrgyzstan; introduced but not established in the Czech Republic, Latvia, and USSR (no specific location given); and introduced but status unknown in Japan.

Coregonus migratorius is listed as introduced and invasive in Ukraine (GBIF Secretariat 2022).

According to Koščo et al. (2010), *Coregonus migratorius* was introduced to Slovakia around 1960 and has become established.

Means of Introduction Outside the United States

From Kottelat (2006):

"The larvae came from the hatchery of Bolsherechinsk, Russia."

From Froese and Pauly (2023):

"Reason: aquaculture"

"This has been translocated to areas within the country [Russia] for stocking in open waters […]"

Short Description

From Sukhanova et al. (2004):

"[…] and is a typical coregonid fish with a terminal mouth, a large number of gill rakers, and the body characteristics of fish that feed in the pelagic zone."

Biology

From Anoshko et al. (2019):

"Effective pressure regulating mechanisms in the swim bladder are one of the important adaptive characteristics that enabled *C. migratorius* to migrate over a wide range of depths and occupy a dominant position among all Baikal fishes with a swim bladder. *C. migratorius* inhabits oligotrophic water bodies at depths of 0-350 m."

From Kottelat (2006):

"*Coregonus migratorius* inhabits only Lake Baikal basin and migrates into its tributaries for spawning. It does not seem to have spawning migration into its effluent Lower Angara."

From Sukhanova et al. (2004):

"Baikal omul migrates for spawning to the tributaries of Lake Baikal in September-October, […] (Skryabin 1969)."

From Smirnov et al. (2012):

"In the 1950s–1977s, the age when mass reproduction of individuals in omul populations occurred was 5–6 years in the North Baikal population (SMIRNOV and SHUMILOV 1974) and 10–11 years in the Selenga and Posolsky populations (SMIRNOVA-ZALUMI 1977, SMIRNOV et al. 1987)."

Human Uses

From Froese and Pauly (2023):

"Important food fish in the Lake Baikal."

From Smirnov et al. (2012):

"The earliest written mentions on commercial catches date back to the 17th and 18th centuries. Most catches comprised omul (*Coregonus autumnalis migratorius* (Georgi)). During the above

period, as much as 8–10 thousand tonnes of this fish were caught annually. At the turn of the 18th and 19th centuries, first reports on fluctuations in fish catches started to emerge."

Diseases

No records of OIE-reportable diseases (OIE 2022) were found for *Coregonus migratorius*.

Froese and Pauly (2022) list the following parasites, diseases, and pathogens of *C. migratorius*: *Crepidostomum baicalensis* (Layman, 1933), *Crepidostomum farionis* (Müller, 1780), *Salmincola omuli* (Messjatzeff, 1928), and *Salmincola extumescens* (Gadd, 1901).

Poelen et al. (2014) list *Coregonus migratorius* as a host of canine morbillivirus.

Threat to Humans

From Froese and Pauly (2023):

"Harmless"

3 Impacts of Introductions

Coregonus migratorius has been introduced and become established outside its native range. However, there was no information found regarding impacts from those introductions on native species or ecosystems, human health, or the economy.

The importation, possession, and/or trade of *Coregonus migratorius* is regulated federally by the Lacey Act (USFWS 2020) due to the risk of pathogens that can be transmitted from salmonid species.

4 History of Invasiveness

Coregonus migratorius has been introduced to lakes in Czech Republic, Ukraine, Kyrgyzstan, Latvia, Slovakia, Mongolia, Japan, and outside its native range in Russia. It has become established in Kyrgyzstan, Mongolia, Slovakia, Ukraine, and outside its native range in Russia. However, information is lacking on impacts from these introductions. Trade information could not be found for *C. migratorius*, but it is an important food source in its native range.
C. migratorius is listed under the Lacey Act in the United States along with all other fish in the family Salmonidae. Due to the lack of information regarding impacts, the history of invasiveness is classified as Data Deficient.

5 Global Distribution

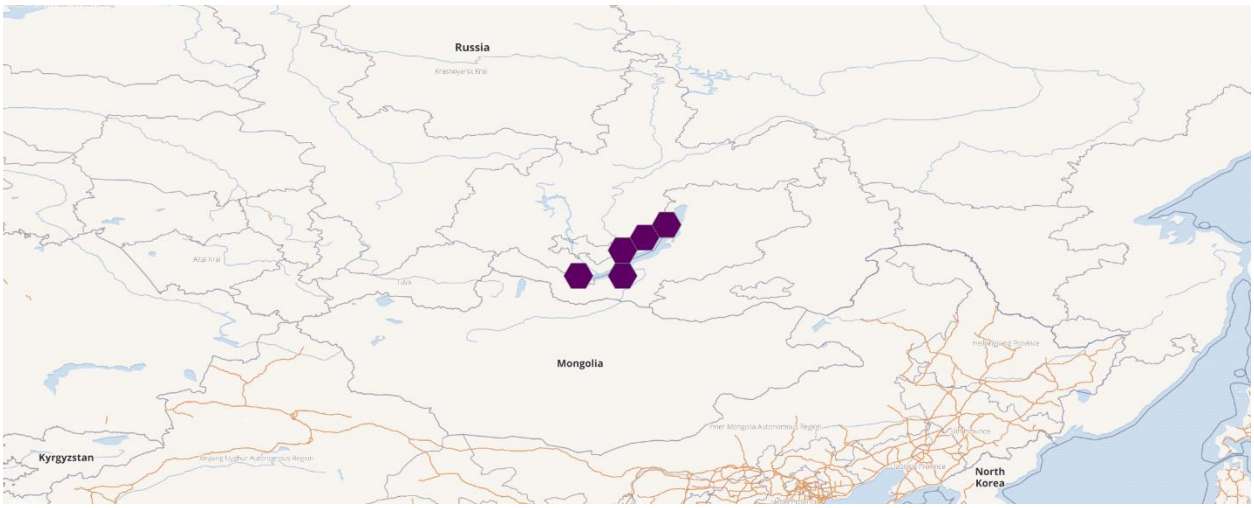


Figure 1. Map of central and northern Asia showing known observations of *Coregonus migratorius*. Observations are reported from Lake Baikal in southern Russia. Map from GBIF Secretariat (2022).

Additional populations are found in Mongolia (Kottelat 2006; Dulmaa et al. 2016) and Kyrgyzstan (Froese and Pauly 2023). Text descriptions of the locations of these populations were used to select source points for the climate match.

Coregonus migratorius has been introduced to and become established in Slovakia (Koščo et al. 2010), Ukraine (GBIF Secretariat 2022), and in Russia outside its native range (Froese and Pauly 2023). These populations were not represented in the climate match as no specific information was found to estimate the locations of the populations.

6 Distribution Within the United States

No records of *Coregonus migratorius* in the wild in the United States were found.

7 Climate Matching

Summary of Climate Matching Analysis

Most of the contiguous United States had a medium local climate match for *Coregonus migratorius*. Small areas of high match were found in the upper Great Lakes and Great Plains. The southeast from eastern Texas to southern New Jersey had low matches. Most of the Pacific Coast also had low matches, along with a portion of the Desert Southwest. The overall Climate 6 score (Sanders et al. 2021; 16 climate variables; Euclidean distance) for the contiguous United States was 0.189, High (scores of 0.103 or greater are categorized as High). Colorado, Iowa, Maine, Michigan, Minnesota, Montana, New Hampshire, New Mexico, New York, North Dakota, South Dakota, Vermont, Wisconsin, and Wyoming had high individual Climate 6 scores. Arizona, Idaho, Illinois, Indiana, Nebraska, Ohio, Oregon, Pennsylvania, Utah, and Washington had medium individual Climate 6 scores. All other States had low Climate 6 scores.

Part of the species' introduced range was not represented in the climate match source points due to the lack of georeferenced observations or detailed descriptions of the location.

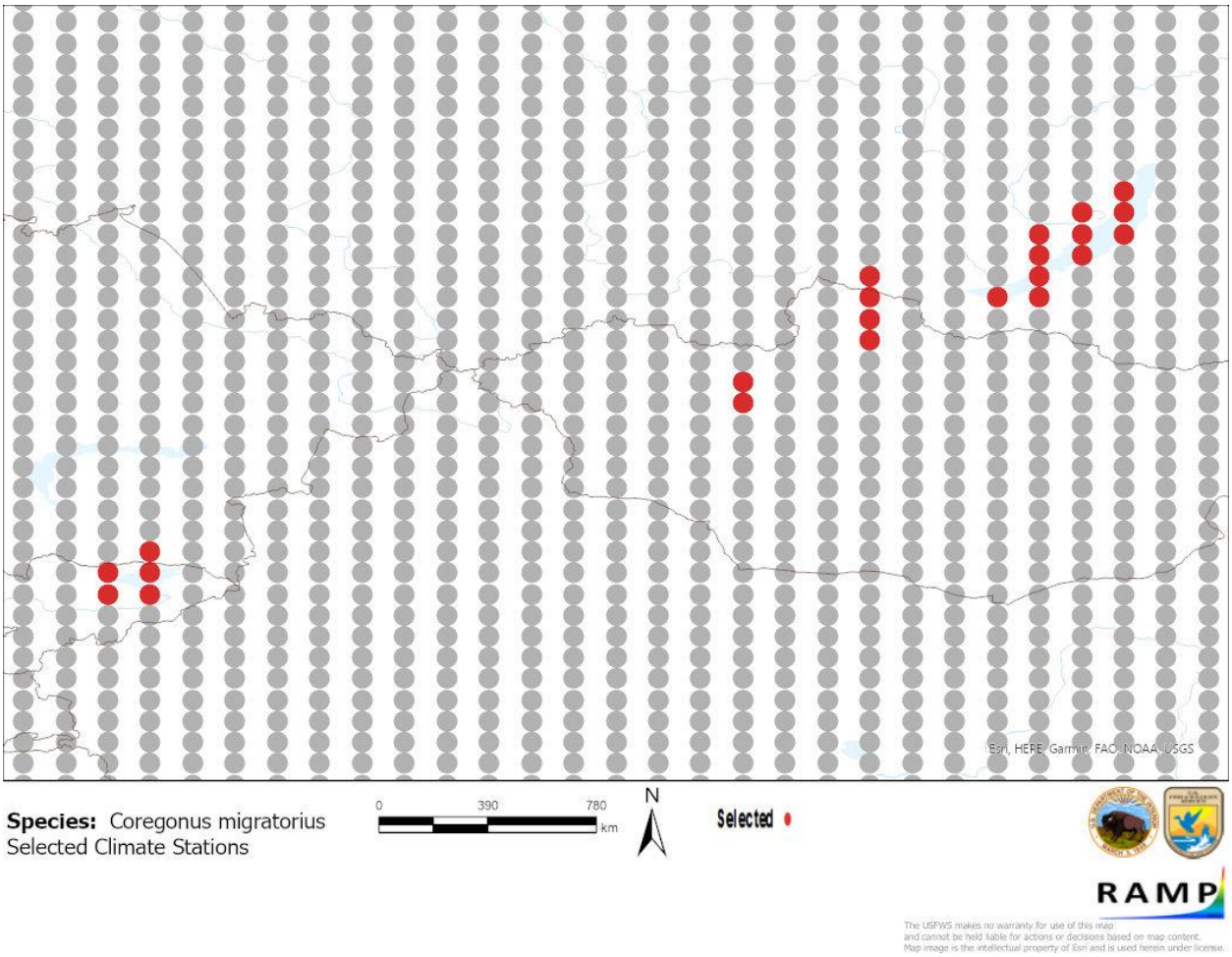


Figure 2. RAMP (Sanders et al. 2021) source map showing weather stations in central Asia selected as source locations (red; Kazakhstan, Kyrgyzstan, Mongolia, Russia) and non-source locations (gray) for *Coregonus migratorius* climate matching. Source locations from Kottelat (2006), Dulmaa et al. (2016), GBIF Secretariat (2022), and Froese and Pauly (2023). Selected source locations are within 100 km of one or more species occurrences, and do not necessarily represent the locations of occurrences themselves.

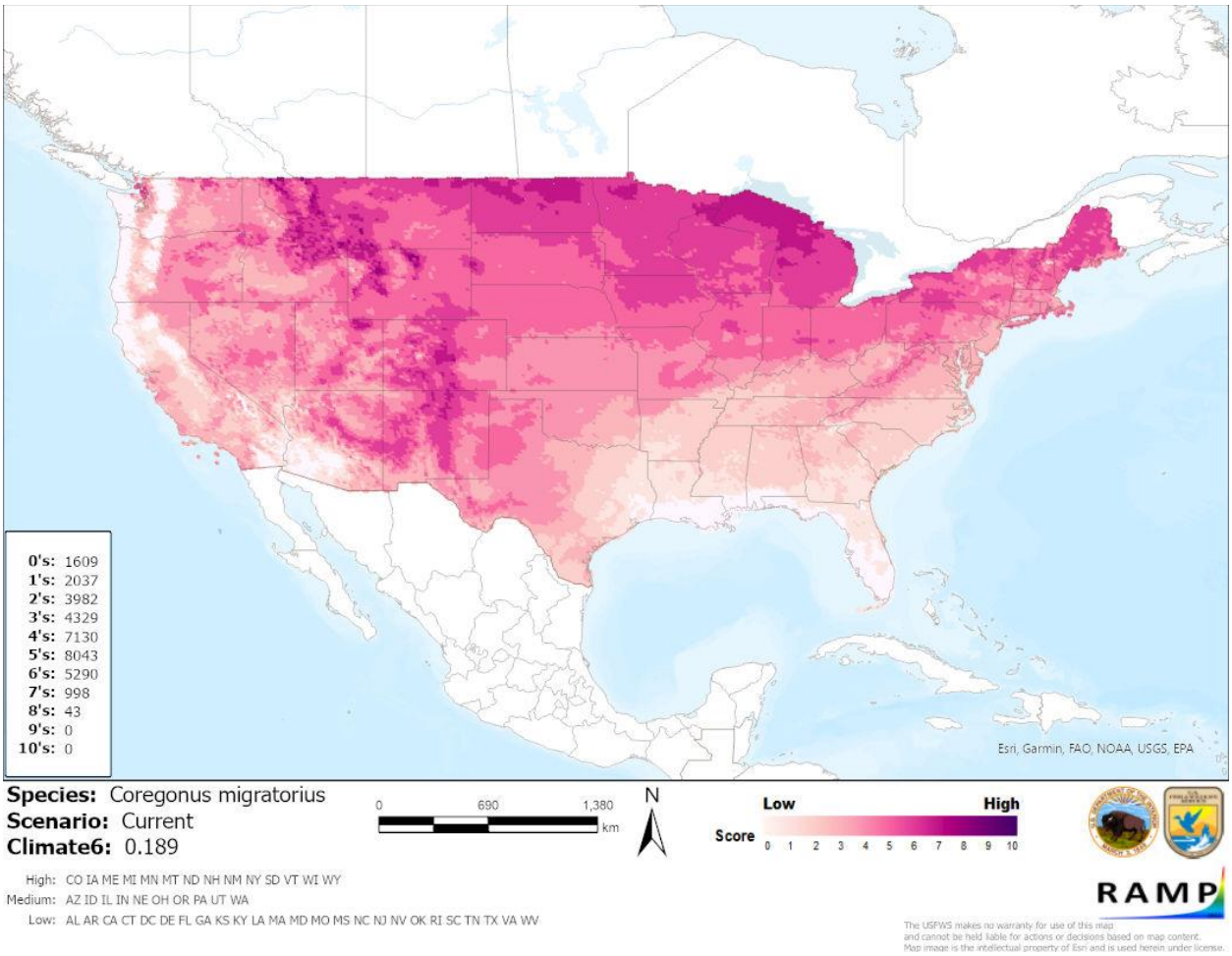


Figure 3. Map of RAMP (Sanders et al. 2021) climate matches for *Coregonus migratorius* in the contiguous United States based on source locations reported by Kottelat (2006), Dulmaa et al. (2016), GBIF Secretariat (2022), and Froese and Pauly (2023). Counts of climate match scores are tabulated on the left. 0/Pale Pink = Lowest match, 10/Dark Purple = 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 adequate information on the biology and life history of this species. *Coregonus migratorius* has been recorded as introduced and established outside its native range. There is no information on the impacts this species has on native species or ecosystems, human health, or the economy in these introduced areas. Part of the species' range was not represented in the climate

match due to a lack of georeferenced observations or detailed location descriptions. This reduces certainty in the interpretation of the climate match results. Due to the lack of information regarding history of invasiveness, the certainty of assessment is Low.

9 Risk Assessment

Summary of Risk to the Contiguous United States

Coregonus migratorius is a fish species native to Lake Baikal and its tributaries in Russia and Mongolia. This fish is heavily exploited in both commercial and recreational fisheries and has been stocked outside its native range. *C. migratorius* has become established outside its native range in Russia, Mongolia, and Kyrgyzstan. Although *Coregonus migratorius* is established in lakes outside of its native range there is little information on impacts, leading to a history of invasiveness of Data Deficient. Overall, the climate match for the contiguous United States was High. Most of the contiguous United States had medium local matches. Areas of the northern Great Lakes and Great Plains had high local matches. The certainty of this assessment is Low due to no relevant information on impacts of introductions and part of the introduced range of the species not being represented in the source points of the climate match. The overall risk assessment for *Coregonus migratorius* 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: No additional remarks.**
- **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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