

European Water-Plantain (*Alisma plantago-aquatica*) Ecological Risk Screening Summary

U.S. Fish & Wildlife Service, April 2021
Revised, April 2021
Web Version, 8/23/2021

Organism Type: Plant
Overall Risk Assessment Category: Uncertain



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<https://commons.wikimedia.org/w/index.php?curid=63924671> (April 2021).

1 Native Range and Status in the United States

Native Range

From POWO (2021):

“Common water-plantain is a widespread temperate species occurring across Eurasia and from North Africa to Tanzania. It is also considered to be native in parts of Australia.”

“Native to: Afghanistan, Albania, Algeria, Altay [Russia], Amur [Russia], Assam [India], Austria, Balears [Spain], Baltic States [Estonia, Latvia, Lithuania], Bangladesh, Belarus, Belgium, Bulgaria, Burundi, Buryatiya [Russia], Central European [Russia], China North-Central, China South-Central, China Southeast, Chita [Russia], Corse [France], Czechoslovakia [Czech Republic, Slovakia], Denmark, East Aegean Is. [Greece], East European Russia, East Himalaya [India, China, Bhutan], Egypt, Eritrea, Ethiopia, Finland, France, Germany, Great Britain, Greece, Hungary, Inner Mongolia [China], Iran, Iraq, Ireland, Irkutsk [Russia], Italy, Japan, Kamchatka [Russia], Kazakhstan, Kenya, Khabarovsk [Russia], Kirgizstan, Korea, Krasnoyarsk [Russia], Kriti [Greece], Krym [Ukraine], Lebanon-Syria, Manchuria [China], Mongolia, Morocco, Myanmar, Nepal, Netherlands, North Caucasus [Russia], North European [Russia], Northwest European [Russia], Norway, Pakistan, Palestine [Israel, Jordan], Poland, Portugal, Primorye [Russia], Qinghai [China], Romania, Rwanda, Sakhalin [Russia], Sardegna [Italy], Sicilia [Italy], South European [Russia], Spain, Sudan [Republic of Sudan, South Sudan], Sweden, Switzerland, Tadzhikistan, Tanzania, Thailand, Transcaucasus [Georgia, Armenia, Azerbaijan], Turkey, Turkey-in-Europe, Tuva [Russia], Uganda, Ukraine, Uzbekistan, Vietnam, West Himalaya [India, Pakistan], West Siberia [Russia], Xinjiang [China], Yakutskiya [Russia], Yugoslavia [Slovenia, Croatia, Bosnia and Herzegovina, Serbia, Montenegro, North Macedonia], Zaïre [Democratic Republic of the Congo]”

From Jacobs et al. (2020):

“Native to South Australia, New South Wales, Australian Capital Territory and Victoria [Australia].”

Status in the United States

From POWO (2021):

“Introduced into: Alaska [...]”

From Burke Museum Herbarium (2021):

“Introduced to western Washington [...]”

From N.C. Cooperative Extension (2021):

“This plant is an invasive species in North Carolina”

No further information was found to indicate that *A. plantago-aquatica* has been introduced in North Carolina.

According to Michigan State University (2021), *A. plantago-aquatica* was reported from St. Charles County, Missouri, in 2003. USGS (2021) reports the St. Charles County occurrences as established populations, along with occurrences of unknown status in Greene County, Missouri in 1909; Shannon County, Missouri, in 1968; Grant County, South Dakota, in 1973; St. Louis County, Missouri, in 1988; and Pulaski County, Missouri, in 1999.

According to USDA (2021), this species is “routinely available” commercially. Due to past confusion over the definition of the species *A. plantago-aquatica* and its status in North America (see Remarks), it is uncertain whether reports of this species for sale in the United States are valid reports of *A. plantago-aquatica*.

From San Marcos Growers (2021):

“This plant is not currently for sale. [...] We grew this plant unitl [*sic*] 2007 but determined it too weedy and discontinued production.”

Means of Introductions in the United States

No information is available on means of introductions in the United States.

Remarks

From Jacobson and Hedrén (2007):

“The morphology of most members of the genus *Alisma* is strongly dependent on growth conditions. The large degree of phenotypic plasticity within species has resulted in confusion regarding taxonomic treatments over the years.”

“The genus *Alisma* has been revised several times. *Michelii* (1881) and Buchenau (1903) each recognized only one species in the genus (as *Alisma plantago* and *A. plantago-aquatica*, respectively). Buchenau also distinguished several varieties and forms of *A. plantago-aquatica*. *Alisma* was subsequently monographed by Samuelsson (1931), who recognized six species: *A. plantago-aquatica*, *A. lanceolatum*, *A. rariflorum*, *A. canaliculatum*, *A. subcordatum* and *A. gramineum*. He also described three subspecies: *A. plantago-aquatica ssp. orientale*, *A. plantago-aquatica ssp. breviceps* and *A. gramineum ssp. wahlenbergii*. A few years later, Juzepczuk (1934) elevated these subspecies to rank of species (*A. orientale*, *A. triviale* and *A. wahlenbergii*, respectively). Hendricks (1957) mainly studied *Alisma* originating from the American continent and added some taxa to those recognized by Samuelsson (1931). However, Hendricks’ revision did not gain general acceptance. Björkqvist (1967, 1968) published a monograph of the genus based on detailed morphological and karyological studies as well as crossing experiments. He agreed with the taxonomical opinions of Juzepczuk and recognized nine species within *Alisma* [...]”

“The results from our study conclude that there is no need for a major revision of the genus. In general, the results support Björkqvist’s taxonomical opinion, which was based on morphological and karyological studies as well as crossing experiments (Björkqvist 1967, 1968). However, the indication that *A. plantago-aquatica* appears to be a paraphyletic species needs further investigations.”

From Pogan (1963):

“Detailed morphological and karyological studies have revealed that the North American taxa of the *Alisma plantago-aquatica* complex are most appropriately classified as the two species, *A. subcordatum* Rafin. ($2n = 14$), and *A. triviale* Pursh ($2n = 28$).”

From Haynes and Hellquist (2021):

“The name *Alisma plantago-aquatica* has been used in a variety of North American floras. We are following, however, the treatment of I. Björkqvist (1968), in which the native distribution of *A. plantago-aquatica* is restricted to Eurasia.”

In this Ecological Risk Screening Summary, all efforts have been made to follow the consensus definition of *A. plantago-aquatica* in the peer-reviewed scientific literature, which does not include any native range in North America.

According to WFO (2021), the following species-level synonyms have been used for *Alisma plantago-aquatica*: *Alisma angustifolium* Hoppe, *Alisma ceretanica* Sennen, *Alisma heterophyllum* Schur, *Alisma latifolium* Gilib., *Alisma major* Gray, *Alisma michaletii* (Asch. & Graebn.) Asch. & Graebn., *Alisma natans* Pollich, *Alisma paniculatum* Stokes, *Alisma plantagineum* St.-Lag., *Alisma plantaginifolium* St.-Lag., *Alisma verticillatum* Dulac, and *Echinodorus vulgaris* Bubani. Information for this ERSS was sought under the accepted scientific name as well as all the above synonyms.

The common name for this species is European Water-Plantain per USDA (2021), but it is also frequently referred to as Common Water-Plantain (Lansdown and Beentje 2017; POWO 2021).

From Lansdown and Beentje (2017):

“Plants with the leaves similar to that of *A. plantago-aquatica*, styles as in *A. gramineum* and 0.2-0.3 mm long undeveloped anthers are known from Orenburg Region (basin of the Ural and Samara Rivers). Apparently this is the result of hybridization of *A. plantago-aquatica* × *A. gramineum* and possibly sterile. These are known as *A. ×bjorkqvistii* Tzvel. (Tzvelev 2001).”

“*A. plantago-aquatica* is reported to hybridise occasionally with *A. lanceolatum* (*A. ×rhicnocarpum* Schotsm.) [...]”

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

According to WFO (2021), *Alisma plantago-aquatica* is the current accepted name for this species.

From ITIS (2021):

Kingdom Plantae
Subkingdom Viridiplantae
Infrakingdom Streptophyta
Superdivision Embryophyta
Division Tracheophyta
Subdivision Spermatophytina

Class Magnoliopsida
Superorder Lilianae
Order Alismatales
Family Alismataceae
Genus *Alisma*
Species *Alisma plantago-aquatica* L.

Size, Weight, and Age Range

From POWO (2021):

“[...] up to 1 m tall.”

“It will reach full height within 2-5 years.”

Environment

From Lansdown and Beentje (2017):

“*A. plantago-aquatica* is an amphibious and herbaceous perennial Helophyte. It [...] will grow in most mesotrophic to eutrophic wetland types, from the margins of streams and rivers, to lakes, ponds and marshy pools, as well as some artificial habitats such as canals and rice fields.”

From POWO (2021):

“It performs best in full sun and can grow in any aspect, in an exposed or sheltered site. It can be planted in up to 30 cm of water.”

According to USDA (2021), *A. plantago-aquatica* tolerates pH values between 6.3 and 7.5.

From Ford and Champion (2020):

“Emergent or marginal in humus-rich soils in farm drains, roadside ditches, swamps, swamp drains, pools and ponds, edges of slow-flowing streams and rivers, estuaries, marshy pasture. Recorded from oligotrophic and eutrophic water bodies, and some tolerance of brackish water evident.”

“In New Zealand, plants can survive the winter with submersed leaves in protected parts of water bodies such as shaded drains. Emergent leaves wither and die back over winter.”

Climate

From Lansdown and Beentje (2017):

“It occurs mainly in lowlands (though in Ethiopia it grows to altitudes of 2500 m) [...]”

From Haynes and Hellquist (2021):

“Elevation: 200 m”

From POWO (2021):

“Common water-plantain is a widespread temperate species [...]”

According to USDA (2021), *A. plantago-aquatica* tolerates temperatures down to -33°F.

Distribution Outside the United States

Native

From POWO (2021):

“Common water-plantain is a widespread temperate species occurring across Eurasia and from North Africa to Tanzania. It is also considered to be native in parts of Australia.”

“Native to: Afghanistan, Albania, Algeria, Altay [Russia], Amur [Russia], Assam [India], Austria, Balears [Spain], Baltic States [Estonia, Latvia, Lithuania], Bangladesh, Belarus, Belgium, Bulgaria, Burundi, Buryatiya [Russia], Central European [Russia], China North-Central, China South-Central, China Southeast, Chita [Russia], Corse [France], Czechoslovakia [Czech Republic, Slovakia], Denmark, East Aegean Is. [Greece], East European Russia, East Himalaya [India, China, Bhutan], Egypt, Eritrea, Ethiopia, Finland, France, Germany, Great Britain, Greece, Hungary, Inner Mongolia [China], Iran, Iraq, Ireland, Irkutsk [Russia], Italy, Japan, Kamchatka [Russia], Kazakhstan, Kenya, Khabarovsk [Russia], Kirgizstan, Korea, Krasnoyarsk [Russia], Kriti [Greece], Krym [Ukraine], Lebanon-Syria, Manchuria [China], Mongolia, Morocco, Myanmar, Nepal, Netherlands, North Caucasus [Russia], North European [Russia], Northwest European [Russia], Norway, Pakistan, Palestine [Israel, Jordan], Poland, Portugal, Primorye [Russia], Qinghai [China], Romania, Rwanda, Sakhalin [Russia], Sardegna [Italy], Sicilia [Italy], South European [Russia], Spain, Sudan [Republic of Sudan, South Sudan], Sweden, Switzerland, Tadzhikistan, Tanzania, Thailand, Transcaucasus [Georgia, Armenia, Azerbaijan], Turkey, Turkey-in-Europe, Tuva [Russia], Uganda, Ukraine, Uzbekistan, Vietnam, West Himalaya [India, Pakistan], West Siberia [Russia], Xinjiang [China], Yakutskiya [Russia], Yugoslavia [Slovenia, Croatia, Bosnia and Herzegovina, Serbia, Montenegro, North Macedonia], Zaïre [Democratic Republic of the Congo]”

From Jacobs et al. (2020):

“Native to South Australia, New South Wales, Australian Capital Territory and Victoria [Australia].”

Introduced

From POWO (2019):

“Introduced into: [...] Angola, Argentina South, Cape Provinces [South Africa], Chile Central, Free State [South Africa], KwaZulu-Natal [South Africa], New South Wales [Australia], New

Zealand North, New Zealand South, Northern Provinces [South Africa], Queensland [Australia], South Australia, Tasmania [Australia], Victoria [Australia], Zimbabwe”

Establishment status in Angola and Argentina could not be confirmed.

Gonzalez et al. (1981) report *A. plantago-aquatica* as a common aquatic weed in irrigated rice in Brazil and Chile.

Henderson (2007) reports *A. plantago-aquatica* as naturalized in South Africa.

Maroyi (2017) report *A. plantago-aquatica* as naturalized in Zimbabwe.

From Ford and Champion (2020):

“Exotic; fully naturalized [in New Zealand].”

From Jacobs et al. (2020):

“Considered to be introduced in Tasmania and Queensland [Australia].”

From Burke Museum Herbarium (2021):

“Introduced to [...] southwest British Columbia.”

Means of Introduction Outside the United States

From Esler and Astridge (1987):

“In the 1900-1940 period many garden plants became naturalized [in Auckland, New Zealand, including *Alisma plantago-aquatica*].”

From Maroyi (2017):

“Ornamental”

From Hyde et al. (2021):

“The plants are eaten by birds, not digesting and spreading the seeds. Seeds also float and dispersed [*sic*] by water.”

Reynolds and Cumming (2016) report finding *A. plantago-aquatica* seeds in waterfowl fecal samples in South Africa.

Short Description

From Haynes and Hellquist (2021):

“**Herbs**, to 1 m. **Leaves** emerged, petiolate; blade linear-lanceolate to broadly elliptic to ovate, to 30 × 1–12 cm. **Inflorescences** to 1 m. **Flowers** chasmogamous; sepals 1.7–3.2 mm; petals purplish white to purplish pink, 3.4–6.4 mm, margins ± erose, apex obtuse; anthers ellipsoid, 0.7–1.4 mm; style ± straight, 0.6–1.5 mm, exceeding ovary length. **Fruiting** heads 4–6.5 mm diam; achenes ovoid, 1.7–3.1 mm, abaxial keels broadly rounded, with 1 median abaxial groove, rarely 2, beak erect or nearly erect.”

Biology

From Lansdown and Beentje (2017):

“This species is widespread and abundant throughout its known range.”

“It is a good coloniser and will often form extensive and locally dominant stands in recently excavated pools on basic clays.”

From Jacobson and Hedrén (2007):

“Each individual [in the genus *Alisma*] produces a number of inflorescences with up to several hundred flowers, depending on the species and growth conditions. The flowers are bisexual and have three sepals, three white to pinkish petals, six stamens and numerous pistils (Björkqvist 1967). Each flower only lasts for a single day. All species are self-compatible (Björkqvist 1967, the authors personal observations from greenhouse cultivation) and the flowers are thus probably often self-fertilized in natural populations. Their main agents of dispersal are nutlets, which can be spread by waterfowl and water currents (Sculthorpe 1967).”

From Haynes and Hellquist (2021):

“Phenology: Flowering and fruiting late summer.”

According to Poelen et al. (2014), numerous insect species interact with *A. plantago-aquaticum*, including:

- moth species *Gynnidomorpha alismana*, *Piercea permixtana*, and *Xylena exsoleta*;
- fly species *Anasimyia lineata*, *Augochlorella aurata*, *Cheilosia pagana*, *Cheilosia proxima*, *Chrysotoxum bicinctum*, *Episyrphus balteatus*, *Eristalinus sepulchralis*, *Eristalis pertinax*, *Gymnoprosope polita*, *Myathropa florea*, *Neoascia interrupta*, *Paragus bicolor*, *Paragus tibialis*, *Platycheirus albimanus*, *Platycheirus granditarsus*, *Platycheirus scutatus*, *Senotainia rubriventris*, *Sphaerophoria contigua*, *Sphaerophoria spp.*, *Syrirta pipiens*, and *Toxomerus marginatus*, and fly families Halictinae and Sarcophagidae;
- bee species *Dialictus spp.*, *Lasioglossum coreopsis*, and *Lasioglossum cressonii*;
- leaf miner species *Bagous alismatis* (synonym *Hydronomus alismatus*) and *B. robustus*;
- aphid species *Aphis spp.* and *Rhopalosiphum nymphaeae*.

According to Poelen et al. (2014), *A. plantago-aquaticum* may be associated with sedge *Carex virgata*.

Human Uses

From Lansdown and Beentje (2017):

“It is widely used as an ornamental plant for outdoor water features in northern Europe. Its root and leaves are used for medicinal purposes as an antibacterial, anticholesterolemic, diuretic, hypoglycaemic, and hypotensive in Viet Nam. Prolonged use as a diuretic may lead to gastroenteritis.”

From POWO (2021):

“According to the *Flora of Pakistan*, the powdered root has been used as a cure for hydrophobia, and fresh leaves are used in homeopathy. The starch-rich rootstock is also eaten in some countries.”

According to USDA (2021), this species is “routinely available” commercially. Due to past confusion over the definition of the species *A. plantago-aquatica* and its status in North America (see Remarks), it is uncertain whether reports of this species for sale in the United States are valid reports of *A. plantago-aquatica*.

From San Marcos Growers (2021):

“This plant is not currently for sale. [...] We grew this plant until [sic] 2007 but determined it too weedy and discontinued production.”

Diseases

According to Poelen et al. (2014), *A. plantago-aquaticum* is a host to the fungal species *Ascochyta agropyrina*, *Ascochyta alismatis*, *Ascochyta boydii*, *Cercospora alismatis*, *Doassansia alismatis*, *Doassansiopsis* spp., *Entyloma alismacearum*, *Gladochytrium alismatis* (possibly a misspelling of *Cladochytrium alismatis*), *Leptosphaeria rivularis*, *Massariosphaeria fridae*, *Phyllosticta alismatis*, *Phyllosticta* spp., *Phoma alismatis*, *Physoderma maculare*, *Plectosporium alismatis*, *Pleospora alismatis*, *Pseudopeziza alismatis*, *Rhabdospora nigrifacta*, *Septoria heterochroa*, *Septoria* spp., *Spermosporina alismatis*, and *Ustilago alismatis*.

From Safari Motlagh (2011):

“Common water-plantain (*Alisma plantago-aquatica* L.), arrowhead (*Sagittaria trifolia* L.) and *Echinochloa* spp. (L.) are among the most important damaging weeds of rice paddies. In this research, [the fungus] *Curvularia lunata* (Waker) Boedijn was isolated from the said weeds. [...] The greatest effect of *C. lunata* was on *Alisma plantago-aquatica*.”

Threat to Humans

From POWO (2021):

“Poisonous if ingested in large quantities.”

From Safari Motlagh (2011):

“Common water-plantain (*Alisma plantago-aquatica* L.), arrowhead (*Sagittaria trifolia* L.) and *Echinochloa* spp. (L.) are among the most important damaging weeds of rice paddies.”

From NSW DPI (2013):

“Water plantain is a sporadic broadleaf weed of rice, usually occurring as a few plants near the water inlet or on the crop margin. It can obstruct drains or compete with rice in patches. It is found naturally along the major river systems and in billabongs and creeks in south eastern Australia. In the 1990s, biotypes resistant to the herbicide bensulfuron methyl (e.g., Londax®) became a serious problem in aerial sown rice in the Murray Valley.”

3 Impacts of Introductions

From Gonzalez et al. (1981):

“Del Pazo and Tay (1971) report that the common rice weeds in Chillan, Chile, are *Alisma plantago-aquatica*, *Sagittaria chilensis*, and *E. crus-galli*.”

From Safari Motlagh (2011):

“Common water-plantain (*Alisma plantago-aquatica* L.), arrowhead (*Sagittaria trifolia* L.) and *Echinochloa* spp. (L.) are among the most important damaging weeds of rice paddies.”

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4 History of Invasiveness

Alisma plantago-aquatica is a widespread species that has become established in multiple countries outside its native range. It has numerous human uses, including as a commercially available ornamental plant, although no quantitative data on trade volume were found. Several sources report *A. plantago-aquatica* as a weed of rice fields within its native range, but there is extremely limited information on rice weed status or any other impacts of introduction (e.g.

obstruction of drains, competition with rice) outside the native range. For that reason, the history of invasiveness is classified as Data Deficient.

5 Global Distribution

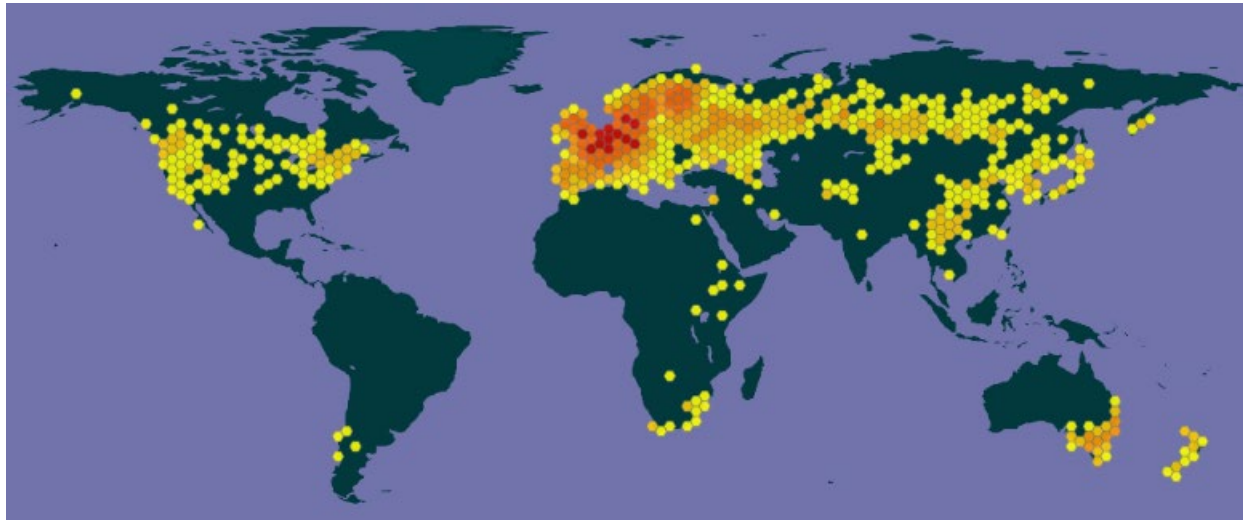


Figure 1. Known global distribution of *Alisma plantago-aquatica*. Observations are reported from temperate North America, southwestern South America, throughout Europe, throughout much of Asia, eastern and southern Africa, Australia, and New Zealand. Map from GBIF Secretariat (2021). Occurrences reported in North America (except in southern British Columbia, Canada, and as mentioned in Distribution Within the United States) were not included in the climate matching analysis to reflect current taxonomic understanding, with North American native representatives of *Alisma* recognized as a separate species from *A. plantago-aquatica*. Occurrences reported in Argentina and Botswana were not included in the climate matching analysis because no evidence was found to suggest that these occurrences represent established populations.

No georeferenced occurrences were available for parts of the species range in Bangladesh, Bhutan, Brazil, Eritrea, Kyrgyzstan, Myanmar, Nepal, Rwanda, Sudan, South Sudan, Tajikistan, Tanzania, Uganda, or Uzbekistan.

6 Distribution Within the United States



Figure 2. Known distribution of *Alisma plantago-aquatica* in the United States, according to USGS (2021). Occurrences near St. Louis, Missouri, were reported to represent established populations; other occurrences were excluded from the climate matching analysis.

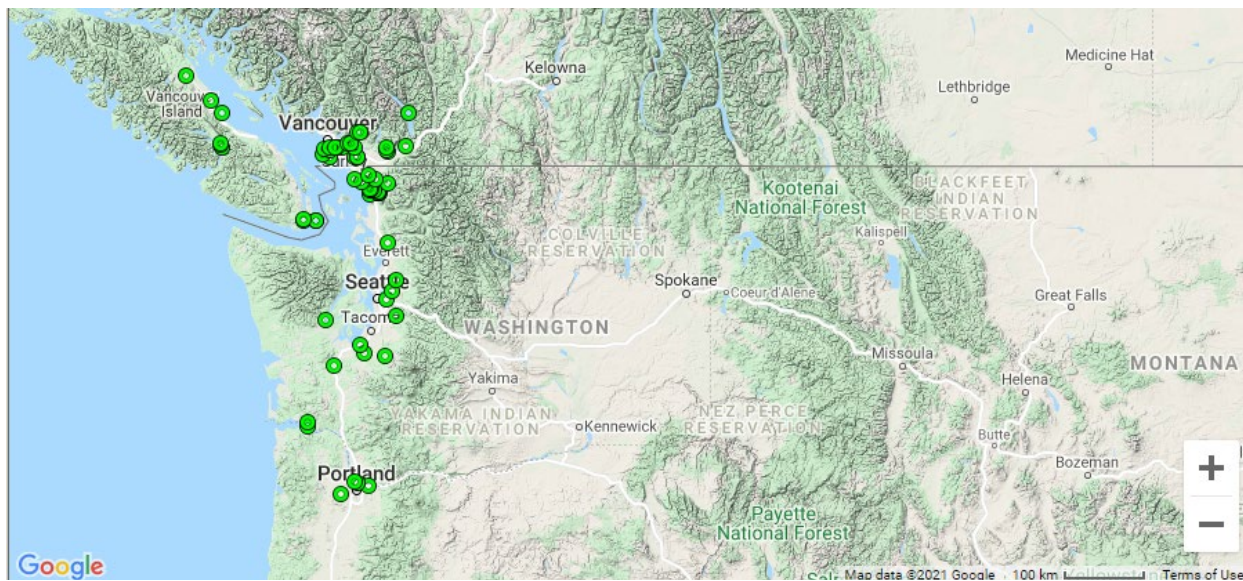


Figure 3. Known distribution of *Alisma plantago-aquatica* in the Pacific Northwest. Map from Burke Museum Herbarium (2021). Only occurrences in the Washington State counties of King, Pierce, Snohomish, and Whatcom were reported as introduced populations; all other occurrences were excluded from the climate matching analysis because they were reported as native to the area and therefore are most likely misidentifications of native *Alisma* species.

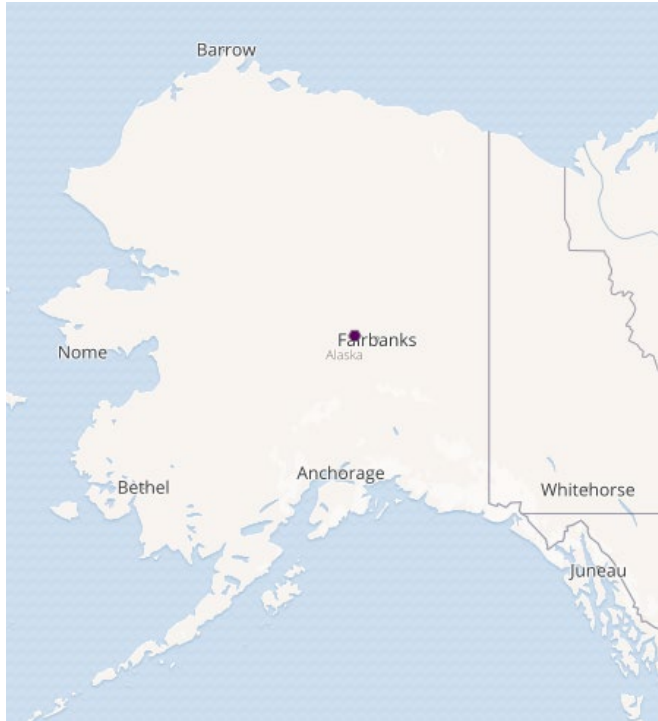


Figure 4. Known distribution of *Alisma plantago-aquatica* in Alaska. Map from GBIF Secretariat (2021).

7 Climate Matching

Summary of Climate Matching Analysis

The climate match for *Alisma plantago-aquatica* was high across much of the United States, with the highest matches occurring in the Midwest and along the Pacific Coast. The only medium-low matches occurred in the Sonoran Desert, the Lower Mississippi Basin east into Alabama, and in central Maine and New Hampshire. The overall Climate 6 score (Sanders et al. 2018; 16 climate variables; Euclidean distance) for the contiguous United States was 0.848, indicating a high overall climate match. (Scores of 0.103 and greater are classified as a high match.) Louisiana had a low individual Climate 6 score, and Alabama and Mississippi were the only States with medium individual Climate 6 scores. All other States had high individual Climate 6 scores.

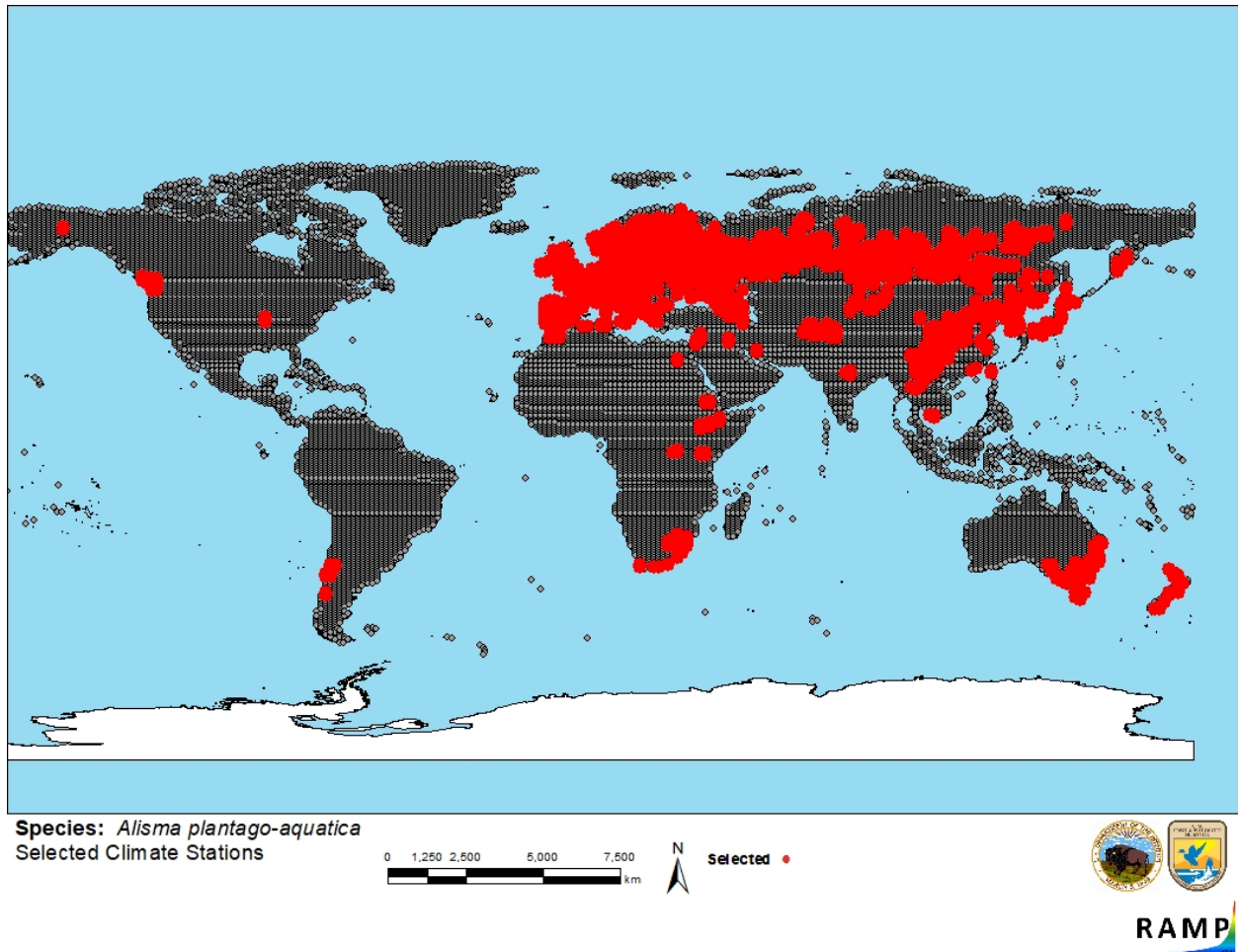


Figure 5. RAMP (Sanders et al. 2018) source map showing global weather stations selected as source locations (red; United States, Canada, Chile, Argentina, South Africa, Mozambique, Democratic Republic of the Congo, Kenya, Ethiopia, Eritrea, Egypt, Morocco, Algeria, Tunisia, Israel, Jordan, Syria, Iraq, Turkey, Azerbaijan, Georgia, Armenia, Iran, Russia, Afghanistan, Tajikistan, Pakistan, India, China [mainland China and Taiwan], Mongolia, North Korea, South Korea, Japan, Myanmar, Thailand, Cambodia, Vietnam, Laos, Australia, New Zealand, all European countries except Moldova) and non-source locations (gray) for *Alisma plantago-aquatica* climate matching. Source locations from Burke Museum Herbarium (2021), GBIF Secretariat (2021), and USGS (2021). Selected source locations are within 100 km of one or more species occurrences, and do not necessarily represent the locations of occurrences themselves.

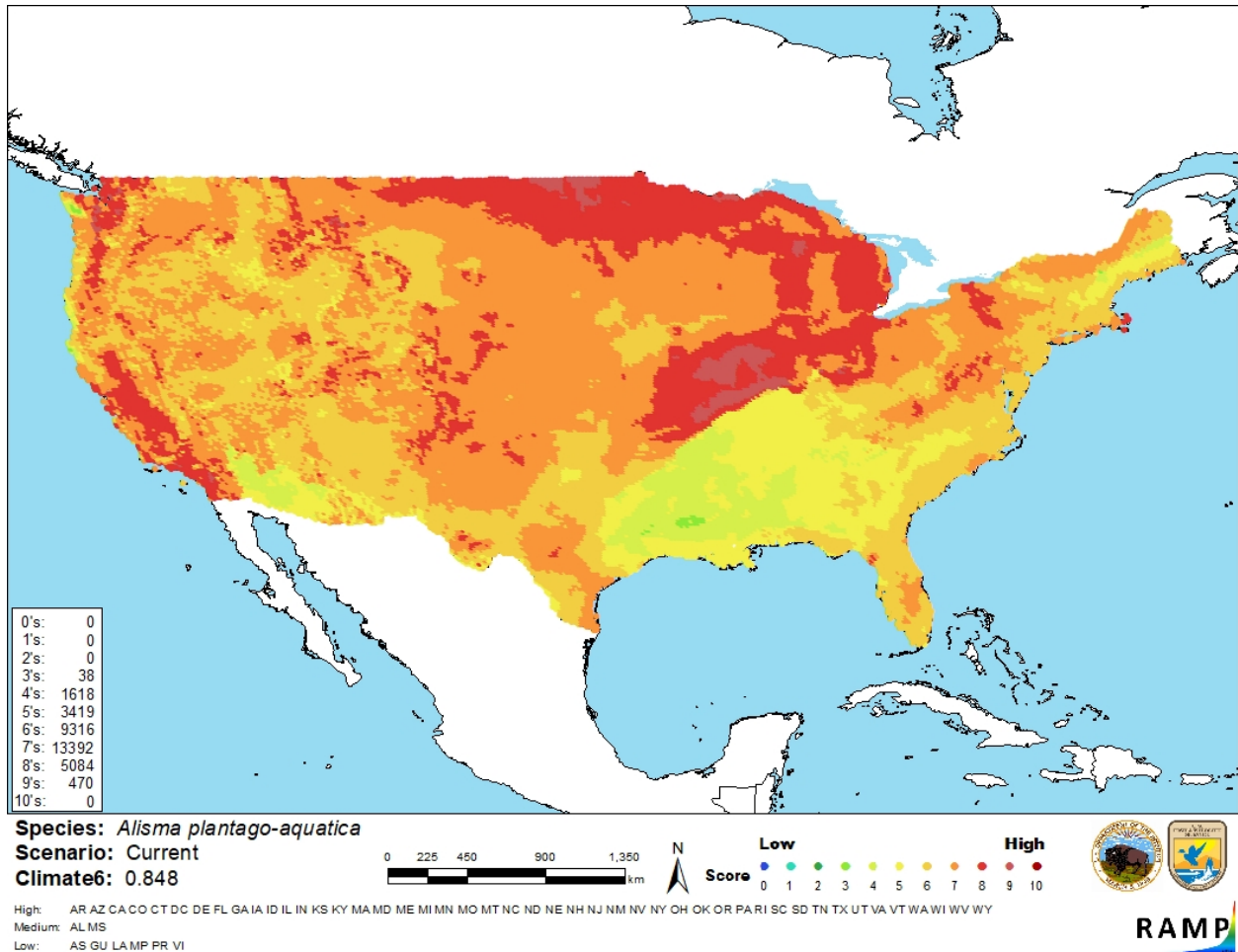


Figure 6. Map of RAMP (Sanders et al. 2018) climate matches for *Alisma plantago-aquatica* in the contiguous United States based on source locations reported by Burke Museum Herbarium (2021), GBIF Secretariat (2021), and USGS (2021). Counts of climate match scores are tabulated on the left. 0/Blue = Lowest match, 10/Red = Highest match.

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

Climate 6: (Count of target points with climate scores 6-10)/ (Count of all target points)	Overall Climate Match Category
$0.000 \leq X \leq 0.005$	Low
$0.005 < X < 0.103$	Medium
≥ 0.103	High

8 Certainty of Assessment

Ample information is available on the biology and ecology of *Alisma plantago-aquatica*, but more information on distribution and impacts of introductions is needed. The information on introductions and distribution within the United States is particularly confusing. Although the taxonomic literature has been consistent since the 1960s in considering *A. plantago-aquatica* as

nonnative to North America, many occurrence data report *A. plantago-aquatica* within North America, in some cases explicitly as a native species (Burke Museum Herbarium 2021). Sources that reported *A. plantago-aquatica* as introduced in the United States were not consistent on the locations where introductions had occurred. Additionally, although several introductions have been reported outside North America, very little information is available on impacts of these introductions or lack thereof. The certainty of this assessment is low.

9 Risk Assessment

Summary of Risk to the Contiguous United States

Alisma plantago-aquatica, European water-plantain, is an emergent aquatic plant native to Europe, northern and eastern Africa, much of Asia, and southeastern Australia. The plant is used in the ornamental trade, particularly in northern Europe, and also for medicinal purposes. Both introduction and trade history in the United States is unclear due to taxonomic redescrptions of the genus in the mid-twentieth century that were not consistently adopted by non-taxonomists. The species has become established in several other countries outside the native range, including Brazil, Chile, South Africa, Zimbabwe, Canada, New Zealand, and additional Australian states. It has been introduced through escaping cultivation and is spread by seeds passing through the digestive systems of birds. *A. plantago-aquatica* is known to be a weed in rice fields, but because very limited information on harm is available from outside the native range, the history of invasiveness is classified as Data Deficient. The climate match to the contiguous United States is high overall, with areas of low to medium match limited to the Sonoran Desert, the Lower Mississippi Basin east into Alabama, and northern New England. The certainty of the assessment is low due to taxonomic confusion and lack of sufficient information on nonnative establishment and impacts. The overall risk assessment category is Uncertain for *A. plantago-aquatica* in the contiguous United States.

Assessment Elements

- **History of Invasiveness (Sec. 4): Data Deficient**
- **Overall Climate Match Category (Sec. 7): High**
- **Certainty of Assessment (Sec. 8): Low**
- **Remarks, Important additional information:** Poisonous if ingested in large quantities.
- **Overall Risk Assessment Category: Uncertain**

10 Literature Cited

Note: The following references were accessed for this ERSS. References cited within quoted text but not accessed are included below in Section 11.

Burke Museum Herbarium. 2021. *Alisma plantago-aquatica* L. Washington Flora Checklist. Seattle: University of Washington. Available: <http://biology.burke.washington.edu/herbarium/waflora/checklist.php?Taxon=Alisma%20plantago-aquatica> (April 2021).

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