Common Nase (*Chondrostoma nasus*)

Ecological Risk Screening Summary

U.S. Fish & Wildlife Service, April 2020
Revised, April 2020
Web Version, 2/8/2021

Organism Type: Fish
Overall Risk Assessment Category: High

Photo: André Karwath. Licensed under CC BY-SA 2.5. Available: https://commons.wikimedia.org/wiki/File:Chondrostoma_nasus_(aka).jpg#file. (April 2020).

1 Native Range and Status in the United States

Native Range

From Froese and Pauly (2021):

"Europe: Basins of Black (Danube, Dniestr, South Bug and Dniepr drainages), southern Baltic (Nieman, Odra, Vistula) and southern North Seas (westward to Meuse). […] Asia: Turkey."

Status in the United States

No information on occurrence, status, sale or trade in the United States was found.

Chondrostoma nasus falls within Group I of New Mexico's Department of Game and Fish Director's Species Importation List (New Mexico Department of Game and Fish 2010). Group I species "are designated semi-domesticated animals and do not require an importation permit." With the added restriction of "Not to be used as bait fish."

Means of Introductions in the United States
No introductions have been reported in the United States.

Remarks
Although the accepted and most used common name for *Chondrostoma nasus* is "Common Nase", it appears that the simple name "Nase" is sometimes used to refer to *C. nasus* (Zbinden and Maier 1996; Jirsa et al. 2010). The name "Sneep" also occasionally appears in the literature (Irz et al. 2006).

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing
From Fricke et al. (2020):

"Current status: Valid as *Chondrostoma nasus* (Linnaeus 1758)."

From ITIS (2020):

Kingdom Animalia
Subkingdom Bilateria
Infrakingdom Deuterostomia
Phylum Chordata
Subphylum Vertebrata
Infraphylum Gnathostomata
Superclass Actinopterygii
Class Teleostei
Superorder Ostariophysi
Order Cypriniformes
Superfamily Cyprinoidea
Family Cyprinidae
Genus *Chondrostoma*
Species *Chondrostoma nasus* (Linnaeus, 1758)

Size, Weight, and Age Range
From Froese and Pauly (2020):

"Max length : 50.0 cm TL male/unsexed; [Muus and Dahlström 1968]; common length: 25.0 cm TL male/unsexed; [Muus and Dahlström 1968]; max. published weight: 1.5 kg [Muus and Dahlström 1968]."

"max. reported age: 15 years [Billard 1997]."

Environment

From Froese and Pauly (2021):

"Freshwater; benthopelagic; potamodromous [Riede 2004]."

"They inhabit moderate to fast-flowing large to medium sized rivers with rock or gravel bottom."

In their species comparison across rivers, lakes, and reservoirs in France, Irz et al. (2006) found *C. nasus* to be river-specific, as the species was not collected in lakes or reservoirs.

Climate

From Froese and Pauly (2021):

"Temperate; 56°N - 37°N, 0°E - 35°E"

Distribution Outside the United States

Native

From Froese and Pauly (2021):

"Europe: Basins of Black (Danube, Dniestr, South Bug and Dniepr drainages), southern Baltic (Nieman, Odra, Vistula) and southern North Seas (westward to Meuse). […] Asia: Turkey."

Introduced

From Froese and Pauly (2021):

"Invasive or introduced in Rhône, Loire, Hérault, Seine (France) and Soca (Italy, Slovenia) drainages."

According to Froese and Pauly (2020), *Chondrostoma nasus* have been introduced and are established in the Czech Republic, France, and Italy. They have also been introduced in Slovenia, but their current status there is unknown.

Means of Introduction Outside the United States

From Froese and Pauly (2021):

"This species was stocked in the Slovenian part of the Isonzo River [Soca River] and diffused in the Italian part of the river where it is now very abundant [Bianco 1995]."

From Zbinden and Maier (1996):

"In France, the nase was previously only found in the Rhine basin. But, at the end of last [the 19th] century, it spread into other basins by using artificial shipping canals connecting the Rhine to the Seine, the Rhone and the Loire (Nelva, 1985; Nelva, 1988)."

Short Description

From Froese and Pauly (2020):

"Dorsal spines (total): 3; Dorsal soft rays (total): 8-10; Anal spines: 3; Anal soft rays: 9 - 11; Vertebrae: 47 - 48. Diagnosed from congeners in Black and Caspian Sea basins by the following characters: straight mouth in individuals larger than 20 cm SL, lower lip with thick cornified sheath; dorsal fin with 9½ branched rays; anal fin with 10-11½ branched rays; scales on lateral line 52-66 (usually 60-63); eye large, diameter 50-65% of interorbital distance; and side lacking broad dark midlateral stripe. Differs from species of *Chondrostoma*, *Protochondrostoma* and *Parachondrostoma* in Atlantic, Adriatic and Mediterranean basins of France, Italy and Slovenia by having the following features: mouth straight, lower lip with thick cornified sheath; 27-36 gill rakers; anal fin with 10-11½ branched rays; and pectoral, pelvic, anal and caudal fins red [Kottelat and Freyhof 2007]. […] Caudal fin with 19 to 21 rays [Keith and Allardi 2001]."

Biology

From Freyhof (2011):

"Spawns in fast-flowing water on shallow gravel beds often in small tributaries. May show a strong size related longitudinal distribution in smaller rivers, with adults inhabiting more upper river stretches."

"Spawns for the first time at 4-5 years. May migrates [sic] some tens of km to spawning sites, which are often situated in tributaries, but which it does not inhabit in summer. Spawns in March-May when temperature reaches 12°C. Males form large aggregations, each male defending a small territory. Females spawn only once a year and, in some populations, during a very short period (3-5 days). Females deposit the sticky eggs into excavations made in gravel. Feeding larvae live along shores. Larvae live below surface. Early juveniles are benthic and inhabit very shallow shoreline habitats. When growing, they leave the shores for faster-flowing waters. Recruitment is closely related to high spring temperature, absence of spring floods and available shallow-water habitats along shores. Juveniles overwinter in backwaters or in cavities along shores. Adults form dense swarms during winter in lower parts of rivers. Larvae and early juveniles with superior mouth feed on small invertebrates. Larger juveniles and adults, which have inferior mouth, feed on benthic diatoms and detritus cleaned up from hard substrate in habitats with strong current."

Human Uses

From Froese and Pauly (2021):

"Fisheries: minor commercial; aquarium: public aquariums"

From Freyhof (2011):

"human consumption, and for sport fishing."

Diseases

The koi herpes virus is an OIE-reportable disease (OIE 2020) and has been reported in *Chondrostoma nasus*.

Kempter et al. (2012) reports that along with several other species, one individual of *Chondrostoma nasus* was confirmed to be a carrier of the koi herpes virus (KHV). This individual was the only specimen of *C. nasus* collected and tested, and the carrier status was confirmed by polymerase chain reaction (PCR).

From Jirsa et al (2010):

"[…] individuals of the predominantly herbivorous fish species nase *Chondrostoma nasus* (L. 1758) were examined for parasites from six river sites in Austria. The following parasite taxa were recovered – Ciliata: *Trichodina* sp., *Chilodonella piscicola*, *Ichthyophthirius multifiliis*; Myxozoa: *Myxobolus muelleri* (cysts) and *Myxobolus* sp. (cysts); Monogenea: *Dactylogyrus vistulae*, *D. chondrostomi* and *Dactylogyrus* spp., *Gyrodactylus* sp., *Diplozoon paradoxum*; Digenea: *Diplostomum spathaceum* (larv.) and *Tylodelphis clavata* (larv.); Cestoda: *Caryophyllaeus laticeps*; Acanthocephala: *Pomphorhynchus laevis*; Bivalvia: *Unio* sp. (Glochidia); Crustacea: *Lamproglena pulchella*; Hirudinea: *Piscicola geometra*."

According to Poelen et al. (2014) *Chondrostoma nasus* is a host to *Acanthocephalus* anguillae, *Allocreadium isoporum, Allocreadium markewitschi, Anguillicola crassus, Apophallus muehlingi, Asymphylodora markewitschi, Bothriocephalus acheilognathi, Caryophyllaeides fennica, Caryophyllaeus laticeps, Crowcrocaecum skrjabini, Cucullanus dogieli, Dactylogyrus chondrostomi, Dactylogyrus cornu, Dactylogyrus dirigerus, Dactylogyrus ergensi, Dactylogyrus nybelini, Dactylogyrus similis, Dactylogyrus Sphyrna, Dactylogyrus vistulae, Diplostomulum clavatum, Diplostomum spathaceum, Gyrodactylus chondrostomatis, Gyrodactylus chondrostomi, Gyrodactylus macrocornis, Gyrodactylus paraminimus, Ichthyocotylurus pileatus, Ligula intestinalis, Metagonimus yokogawai, Neoechinorhynchus rutile, Opisthorchis felineus, Paracoenogonimus ovatus, Paradilepis scolecina, Paradiplozoon homoion, Philometra rischta, Pomphorhynchus laevis, Posthodiplostomum cuticola, Proteocephalus torulosus, Pseudocapillaria brevispicula, Pseudocapillaria tomentosa, Raphidascaris acus, Rhipidocotyle campanula, Sanguinicola armata, Sanguinicola cf. inermis, Tetraonchus monenteron, Triaenophorus nodulosus,* and *Tylodelphys clavata*.

Threat to Humans

From Froese and Pauly (2021):

"Harmless"

3 Impacts of Introductions

From Froese and Pauly (2020):

"In drainages where they are introduced, they outcompete and eliminate [native] *Parachondrostoma toxostoma* in Rhône and [native] *Protochondrostoma genei* in Soca [Kottelat and Freyhof 2007]."

"Has caused near extirpation of *Protochondrostoma genei* [Kottelat and Freyhof 2007; Bianco 2014] and the Italian nase [*Chondrostoma soetta*] [Bianco 2014]. The joint introduction of *R. rutilus* and *Chondrostoma nasus* is affecting also other still water species such as *Leucos aula* and *Chondrostoma soetta*, that have nearly vanished from northern Italian lakes [Bianco and Ketmaier 2014]"

From Gozlan (2008):

"One concern of ecological impacts is related to hybridization between introduced and native species. […] Another example is the colonization by the non-native nase (*Chondrostoma nasus*, Cyprinidae) in the Rhone catchment where the French nase (*Chondrostoma toxostoma* [synonym of *Parachondrostoma toxostoma*], Cyprinidae) occurs. These two species have hybridized for decades creating a 'hybrid zone', while at the same time maintaining pure bred populations within the ecosystem."

From Šimkovál et al. (2012):

"Our results suggest that *C. nasus* is a source of infection of *Dactylogyrus* parasites and has an impact on native and protected [*Parachondrostoma*] *toxostoma* with respect to their transmission."

"In cyprinids, several previous cases involving introduction of new species have led to the endangerment of native species. The situation with two particular cyprinid species – the native *Parachondrostoma toxostoma* and the introduced *Chondrostoma nasus* living in sympatry and forming two hybrid zones in the Durance River (including the Durance river plus the Buech river, which is a tributary) and the Ardeche River (South France, Rhone River drainage) – is such an example. *Parachondrostoma toxostoma* is a threatened, protected endemic cyprinid species in southern France. *Chondrostoma nasus* was introduced from Eastern Europe and colonized a part of the distribution range of *P. toxostoma*. The Durance hybrid zone of *P. toxostoma* and *C. nasus* has, until now, been studied more than the Ardeche hybrid zone. The Durance hybrid zone is of recent origin (around 100–150 years old) and represents a complex system with multiple effects including inter-species competition, bidirectional introgression, and environmental pressures [Costedoat et al. 2007]. The absence of a reproductive barrier between these two species found by Costedoat *et al*.[2004] facilitates the hybridization between *P. toxostoma* and *C. nasus*."

"[…] low similarity in parasite communities between the allopatric and sympatric populations of *P. toxostoma* may indicate that *P. toxostoma* secondarily acquired the parasites (especially *Dactylogyrus*) after coming into contact with *C. nasus*. From this point of view, the changes in parasite communities in *P. toxostoma* linked to the invasion of *C. nasus* into areas originally

inhabited solely by *P. toxostoma* could represent a danger for native endemic species. However, following the general trend of low *Dactylogyrus* abundance in *P. toxostoma* in relation to *C. nasus* observed in sympatric zones, it seems that *Dactylogyrus* infection probably has a genetic basis limiting the intensity of infection in endemic *P. toxostoma*."

From Changeux and Pont (1995):

"It is still difficult to assess the impact of the arrival of *C. nasus* in the Rhfne basin on the distribution of *C. toxostorna*. It seems that at the start of this century, *C. toxostoma* was really subject to competition since a decline was recorded in the Safne (Paris, 1932). It is possible, however, that *C. toxostoma* was never very common in river habitats (Nelva, 1988) and *C. nasus* does not seem to have colonised very far up tributary rivers (Spillmann, 1961). In the Ardfche, an equilibrium seems to have been established between *C. toxostoma*, which occupies the areas upstream, and *C. nasus*, which is combined to the downstream parts (Nelva-Pasqual, 1985). The separation of the spawning seasons and dietary differences are sufficient to allow the two species to coexist in the contact zones (Chappaz et al.. 1989). Nevertheless, in the absence of *C. nasus*, *C. toxostoma* occupies both upstream and downstream zones by adjusting its microhabitat preferences (Grossman et al., 1987a, b)."

4 History of Invasiveness

There are records of *Chondrostoma nasus* entering new basins through artificial canals and connections, and once there, having detrimental effects on other cyprinids. *C. nasus* is reported to outcompete and eliminate species that occupy a similar niche, and can carry diseases or parasites which native species are susceptible to. They are also known to hybridize with at least one species which is imperiled and protected in France, which further complicates conservation. Introduction of *C. nasus* is also blamed for reduction in the geographic distribution of that species. Based on the existence of established populations outside its native range, and documented negative impacts to native species, the history of invasiveness for *Chondrostoma nasus* is rated as high.

5 Global Distribution

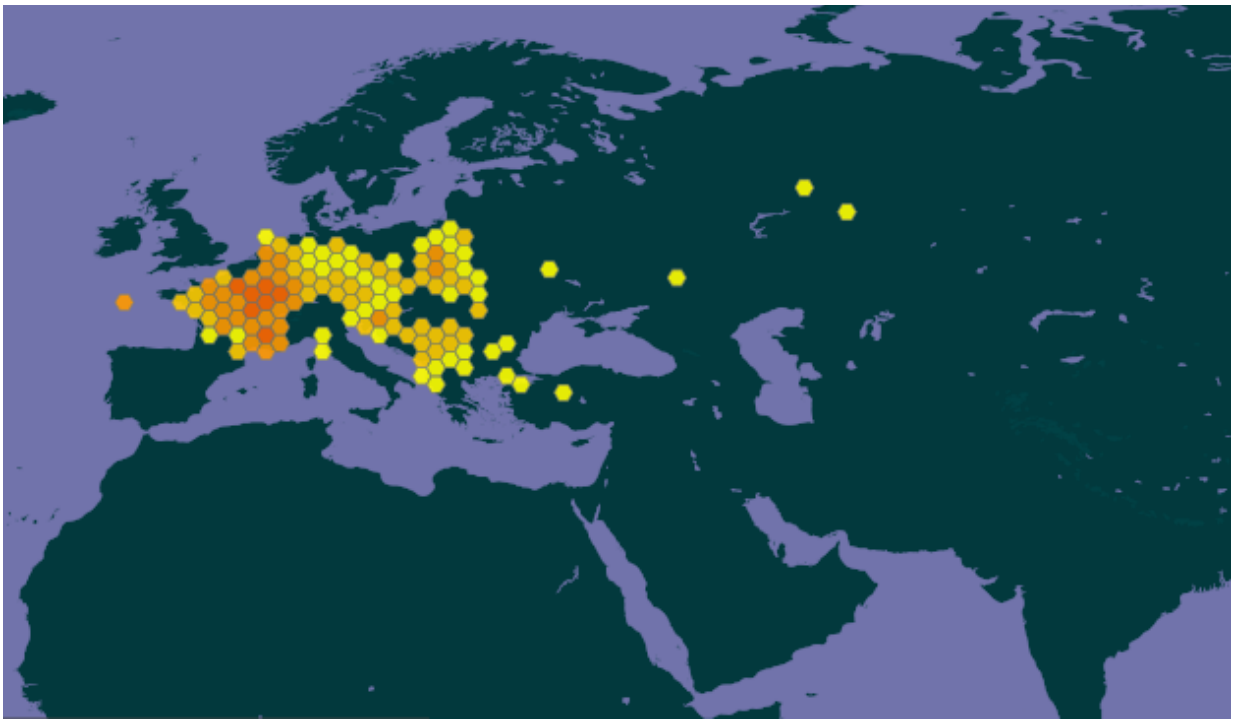

Figure 1. Known global distribution of *Chondrostoma nasus*. Locations are shown across Europe and into western Russia. Map from GBIF Secretariat (2020). Note the few locations in Russia, Ukraine, Turkey and Greece do not represent established populations and were not used to select source points for climate matching. The location west of France in the Atlantic Ocean is due to erroneous coordinates, as *C. nasus* is a freshwater fish, and was also not used.

6 Distribution Within the United States

No populations have been reported in the United States.

7 Climate Matching

Summary of Climate Matching Analysis

The climate match for *Chondrostoma nasus* was medium to high across much of the contiguous United States, with the highest matches occurring in the Midwest, Northeast, and Appalachia regions. The lowest matches were found along the southern edge of the country, including the entire state of Florida, as well as areas in the Pacific Northwest. Much of the interior of the United States showed a medium level of climate matching. The overall Climate 6 score (Sanders et al. 2018; 16 climate variables; Euclidean distance) for the contiguous United States was 0.265, placing it in the high climate match category (scores 0.103 and greater are classified as high). The following States had low individual Climate 6 scores: Alabama, Florida, Louisiana, Mississippi, North Dakota and Texas; the remainder of the contiguous United States fell into the medium or high score categories.

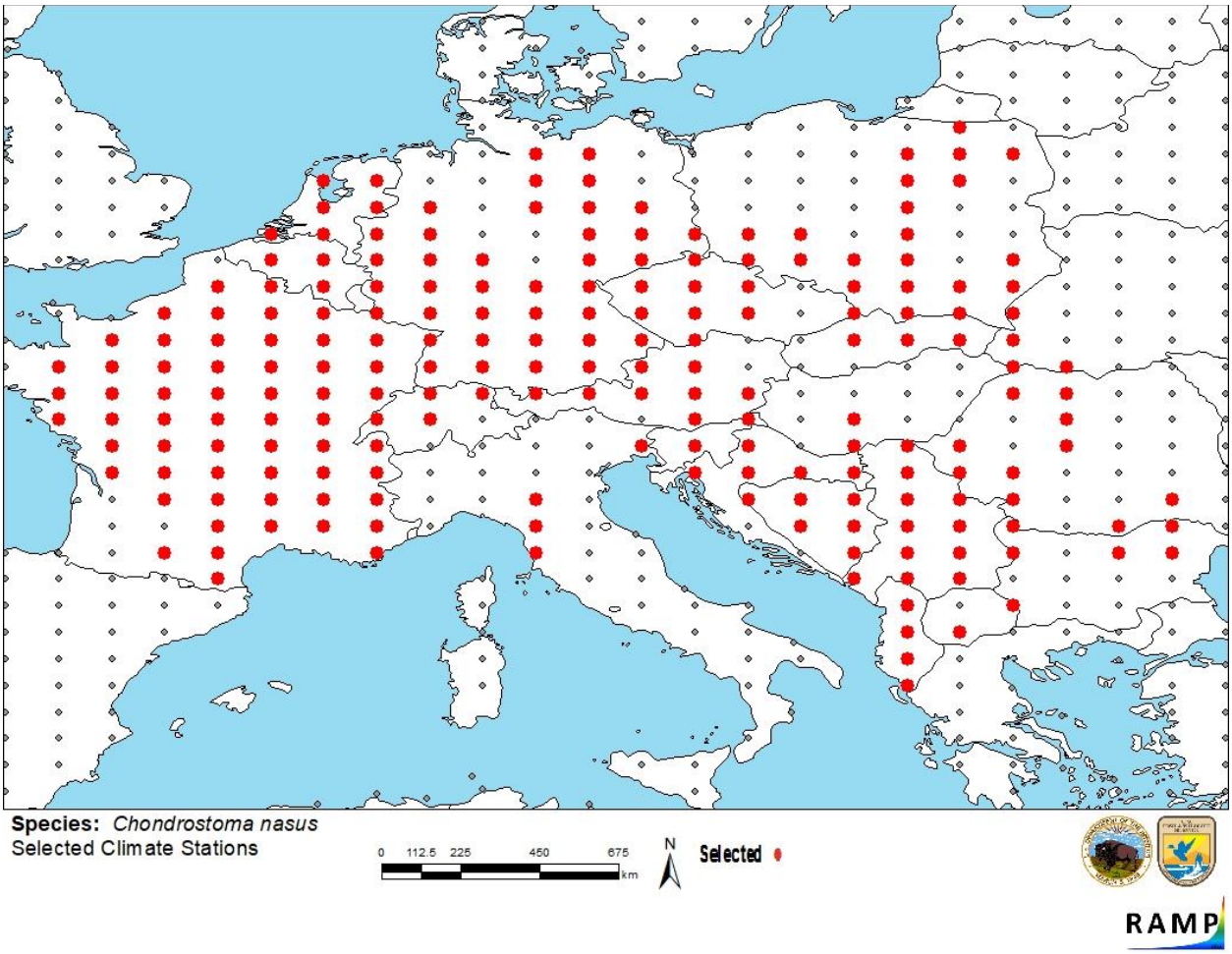

Figure 2. RAMP (Sanders et al. 2018) source map showing weather stations in Europe selected as source locations (red; France, Germany, Netherlands, Belgium, Luxembourg, Switzerland, Italy, Poland, Czech Republic, Slovakia, Austria, Slovenia, Croatia, Bosnia and Herzegovina, Hungary, Romania, Serbia, Bulgaria, Albania, Macedonia) and non-source locations (gray) for *Chondrostoma nasus* climate matching. Source locations from GBIF Secretariat (2020). Selected source locations are within 100 km of one or more species occurrences, and do not necessarily represent the locations of occurrences themselves.

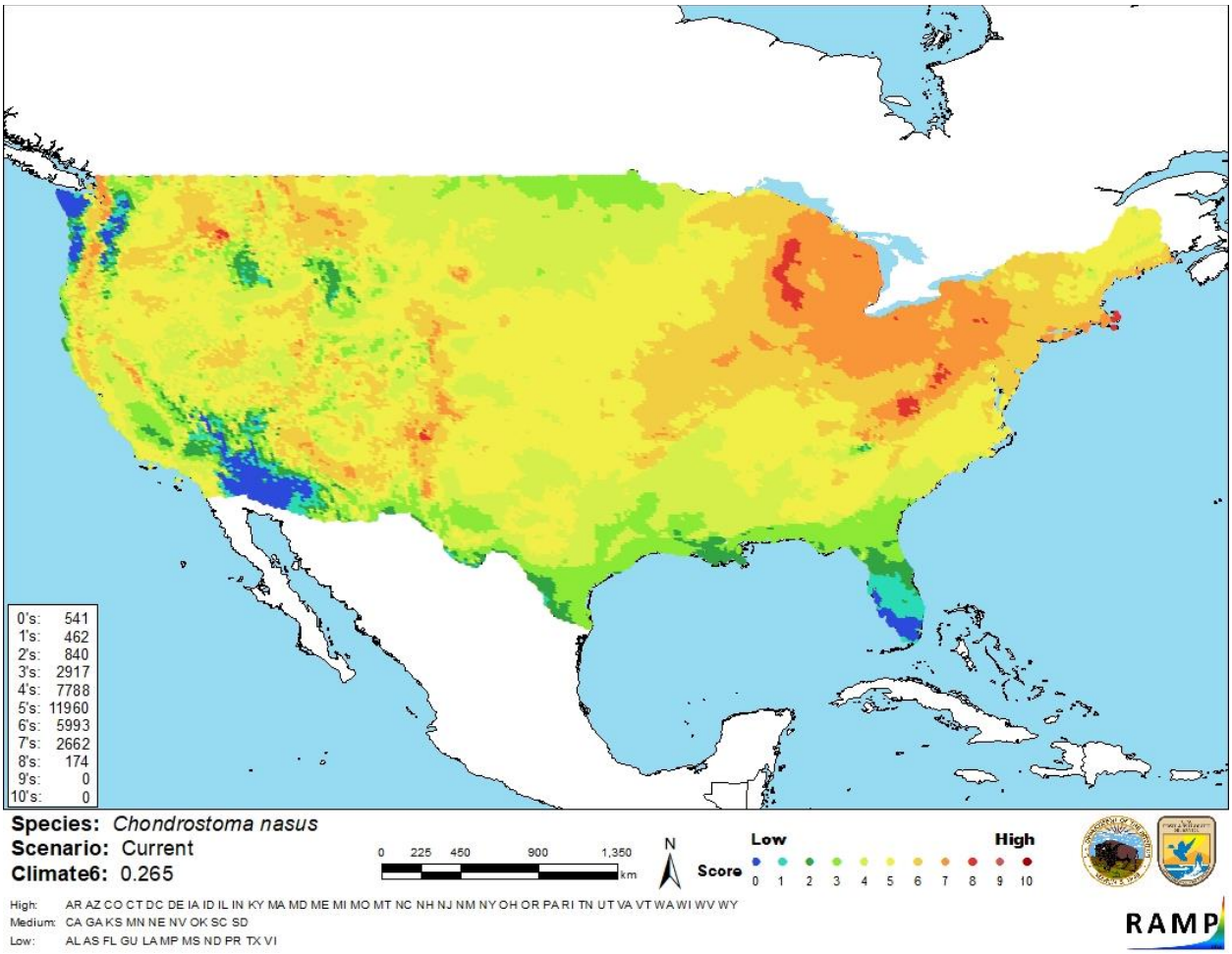

Figure 3. Map of RAMP (Sanders et al. 2018) climate matches for *Chondrostoma nasus* in the contiguous United States based on source locations reported by GBIF Secretariat (2020). Counts of climate match scores are tabulated on the left. 0/Blue = Lowest match, 10/Red = Highest match.

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

The certainty of assessment for *Chondrostoma nasus* is high. Information is available about their biology and negative impacts of introductions, and there are records of established populations, both native and introduced, spanning across Europe. The minor gaps in georeferenced

observations for this species when compared to the described distribution do not increase uncertainty in the interpretation of the climate match results.

9 Risk Assessment

Summary of Risk to the Contiguous United States

Chondrostoma nasus, the Common Nase, is a predominantly herbivorous/ detritivorous cyprinid that is native to medium and large rivers across much of Europe. There are some small variations in regards to its native range within Europe, but this is unlikely to have an effect on the overall climate match for the contiguous United States. Primary human uses of *C. nasus* include consumption and sport fishing, but neither appear to be a driver behind any of the introductions outside the native range. Reported introductions seem to have occurred largely through dispersion and via artificial canals and connections between basins. When introduced and established, *C. nasus* is reported to outcompete and eliminate native congeners which exist in a similar niche. Because of these detrimental effects on native cyprinids, the history of invasiveness is categorized as high. The climate match for the contiguous United States is also rated as high with a climate match score of 0.265. The certainty of assessment is high due to the quality and quantity of information available for this species. The overall risk assessment category is high.

Assessment Elements

- **History of Invasiveness (Sec. 4): High**
- **Overall Climate Match Category (Sec. 7): High**
- **Certainty of Assessment (Sec. 8): High**
- **Remarks, Important additional information:** Potential carrier of koi herpes virus (KHV)
- **Overall Risk Assessment Category: High**

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.

Changeux T, Pont D. 1995. Current status of the riverine fishes of the French Mediterranean basin. Biological Conservation 72:137–158.

[FAO] Fisheries and Agriculture Organization of the United Nations. 2020. Database on introductions of aquatic species. Rome: FAO. Available: http://www.fao.org/fishery/factsheets/search/fs/introsp/species/Chondrostoma+nasus/en# (April 2020).

Freyhof J. 2011. *Chondrostoma nasus* (errata version published in 2016). The IUCN Red List of Threatened Species 2011. Available: https://www.iucnredlist.org/species/4789/97800985 (April 2020).

Fricke R, Eschmeyer WN, van der Laan R, editors. 2020. Eschmeyer's catalog of fishes: genera, species, references. California Academy of Science. Available: http://researcharchive.calacademy.org/research/ichthyology/catalog/fishcatmain.asp (April 2020).

Froese R, Pauly D, editors. 2020. *Chondrostoma nasus* (Linnaeus, 1758). FishBase. Available: https://www.fishbase.se/summary/Chondrostoma-nasus.html (April 2020).

GBIF Secretariat. 2020. GBIF backbone taxonomy: *Chondrostoma nasus* (Linnaeus, 1758). Global Biodiversity Information Facility, Copenhagen. Available: https://www.gbif.org/species/2360551 (April 2020).

Gozlan RE. 2008. Introduction of non-native freshwater fish: is it all bad? Fish and Fisheries 9:106–115.

Irz P, Odion M, Argillier C, Pont D. 2006. Comparison between the fish communities of lakes, reservoirs and rivers: can natural systems help define the ecological potential of reservoirs? Aquatic Sciences 68:109–116.

[ITIS] Integrated Taxonomic Information System. 2020. *Chondrostoma nasus* (Linnaeus, 1758). Reston, Virginia: Integrated Taxonomic Information System. Available: https://www.itis.gov/servlet/SingleRpt/SingleRpt?search_topic=TSN&search_value=639383#null (April 2020).

Jirsa F, Konecny R, Frank C, Sures B. 2010. The parasite community of the nase *Chondrostoma nasus* (L. 1758) from Austrian rivers. Journal of Helminthology 85:255–262.

Kempter J, Kielpinski M, Panicz R, Sadowski J, Myslowski B, Bergmann SM. 2012. Horizontal transmission of koi herpes virus (KHV) from potential vector species to common carp. Bulletin of the European Association of Fish Pathologists 32:212–219.

New Mexico Department of Game and Fish. 2010. Director's species importation list. Santa Fe, New Mexico: New Mexico Department of Game and Fish. Available: http://www.wildlife.state.nm.us/download/enforcement/importation/information/Directors-Species-Importation-List-08_03_2010.pdf (November 2020).

[OIE] World Organisation for Animal Health. 2020. OIE-listed diseases, infections and infestations in force in 2020. Available: http://www.oie.int/animal-health-in-the-world/oie-listed-diseases-2020/ (April 2020).

Poelen JH, Simons JD, Mungall CJ. 2014. Global Biotic Interactions: an open infrastructure to share and analyze species-interaction datasets. Ecological Informatics 24:148–159.

Sanders S, Castiglione C, Hoff M. 2018. Risk Assessment Mapping Program: RAMP. Version 3.1. U.S. Fish and Wildlife Service.

Šimkoval A, Navrátilová1 P, Dávidová1 M, Ondračková1 M, Sinama M, Chappaz R, Gilles A, Costedoat C. 2012. Does invasive *Chondrostoma nasus* shift the parasite community structure of endemic *Parachondrostoma toxostoma* in sympatric zones? Parasites & Vectors 5:200–212.

Zbinden S, Maier KJ. 1996. Contribution to the knowledge of the distribution and spawning grounds of *Chondrostoma nasus* and *Chondrostoma toxostoma* (Pisces, Cyprinidae) in Switzerland. Pages 287–297 in Kirchhofer A, Hefti D, editors. Conservation of endangered freshwater fish in Europe. Basel, Switzerland: Birkhäuser. Advances in Life Sciences.

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.

Bianco PG. 1995. Introductions, chief elements of native freshwater fish degradation and use of indices and coefficients in quantifying the situation in Italy. Pages 175–198 in Philipp DP, Epifanio JM, Marsden JF, Claussen JE, Wolotira RJ Jr, editors. Protection of aquatic biodiversity: proceedings of the World Fisheries Congress, theme 3. India: Oxford and IBH Publishing.

Bianco PG. 2014. An update on the status of native and exotic freshwater fishes of Italy. Journal of Applied Ichthyology 30:62–77.

Bianco PG, Ketmaier V. 2014. A revision of the *Rutilus* complex from Mediterranean Europe with description of a new genus, *Sarmarutilus*, and a new species, *Rutilus stoumboudae* (Teleostei: Cyprinidae). Zootaxa 3481(3):379–402.

Billard R. 1997. Les poissons d'eau douce des rivières de France. Identification, inventaire et répartition des 83 espèces. Lausanne, Switzerland: Delachaux & Niestlé.

Chappaz R, Brun G, Olivari G. 1989. Données nouvelles sur la biologie et l'écologie d'une espéce de poisson Cyprinidé peu étudié *Chondrostoma toxostoma* (Vallot, 1836). Comparaison avec *Chondrostoma nasus* (L., 1766). C. R. Hebd. Seances Acad. Sci. (III) 309:181–186.

Costedoat C, Pech N, Chappaz R, Gilles A. 2007. Novelties in hybrid zones: crossroads between population genomic and ecological approaches. PLoS One 2(4):e357-10.1371/journal.pone.0000357.

Costedoat C, Pech N, Chappaz R, Salducci MD, Lim P, Gilles A. 2004. Étude de lÂ´hybridation introgressive entre *Chondrostoma t. toxostoma* et *Chondrostoma n. nasus* (Téléostéen, Cyprinidae) en utilisant une approach multiple. Cybium 28:51–61.

Grossman GD, de Sostoa A, Freeman MC, LobonCervia J. 1987a. Microhabitats use in a Mediterranean riverine fish assemblage--fishes of the lower Matarraña. Oecologia (Berl.) 73:490–500.

Grossman GD, de Sostoa A, Freeman MC, LobonCervia J. 1987b. Microhabitats use in a Mediterranean riverine fish assemblage--fishes of the upper Matarraña. Oecologia (Berl.), 73:501–512.

Keith P, Allardi J, coordinators. 2001. Atlas des poissons d'eau douce de France. Paris: Muséum national d'Histoire naturelle. Patrimoines naturels 47:1–387.

Kottelat M, Freyhof J. 2007. Handbook of European freshwater fishes. Berlin: Maurice Kottelat (privately published).

Muus BJ, Dahlström P. 1968. Süßwasserfische. München: BLV Verlagsgesellschaft.

Nelva A. 1988. Origine et biogéographie des deux Chondrostomes français: *Chondrostoma nasus* et *C. toxostoma* (Pisces, Cyprinidae). Cybium 12:287–299.

Nelva[-Pasqual] A. 1985. Biogéographie, démographie et écologie de Chondrostoma nasus nasus (L., 1758) Hotu (Poisson, Téléostéen, Cyprinidé). Doctoral dissertation. Lyon, France: Université Claude Bernard.

Paris P. 1932. Faune de la Saône moyenne, 2ème note (Cyclostomes et Poissons). Bull. Scient. Bourgogne 2:47–54.

Riede K. 2004. Global register of migratory species - from global to regional scales. Bonn, Germany: Federal Agency for Nature Conservation. Final Report R&D-Projekt 808 05 081.

Spillmann CJ. 1961. Poisson d'eau douce. In Faune de France. Paris : Paul Lechevalier.