U.S. Fish & Wildlife Service

Chinese Mitten Crab (*Eriocheir sinensis*)
Ecological Risk Screening Summary

U.S. Fish and Wildlife Service, December 2023
Revised, January 2024
Web Version, 1/22/2026

Organism Type: Crustacean
Overall Risk Assessment Category: Uncertain


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1 Native Range and Status in the United States

Native Range

From Benson and Fuller (2026):

"Pacific coast of China and Korea."

From Qin (2023):

"This species is endemic to the Yellow Sea region bordering China and Korea in Eastern Asia. Its native habitats are the coastal rivers and estuaries in North China and Korea, extending from the West coast of Korea by the Yellow Sea to the Fujian Province south of Shanghai, with the Yangtze River in China being the largest river within its native range."

Status in the United States

From Qin (2023):

"The crab has also been reported from North America with reports from the Detroit River and Great Lakes (without establishment). There are also records of this species from the Mississippi River (one only), Chesapeake Bay and the St Lawrence seaway (S Gollasch, GoConsult, Germany, personal communication, 2010). It was first reported in the Great Lakes in 1965, where it occasionally showed up in Lakes Ontario and Erie. […] No freshwater crab species existed in North America before its arrival."

From Benson and Fuller (2026):

"They are established on the California coast, but adults are now rare in San Francisco Bay as of 2012. […] However, with all the recent collections from the mid-Atlantic Region of the east coast of the United States, reproduction may be occurring. Until 2007, all mitten crabs collected were males. Since then several female specimens were collected, each containing eggs and sperm stored in a special organ. This is evidence of mating but not necessarily of an established population."

From Bouma and Soes (2010):

"In 1992 the Chinese mitten crab established itself in the San Francisco Bay (California) in North America. By 1998 the numbers in this Bay exploded and between 1998 and 2000 catches of adult crabs reached between 100,000 and 800,000 specimens per year in different parts of the bay (Rudnick et al., 2003)."

From Fofonoff et al. (2018):

"A single crab caught in the Columbia River, near Astoria, Oregon, in 1997, was identified as *E. japonica* (Jensen and Armstrong 2004). It is now considered to be *E. sinensis* (Palero et al. 2011)."

"In 2004, several specimens were caught in the St. Lawrence River, the first near Quebec City, a second near Trois Rivieres, and a third in Lake St. Pierre, in a dammed portion of the river, above the head of the tide (de Lafontaine 2005; Environment Canada 2006). Reproduction of *E. sinensis* in the St Lawrence River has not been documented."

"So far, all of the crabs collected and examined in Chesapeake Bay have been adults with a 62-66 mm carapace diameter. One of the female crabs appeared to be in the process of developing a second brood of eggs. No mitten crabs have been collected in Chesapeake Bay since 2009, and there is no evidence of an established population at this time (May 2011)."

"In late May 2007, Mitten Crabs were caught in two locations in upper Delaware Bay, at Liston Point (May 25, one male) and Woodland Beach (May 29-30, three males) (Center for Aquatic Resource Studies 2007, Carin Ferrante, personal communication). On July 11, a female crab was caught at Silver Bed Oyster Bar, in the Simons River, Delaware. This female had spawned once, and was bearing a second brood of fertilized eggs (Center for Aquatic Resource Studies 2007, Carin Ferrante, personal communication). As of May 2011, 16 adult mitten crabs have been collected in brackish waters of Delaware Bay. No juvenile crabs have been collected, and there is no evidence of a breeding population (Carin Ferrante, Darrick Sparks, personal communication)."

"In June 2008, an adult male crab was caught in Toms River, New Jersey, a tributary of Barnegat Bay (Carin Ferrante, personal communication). Two female crabs were also caught in Toms River, one in May 2008 and one in May 2009. In 2010, a male crab was caught in Barnegat Bay, at Seaside Park. To the north of Barnegat Bay, a female crab was caught in the Manasquan River in October 2009. In Great Egg Harbor, to the south, a male crab was collected at Ocean City in May 2010 (Darrick Sparks, personal communication). Again, no juvenile crabs have been collected, and there is no evidence of a breeding population."

"Starting in October 2007, 115 total crabs, including juveniles as small as 16 mm in carapace width, males, and egg-bearing females have been caught in tidal portions of the river from near Albany, New York to New York Harbor. Some were caught near dams and falls of tributaries, which suggests migration (Carin Ferrante; Darrick Sparks, personal communication), and a number of molted carapaces have been seen in several tributary streams (Schmidt et al. 2009). […] In 2009, 39 crabs, including several adult females, were caught in Raritan Bay and its tributaries. Since Chinese Mitten Crabs have not been caught in the freshwaters of the Raritan River system, the Raritan crabs appear to be an offshoot of the breeding population in the Hudson River (Carin Ferrante; Darrick Sparks, personal communication)."

"Since 2006, 165 Chinese Mitten Crabs (number as of May 2011), have been collected in the mid-Atlantic region of the US, from Chesapeake Bay north to the Hudson River. In the Hudson River, the occurrence of gravid females in the higher-salinity parts of the estuary, and molting juveniles in freshwater streams supports the presence of a breeding, migratory population (Schmidt et 2009, Carin Ferrante; Darrick Sparks, personal communication; Ruiz et al., unpublished data). Occurrences in estuaries to the south may represent an outflow of larvae from the Hudson, or could indicate the presence of undiscovered reproducing populations."

"Two specimens of *E. sinensis* were caught in the Mianus Pond fishway in Greenwich, Connecticut, on June 20 2012 and October 30 2014. The fishway is just above the tidal river. The first specimen was a young crab, missing claws and the second was an adult female (Darrick Sparks, personal communication, USGS Nonindigenous Aquatic Species Program 2013; Matthew Goclowski 10/30/2014)."

"In 1987, a single specimen of *Eriocheir sinensis* was collected from the Mississippi River Delta in Plaquemines Parish, Louisiana (Center for Aquatic Resource Studies 2006)."

In addition to locations mentioned above, Benson and Fuller (2026) report single nonnative observations of *Eriocheir sinensis* in Alaska (2004) and Oregon (Columbia River, 2025) and two observations reported from Washington (1997, 2002). None of these observations are recorded as representing an established population.

From USFWS (2021):

"U.S. Fish and Wildlife Service announced the completion of Operation Mitten Catcher, an international law enforcement investigation that prevented the illegal import of approximately 15,525 live Chinese mitten crabs into the U.S."

From White (2020):

"U.S. Customs and Border Protection has seized 3,700 live mitten crabs – sent under false manifests – shipped from China and Hong Kong to individuals and businesses in the United States over the past four months."

"The crabs were sent in 51 separate shipments through the port of Cincinnati, Ohio, U.S.A., and weighed in at around 3,400 pounds, according to a CBP press release."

Regulations

Eriocheir sinensis is listed as injurious wildlife under (18 U.S.C. 42) Lacey Act (USFWS 2022).

Eriocheir sinensis is regulated in Arkansas (AGFC 2022), Arizona (Arizona Game and Fish Commission 2022), Connecticut (DEEP 2020), Maryland (Code of Maryland Regulations 2022), Nevada (Nevada Board of Wildlife Commissioners 2022), New York (NYDEC 2022), Ohio (ODNR 2022), Virginia (Virginia DWR 2022), and Wisconsin (Wisconsin DNR 2022). All species of the genus *Eriocheir* are regulated in California (CDFW 2022), Florida (FFWCC 2022), Illinois (Illinois DNR 2015), Missouri (MDC 2023), Oregon (ODFW 2022), Texas (TPDW 2022), Utah (Utah DWR 2022), and Washington (WDFW 2022). 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 Benson and Fuller (2026):

"Ballast water on the West Coast and in the Great Lakes. Its presence in Maryland may either be due to releasing crabs purchased as food (only males are sold), or they may have been introduced by ballast water."

From Qin (2023):

"Forms of accidental introduction listed by Cohen and Carlton (1997) are: transport of larvae or juveniles in ballast water; transport of adults or juveniles by ship fouling; transport of adults or juveniles in cargo; transport of adults or juveniles on semi-submersible drilling platforms, barges and other long-distance slow-moving vessels; transport of adults or juveniles in fisheries products; transport of larvae in water with shipment of live fish; and escape or release from research, public, or private aquaria."

"*Eriocheir sinensis* has been intentionally introduced into new locations for aquarium purposes or (Cohen and Carlton, 1997) to develop a food resource."

From Schmidt et al. (2009):

"The waterfall and the mill dam are barriers to upstream movement of mitten crabs, nevertheless crabs did circumnavigate both barriers in their first year of occurrence in the Saw Kill [Hudson River, New York]."

Remarks

From GISD (2017):

"Taxonomy of mitten crabs has been problematic and confusing. *Eriocheir* was considered to comprise four species (*E. japonica*, *E. sinensis*, *E. recta*, and *E. leptognathus*) (Chu et al. 2003). However, recent taxonomic revision has recognised five species and three genera, *Eriocheir* being restricted to *E. sinensis*, *E. japonica*, and *E. hepuensis*, and the establishment of two genera for *Neoeriocheir leptognathus* and *Platyeriocheir formosa*, however, [Chu et al. 2003] believe the genetic divergence among the crabs provides no support for separating *Eriocheir s.l.* into three different genera […]."

From Fofonoff et al. (2018):

"There has been a disagreement as whether to consider *E. sinensis* as a single variable species, or to recognize several regional species. Recent morphological (Guo et al. 1997; Komai et al. 2006) and genetic studies (Tang et al. 2005) have not resolved this disagreement. If the regional forms are subspecific, *E. japonica* is the senior name, and the Chinese Mitten Crab becomes *E. japonica sinensis* (Tang et al. 2005). This synonymy has not been generally accepted. Differences among the various regional morphotypes are quite small."

"A single specimen, collected from a brackish canal feeding into the Persian Gulf, in Basra, Iraq (Clark et al. 2006), has been re-identified as *E. hepuensis* (Naser et al. 2012)."

From Dittel and Epifanio (2009):

"Because of its unique life history, *E. sinensis* is one of few invasive species that impact both freshwater and marine ecosystems."

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From ITIS (2023):

Kingdom Animalia
  Subkingdom Bilateria
    Infrakingdom Protostomia
      Superphylum Ecdysozoa
        Phylum Arthropoda
          Subphylum Crustacea
            Class Malacostraca
              Subclass Eumalacostraca
                Superorder Eucarida
                  Order Decapoda
                    Suborder Pleocyemata
                      Infraorder Brachyura
                        Superfamily Grapsoidea
                          Family Varunidae
                            Genus *Eriocheir*
                              Species *Eriocheir sinensis* H. Milne Edwards, 1853

According to DecaNet (2023), *Eriocheir sinensis* is the current valid name for this species.

Size, Weight, and Age Range

From Qin (2023):

"The lifespan of *E. sinensis* is dependent upon a number of factors, such as water temperature and salinity for example, but can range from 1 to 5 years (ADW, 2016)."

From GISD (2017):

"It can reach a carapace width of 5cm to 7cm, but the maximum carapace width of the adult mitten crab is approximately 10 cm (Czerniejewski et al. 2003, in [Gollasch 2006b]."

From Fofonoff et al. (2018):

"In California, adult mitten crabs often reach 80 mm (3 1/8 inches) in carapace width."

Environment

From Qin (2023):

"[*E. sinensis*] can tolerate a wide range of temperatures and salinities and live in polluted waters. Although the temperature and salinity of the water are important factors for the development of the larvae, adult crabs can survive at water temperatures ranging from 4 - 32°C and salinities ranging from 0 to 35 ‰ (Cohen and Weinstein, 2001). They can also survive for a relatively long time out of the water, up to 35 days in wet meadows and 10 days in their burrows during a drought. *E. sinensis* usually burrow in areas with fluctuating water levels, and between high and low water levels in tidal rivers (Lin, 1994)."

"In the natural range, mating occurs in October. Egg laying and hatching take place in estuaries or coastal regions at salinities of 1.85-17% and temperatures of 12-17°C."

From Fofonoff et al. (2018):

"Adult mitten crabs (*Eriocheir* spp.) are catadromous [migrate from freshwater to marine to spawn]. […] The planktonic larvae require salinities of 15-30 ppt for successful development to the megalopa stage, and show their best survival at 25 ppt. Megalopae show a preference for intermediate salinities of 15-25 ppt, […]"

"Adult crabs are tolerant of a wide range of salinities and temperatures, growing actively at temperatures from 7 to 30°C (Anger 1991; Rudnick et al. 2000)."

From Fialho et al. (2016):

"In our study, we found a 4.3 day resistance to desiccation when exposed to 16°C and 51% relative humidity. At higher temperatures and lower humidity, resistance to desiccation decreased which is probably related to the larger water loss. […] Short periods of drought, e.g., a couple of days, will certainly not suffice to eliminate the species."

Climate

From Qin (2023):

"This species is also found in other temperate zones throughout the world in the northern hemisphere only."

Distribution Outside the United States

Native

From Benson and Fuller (2026):

"Pacific coast of China and Korea."

From Qin (2023):

"This species is endemic to the Yellow Sea region bordering China and Korea in Eastern Asia. Its native habitats are the coastal rivers and estuaries in North China and Korea, extending from the West coast of Korea by the Yellow Sea to the Fujian Province south of Shanghai, with the Yangtze River in China being the largest river within its native range."

Introduced
From Garcia de Lomas et al. (2010):

"Mitten crabs were first introduced in Germany in 1912, and the species is now dispersed throughout Northern Europe. Current distribution includes the North Sea, Baltic Sea and North Atlantic coast (Gollasch 1999; Herborg et al. 2003, 2005; Ojaveer et al. 2007), the Seine Estuary in France (Vincent 1996), the Tagus river in Portugal (Cabral and Costa 1999) and the Mino (Ferdinand-Martinez and Carrera 2003) and the Guadalquivir rivers (Cuesta et al. 2006) in Spain, the Dalaeven river in Sweden (Peters 1938), Lake Ladoga in Russia (Panov 2006), and the Tyne river in the U.K. (Herborg et al. 2002) also Ireland (Minchin 2006)."

From Fofonoff et al. (2018):

"Canal systems and ballast water transport have enabled *Eriocheir sinensis* to reach outlying bodies of water in Eurasia, including rivers and lakes in landlocked countries such as the Czech Republic, Austria, Switzerland and Hungary (Herborg et al. 2003). In 1960, several specimens of this crab were found in Mediterranean lagoons in the vicinity of Narbonne, France. The crabs had probably reached the Mediterranean by the Canal du Midi. However, this population did not become established (Galil et al. 2002). In 1998, *E. sinensis* was collected in the Gulf of Odessa, on the Black Sea, where a population is now established and has been collected from inland sites in the Volga River basin, and in the Sea of Azov (Murina and Antonovsky 2001; Gomiou et al. 2002). A specimen has also been collected from a freshwater river near the Caspian Sea, in Iran, in 2001 (Robbins et al. 2006). […] Chinese Mitten Crabs are now regularly caught in the Archangel Bay, of the White Sea [Russia] (Berger and Naumov 2002)."

"Two specimens collected in Tokyo Harbor in 2004 represent a probable introduction of *E. sinensis* to Japan from China (Takeda and Koziumi 2005), either by ballast water, or as a fisheries-related release."

Additionally, according to FAO (2026), *Eriocheir sinensis* has been introduced to and become established in at least one location in the following countries: Austria, Belgium, Denmark, Netherlands, Poland, Switzerland, Estonia, Italy, Latvia, Finland, Romania, Moldova, Lithuania, Czech Republic (Czechia), and Norway. FAO (2026) also lists *Eriocheir sinensis* as introduced but not established in Germany, and introduced with status unknown in Canada.

Means of Introduction Outside the United States
From Garcia de Lomas et al. (2010):

"The crab, outside its native range, is rapidly colonizing worldwide, as a consequence of ships´ ballast water discharges and subsequent dispersal (Herborg et al. 2007)."

From Fofonoff et al. (2018):

"Canal systems and ballast water transport have enabled *Eriocheir sinensis* to reach outlying bodies of water in Eurasia, […] Canals connecting to the Baltic are a likely vector for the Black, White Sea, and Caspian Sea populations, […]."

"[…] a probable introduction of *E. sinensis* to Japan from China (Takeda and Koziumi 2005), either by ballast water, or as a fisheries-related release."

From Hänfling et al. (2011):

"Secondary introductions of *E. sinensis* were likely associated with their use as a culinary delicacy accompanied by a market value of US$1.25 billion $year^{-1}$ (Dittel and Epifanio 2009)."

From Qin (2023):

"Forms of accidental introduction listed by Cohen and Carlton (1997) are: transport of larvae or juveniles in ballast water; transport of adults or juveniles by ship fouling; transport of adults or juveniles in cargo; transport of adults or juveniles on semi-submersible drilling platforms, barges and other long-distance slow-moving vessels; transport of adults or juveniles in fisheries products; transport of larvae in water with shipment of live fish; and escape or release from research, public, or private aquaria."

"*Eriocheir sinensis* has been intentionally introduced into new locations for aquarium purposes or (Cohen and Carlton, 1997) to develop a food resource."

Short Description

From Eberhardt et al. (2016):

"As an adult, the Chinese mitten crab is a medium-to-large sized greenish or brownish crab […]. Both adult and juvenile Chinese mitten crabs have a notch between their eyes, with two small spines located on either side of the notch. The carapace has four lateral spines on each side, the fourth spine being smaller than the rest. The crab's legs are approximately twice the length of the carapace width. Sex can be determined in crabs larger than a few centimeters in width by examining the morphology of the abdomen — males have a narrow abdominal flap, while females have a wide abdominal flap that extends to the abdominal edge when fully mature […]."

"One of the most notable features of adult Chinese mitten crabs are their white-tipped claws covered with large dense patches of brown setae or bristles that look like "hairy mittens" […]. The claws tend to be equal in size, but larger on males than females, and males have fuller and wider patches of setae (Hoestlandt 1948). Adult carapaces are slightly wider than long and range from one to four inches (30-100 mm) in invasive San Francisco Bay populations (Rudnick et al. 2000; Rudnick et al. 2003; Veldhuizen 2001)."

"Juvenile crabs begin to develop noticeable brown setae on their claws once the carapace is greater than one inch (25 mm) in width. The setae are minimal or lacking with a carapace width under 0.8 inches (20 mm; […]). Coloration is light brown-orange to green-brown, with juveniles being more brown-orange than adults and newly molted crabs (Zhao 1999). In the absence of the "hairy mittens" that juveniles may not have yet developed, juveniles are best identified by the presence of the notch between the eyes and lateral spines on the carapace."

From Fofonoff et al. (2018):

"Specimens of *E. sinensis* (Chinese Mitten Crab) differ from *E. japonica* (Japanese Mitten Crab) in having a more convex carapace, lacking a central depression over the stomach. The frontal teeth are sharper and more deeply divided than those of *E. japonica*, with a deeper median notch. The four antero-lateral teeth are more well-defined in *E. sinensis* than in *E. japonica*. The propodus of the fourth walking leg is narrower (2.5-3.6 X as long as wide) in *E. sinensis* compared to *E. japonica* (2.2-2.7 X long as wide) (Jensen and Armstrong 2004)."

Biology

From Qin (2023):

"Juvenile and adult *E. sinensis* are found in many habitats, including stagnant and dynamic water systems like small streams, rivers, canals and lakes."

"Adult *E. sinensis* usually live in the banks of freshwater rivers and lakes, and in areas where floating vegetation grows thickly; however, the species can live in a wide variety of riverine and wetland habitats […]"

"The females are thought to continue seaward after mating, overwintering in deeper water before returning to brackish water in the spring to hatch their eggs. […] Larval development probably occurs in the lower estuary. After a month as planktonic larvae, small juveniles settle out in salt or brackish water and juvenile crabs gradually move upstream into fresh water to complete the lifecycle."

"*Eriocheir sinensis* will naturally migrate towards the sea to reproduce. Distances of 1500 km have been reported (Sewell, 2016). Juveniles will also naturally migrate upstream to freshwater. […] *E. sinensis* are adept walkers on land and may travel some distance overland, especially if their passage is blocked by obstructions such as dams or weirs during migration (ISSG, 2004)."

"The life cycle is commonly 3 years in length, but sexual maturity may take 1-5 years, depending on environmental conditions. Female crabs are very fecund; a 100-200 gram-weight female can produce 50,000-900,000 eggs (Lin, 1987)."

From Fofonoff et al. (2018):

"Adult mitten crabs (*Eriocheir* spp.) are catadromous. They spawn in estuaries in brackish-marine waters. Females carry a sponge-like mass of fertilized eggs under their abdomens, until the eggs hatch into spiny larvae (zoeae), which molt through five zoea stages, before molting into a more crablike megalopa stage. The megalopa stage molts into a 1st crab stage, which has a typical crablike form and settles to the bottom. Settlement occurs 18 to 42 days after hatching, depending on temperature (Anger 1991). The planktonic larvae require salinities of 15-30 ppt for successful development to the megalopa stage, and show their best survival at 25 ppt. Megalopae show a preference for intermediate salinities of 15-25 ppt, and tend to seek bottom waters, resulting in upstream transport (Anger 1991)."

“Variation in abundance of larvae and recruitment of juveniles appears to vary greatly among years, and appears to be most strongly affected by temperature during the spawning season, which occurs in winter (Blumenshine et al. 2011).”

“Early crab stages may spend their first winter in brackish water and then migrate upstream into non-tidal portions of rivers and streams, where they feed, grow and molt about 10-12 more times. Some crabs have been collected 1000 km from the sea. […] When crabs approach maturity, at 2 to 4 years, rapid growth of reproductive organs begins, and crabs develop an urge to migrate downstream for spawning (Herborg et al. 2005). Migration, with a final puberty molt, takes place in the fall, and spawning occurs in late fall. Adult crabs migrate downstream for spawning (in Europe in late fall), the males first, followed by the females. […] Female crabs in the Szczecin Lagoon, Poland, carried 141,100 to 686,200 eggs, increasing in number with body size (Czerniejewski and [de Giosa] 2013). After spawning, not all crabs migrate back upstream- some may stay in brackish water (Rudnick et al. 2000). Adults die after spawning (Anger 1991; Hymanson et al. 1999; Herborg et al. 2005; Rudnick et al. 2005a).”

“Mitten crabs are omnivorous, feeding opportunistically on detritus, vascular plants, and carrion, with diets varying among habitats (Czerniejewski et al. 2010; Wójcik-Fudalewska et al. 2019). Mitten crabs are not fast-movng [sic] predators, but predation on fish eggs, and fishes in confined habitats (fishways, aquaculture ponds, etc.) is a concern ([ANSTF] 2003; Webster et al. 2015).”

Human Uses

From Qin (2023):

“*Eriocheir sinensis* is one of the most commercially valuable crabs in East and Southeast Asia (e.g. see Peng, 1986; Lai and Lu, 1992; Zhao et al., 1998), where the gonads, which develop during the annual downstream migration, are regarded as a delicacy. Eating the developing mitten crab gonads has been part of Chinese culture for many centuries dating back to the Ming Dynasty (1368-1644). Today, *E. sinensis* command a high price in Southeast Asian restaurants during the autumnal months when they are harvested. Wild Chinese populations have dramatically declined due to overexploitation, increased demand, river pollution and irrigation schemes that have disrupted natural migration patterns (Hymanson et al., 1999), but local and international demand has been met by an intensive aquaculture programme and this species has been farmed throughout China for the last 40 years (Sui et al., 2009) especially along the Yangtze valley (Jin et al., 2001; Wang et al., 2006). This industry is estimated to be worth nearly US$10 billion annually (FAO, 2021).”

“Crab shell from *E. sinensis* has been used as a component of traditional Chinese medicine. Chitin extracted from crab shell can be widely used in pharmaceuticals, food, fabrics and fibres, paper, wood processing, plastics, etc. (Zhao et al., 1998).”

From Hänfling et al. (2011):

“For example, *E. sinensis* was imported into several countries for the production of cosmetics and as agricultural fertilizer (Herborg et al. 2005), […]”

"Some crayfish species, such as *O. limosus*, the rusty crayfish *Orconectes rusticus* (Girard) and the crab *E. sinensis*, have been commonly used as live fish bait (Dittel and Epifanio 2009; Holdich and Black 2007; Lodge et al. 2000)."

Diseases

***Eriocheir sinensis* has been documented as a carrier of *Aphanomyces astaci*, causative agent of crayfish plague, which is a disease listed by the World Organisation for Animal Health (January 2024).**

From Schrimpf et al. (2014):

"Transmission experiments and subsequent molecular diagnostics have proven that the Chinese mitten crab [*Eriocheir sinensis*] from the River Rhine is a) carrier of the crayfish plague pathogen [*Aphanomyces astaci*] and is b) capable of transmitting the pathogen to the noble crayfish."

From Qin (2023):

"*Eriocheir sinensis* is a host for the lung fluke (*Paragonimus westermani*) in Asia. Mammals, including humans, are also hosts of this parasite after consuming raw or inadequately cooked crab. The lung fluke has not yet been reported in the crab's European range (Gollasch, 2006a)."

Qin (2023) lists the following additional diseases, disorders, and pathogens for *E. sinensis*: Bryozoa, *Chilodonella*, *Saprolegnia*, *Spiroplasma mirum*, *Vorticella*, *Zoothamnium*.

Threat to Humans

From Qin (2023):

"*Eriocheir sinensis* is a host for the lung fluke (*Paragonimus westermani*) in Asia. Mammals, including humans, are also hosts of this parasite after consuming raw or inadequately cooked crab. The lung fluke has not yet been reported in the crab's European range (Gollasch, 2006a). During their migration, crabs are reported in urban areas like backyards, playgrounds and even inside houses or apartments. These social impacts are of concern (Bouma and Soes, 2010). Chinese mitten crabs interfere with recreational fishermen through bait stealing. To avoid interference, fishermen have to abandon their traditional fishing grounds."

From Eberhardt et al. (2016):

"In China and Korea, the crab reportedly damaged rice crops by feeding on the young shoots (Ng 1988)."

3 Impacts of Introductions

From Dittel and Epifanio (2009):

"Documented impacts include weakening of levees and stream banks due to the burrowing behavior of the crab [Panning, 1939; Ingle, 1986; Dutton and Conroy, 1998; Rudnick et al., 2005b]. In addition, the feeding activities of the crab have caused declines in natural vegetation, and the crabs have hindered fishing activities by consuming bait and clogging fishing gear (Panning, 1939; Veldhuizen and Stanish, 1999). Economic damage in German waters alone totals approximately 80 million Euros since 1912 (Gollasch, 2006). Financial impacts from California populations of *E. sinensis* are on the order of millions of dollars per year (White et al., 2000)."

From Rudnick et al. (2000):

"[In the San Francisco Bay-San Joaquin Delta] Mitten crab [*Eriocheir sinensis*] burrows were only very dense in tidally influenced areas with steep banks. We observed mitten crab burrow densities ranging from 2/m^2 - 18/m^2 in 1995/1996, and from 18/m^2 to 39/m^2 in 1999 […]. We observed limited areas of bank collapse in areas with high densities of mitten crab burrows. Bank collapse often altered the morphology of the bank, changing the bank from a near vertical wall to a more reduced slope."

"Using the range of mitten crab densities found in the field (4/m^2 - 18/m^2 for 1995/1996, and 18/m^2 – 39/m^2 for 1999 estimates) we estimated sediment removal caused by crab burrowing to range between 564cm^3 to 2,538cm^3 per m^3 bank area for 1995 and 1996 densities, and from 2,538cm^3 to 5,499cm^3 per m^3 bank area for 1999 densities. This estimate does not include the secondary effect of increased erosion of banks weakened by burrows."

"Our observation of slumping in high burrow-density areas suggests that the burrows may indeed be causing bank slumping to occur. By increasing pore pressure and removing sediment, mitten crab burrows also make bank areas more susceptible to natural erosive forces such as rain and tidal events."

From Eberhardt et al. (2016):

"Renewed burrowing of the collapsed banks, along with wave action, resulted in the continual removal of marsh bank sediments (Philips 2001[; U.S. Geological Survey, personnel communication])."

"Chinese mitten crabs can interfere with both commercial and recreational fishing by damaging bait, gear, and/ or the catch. In California, many areas were reported "unfishable" during periods of high crab abundance due to their severe impacts (ANSTF 2003), particularly during the fall downstream migration when crabs become concentrated in lower river systems and upper estuarine channels."

"For example, during the 1997 crab population increase in the San Francisco Bay Delta, natural gas power plants experienced intermittent problems with crabs clogging water intakes (ANSTF

2003). The crabs entered the cooling water intakes during their downstream migration that blocked the plumbing and drastically reduced water flow (ANSTF 2003). To remedy the problem, periodic back flushing is required to prevent the system from overheating (Hieb 1998[; California Department of Fish and Game, personal communication cited in Hui et al. 2005]) at additional expense to the plant."

From Qin (2023):

"The burrowing activity of *E. sinensis*, especially large numbers of juveniles, accelerates the erosion of dykes, stream banks and levees in European countries."

"*Eriocheir sinensis* have affected commercial and recreational fishing. Crabs caught in the nets can damage the nets and kill netted fish. They also are responsible for bait loss and damage to fishing gear."

"Burrowing activities of Chinese mitten crabs can induce the release of phosphate and pollutants stored in the sediment. Depending on the substances in the sediment and their concentrations, this may consequently affect water quality. In addition, burrowing activities can also reduce the water clarity, negatively impacting aquatic plant development and growth (Bouma and Soes, 2010)."

From Fofonoff et al. (2018):

"In California, they [*Eriocheir sinensis*] caused serious mortality in fish-salvage facilities, designed to divert fish from irrigation facilities in the Sacramento-San Joaquin Delta. At peak migration times, mortality of migrating fish in 1998 was 98-99%. Retrofitting of the facilities to prevent mitten crab entrapment was expensive but necessary (Rudnick et al. 2000; Chinese Mitten Crab Control Committee 2003). Mitten Crabs can also interfere with fisheries by competing for food and shelter with fished species, such as crayfish and shrimp in San Francisco Bay (Chinese Mitten Crab Control Committee 2003), or potentially with crab fisheries."

"In the Thames estuary, England, and in laboratory experiments, juvenile *E. sinensi*s excluded native *Carcinus maenas* (Green Crabs) of similar size from shelters under boulders (Gilbey et al. 2008)."

"*Eriocheir sinensis* burrows in estuarine river-banks undermine the banks, causing their collapse (Panning 1938). Banks on some portions of the lower Thames have retreated up to 6 m, apparently due to crab burrows (Clark 2011)."

Eriocheir sinensis is federally listed as injurious wildlife under the Lacey Act and is regulated in at least 17 states, see section 1.

4 History of Invasiveness

The History of Invasiveness for *Eriocheir sinensis* is classified as High. *E. sinensis* has been introduced and become established in the United States and Europe. *Eriocheir sinensis* is federally listed as injurious wildlife under the Lacey Act as part of the *Eriocheir* genus. Large quantities of this species have been found in attempted illegal imports into the United States. It is also regulated in 17 states. Evidence of documented negative impacts is available. Due to its burrowing behavior, *E. sinensis* impacts include damage to stream banks and levees, including increased slumping and erosion. *E. sinensis* exerts significant predation pressure on fish when both species are in confined spaces such as fish passageways. In addition, *E. sinensis* hinders commercial and recreational fishing by causing damage to nets and fishing gear, fish catch, and bait loss.

5 Global Distribution

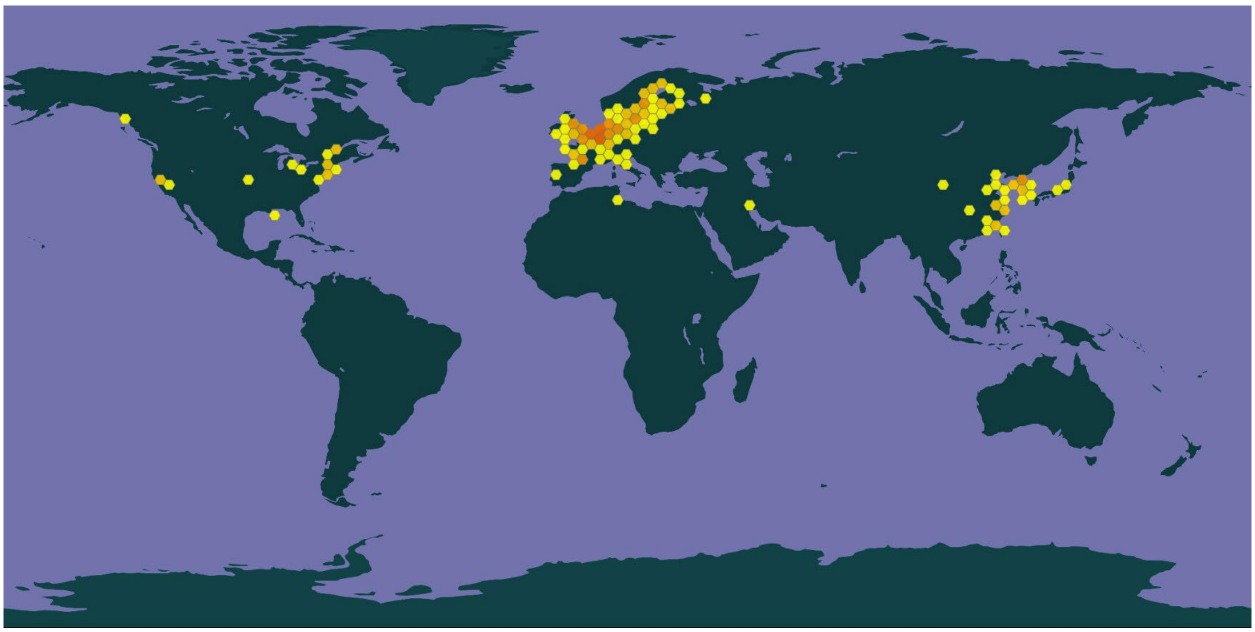

Figure 1. Reported global distribution of *Eriocheir sinensis*. Map from GBIF Secretariat (2023). Observations are reported from United States, Canada, Europe, Tunisia, Iraq, and Eastern Asia. No literature or records were found to support established wild populations in central China, Japan, Tunisia, or Canada and these points were not used in the climate match analysis. The observation in Iraq was due to a misidentification (Fofonoff et al. 2018) and also was not used in the climate matching analysis. Observations in the United States outside of California and New York were not used in the climate matching analysis, see section 6.

Because the climate matching analysis (section 7) is not valid for marine waters, no marine occurrences were used in the climate matching analysis.

6 Distribution Within the United States

Figure 2. Reported distribution of *Eriocheir sinensis* in the contiguous United States. Map from Benson and Fuller (2026). Observations in the San Francisco Bay (California) and Hudson River Estuary (New York) represent established populations and were used in the climate matching analysis. All other observations do not represent established populations and were not used in the climate matching analysis.

Because the climate matching analysis (section 7) is not valid for marine waters, no marine occurrences were used in the climate matching analysis.

Figure 3. Reported observation of *Eriocheir sinensis* in southeastern Alaska. The observation does not represent an established population and was not used in the climate matching analysis.

7 Climate Matching

Summary of Climate Matching Analysis

On average, the climate matching analysis for *Eriocheir sinensis* to the contiguous United States found high climate match in the Appalachian Range, California, Great Lakes, Mid-Atlantic, Northeast, Southern Atlantic Coast, and Southern Florida regions. Low match was found in smaller areas of the Pacific Northwest and Desert Southwest. The remainder of the contiguous United States had a medium match. The overall Climate 6 score (Sanders et al. 2023; 16 climate variables; Euclidean distance) for the contiguous United States was 0.872, 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). This species is catadromous, therefore, the climate matching analysis refers only to where the species can survive and not necessarily to where it can reproduce.

Projected climate matches in the contiguous United States under future climate scenarios are available for *Eriocheir sinensis* (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.

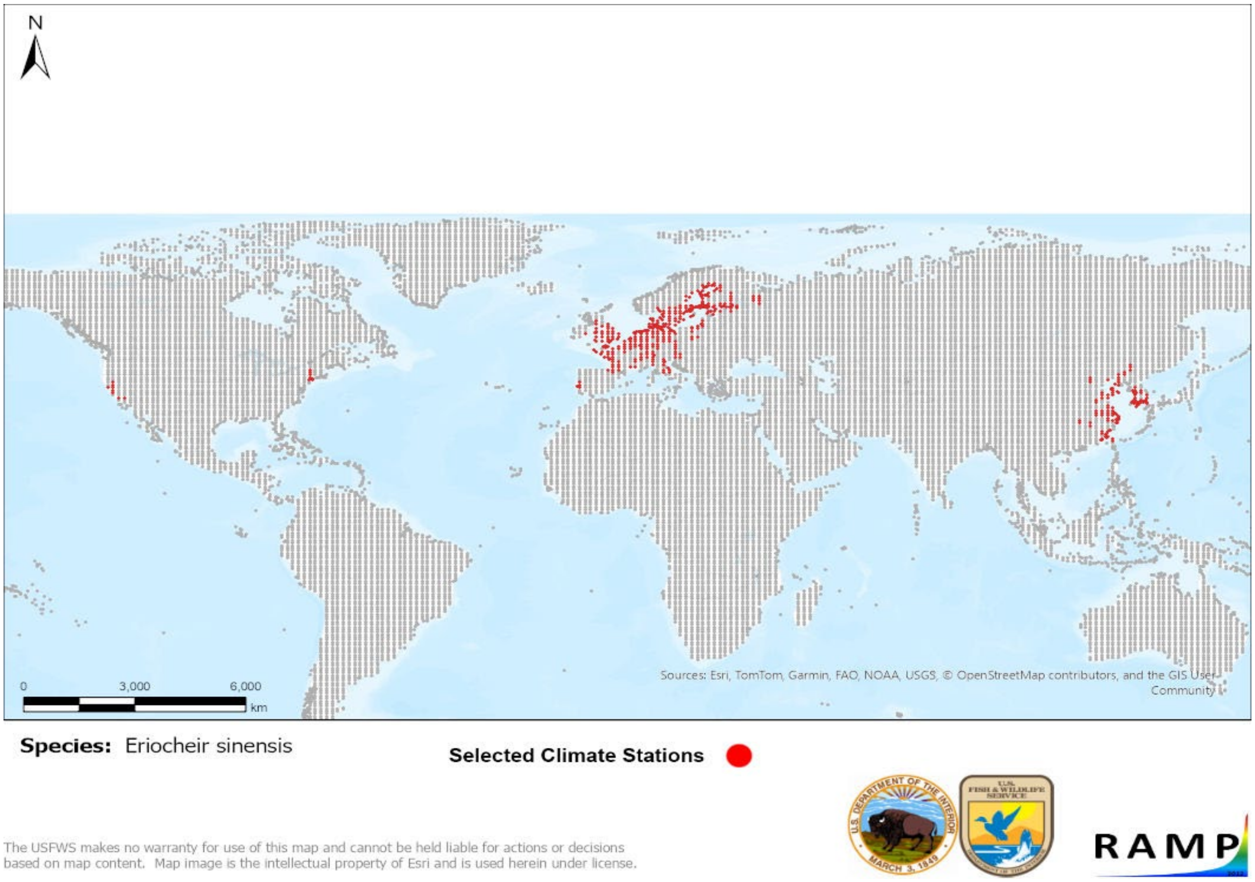

Figure 4. RAMP (Sanders et al. 2023) source map showing weather stations in Northern Hemisphere selected as source locations (red; Austria, Belgium, China, Czech Republic, North Korea, Denmark, Estonia, Finland, France, Germany, Guernsey, Ireland, Isle of Man, Italy, Japan, Jersey, Liechtenstein, Lithuania, Luxembourg, Netherlands, Norway, Poland, Portugal, South Korea, Russia, Slovenia, Spain, Sweden, Switzerland, Taiwan, United Kingdom, and United States) and non-source locations (gray) for *Eriocheir sinensis* 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.

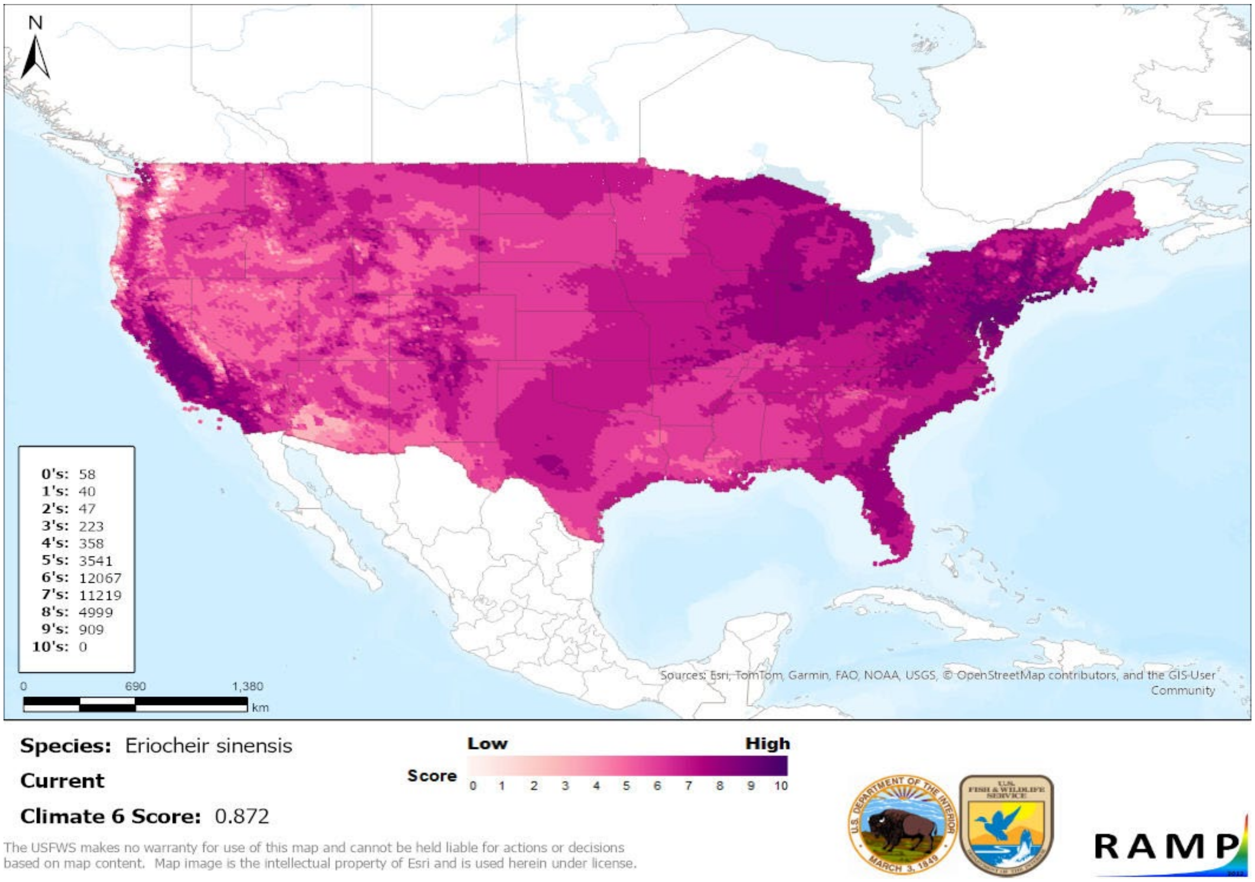

Figure 5. Map of RAMP (Sanders et al. 2023) climate matches for *Eriocheir sinensis* in the contiguous United States based on source locations reported by GBIF Secretariat (2023). Counts of climate match scores are tabulated on the left. 0/Pale Pink = Lowest match, 10/Dark Purple = Highest match.

8 Certainty of Assessment

Information regarding the biology, ecology, and distribution of *Eriocheir sinensis* was available. Peer-reviewed literature supports the establishment of *Eriocheir sinensis* outside of its native range. Information on impacts from the introductions was available from reliable sources. This species is catadromous; therefore, the climate matching analysis refers only to where the species can survive and not necessarily to where it can reproduce. Therefore, the Certainty of Assessment for *Eriocheir sinensis* is classified as Medium.

9 Risk Assessment

Summary of Risk to the Contiguous United States

Eriocher sinensis, Chinese mitten crab, is a crustacean native to the coastal rivers and estuaries of the Yellow Sea in China. This species is catadromous, spending most of its life in freshwater and must return to the sea for successful reproduction. It is one of the few invasive species that impact both freshwater and marine ecosystems due to its unique life history. *E. sinensis* has a long history of utilization as a food source and in traditional medicines. *Eriocheir sinensis* is federally listed as injurious wildlife under the Lacey Act and is regulated in at least 17 states. It has been introduced into several countries throughout Europe, Japan, Canada, and the United States. Its burrowing activities cause destabilization of stream banks, leeves, and dykes. Crabs caught up in fishing nets cause damage to the nets and caught fish. They are also responsible for bait loss and damage to fishing gear causing abandonment of fishing grounds. There have also been impacts to operations at power generation plants in areas with high density of crabs. They can carry and transmit the crayfish plague pathogen. The History of Invasiveness for *Eriocheir sinensis* is classified as High due to its history of introductions and establishment outside its native range, and the negative impacts reported from those established populations. The climate matching analysis for the contiguous United States indicates establishment concern for this species. Areas of high climate match were found in the Northeast, around the Great Lakes, in California, and along most coastal areas except for the northern Pacific Coast. However, this species is catadromous so the climate matching analysis refers only to where the species can survive and not necessarily to where it can reproduce. The Certainty of Assessment for this ERSS is classified as Medium. High quality information is readily available, but the salinity requirement for reproduction complicates the interpretation of the climate matching results for areas without a connection to brackish or marine waters. The Overall Risk Assessment Category for *Eriocheir sinensis* in the contiguous United States is Uncertain due to the salinity requirement for reproduction.

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: Can carry and transmit the pathogen that causes crayfish plague. Federally listed as Injurious Wildlife. Cannot reproduce in freshwater.**
- **Overall Risk Assessment Category: Uncertain**

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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 *Eriocheir sinensis* was projected to occur in California and the Great Lakes regions of the contiguous United States. The Climate 6 scores for the individual future scenario models (figure A2) ranged from a low of 0.345 (model: UKESM1-0-LL, SSP5, 2085) to a high of 0.788 (model: MRI-ESM2-0,, SSP3, 2055). All future scenario Climate 6 scores were above the Establishment Concern threshold, indicating that Yes, there was an Establishment Concern for this species. The Climate 6 score for the current climate match (0.872, figure 5) 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 (figure A3). Under one or more time step and climate scenarios, areas within the Northeast and Southwest saw a moderate increase in the climate match relative to current conditions. No large increases were observed regardless of time step and climate scenarios. Under one or more time step and climate scenarios, areas within the Appalachian Range, California, Mid-Atlantic, Northeast, and Southeast saw a large decrease in the climate match relative to current conditions. Additionally, areas within the Colorado Plateau, Great Lakes, Gulf Coast, Northern Plains, Southern Atlantic Coast, Southern Florida, Southern Plains, 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).

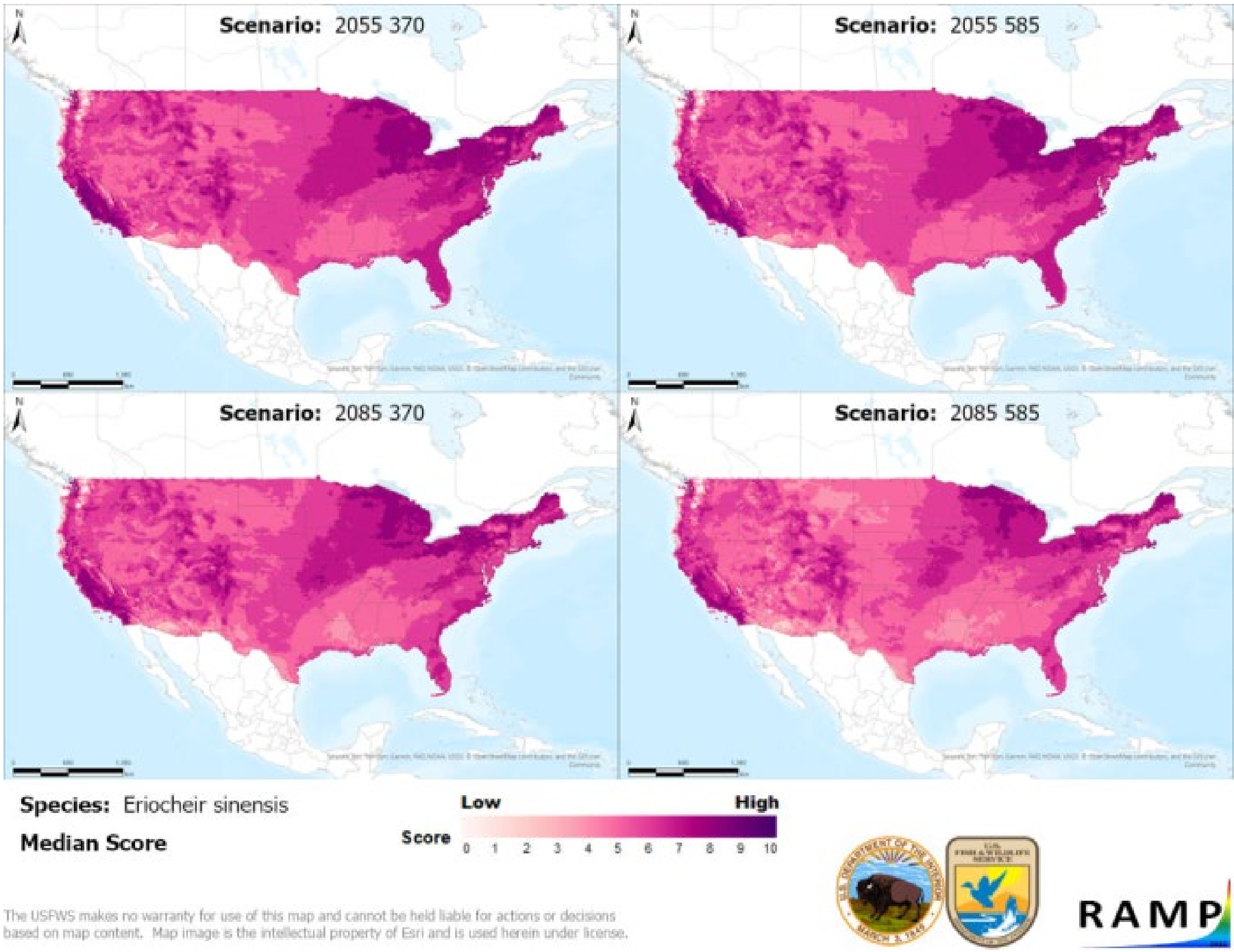

Figure A1. Maps of median RAMP (Sanders et al. 2023) climate matches projected under potential future climate conditions using five global climate models for *Eriocheir sinensis* in the contiguous United States. Climate matching is based on source locations reported by GBIF Secretariat (2023). Shared 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.

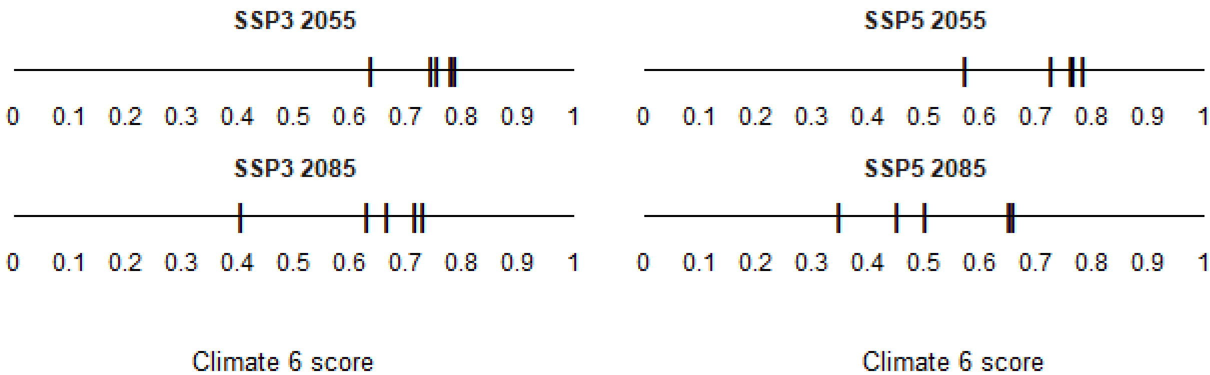

Figure A2. Comparison of projected future Climate 6 scores for *Eriocheir sinensis* in the contiguous United States for each of five global climate models under four combinations of Shared Socioeconomic Pathway (SSP) and time step. SSPs used (from left to right): SSP3, SSP5 (Karger et al. 2017, 2018; 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.

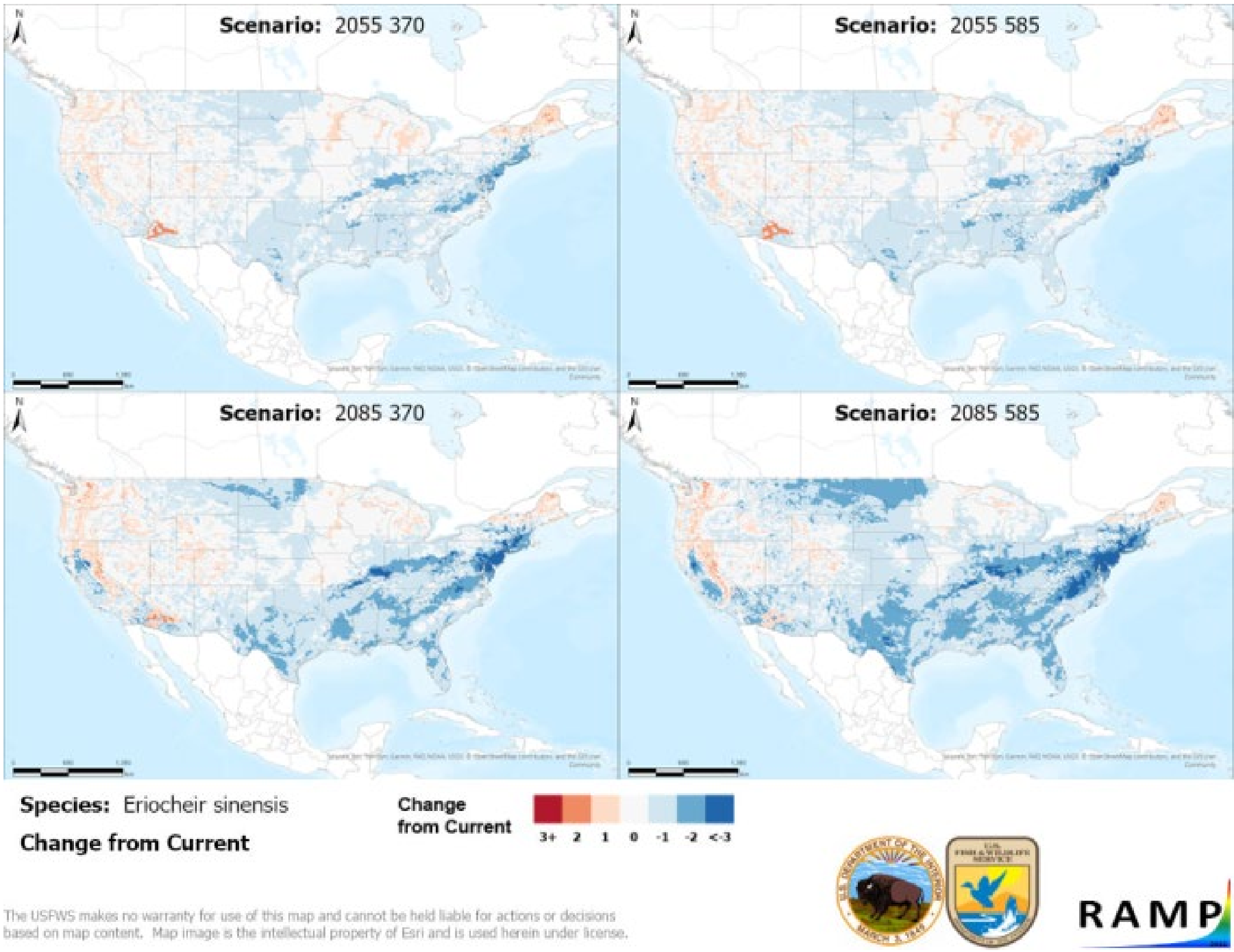

Figure A3. RAMP (Sanders et al. 2023) maps of the contiguous United States showing the difference between the current climate match target point score (figure 5) and the median target point score for future climate scenarios (figure A1) for *Eriocheir sinensis* based on source locations reported by GBIF 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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