U.S. Fish & Wildlife Service

Prussian Carp (*Carassius gibelio*)
Ecological Risk Screening Summary

U.S. Fish and Wildlife Service, August 2025
Revised, September 2025
Web Version, 12/15/2025

Organism Type: Fish
Overall Risk Assessment Category: High

Photo: George Chernilevsky. Licensed under Creative Commons (CC BY-SA 3.0). Available: https://commons.wikimedia.org/wiki/File:Carassius_gibelio_2008_G3.jpg (August 2025).

1 Native Range and Status in the United States

Native Range

From Britton (2022):

"*C. gibelio* is distributed in Europe and Asia: it is usually considered as native from central Europe to Siberia or introduced to European waters from eastern Asia. Clear and definite data on original distribution in Europe are not available due to introduction, confusion with *Carassius* *auratus* and complex modes of reproduction. […] It is absent in the northern Baltic basin, Iceland, Ireland, Scotland and the Mediterranean islands (Kottelat and Freyhof, 2007)."

According to Britton (2022), *Carassius gibelio* is native to the following countries: Albania, Austria, Bosnia and Herzegovina, Bulgaria, China, Croatia, Georgia, Greece, Hungary, Kyrgyzstan, Latvia, Lithuania, Moldova, Mongolia, Netherlands, Romania, Russia, Serbia, Slovakia, Turkmenistan and Ukraine.

Froese and Pauly (2025) treat Albania and Kyrgyzstan as part of the introduced range, while including Armenia and Estonia (introduced according to Britton 2022), and Kazakhstan (not mentioned by Britton 2022) as part of the native range.

Status in the United States

From Elgin et al. (2014):

"[…] there is a record of importation from Germany to New York state in 1876 (Ferguson 1876) and an isolated, unconfirmed observation of hybrids (*Carassius auratus* × *C. gibelio*) in the Hudson River, New York around this date (Redding 1884), although the hybrids were later considered *Carassius carassius* (Cole, 1905). […] inconsistent use and confusion over the *C. gibelio* nomenclature make it difficult to confirm if the fish found in the Hudson River were indeed *C. gibelio* or a hybrid (Fuller et al. 1999)."

This species or its hybrids may be available in trade in the United States (e.g., J&J Aquafarms 2025).

Regulations

Carassius gibelio has been listed as an injurious wildlife species under the Lacey Act (18.U.S.C.42(a)(1)) by the U.S. Fish and Wildlife Service (USFWS 2016).

C. gibelio is regulated in Alabama (ADCNR 2022), Kansas (KDWP 2023), Minnesota (MNDNR 2022), North Carolina (NCDEQ 2022), North Dakota (NDGF 2025), and Ohio (ODNR 2022). It is regulated under the name *C. auratus gibelio* in Hawaii (HDOA 2019). It is regulated at the family level (Cyprinidae) in Alaska (ADFG 2023) and Utah (UDWR 2023). Please refer back to state agency regulatory documents for details on the regulations, including restrictions on activities involving this species. While effort was made to find all applicable regulations, this list may not be comprehensive. Notably, it does not include regulations that do not explicitly name this species or its genus or family, for example, when omitted from a list of authorized species with blanket regulation for all unnamed species.

Means of Introductions within the United States

From Elgin et al. (2014):

"These records indicate that *C. gibelio* have been imported into North America, yet it is unclear if individuals were ever released into the wild."

Remarks

This ERSS was previously published in July 2019. Revisions were completed to incorporate new information and conform to updated standards.

From Brown (2025):

"Synonyms and Other Names: Gibel carp"

"Prussian carp's morphological similarity to goldfish [*Carassius auratus*] and common carp [*Cyprinus carpio*] could lead to misidentification and thereby underestimation of extent of invaded range (Docherty et al. 2017)."

From Rylková et al. (2013):

"The combination of morphologically similar species, of hybrid specimens and of gynogenetic lineages within species, hampers studies aiming to clarify the biogeography and taxonomy of the genus *Carassius*."

This species is also part of Ontario's Invading Species Awareness Program Tracked Species List (EDDMapS 2025).

Mention of commercial products in this Ecological Risk Screening Summary does not entail endorsement by the U.S. Federal Government.

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From ITIS (2025):

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 *Carassius*
                          Species *Carassius gibelio* (Bloch, 1782)

According to Fricke et al. (2025), *Carassius gibelio* (Bloch 1782) is the current valid name for this species.

The following synonyms of *Carassius gibelio* from Froese and Pauly (2025) were used to search for information for this report: *Carassius auratus gibelio*, *Cyprinus gibelio*.

Size, Weight, and Age Range

From Froese and Pauly (2025):

"Maturity: L_m [length at maturity] 10.3 [cm], range 13 -? cm
Max length : 46.6 cm TL [total length] male/unsexed; [Verreycken et al. 2011]; common length : 20.0 cm TL male/unsexed; [Muus and Dahlström 1968]; max. published weight: 3.0 kg [Muus and Dahlström 1968]; max. reported age: 10 years [Kottelat and Freyhof 2007]"

Environment

From Froese and Pauly (2025):

"Freshwater; brackish; benthopelagic; pH range: 7.1 - 7.5; dH [degree of German hardness] range: 12 - ?; potamodromous [migratory within freshwater systems; Riede 2004]; depth range 0 - ? m. […] 10°C - 20°C [Baensch and Riehl 1991; assumed to represent recommended aquarium water temperatures]"

"Inhabits a wide variety of still water bodies and lowland rivers, usually associated with submerged vegetation or regular flooding. Can strongly tolerate low oxygen concentrations and pollution [Kottelat and Freyhof 2007]. Lake dwelling individuals move into river mouths to avoid low oxygen water in winter [Kukuradze and Mariyash 1975]. Feeding larvae and juveniles occur in high-complexity habitats as reed belts."

From Britton (2022):

"As a warm water species, gibel carp is known to prefer shallow, eutrophic waters with dense vegetation with large adult specimens and is only occasionally captured in the open deeper and colder waters (Vetemaa et al., 2005)."

Climate

From Froese and Pauly (2025):

"Temperate; […] 62°N - 35°N, 10°W - 155°E"

Distribution Outside the United States

Native

From Britton (2022):

"*C. gibelio* is distributed in Europe and Asia: it is usually considered as native from central Europe to Siberia or introduced to European waters from eastern Asia. Clear and definite data on original distribution in Europe are not available due to introduction, confusion with *Carassius* *auratus* and complex modes of reproduction. […] It is absent in the northern Baltic basin, Iceland, Ireland, Scotland and the Mediterranean islands (Kottelat and Freyhof, 2007)."

According to Britton (2022), *Carassius gibelio* is native to the following countries: Albania, Austria, Bosnia and Herzegovina, Bulgaria, China, Croatia, Georgia, Greece, Hungary, Kyrgyzstan, Latvia, Lithuania, Moldova, Mongolia, Netherlands, Romania, Russia, Serbia, Slovakia, Turkmenistan and Ukraine.

Froese and Pauly (2025) treat Albania and Kyrgyzstan as part of the introduced range, while including Armenia and Estonia (introduced according to Britton 2022), and Kazakhstan (not mentioned by Britton 2022) as part of the native range.

Introduced

Africa

Chaibi et al. (2012) report *C. gibelio* from 2.5% of sites surveyed in northeastern Algeria, including riverine and reservoir habitats.

Asia

From Yerli et al. (2014):

"From its first introduction date in 1980's (Baran and Ongan, 1988) *Carassius gibelio* seems to invade hundreds of water courses and reported from several freshwater basins of Turkey. There are no records from Ceyhan (Erk'akan and Özdemir, 2011; Kara et al., 2010), Göksu (Küçük et al., 2007), Eastern Black Sea (İlhan and Balık, 2008) and Western Black Sea basins."

From Kuljanishvili et al. (2020):

"*Carassius gibelio* is widely introduced all over the study area [Armenia, Azerbaijan, and Georgia]. It appeared in the late 1970-ies in Armenia (Pipoyan & Rukhkyan, 1998), followed by record from Georgia in the middle 1980th [sic] by Daraselia (1985) (as *C. carassius*). […] While *C. gibelio* and *C. auratus* can be distinguished by molecular characters (Rylková, Kalous, Bohlen, Lamatsch, & Petrtýl, 2013), there is no agreed set of morphological characters to separate both species and we cannot exclude that many records of *C. gibelio* actually refer to *C. auratus*."

From Abdullah et al. (2021):

"Fish samples were monthly collected from three sites in southern Iraq (Al-Chibyaish marsh, the lower parts of Euphrates River, and the northern part of Shatt Al-Arab River) from April 2017 to June 2018. […] the Prussian carp *Carassuis* [sic] *gibelio* comprised 12.58%, 26.19%, and 13.84% […] of the total number of species in three study sites respectively."

From Khosravi et al. (2020):

"In order to increase the knowledge of introduced species of the genus [*Carassius*] in Iran, molecular approaches were employed to identify species based on the mitochondrial gene, cytochrome *b* (Cyt *b*). […] The results revealed that there are three introduced species [including] *Carassius gibelio* […] in inland waters of Iran."

From Froese and Pauly (2025):

"It was introduced to pond culture in Tashkent [Uzbekistan] and it soon penetrated into natural waters."

"established, natural reproduction [in Kyrgyzstan] […] Recorded from Lake Issyk-kul."

"A single specimen was collected on October 25, 1981 in Lake Kinneret [Israel] […]"

Froese and Pauly (2025) also report *Carassius gibelio* as introduced but not established in Japan.

Europe

From Rylková et al. (2013):

"The earliest records from the Danube basin (lower Danube in Bulgaria and Romania) are from the 1940s (Bănărescu, 1964), but catches were rather negligible until the 1960s, when the species became rapidly more abundant and started to spread (Holčík and Žitňan, 1978). Subsequently, the species was observed more and more westward in the Danube system and finally also in several western European river basins. These late records together with the observation that *C. gibelio* in the Danube basin carried parasites that were new to the region (Žitňan, 1974) suggest that the species is a recent invader in these areas."

"Our dataset identifies […] *C. gibelio* from […] Czech Republic, […] Finland, France, Germany, […] Italy, Poland, […] Turkey […]"

From Britton (2022):

"*C. gibelio* was intentionally introduced either to Belarus or Poland […] with a secondary dispersal route being the central corridor (the rivers Dnieper and Pripyat, the Dnieper-Bug Canal, the Western River Bug, the River Vistula, the Bydgoski Canal, the rivers Notec, Warta, and Oder, the Oder-Spree and Oder-Havel canals, and the River Rhine). During a recent survey, *C. gibelio* were not found in the main riverbed of the River Pripyat, but occurred in its oxbows, although it was only caught in low numbers (two to three individuals per fish-net). In the Vistula and Bug river basins, *C. gibelio* have been noted since the 1940s; however, during recent surveys it was present only in the Wloclawski Reservoir [central Poland] in the lower River Vistula (Semenchenko et al., 2011)."

"In Belgium, […] the species was probably present in Flanders at least by the seventeenth century. Now the most widespread non-indigenous fish in Flanders, *C. gibelio* occurs locally in high densities."

"*C. gibelio* dispersed into the river networks of the Czech Republic from the River Danube via the River Morava. The first recordings, around the confluence of the Morava and Dyje rivers, date from 1976. […] Within 15 years, *C. gibelio* had occupied all suitable habitats in the Czech Republic (Lusková et al., 2010), recognised as *C. a. gibelio* […]"

"*C. gibelio* are present in the Thrace region of Turkey."

From Wouters et al. (2012):

"Both mitochondrial DNA sequence and two nuclear microsatellite markers were used to confirm the identity of the first record of *Carassius auratus gibelio* in the western (Swedish) Baltic Sea region. […] All except three of these 16 fishes had microsatellite alleles suggesting hybridization with *Carassius carassius*. These findings suggest that a cryptic invasion of *C. a. gibelio* might be in progress."

"These fishes [in Sweden] were present at three locations, two on the island of Gotland and one on the mainland."

From Ribeiro et al. (2015):

"In this study, genetic markers were used to identify the Prussian carp in several locations of the Iberian Peninsula (Portugal and Spain). The presence of polyploid *C. gibelio* is confirmed for the first time in Iberian Peninsula, in four large river systems (Guadalquivir, Guadiana, Tagus and Douro)."

From Environment Agency (2022):

"Prussian carp were first detected in England in 2020 and have been confirmed in four stlllwater [sic] fisheries."

Froese and Pauly (2025) also report *Carassius gibelio* as introduced and established in Denmark and Switzerland.

North America

From Elgin et al. (2014):

"The Government of Alberta and private data for southern Alberta suggest that *C. gibelio* are present in natural streams and irrigation canals in the Bow, Red Deer, and South Saskatchewan River basins […]."

From Docherty et al. (2017):

"[…] the species has become well established in southern Alberta, Canada […]. Prussian Carp range extent has increased from about 1,800 km^2 in 2000 to over 20,000 km^2 in 2014 […]"

From Menard et al. (2025):

"At the time of this study Prussian carp were established in Saskatchewan [Canada] throughout the South Saskatchewan River watershed from the Alberta border to Saskatoon."

Means of Introduction Outside the United States

From Britton (2022):

"*C. gibelio* have been introduced intentionally for the purposes of food production and unintentionally due to the similarity in appearance between *C. gibelio* and native *Carassius* spp."

"Fishermen have admitted intentionally introductions [sic] from Kayali Dam to Büyükcekmece Dam Lake [Turkey] (Özulug et al., 2004)."

"*C. a. gibelio* [*C. gibelio*] has been intentionally introduced for production reasons and also possibly for sport angling in the eastern parts of the former Soviet Union and in several countries in eastern Europe (M Lusk, Institute of Vertebrate Biology ASCR, Czech Republic, personal communication, 2011)."

"Automigration of *C. a. gibelio* [*C. gibelio*] has taken place within river basins (e.g. in the Czech Republic: Danube – Morava rivers; Slovakia: Danube (western part), Tisa River (eastern part)) (M Lusk, Institute of Vertebrate Biology ASCR, Czech Republic, personal communication, 2011)."

From Brown (2025):

"The means of original introduction to North America is currently unknown but potentially occurred through contaminated shipments of other aquaculture species or through aquarium or bait fish releases (Elgin et al. 2014). Dispersal has been facilitated by artificial irrigation waterways (Elgin et al. 2014) and likely human mediated transport (Docherty et al. 2017)."

"In a laboratory experiment, mallard ducks were fed Prussian carp eggs. While only a small amount (0.25%) of the eggs were recovered from the duck feces, a few had viable embryos within the egg and two survived beyond hatching, suggesting that bird-mediated dispersal, albeit a small one [sic], is possible (Lovas-Kiss et al. 2020)."

Short Description

From EDDMapS (2025):

"It has a silvery-brown body and the lateral line has 29-33 scales. Strong serration on the last simple anal and dorsal rays. Anal fin has 5 1/2 branched rays. End of dorsal fin is free and concave or straight back towards the head. Peritoneum (membranous sac lining the body cavity) is black. It has 37-52 gill rakers (bony projections in the gills that trap food)."

Biology

From Menard et al. (2025):

"These fish grow and mature quickly, often reproducing in their second year [Leonardos et al. 2001, 2008a]. Prussian carp also have an unusual reproductive system in which asexual and sexual reproduction occur simultaneously [Fan and Liu 1990; Fan and Shen 1990; Gui et al. 1993; Gui 1996, 1997]. In the gynogenetic (asexual) reproductive mode, triploid females use sperm from males to stimulate the development of unreduced eggs [Paschos et al. 2004; Leonardos et al. 2007, 2008a, 2008b; Liasko et al. 2010]. This mode of reproduction results in triploid females and both triploid and tetraploid males [Liasko et al. 2010]. Gynogenetic reproduction can be achieved by sperm parasitism from other species (allogynogenesis), and is common in invasive Prussian carp populations [Yu 1982; Jiang et al. 1983; Paschos et al. 2004; Lusková et al. 2010]. This strategy, paired with observations of 4–5 spawning events in a year, enables invading Prussian carp populations to explode in size over a short time frame [Leonardos et al. 2007; Saşı 2008]."

"Eggs have a relatively short incubation period of 3 days at 20 °C and 52 h at 22–25 °C [Laurila et al. 1987; Laurila and Holopainen 1990; Zhenqi et al. 2014]; juvenile Prussian carp reach ~ 20 mm long in 20 days post hatch at water temperatures of 22–25 °C."

From Brown (2025):

"In the northern portion of its native range where temperatures are cooler, spawning occurs at 3-4 years of age, but occurs at 1-2 years in southern Europe from May-July when water temperatures are above 14°C (Kottelat and Freyhof 2007). Spawning occurs in shallow water along warm shorelines on submerged vegetation (Kottelat and Freyhof 2007, Paschos et al. 2004)."

From Britton (2022):

"*C. gibelio* feeds on plankton, benthic invertebrates, plant material and detritus (Specziar et al., 1998; Kottelat and Freyhof, 2007)."

From Docherty et al. (2017):

"Prussian Carp is also flexible in its diet, which can vary widely depending on season, habitat (i.e. lake vs. river), geographic location, and life stage (Balik et al. 2003)."

Human Uses

From Froese and Pauly (2025):

"Fisheries: minor commercial"

From Narščius (2012):

"Prussian carp has become so common in the Gulf of Riga that there is now a commercial fishery for the species in Estonian waters of the Gulf. The same is true of the Curonian Lagoon, the shallow sea area enclosed by a sand spit on the coast of Lithuania and the Russian province of Kaliningrad. Likewise, in the Gulf of Gdańsk on the Polish coast, the species has become so well established that there is a regular recreational fishery for it."

From Xu et al. (2019):

"Gibel carp (*Carassius gibelio*) is a commercially important aquaculture species in China."

Diseases

***Carassius gibelio* may be infected by koi herpesvirus (KHV) and spring viraemia of carp virus (SVCV); both of these pathogens are responsible for diseases listed by the World Organisation for Animal Health (2025).**

From Matras et al. (2019):

"Eight species were experimentally infected with KHV […] We confirmed that […] Prussian carp […] can transfer the virus to naïve common carp."

From Vetešník et al. (2024):

"Two cyprinid species, *C. carpio* and *C. gibelio*, and their various hybrid generations were studied for their susceptibility to SVCV (Šimková et al., 2022). […] *C. gibelio* was revealed as weakly susceptible to SVCV."

From Lu et al. (2016):

"Outbreaks of cyprinid herpesvirus 2 (CyHV-2) disease, also known as herpesviral hematopoietic necrosis, among cultured Prussian Carp *Carassius gibelio* has occurred each year in Jiangsu province, China, since 2009. […] Here we present a diagnostic case report involving Prussian Carp naturally infected with CyHV-2 during autumn 2014 in Yancheng, Jiangsu province. […] The mortality rate nearly reached 100%. Moribund Prussian Carp showed lethargy, anorexia, and dorsal hyperpigmentation. They were observed gasping to breathe near the surface of the water, apparently suffering from insufficient oxygen intake, and finally died within 1–2 d."

"[…] only two kinds of viral diseases in Prussian Carp have been reported in China. One is CyHV-2 disease, and the other occurs in winter with low mortality and is a putative viral disease causing epidermal papillomas (Lu et al. [2009]), which is completely different from that of disease caused by CyHV-2 infection."

According to Froese and Pauly (2025), *C. gibelio* is susceptible to black spot disease and *Thelohanellus* infection.

According to Poelen et al. (2014), *Carassius gibelio* is a host for the following additional pathogens and parasites: platyhelminths *Dactylogyrus anchoratus*, *Da. balistae*, *Da. formosus*, *Da. inexpectatus*, *Da. intermedius, Da. legionensis*, *Da. vastator*, *Diplostomum spathaceum*, *Gyrodactylus kobayashii*, *G. longoacuminatus*, and *G. sprostonae*; nematodes *Khawia parva*, *K. rossittensis*, *K. sinensis*, and *Neogryporhynchus cheilancristrotus*; cnidarians *Myxobolus ampullicapsulatus*, *M. hearti*, *M. honghuensus, M. lentisuturalis, M. pronini*, *M. wulii*, and *Zschokkella nova*; the fish louse *Argulus foliaceus*; the leech *Piscicola geometra*; the amoeba *Filamoeba sinensis*; and the bacterium *Aeromonas sobria*.

According to WoRMS (2025), *C. gibelio* is a host for the following additional pathogens and parasites: platyhelminths *Allocreadium pseudoisoporum*, *Al. transversale*, *Asymphylodora demeli*, *As. japonica*, *Bucephalus polymorphus*, *Carassotrema koreanum*, *Clinostomum complanatum*, *Diplostomum chromatophorum*, *D. helveticum*, *D. huronense*, *D. hupehensis*, *D. mergi*, *D. niedashui, D. rutili*, *Georduboisia teganuma*, *Gryporhynchus pusillus*, *Himasthla militaris*, *Hysteromorpha triloba*, *Ligula alternans*, *Metagominus takahashi*, *M. yokogawai*, *Nicolla skrjabini*, *Parabucephalopsis parasiluri*, *Paracoenogonimus ovatus*, *Paradilepis scolecina*, *Parasymphylodora khankensis*, *Paras. lacustris*, *Paras. markewitschi*, *Paras. ussuriensis*, *Posthodiplostomum cuticola*, *Prosorhynchoides ozakii*, *Rhipidocotyle campanula*, *Sanguinicola inermis*, and *Tylodelphys clavata*; nematodes *Contracaecum rudolphii*, *Philometroides cyprini*, and *P. sanguineus*; the cnidarian *Myxobolus acutus*; and the copepod *Neoergasilus japonicus*.

Threat to Humans

From Froese and Pauly (2025):

"Potential pest [Lusk et al. 2010]"

From Narščius (2012):

"In aquaculture systems, *C. gibelio* is an unwelcome competitor with cultures of the major reared species"

3 Impacts of Introductions

From Britton (2022):

"*C. gibelio* has caused significant impact in all countries of introduction in Europe (Savini et al., 2010, comparison of invasive species databases). In a 6-year study in a mesotrophic reservoir in Turkey, Tarkan et al. ([2012]) observed a relative decrease in native cyprinid density when *C. gibelio* density increased. This was attributed to a combination of degrading environmental conditions and reproductive competition by *C. gibelio*."

"In aquaculture systems, *C. gibelio* is an unwelcome competitor with cultures of the major reared species. The occurrence of numerous populations of *C. gibelio* in fishponds causes considerable economic loss in the Czech Republic as there is no market for the species. Even when it can be sold, it reaches a considerably lower price (Lusková et al., 2010)."

From Lusk et al. (2010):

"[…] *C. gibelio* is a competitor for a number of cyprinid fish species [in the Czech Republic]. Having penetrated into fishponds, it yields production of substantially lower marketable value to the detriment of [native] *C. carpio*, the main productive species. Thus, for example in some of the fishponds situated in the floodplain of the Dyje River, the financial losses attained up to 200 – 300 EUR per hectare, owing to the excessive occurrence of *C. gibelio* in 1999. Our observations show that in natural aquatic habitats in the floodplain along the lower section of the Dyje River the number and biomass of *C. gibelio* amount to 2 500 individuals and 390 kg biomass per hectare of water surface. This situation results in enormous competition for food and space and the drop in numbers or even the vanish [sic] of characteristic native fish species, such as *C. carassius*, *T. tinca*, *L. delineatus*, and *Scardinius erythrophthalmus*. Besides, we have observed mass sexual parasitism of triploid female *C. gibelio*, spawning with male *C. carpio* and *Abramis brama*, less frequently even *C. carassius*, *Rutilus rutilus*, *Abramis bjoerkna*, and *T. tinca* (Lusk et al. [1998], unpublished data). Hybridization with *C. gibelio* exerts a negative impact even on the initial status of populations of *C. carassius* (Papoušek et al. 2008)."

From Ruppert et al. (2017):

"In this study, we found evidence that Prussian carp are capable of restructuring native communities of both fish and benthic invertebrates. Specifically, we documented declines of brook stickleback and fathead minnow alongside their invasion […]. Further, when Prussian carp abundance was higher, we found significantly less abundance of brook stickleback, fathead minnow, lake chub and white sucker […]. These findings may result from Prussian carp having similar diet and habitat preferences to brook stickleback, fathead minnow and white sucker, suggesting that Prussian carp may be introducing novel competition [Docherty et al. 2017]. The negative impact on native species is surprising given that it can often take many years before community-level effects are detected [Mooney and Cleland 2001]; however, the fact that Prussian carp do have community-level effects already demonstrates that they can be a potent invader."

"[…] we detected significant concordance between changes in the fish and benthic invertebrate community with the time since invasion, where there are increases in Chironomidae (larvae and pupae), Simuliidae (larvae and pupae) and Caenidae alongside Prussian carp invasion […]. While we cannot disentangle whether changes in the benthic invertebrate community were due to the Prussian carp invasion or habitat selection [of Prussian carp for more turbid, eutrophic, and polluted habitats], we cannot rule out that Prussian carp may be impacting benthic invertebrates, due to their diet and role as a known bioturbator (a species that reworks soils or sediments) [Richardson et al. 1995; Meyer et al. 1998]."

"As a bioturbator, we surprisingly find little evidence that they are altering abiotic elements of the freshwater ecosystems they have invaded [Meyer et al. 1998]."

From Brown (2025):

"In a mesocosm experiment, the presence of Prussian carp increased total suspended solids in the water column, enhanced the growth of planktonic algae, decreased light conditions, reduced benthic algae growth, reduced zooplankton biomass, and prevented submerged macrophyte development ultimately enhancing eutrophication (Razlutskij et al. 2021)."

Carassius gibelio has been listed federally as an injurious wildlife species (USFWS 2016). *C. gibelio* is also regulated in Alabama (ADCNR 2022), Alaska (ADFG 2023), Hawaii (HDOA 2019), Kansas (KDWP 2023), Minnesota (MNDNR 2022), North Carolina (NCDEQ 2022), North Dakota (NDGF 2025), Ohio (ODNR 2022), and Utah (UDWR 2023). It is regulated under the name *C. auratus gibelio* in Hawaii. See section 1.

4 History of Invasiveness

The History of Invasiveness for *Carassius gibelio* is classified as High. Despite uncertainty about the status of *C. gibelio* as native or introduced in parts of Europe, there is robust information on establishment of nonnative populations from North America. Declines in native fish populations have been observed in multiple locations after *C. gibelio* establishment. There are also negative economic impacts associated with *C. gibelio* contamination of aquaculture facilities. Some studies have observed changes to macrophyte and benthic invertebrate communities in the presence of *C. gibelio*, but these impacts are less consistent than the impacts to the fish community.

5 Global Distribution

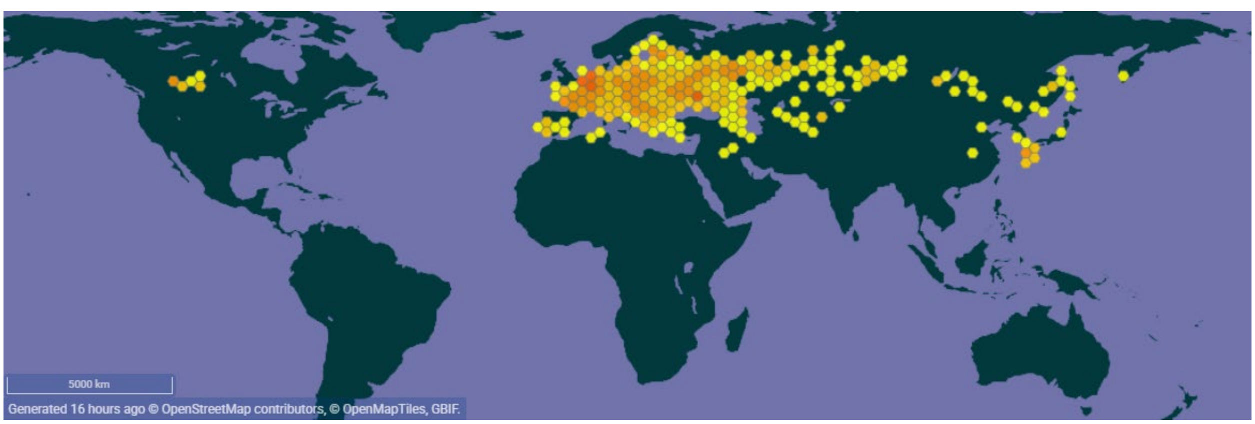

Figure 1. Reported global distribution of *Carassius gibelio*. Map from GBIF Secretariat (2023). Observations are reported from Canada, most of Europe, and eastern and central Asia. No sources were found to confirm establishment of *C. gibelio* in Japan or South Korea, so reported occurrences in these countries were not used to select source points for the climate matching analysis. Occurrences in the Aegean Sea were also modified for the climate matching analysis based on Perdikaris et al. (2012), adding climate matching source points on Crete and removing them from other Aegean Sea islands.

6 Distribution Within the United States

No records of *Carassius gibelio* in the wild in the United States were found.

7 Climate Matching

Summary of Climate Matching Analysis

The climate match for *Carassius gibelio* to the contiguous United States was high in most areas, although many of the highest climate matches were found in the Northern Plains, closest to where *C. gibelio* is already established in Canada. Medium climate matches were found in the Southeast region, from southern Texas to southern Florida and north to North Carolina and Arkansas. Southern New Mexico, southern Arizona, and eastern Maine also had medium climate match. Low climate match was found for coastal Washington and Oregon and along the Cascade and Sierra Nevada ranges in the Pacific Northwest and California. The overall Climate 6 score (Sanders et al. 2023; 16 climate variables; Euclidean distance) for the contiguous United States was 0.932, indicating that Yes, there is establishment concern for this species. The Climate 6 score is calculated as: (count of target points with scores ≥ 6)/(count of all target points). Establishment concern is warranted for Climate 6 scores greater than or equal to 0.002 based on an analysis of the establishment success of 356 nonnative aquatic species introduced to the United States (USFWS 2024).

Projected climate matches in the contiguous United States under future climate scenarios are available for *Carassius gibelio* (see Appendix). These projected climate matches are provided as additional context for the reader; future climate scenarios are not factored into the Overall Risk Assessment Category.

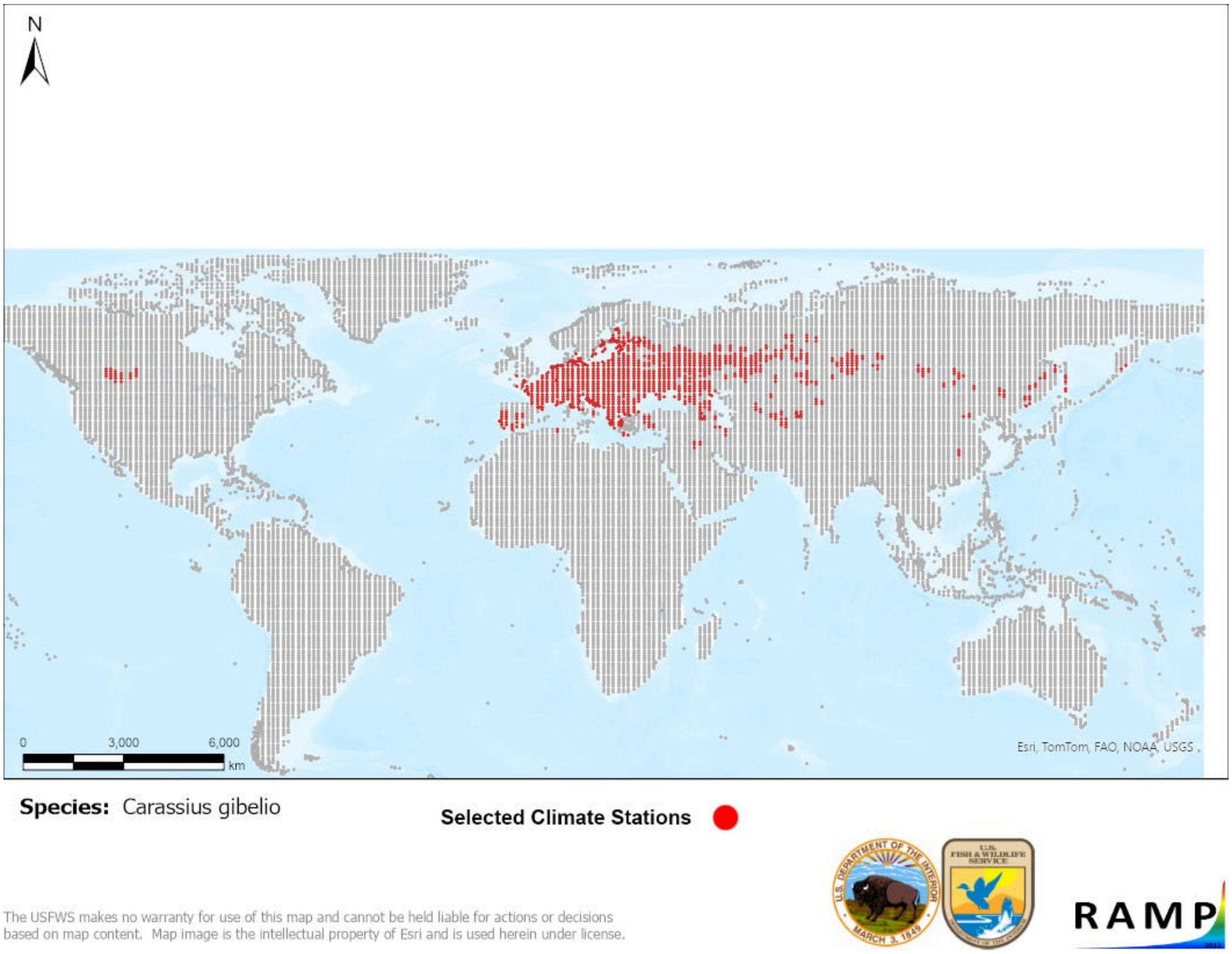

Figure 2. RAMP (Sanders et al. 2023) source map showing global weather stations selected as source locations (red; Algeria, Armenia, Azerbaijan, Canada, China, Georgia, Iran, Iraq, Kazakhstan, Kyrgyzstan, Mongolia, Russia, Tajikistan, Turkey, Turkmenistan, Uzbekistan, and all European countries except Iceland, Ireland, and Norway) and non-source locations (gray) for *Carassius gibelio* climate matching. Source locations from GBIF Secretariat (2023). Selected source locations are within 100 km of one or more species occurrences, and do not necessarily represent the locations of occurrences themselves.

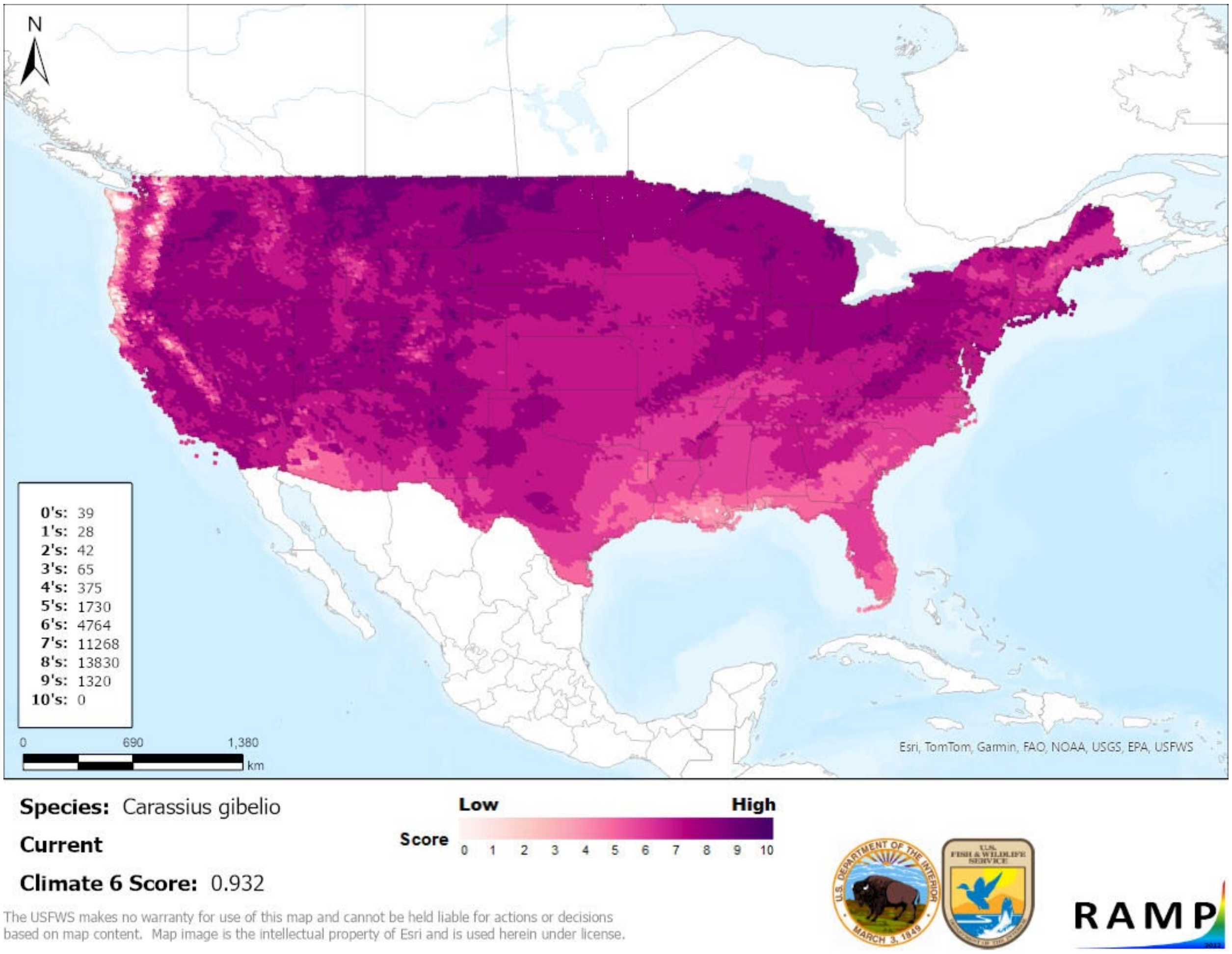

Figure 3. Map of RAMP (Sanders et al. 2023) climate matches for *Carassius gibelio* in the contiguous United States based on source locations reported by GBIF Secretariat (2023). Counts of climate match scores are tabulated on the left. 0/Pale Pink = Lowest match, 10/Dark Purple = Highest match.

8 Certainty of Assessment

The Certainty of Assessment for *Carassius gibelio* is classified as Medium. There is abundant information available on the biology, ecology, and distribution of this species. Established nonnative populations and negative impacts of introduction are documented in peer-reviewed literature. However, there remains substantial confusion about the extent of the native versus introduced range of this species in Eurasia due to morphological similarity to congeners, hybridization, and taxonomic uncertainty.

9 Risk Assessment

Summary of Risk to the Contiguous United States

Carassius gibelio, Prussian Carp, is a fish that is native to northern and eastern Asia and potentially as far west as central Europe. It has been introduced and established populations throughout Europe in addition to southwest and central Asia, Algeria, and Canada; these introductions have occurred both intentionally for aquaculture or fishing opportunities as well as accidentally. *C. gibelio* prefers shallow, eutrophic waters and is known to tolerate low dissolved oxygen concentrations and pollution. This species is able to reproduce both sexually and asexually, producing all-female offspring after having their eggs activated, but not fertilized, by other fish species. The History of Invasiveness for *Carassius gibelio* is classified as High due to clear and convincing evidence of nonnative establishment and negative impacts of introduction, including declines in native fish populations. The climate matching analysis for the contiguous United States indicates establishment concern for this species. The climate match was high across most of the contiguous United States, with the exception of parts of the Southeast, Southwest, and Pacific Northwest. The Certainty of Assessment for this ERSS is classified as Medium due to uncertainty in the native versus introduced range related to identification challenges and taxonomic uncertainty. The Overall Risk Assessment Category for *Carassius gibelio* in the contiguous United States is High.

Assessment Elements

- **History of Invasiveness (see Section 4): High**
- **Establishment Concern (see Section 7): Yes**
- **Certainty of Assessment (see Section 8): Medium**
- **Remarks, Important additional information: Capable of both sexual and asexual reproduction. High potential for misidentification due to lack of distinguishing morphological characteristics.**
- **Overall Risk Assessment Category: High**

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Appendix

Summary of Future Climate Matching Analysis

Future climate projections represent two Shared Socioeconomic Pathways (SSP) developed by the Intergovernmental Panel on Climate Change (IPCC 2021): SSP5, in which emissions triple by the end of the century; and SSP3, in which emissions double by the end of the century. Future climate matches were based on source locations reported by GBIF Secretariat (2023).

Under the future climate scenarios (figure A1), on average, high climate match for *Carassius gibelio* was projected to occur in the western contiguous United States (California, Colorado Plateau, Great Basin, Western Mountains) and the Great Lakes region. There were also medium-high matches across the Northern Plains under all scenarios except SSP5, 2085. The Southeast Region was consistently a medium match under future scenarios and the Pacific Northwest coastline remained consistently low match. The Climate 6 scores for the individual future scenario models (figure A2) ranged from a low of 0.414 (model: UKESM1-0-LL, SSP5, 2085) to a high of 0.885 (model: MPI-ESM1-2-HR, SSP3, 2055). All future scenario Climate 6 scores were above the Establishment Concern threshold, indicating that Yes, there is establishment concern for this species under future scenarios. The Climate 6 score for the current climate match (0.932, figure 3) falls above the range of scores for future projections. The time step and climate scenario with the most change relative to current conditions was SSP5, 2085, the most extreme climate change scenario. A small area in southwestern Arizona saw a moderate to large increase in the climate match relative to current conditions under all future scenarios, but the increase in climate match was most pronounced at the 2055 time step. No other moderate or large increases in climate match were observed regardless of time step and climate scenarios. Predominantly under the SSP5, 2085 scenario, areas within the Appalachian Range, Gulf Coast, Mid-Atlantic, Northern Plains, Southeast, and Southern Plains saw a large decrease in the climate match relative to current conditions. Additionally, areas within California, the Colorado Plateau, Great Basin, Great Lakes, Northeast, Southern Atlantic Coast, Southwest, and Western Mountains saw a moderate decrease in the climate match relative to current conditions. Additional, very small areas of large or moderate change may be visible on the maps (figure A3).

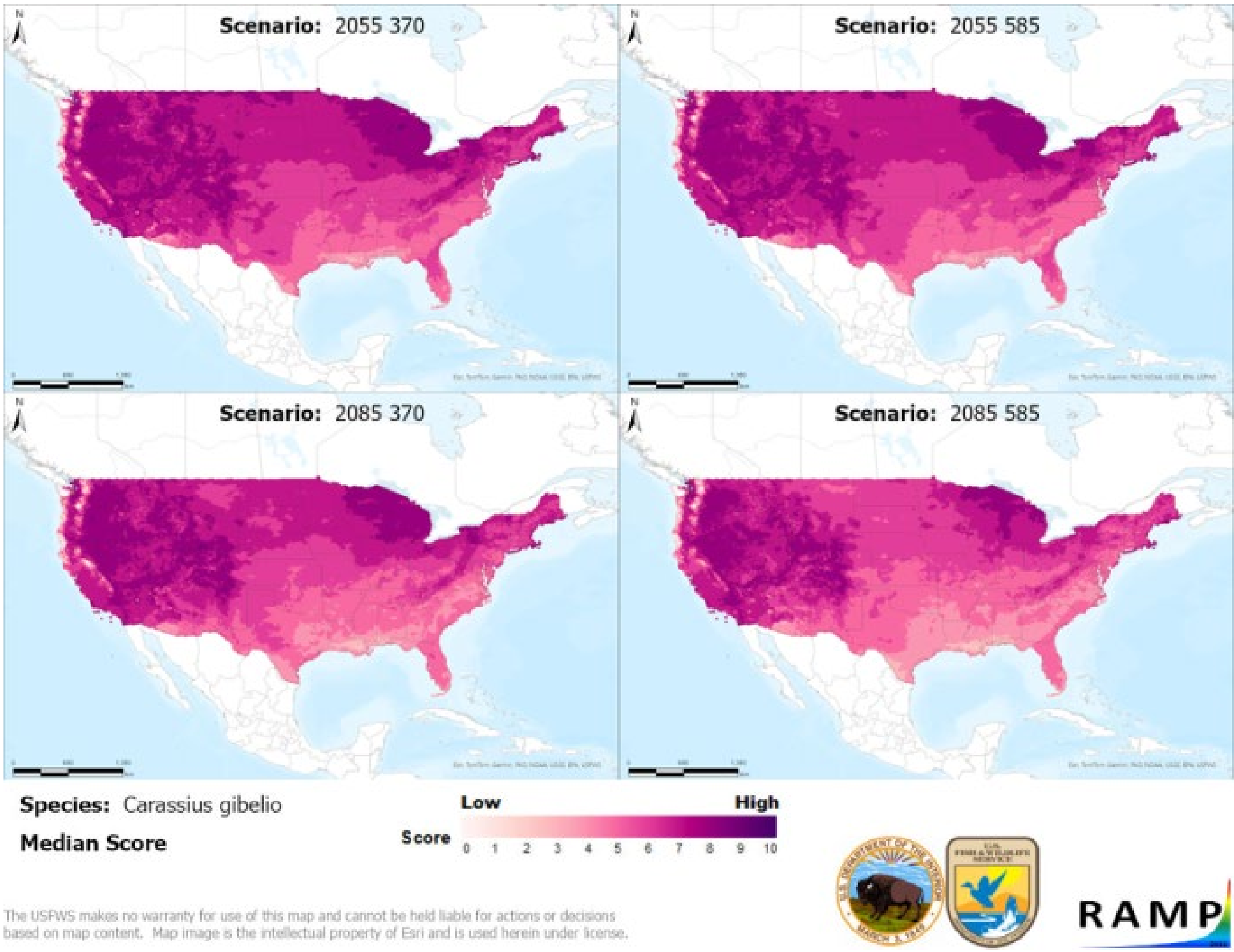

Figure A1. Maps of median RAMP (Sanders et al. 2023) climate matches projected under potential future climate conditions using five global climate models for *Carassius gibelio* in the contiguous United States. Climate matching is based on source locations reported by GBIF Secretariat (2023). Shared Socioeconomic Pathways (SSPs) used (from left to right): SSP3, SSP5 (IPCC 2021). Time steps: 2055 (top row) and 2085 (bottom row). Climate source data from CHELSA (Karger et al. 2017, 2018); global climate models used: GFDL-ESM4, UKESM1-0-LL, MPI-ESM1-2-HR, IPSL-CM6A-LR, and MRI-ESM2-0. 0/Pale Pink = Lowest match, 10/Dark Purple = Highest match.

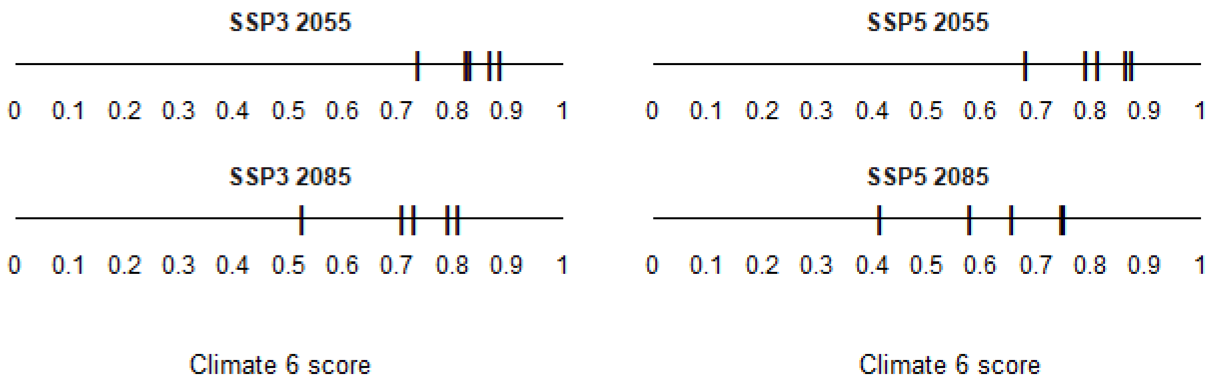

Figure A2. Comparison of projected future Climate 6 scores for *Carassius gibelio* in the contiguous United States for each of five global climate models under four combinations of Shared Socioeconomic Pathway (SSP) and time step. SSPs used (from left to right): SSP3, SSP5 (Karger et al. 2017, 2018; IPCC 2021). Time steps: 2055 (top row) and 2085 (bottom row). Climate source data from CHELSA (Karger et al. 2017, 2018); global climate models used: GFDL-ESM4, UKESM1-0-LL, MPI-ESM1-2-HR, IPSL-CM6A-LR, and MRI-ESM2-0.

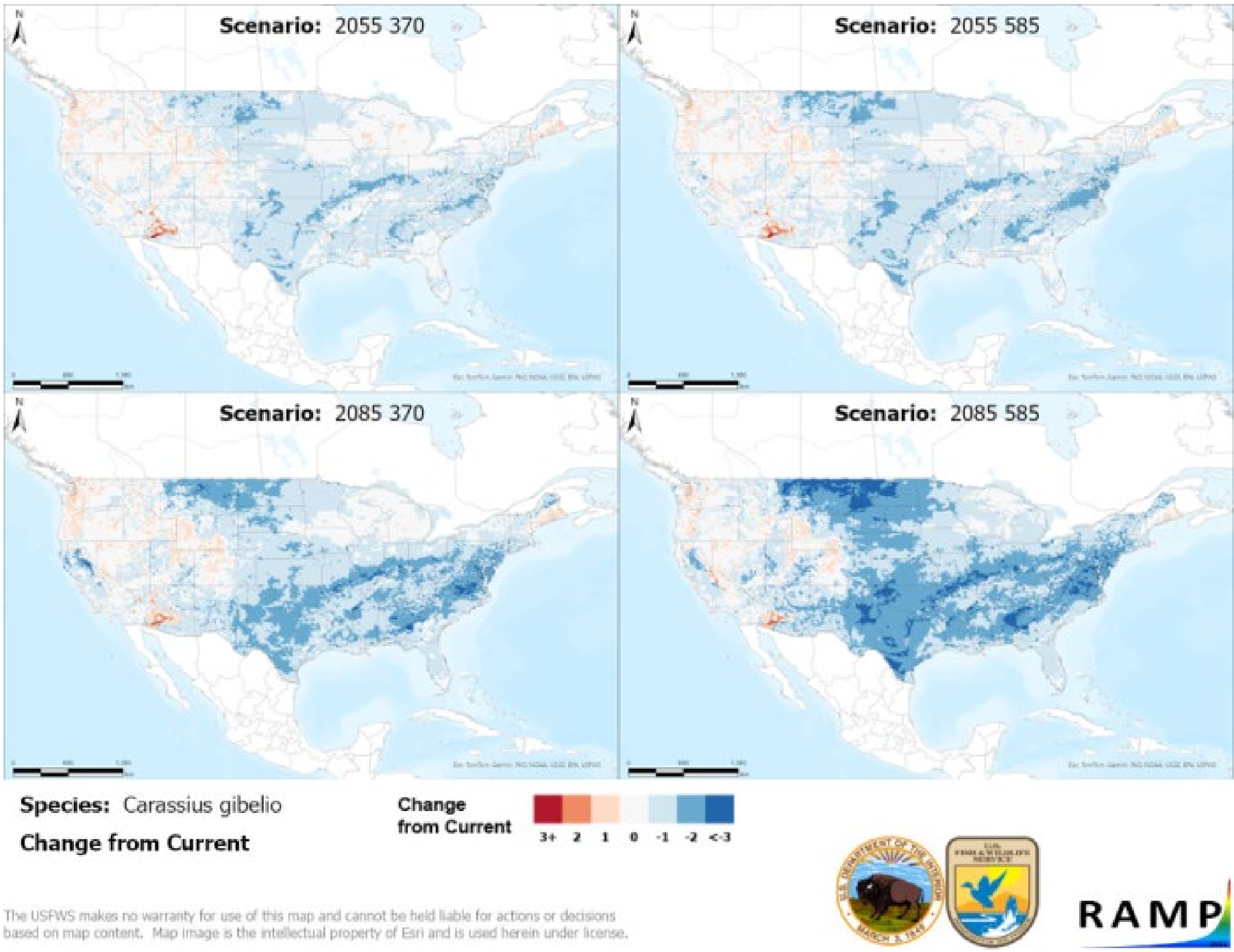

Figure A3. RAMP (Sanders et al. 2023) maps of the contiguous United States showing the difference between the current climate match target point score (figure 3) and the median target point score for future climate scenarios (figure A1) for *Carassius gibelio* based on source locations reported by GBIF Secretariat (2023). Shared Socioeconomic Pathways (SSPs) used (from left to right): SSP3, SSP5 (IPCC 2021). Time steps: 2055 (top row) and 2085 (bottom row). Climate source data from CHELSA (Karger et al. 2017, 2018); global models used: GFDL-ESM4, UKESM1-0-LL, MPI-ESM1-2-HR, IPSL-CM6A-LR, and MRI-ESM2-0. Shades of blue indicate a lower target point score under future scenarios than under current conditions. Shades of red indicate a higher target point score under future scenarios than under current conditions. Darker shades indicate greater change.

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