

Mute Swan (*Cygnus olor*)

Ecological Risk Screening Summary

U.S. Fish & Wildlife Service, February 2011
Revised, November 2018, March 2019
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https://commons.wikimedia.org/wiki/File:Cisne_por_la_noche.jpg. (11/28/2018).

1 Native Range and Status in the United States

Native Range

According to GISD (2018), *Cygnus olor* is native to Australia, Austria, Belarus, Belgium, Bulgaria, Canada, Croatia, Czech Republic, Denmark, Estonia, Europe, Finland, France, Germany, Greece, Hungary, India, Ireland, Israel, Italy, Kazakhstan, Korea, Democratic People's Republic Of Korea, Republic Of Latvia, Lithuania, Republic Of Moldova, Netherlands, Norway, Poland, Portugal, Romania, Russian Federation, Serbia And Montenegro, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine, and the United Kingdom.

From BirdLife International (2018):

“NATIVE

Extant (breeding)

Kazakhstan; Mongolia; Russian Federation (Eastern Asian Russia); Turkmenistan

Extant (non-breeding)

Afghanistan; Armenia; Cyprus; Iran, Islamic Republic of; Iraq; Korea, Republic of; Kyrgyzstan; Spain

Extant (passage)

Korea, Democratic People's Republic of

Extant (resident)

Albania; Austria; Azerbaijan; Belarus; Belgium; Croatia; Czech Republic; Greece; Hungary; Ireland; Italy; Liechtenstein; Luxembourg; Macedonia, the former Yugoslav Republic of; Montenegro; Netherlands; Russian Federation; Serbia; Slovenia; Switzerland; Turkey; United Kingdom

Extant

Bosnia and Herzegovina; Bulgaria; China; Denmark; Estonia; Finland; France; Germany; India; Israel; Japan; Latvia; Lithuania; Moldova; Norway; Pakistan; Poland; Romania; Russian Federation (Central Asian Russia, European Russia); Slovakia; Sweden; Taiwan, Province of China; Ukraine; Uzbekistan”

Status in the United States

According to CABI (2018), *Cygnus olor* is invasive in the following States in the United States: California, Georgia, Illinois, Indiana, Kentucky, Maine, Maryland, Michigan, New Hampshire, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Rhode Island, Tennessee, Virginia, Washington, and Wisconsin.

From NatureServe (2018):

“Introduced and established in North America, with breeding recorded locally from southern Saskatchewan, Great Lakes region (Michigan), southern New York and Connecticut south to central Missouri and along the Atlantic coast to Virginia; other populations have been recorded in the vicinity of Vancouver Island and in Oregon and Indiana; also in other areas of world. In the U.S., the highest winter densities occur in Michigan and along the eastern seaboard from Delaware to Massachusetts (Root 1988).”

According to BISON (2018), *Cygnus olor* is found throughout the Contiguous United States and Hawaii.

Means of Introductions in the United States

From Bailey et al. (2008):

“The mute swan (*Cygnus olor*) was brought to North America from Europe and Asia, largely for esthetics and establishment of captive flocks, early during settlement of the continent (Ciaranca et al. 1997).”

From GISD (2018):

“*C. olor* were introduced to North American city parks, zoos, avicultural collections, and estates in the late 1800s and early 1900s (Bellrose 1980). The intentional release and accidental escape of these birds resulted in the establishment of populations along the northeastern Atlantic Coast of the United States, portions of the Pacific Coast, and more recently, the lower Great Lakes (Petrie and Francis, 2003).”

Remarks

No additional remarks.

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From ITIS (2018):

“Kingdom Animalia
Subkingdom Bilateria
Infrakingdom Deuterostomia
Phylum Chordata
Subphylum Vertebrata
Infraphylum Gnathostomata
Superclass Tetrapoda
Class Aves
Order Anseriformes
Family Anatidae
Subfamily Anserinae
Genus *Cygnus*
Species *Cygnus olor* (Gmelin, 1789)”

“Taxonomic Status:

Current Standing: valid”

Size, Weight, and Age Range

From GISD (2018):

“*Cygnus olor* (mute swans) are large birds, measuring 144 to 158cm. The wingspan is 2 to 2.5m and total mass can reach from 8.4-10.2kg. Males are larger than females.”

From EOL (2018):

“Maximum longevity: 70 years (captivity) Observations: In the wild, these animals can live up to 26.8 years (<http://bna.birds.cornell.edu/>). There are anecdotal reports, which might be true, of animals living up to 70 years in captivity (John Terres 1980).”

Environment

From GISD (2018):

“*Cygnus olor* (mute swans) utilise a variety of aquatic habitats, including ponds and lagoons, fresh to salt water marshes, well-sheltered bays and lakes. In the warmer months, mute swans spend most of their time in shallow water. As shallow water freezes, the birds move to deeper water, but will utilise deeper water throughout the year (Chesapeake Bay Program, 2002; and Ivory, 2002).”

From BirdLife International (2018):

“It is also common on artificial waterbodies such as reservoirs, gravel-pits, ornamental lakes (del Hoyo et al. 1992), ditches (Snow and Perrins 1998) and canals (Scott and Rose 1996) [...]”

“Moulting congregations of adults and non-breeders (Snow and Perrins 1998) may also utilise brackish or saline habitats (Johnsgard 1978) including brackish marshes (Kear 2005), estuaries and sheltered coastal sites (del Hoyo et al. 1992) (e.g. brackish lagoons (Kear 2005) and bays (Madge and Burn 1988)).”

Climate/Range

No information on climate or range of *Cygnus olor* was found

Distribution Outside the United States

Native

According to GISD (2018), *Cygnus olor* is native to Australia, Austria, Belarus, Belgium, Bulgaria, Canada, Croatia, Czech Republic, Denmark, Estonia, Europe, Finland, France, Germany, Greece, Hungary, India, Ireland, Israel, Italy, Kazakhstan, Korea, Democratic People's Republic Of Korea, Republic Of Latvia, Lithuania, Republic Of Moldova, Netherlands, Norway, Poland, Portugal, Romania, Russian Federation, Serbia And Montenegro, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine, and the United Kingdom.

From BirdLife International (2018):

“NATIVE

Extant (breeding)

Kazakhstan; Mongolia; Russian Federation (Eastern Asian Russia); Turkmenistan

Extant (non-breeding)

Afghanistan; Armenia; Cyprus; Iran, Islamic Republic of; Iraq; Korea, Republic of; Kyrgyzstan; Spain

Extant (passage)

Korea, Democratic People's Republic of

Extant (resident)

Albania; Austria; Azerbaijan; Belarus; Belgium; Croatia; Czech Republic; Greece; Hungary; Ireland; Italy; Liechtenstein; Luxembourg; Macedonia, the former Yugoslav Republic of; Montenegro; Netherlands; Russian Federation; Serbia; Slovenia; Switzerland; Turkey; United Kingdom

Extant

Bosnia and Herzegovina; Bulgaria; China; Denmark; Estonia; Finland; France; Germany; India; Israel; Japan; Latvia; Lithuania; Moldova; Norway; Pakistan; Poland; Romania; Russian Federation (Central Asian Russia, European Russia); Slovakia; Sweden; Taiwan, Province of China; Ukraine; Uzbekistan”

Introduced

According to CABI (2018), the *Cygnus olor* is invasive in Ontario and in parts of England and Wales.

According to NIES (2018), *Cygnus olor* is non-native to Japan and has been introduced in North America, Australia, New Zealand, and South Africa.

Although NIES (2018) lists *Cygnus olor* as introduced in Australia, other databases list it as native and therefore both are reported since a scientific determination could not be made.

Means of Introduction Outside the United States

According to European Commission – Joint Research Centre (2018), *Cygnus olor* was introduced through release of pets and escaping zoos and botanical gardens.

Short Description

From GISD (2018):

“Both sexes are similar in appearance: adults have white plumage and orange bills with a characteristic black, basal knob and a black terminal nail. The head and neck may sometimes be stained brown from water and mud containing iron. Legs and feet of adults can range in colour from black to greyish pink. Mute swan cygnets are greyish brown or white, with slate grey legs and feet or pinkish/tan feet, respectively. Cygnets lack the basal knob. White morph cygnets have tan bills, while grey morph cygnets have slate bills (Chesapeake Bay Program, 2002; and Ivory, 2002).”

Biology

From GISD:

“*Cygnus olor* (mute swan) chicks are brownish grey (gradually turning white within the next 12 months) and only remain in the nest for one day. They are able to fly in about 60 days. Chicks can ride on the backs of their parents or under their wings. By the following breeding season the parents drive the young away. Adolescents then join flocks of other non-breeding swans and during this time molt their feathers, becoming flightless for a short period of time. In the next two years, they begin to bond with a mate and begin to look for suitable breeding territory. Swans do not begin to breed until around year three (Ivory, 2002).”

“Adult *Cygnus olor* (mute swans) do not necessarily pair for life, but established pairs are more successful breeders than non-established pairs. Mute swans rarely nest in colonies. Nest sites are selected and breeding begins in March or early April. Nests will be built on a previously constructed mound, such as a muskrat house will be used. Nests are large, composed of aquatic vegetation and lined with feathers and down. It is built above the water level in a swampy place near a pond or lake. Clutch sizes of 5 to 12 can occur, but 5 to 7 is most common. Eggs are pale grey to pale blue-green. Incubation lasts 36 to 38 days. Incubation is shared between the male and female, but the female spends the majority of time sitting and the male typically stands guard (Ivory, 2002).”

“Submerged aquatic vegetation (SAV) is the preferred diet of *Cygnus olor* (mute swan), though they also eat grain crops. They consume daily at least 3-4kg (wet weight) of submerged aquatic plants, including leaves, stems, roots, stolons and rhizomes, uproot additional vegetation that is not eaten, and use emergent vegetation for nest building. They have been observed pulling plants up by the roots or rhizomes or paddling vigorously to dislodge whole plants to consume or to make available for cygnets (Chesapeake Bay Program, 2002; and Petrie and Francis, 2003).”

From BirdLife International (2018):

“Truly wild populations of this species are migratory (particularly where displaced by cold weather) (del Hoyo et al. 1992, Snow and Perrins 1998) although European and feral populations are essentially sedentary (Johnsgard 1978, del Hoyo et al. 1992, Scott and Rose 1996, Snow and Perrins 1998) or only locally migratory or nomadic (Scott and Rose 1996, Snow and Perrins 1998). The species breeds during the local spring (del Hoyo et al. 1992, Kear 2005) as isolated pairs in well-defended territories (del Hoyo et al. 1992). After breeding the adults may gather in large concentrations of thousands or more (Johnsgard 1978, Madge and Burn 1988) on selected waters (Madge and Burn 1988) (non-breeders in northern Europe migrating to such gatherings (Snow and Perrins 1998)) between July and August (Scott and Rose 1996) to undergo a flightless moulting period lasting for 6-8 weeks (Kear 2005). Although not noticeably sociable in many areas during the winter (Johnsgard 1978) the species may flock in groups of several thousands on favoured waters (Johnsgard 1978, Madge and Burn 1988, Scott and Rose 1996).”

From Bailey et al. (2008):

“Overall, mute swan diets mainly consisted of above-ground biomass of pondweed spp., muskgrass (*Chara vulgaris*), coontail (*Ceratophyllum demersum*), slender naiad, common waterweed, wild celery (*Vallisneria americana*), and wild rice (*Zizania palustris*); below-ground parts of wild celery, sago pondweed (*Stuckenia pectinatus*), and arrowhead spp. (*Sagittaria* spp.) were eaten infrequently.”

Human Uses

According to BirdLife International (2018), humans use *Cygnus olor* for sport hunting/specimen collecting, food, pets/display animals, and horticulture.

Diseases

The Avian Influenza Virus and West Nile Virus (see below) are both OIE reportable diseases (OIE 2019).

From Teifke et al. (2007):

“During the recent outbreak of highly pathogenic avian influenza in Germany, mortality due to H5N1 HPAIV was observed among mute and whooper swans as part of a rapid spread of this virus. In contrast to earlier reports, swans appeared to be highly susceptible and represented the mainly affected species.”

According to Komar (2003), *Cygnus olor* located in North America have been affected by the West Nile Virus.

Threat to Humans

From CABI (2018):

“Mute swans have also been known to attack and injure humans and can be especially dangerous to small children.”

3 Impacts of Introductions

From GISD (2018):

“*Cygnus olor* (mute swans) impact native waterfowl habitat. They consume great quantities of submerged aquatic vegetation (SAV) and aquatic invertebrates and cause competition for space and food, attacking and driving off native waterfowl and potentially reducing the carrying capacity of breeding, staging and wintering habitats for native species of migratory waterfowl. Mute swans occupy and defend large territories (up to 6ha) of wetland habitat during nesting, brood rearing and foraging. Studies have shown that in Europe mute swans have successfully eliminated individual plant species from some wetlands and it is feared that in North America, similar impacts on food resources will occur and effect migrant and wintering waterfowl populations. They have been reported to kill adult and juvenile ducks and geese as well as other

wetland-dependent birds (Allin and Husband, 2003; Petrie and Francis, 2003). At high densities, mute swans can overgraze an area with the potential to eliminate some plant species from an ecosystem. During winter, mute swans may also consume nutrient storage and over wintering structures such as tubers, which could reduce the future availability of perennial species such as wild celery (*Vallisneria americana*) and American bulrush (*Scirpus americanus*), both important food sources for native waterfowl (Petrie and Francis, 2003).”

From NIES (2018):

“Possibly competitive with a native geese such as *Anser fabalis middendorffii*”

From Petrie and Francis (2003):

“They also have been reported to cause nest abandonment in least terns (*Sterna albifrons*), black skimmers (*Rynchops niger*), forster's terns (*S. forsteri*), and common terns (*S. hirundo*) (Ciaranca et al. 1997). Mute swans consume and uproot large amounts of aquatic vegetation (Gillham 1956, Mathiasson 1973, Owen and Cadbury 1975, Allin 1981, Fenwick 1983). Competition for space and food imposed by mute swans has the potential to reduce the carrying capacity of breeding, staging, and wintering habitats for native species of migratory waterfowl in areas where feral populations of mute swans are established (Cobb and Harlan 1980, Allin 1981, Allin et al. 1987).”

From Stafford et al. (2012):

“While foraging, mute swans rake the substrate to dislodge plants and roots leaving many parts of the plant unconsumed yet unable to regenerate (Tatu et al. 2007). Because mute swans are generally sedentary and do not migrate unless required (e.g., due to lack of open water or density-dependent dispersal), impacts from their diet and feeding methods can be concentrated and severe (Reese 1975; Perry et al. 2004). Sustained grazing pressure can inhibit SAV regeneration and has resulted in localized depletions of aquatic plants in the Chesapeake Bay (Perry et al. 2004; Tatu et al. 2007).”

4 Global Distribution

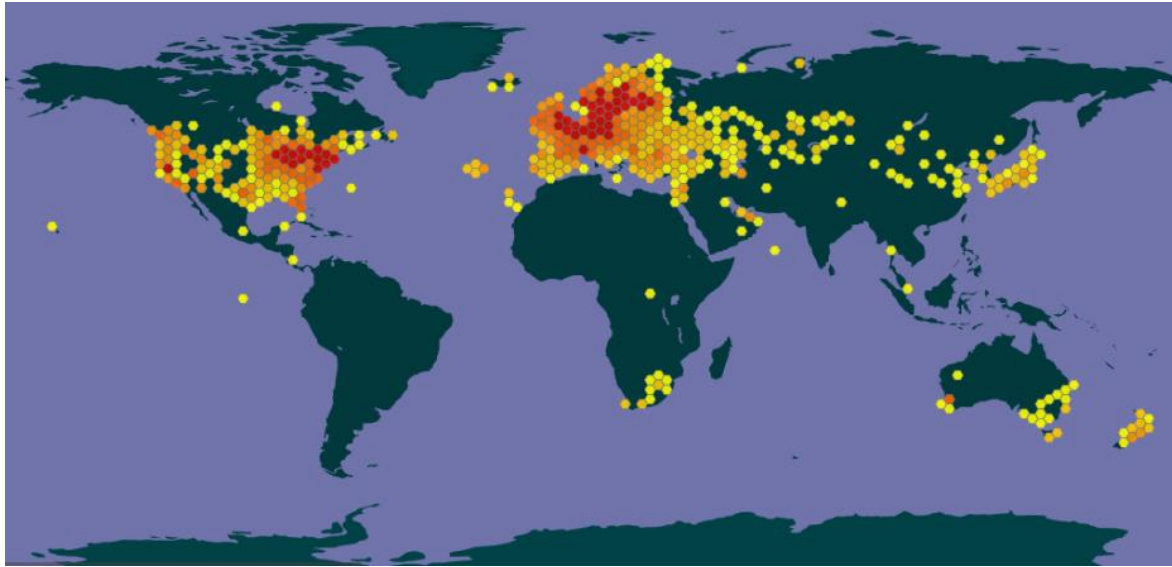


Figure 1. Known global distribution of *Cygnus olor*. Points are located on every continent except South America and Antarctica. Map from GBIF Secretariat (2018). With the exception of a few outliers explained below, data points that appear to be located in the ocean are actually on small islands.

The points located off the west coast of South America (Figure 1) and the east coast of Northern Africa (Figure 1) were excluded from the climate match, the coordinates are incorrect (GBIF Secretariat 2018). The point located in the Democratic Republic of the Congo was excluded from the climate match since it was indicated that this population might be livestock (GBIF Secretariat 2018) and no other literature could verify a live wild population in this area.

5 Distribution Within the United States

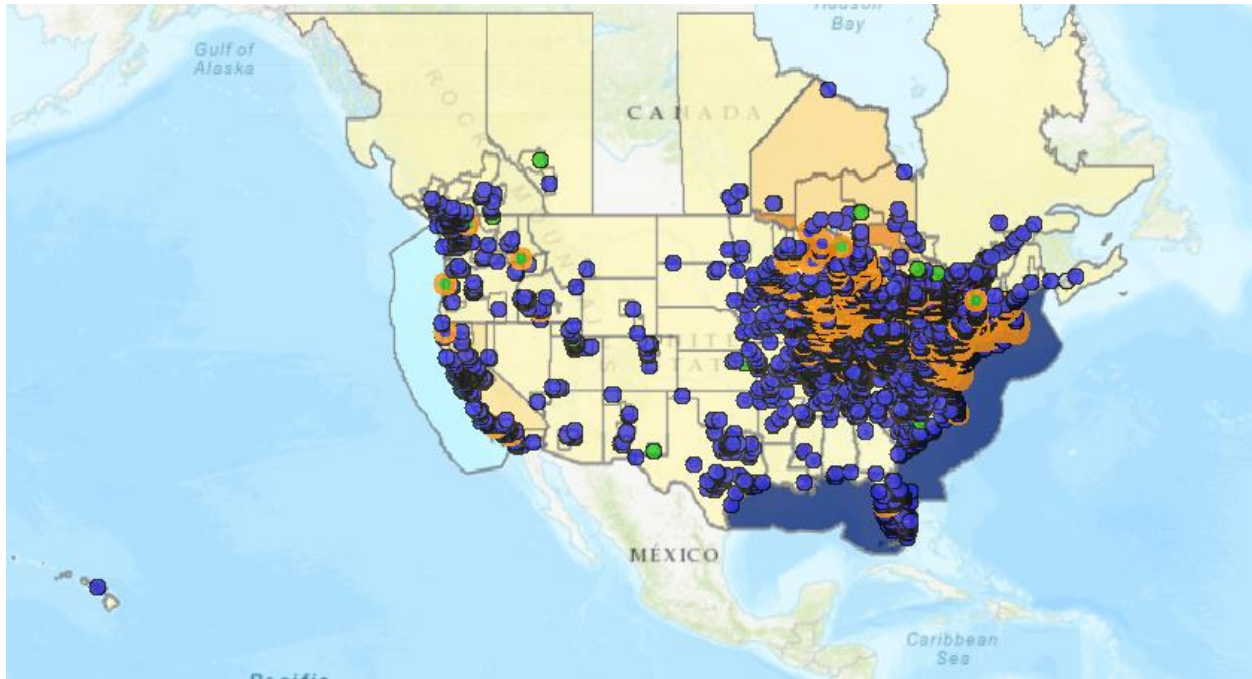


Figure 2. Known distribution of *Cygnus olor* in the United States. Map from BISON (2018).

6 Climate Matching

Summary of Climate Matching Analysis

The climate match for *Cygnus olor* was high throughout the entire contiguous United States. There was a very small area of medium match on the North West coast of the country but everywhere else had a high match. The Climate 6 score (Sanders et al. 2018; 16 climate variables; Euclidean distance) for the contiguous United States was 0.999, high (scores 0.103 and greater are classified as high). All states had high individual climate scores.

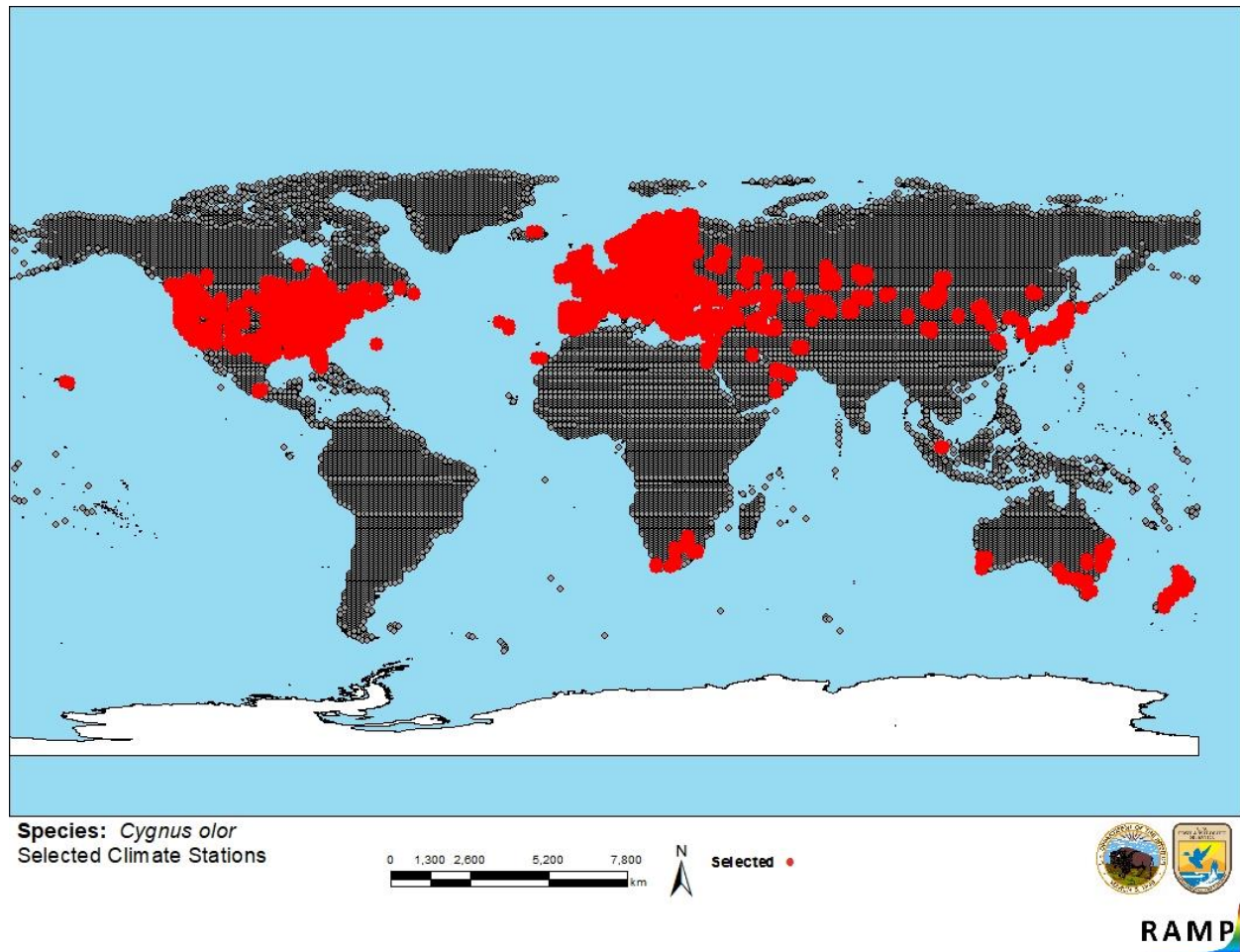


Figure 3. RAMP (Sanders et al. 2018) source map showing weather stations in the contiguous United States, South Africa, Europe, Russia, Japan, Australia, and New Zealand selected as source locations (red) and non-source locations (gray) for *Cygnus olor* climate matching. Source locations from BISON (2018) and GBIF Secretariat (2018). The source points that appear to be located in the ocean are actually located on small islands and are valid source points. Selected source locations are within 100 km of one or more species occurrences, and do not necessarily represent the locations of occurrences themselves.

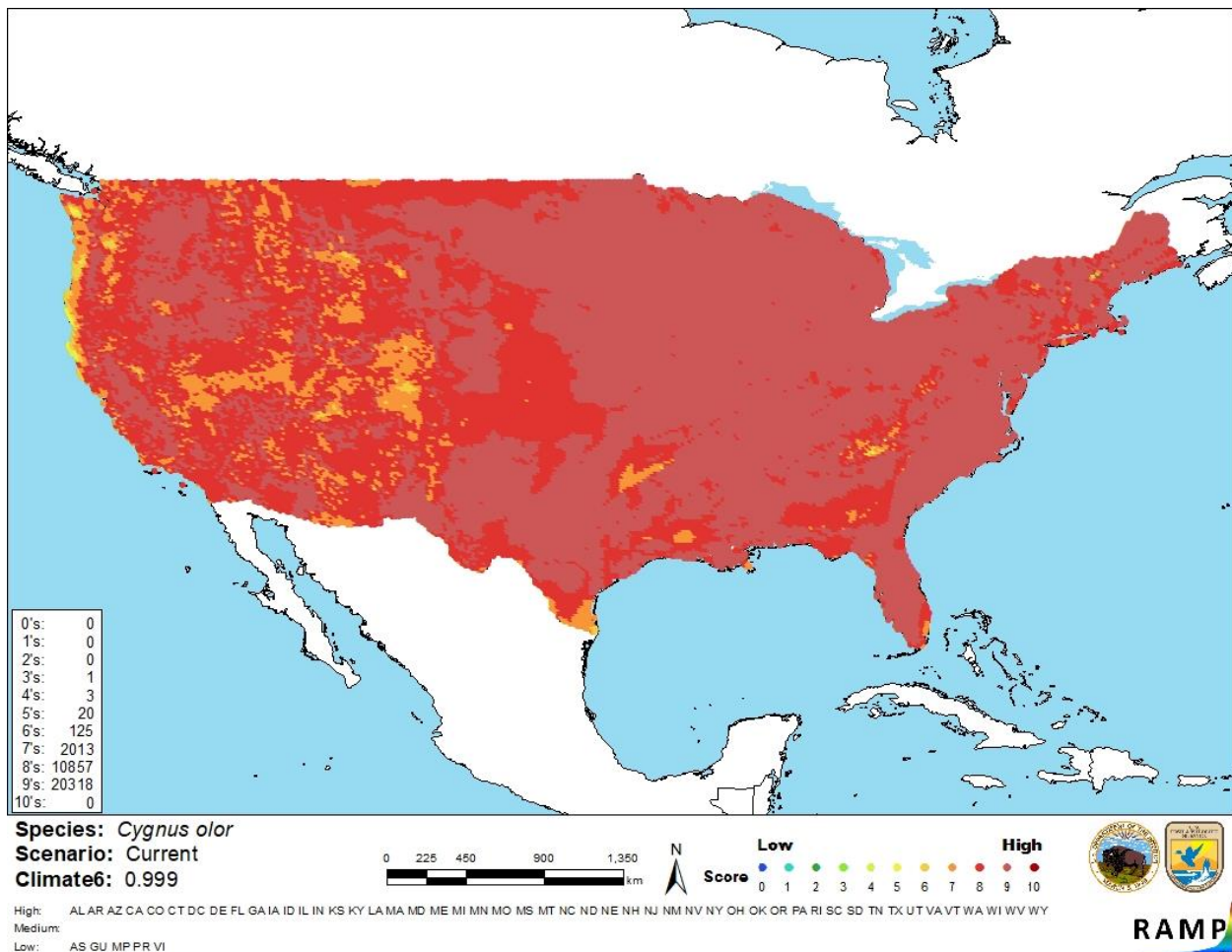


Figure 4. Map of RAMP (Sanders et al. 2018) climate matches for *Cygnus olor* in the contiguous United States based on source locations reported by BISON (2018) and GBIF Secretariat (2018). Counts of climate match scores are tabulated on the left. 0 = Lowest match, 10 = Highest match.

The High, Medium, and Low Climate match Categories are based on the following table:

Climate 6: Proportion of (Sum of Climate Scores 6-10) / (Sum of total Climate Scores)	Climate Match Category
$0.000 \leq X \leq 0.005$	Low
$0.005 < X < 0.103$	Medium
≥ 0.103	High

7 Certainty of Assessment

Information on the biology, invasion history, and impacts of this species is sufficient to give an accurate description of the risk posed by this species. Sources of information come from peer reviewed literature and scientific databases. Certainty of this assessment is high.

8 Risk Assessment

Summary of Risk to the Contiguous United States

Mute Swan (*Cygnus olor*) is a species of swan native to Europe, Russia, and parts of the Middle East. *C. olor* has been used commercially for sport hunting, specimen collecting, food, pets, display animals, and horticulture. The history of invasiveness is high. The species was inadvertently and purposefully introduced, and then spread on its own into various portions of South Africa, New Zealand, Asia, and North America. *C. olor* competes for food with native and migrating waterfowl resulting in the elimination of individual plant species and decline in wetland plant diversity. *C. olor* also directly competes with native waterfowl for breeding and over wintering habitat by driving them away from desired wetlands and have even been known to kill adult and juvenile ducks and geese. *C. olor* has been documented as a cause of or implicated in significant declines in native species in Europe and potentially in North America. The climate match is high. All states had a high individual climate scores. The certainty of this assessment is high. The overall risk assessment category is high.

Assessment Elements

- **History of Invasiveness (Sec. 3): High**
- **Climate Match (Sec. 6): High**
- **Certainty of Assessment (Sec. 7): High**
- **Remarks/Important additional information:** The avian influenza virus and the West Nile Virus are OIE reported diseases.
- **Overall Risk Assessment Category: High**

9 References

Note: The following references were accessed for this ERSS. References cited within quoted text but not accessed are included below in Section 10.

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10 References Quoted But Not Accessed

Note: The following references are cited within quoted text within this ERSS, but were not accessed for its preparation. They are included here to provide the reader with more information.

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