Duck Lettuce (*Ottelia alismoides*)

Ecological Risk Screening Summary

U.S. Fish & Wildlife Service, March 2021
Revised, March 2021
Web Version, 7/26/2021

Organism Type: Aquatic plant
Overall Risk Assessment Category: Uncertain

Photo: J.M. Jarg. Licensed under CC BY-SA. Available: https://commons.wikimedia.org/wiki/File:Ottelia_alismoides_W_IMG_0915.jpg. 03/08/2021.

1 Native Range and Status in the United States

Native Range

From Plants of the World Online (2021):

"widespread [sic] throughout India, E. and SE. Asia and northern Australia as well as scattered localities in Europe, W. Asia and North America T2"

"Assam, Bangladesh, Borneo, Cambodia, China North-Central, China South-Central, China Southeast, Hainan, India, Japan, Jawa, Khabarovsk, Korea, Lesser Sunda Is., Malaya, Maluku, Manchuria, Myanmar, Nansei-shoto, Nepal, New Guinea, Northern Territory, Philippines, Primorye, Queensland, Solomon Is., Sri Lanka, Sulawesi, Sumatera, Taiwan, Thailand, Vietnam"

From Pfingstein (2017):

"Tropical and warmer areas of Asia and Australia (Cook and Urmi-König 1984)."

Status in the United States

From Pfingstein (2017):

"Eradicated in California (Turner 1980); unknown status in Arkansas, Florida, Louisiana, Missouri, and Texas."

"*Ottelia alismoides* is a federally listed noxious weed in the United States (USDA 2016) […]"

"Populations in Louisiana are believed to remain localized; a long established colony at Lake Chicot is still only about 18 m² in size (C. Dugas, pers. comm.). Where introduced to ricefields and agricultural irrigation ditches outside of the United States, *Ottelia alismoides* is not considered a serious weed (Cook 1996)."

According to USDA (2021), *Ottelia alismoides* is listed as a Class A noxious weed in Alabama, North Carolina, and Vermont, a "Quarantine" species in California and Oregon, "Prohibited" in Massachusetts, and "Invasive aquatic plant" by South Carolina.

Otellia alismoides is listed as a rohibited species in Texas (Texas Parks and Wildlife 2020).

No evidence of trade within the United States could be found.

Means of Introductions in the United States

From Pfingstein (2017):

"Propagules likely hitchhiked to North America with rice seed (Dike 1969). Migratory waterfowl are suspected to have transported propagules of *O. alismoides* to Big Cane Conservation Area in Butler County, Missouri (Yatskievych and Raveill 2001)."

Remarks

Ottelia alismoides is also known as *Stratiotes alismoides* (USDA 2021; World Flora Online 2021). Online database and literature searches were conducted using both valid scientific name and synonym.

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From World Flora Online (2021):

"This name is reported by Hydrocharitaceae as an accepted name in the genus *Ottelia* (family Hydrocharitaceae."

From USDA (2021):

Kingdom: Plantae
  Subkingdom: Tracheobionta
    Superdivision: Spermatophyta
      Division: Magnoliophyta
        Class: Liliopsida
          Subclass: Alismatidae
            Order: Hydrocharitales
              Family: Hydrocharitaceae
                Genus: *Ottelia*
                  Species: *Ottelia alismoides*

Size, Weight, and Age Range

From Pfingstein (2017):

"petioles and leaves combined up to 70 cm long (Cook and Urmi-König 1984)"

"*Ottelia alismoides* is an annual or perennial herb […] (Godfrey and Wooten 1979, Cook and Urmi-König 1984)."

Environment

From Pfingstein (2017):

"Occurs along lake shorelines, marsh ponds, irrigation ditches and stream margins in water ranging from 5 cm to 1 m deep, occasionally floating if uprooted (Cook and Urmi-König 1984)."

"*Ottelia alismoides* requires constant water levels; its vegetation does not tolerate drying out."

Climate

From Jiang and Kadono (2001):

"Ottelia alismoides is a submerged aquatic plant which is widespread in the tropical and warmer regions of Asia, Australasia and a part of Africa […]"

Distribution Outside the United States

Native

From Plants of the World Online (2021):

"widespread throughout India, E. and SE. Asia and northern Australia as well as scattered localities in Europe, W. Asia and North America T2"

"Assam, Bangladesh, Borneo, Cambodia, China North-Central, China South-Central, China Southeast, Hainan, India, Japan, Jawa, Khabarovsk, Korea, Lesser Sunda Is., Malaya, Maluku, Manchuria, Myanmar, Nansei-shoto, Nepal, New Guinea, Northern Territory, Philippines,

Primorye, Queensland, Solomon Is., Sri Lanka, Sulawesi, Sumatera, Taiwan, Thailand, Vietnam"

Introduced

From Plants of the World Online (2021):

"Introduced into: California, Egypt, Iraq, Italy, Louisiana, Sudan, Tanzania"

Means of Introduction Outside the United States

No information available.

Short Description

From Yatskievych and Raveill (2001):

"*Ottelia alismoides* is a short-stemmed, robust, submerged aquatic with large, long-petiolate, mostly ovate-cordate leaves resembling those of a plantain (*Plantago*) or water plantain (*Alisma*). The long-pedunculate, 1-flowered, emergent inflorescences are enclosed basally in a spathe with several undulate wings or ribs. The usually perfect flowers have 3 showy (2-3 cm long) white to pale pink petals."

From Pfingstein (2017):

"**Stem/Roots:** stem small and corm-like, occasionally forked, with fibrous roots (Cook and Urmi-König 1984)."

"**Leaves:** juvenile leaves somewhat linear, becoming oblanceolate, ovate or broadly cordate with maturity (Godfrey and Wooten 1979). Largest leaves from 11 to 16 cm long, their bases tapering to meet the petioles. Petioles of varying lengths (potentially up to 50 cm). Lower margins of leaves and edges of petioles often shallowly serrated to sharply toothed (Cook and Urmi-König 1984). Conspicuous longitudinal ribbing and cross-ribbing on the upper surface of the leaves gives a quilted effect (Cook et al. 1984)."

"**Flowers:** wrapped within spathes, cylindrical structures 2-4 cm long, composed of green bracts that are ornamented with 3 or more ruffled wings. Spathes born on long, angled stalks that become spiraled after flowering. Sepals and short-lived petals of male flowers exert from the tip of the spathe just above the water surface. Spathes containing female and/or bisexual flowers are self-fertile and remain submersed. Petals white, pink, blue or purple, often tinged with yellow at the base (Cook and Urmi-König 1984)."

"**Fruit/Seeds:** fleshy, encapsulated fruits contain as many as 2000 seeds (Cook and Urmi-König 1984)"

Biology

From Pfingstein (2017):

"*Ottelia alismoides* is an annual or perennial herb, rooted, and completely submersed"

"Occurs along lake shorelines, marsh ponds, irrigation ditches and stream margins in water ranging from 5 cm to 1 m deep, occasionally floating if uprooted (Cook and Urmi-König 1984). *Ottelia alismoides* can tolerate moderate water level fluctuations, but fluctuations greater than 0.75 m may decrease viability (Yu and Yu 2009). It will act as an annual in ephemeral ponds and ditches, as *O. allismoides* does not have perrenating organs such as turions (Cook and Urmi-König 1984). In waters deeper than 0.8 m, the submerged flowers do not open (cleistogamous) and will self-fertilize if bisexual (Cook and Urmi-König 1984)."

"Seeds may remain viable for up to four years (Kaul 1978). Cook noted that fish prefer to eat the seeds, but it is unknown how this affects germination (Cook and Urmi-König 1984). Seeds will germinate in 25-30 °C, and germination may be influenced by light availability and burial depth, but substratum (mud or sand) and oxygen availability had no significant effect (Yin et al. 2013)."

Human Uses

From Sumithira et al. (2017):

"A [sic] clinical trials, extract of *Ottelia alismoides* cured two cases of bilateral tuberculosis of cervical lymph glands within 3 months. Results suggest *Ottelia alismoides* to be a promising medicinal herb with anti-tubercular effect."

"Ottelione A, isolated from the fresh water plant *Ottelia alismoides*, is among the most potent natural product that possess in vitro antiproliferative activity, with an IC50 in the pM-nM range against 60 human cancer cell lines. Study established the relationship of antimitotic ottelione against tubulin and various cancer cell lines. [Chang et al. 2012]"

"In conclusion, this review confirms the potency of *Ottelia alismoides* is used as an important ingredient in various ailments just on the basis of its traditional medicinal uses."

"The plants are used to improve the water quality in fish ponds by capturing floting [sic] mud particles. The petioles and leaves are eaten as a vegetable with excellent flavour; the leaves are used in Thailand for seasoning rice. The fruit is also edible. The plant is used in the treatment of haemorrhoids and applied as the poultice against fever. It is also grown as an aquarium plant."

Diseases

No information available.

Threat to Humans

From Pfingstein (2017):

"*Ottelia alismoides* is a federally listed noxious weed in the United States (USDA 2016)"

3 Impacts of Introductions

According to USDA (2021), *Ottelia alismoides* is listed as a Class A noxious weed in Alabama, North Carolina, and Vermont, a "Quarantine" species in California and Oregon, "Prohibited" in Massachusetts, and "Invasive aquatic plant" by South Carolina. Documented impacts of this species' introductions were not available. The following pertains to ***potential*** impacts:

From Yatskievych and Raveill (2001):

"In addition to the possibility that *O. alismoides* may spread to natural wetlands in the southern portion of the state, the potential exists for this species to invade rice fields in Missouri's Bootheel."

From Van Dyke (2021):

"It reproduces solely by seeds, is slow to spread, and is generally not considered a top invasive plant in the United States. It is, however, a Federally Listed Noxious Weed."

4 History of Invasiveness

Ottelia alismoides has been documented as introduced in Egypt, Iraq, Italy, Sudan, Tanzania, and the United States. Status of the introductions outside of the United States are unknown however some small localized populations have become established in the United States. Introductions in the United States are believed to be a result of transported rice shipments from Asia and have prompted *Ottelia alismoides* to be federally listed as a noxious weed in the United States. Impacts of introductions for this species are unknown; therefore, the history of invasiveness is classified as Data Deficient.

5 Global Distribution

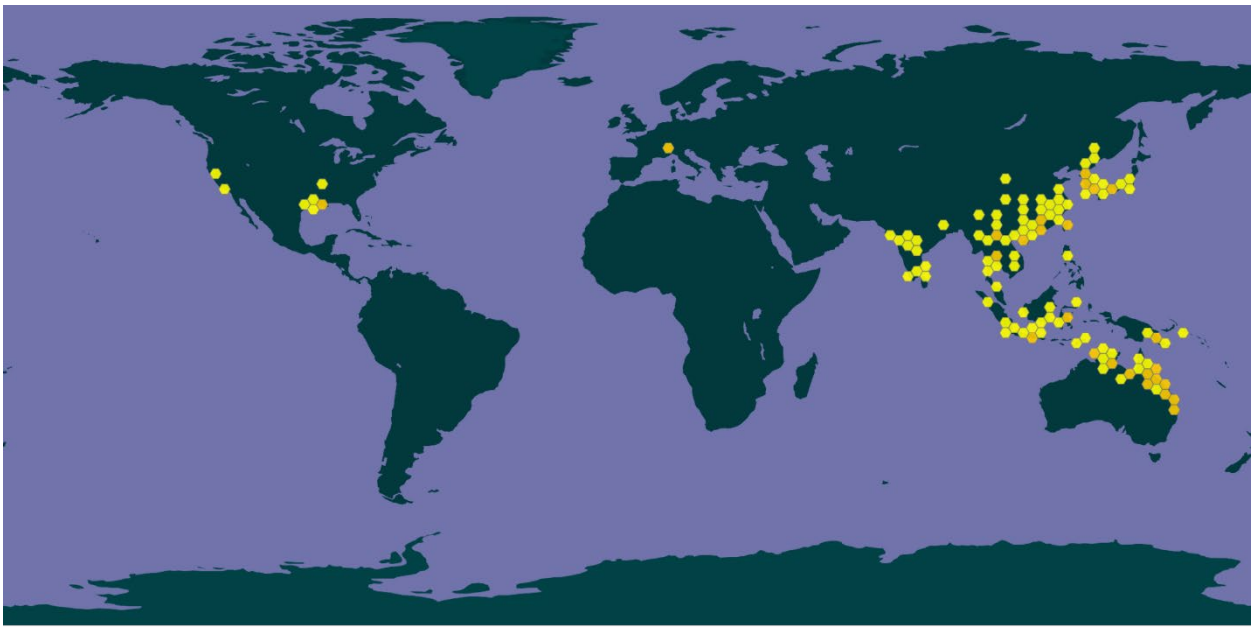

Figure 1. Known global distribution of *Ottelia alismoides*. Observations are reported from Northern Australia, India, Japan, Southeast Asia, Italy, and the United States. Map from GBIF Secretariat (2021). Reported locations in California and Italy are not believed to be representative of an established population and were not used in climate matching analysis.

6 Distribution Within the United States

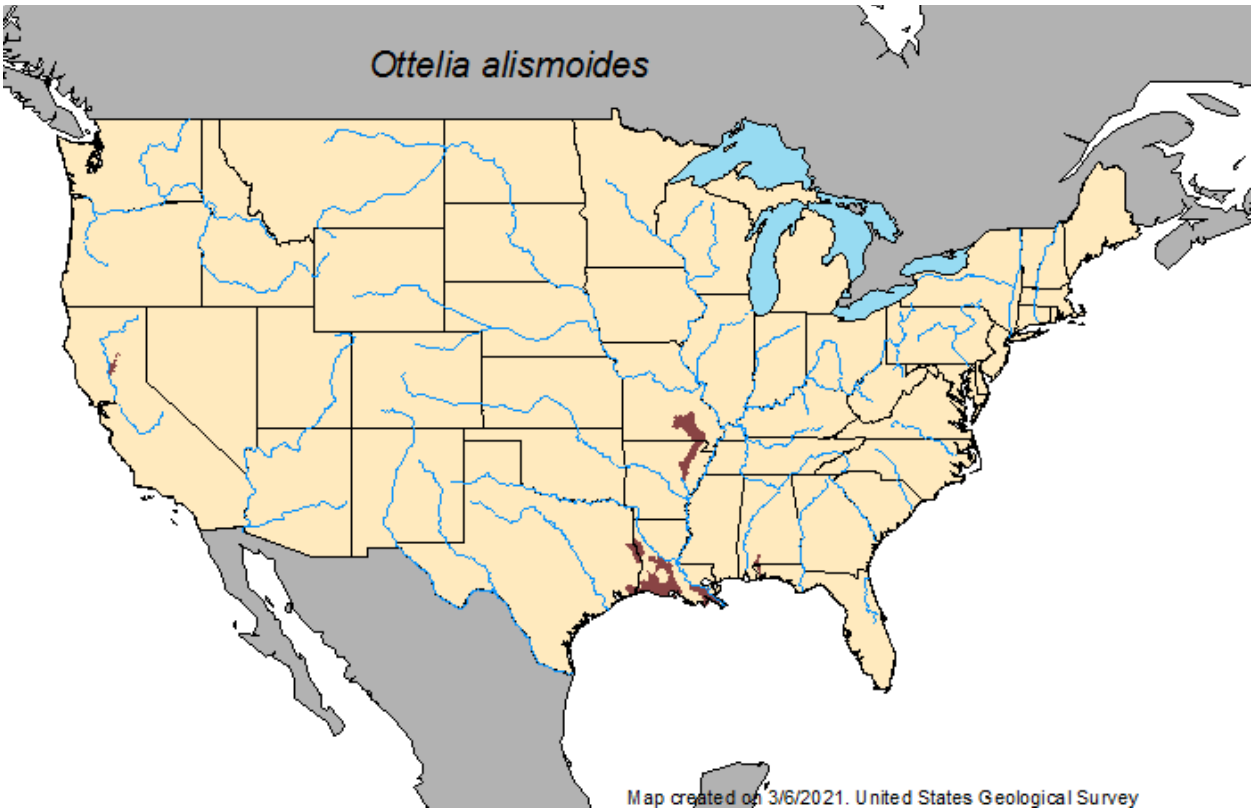

Figure 2. Known distribution of *Ottelia alismoides* in the United States by hydrologic unit. Map from Pfingstein (2017). Hydrologic Unit Codes where *Ottelia alismoides* has been reported are colored red.

7 Climate Matching

Summary of Climate Matching Analysis

Medium to high climate match was found throughout the majority of the United States with most high match found in the southeast and gulf coast plain. Low match was found in small areas of the northeast and in the pacific northwest. The overall Climate 6 score (Sanders et al. 2018; 16 climate variables; Euclidean distance) for the contiguous United States was 0.536, High (scores above 0.103, inclusive, are classified as high). Iowa, Massachusetts, and Michigan registered medium Climate 6 scores while the following states had low individual Climate 6 scores: California, Idaho, Maine, New Hampshire, Nevada, Oregon, Rhode Island, Utah, Vermont, and Washington.

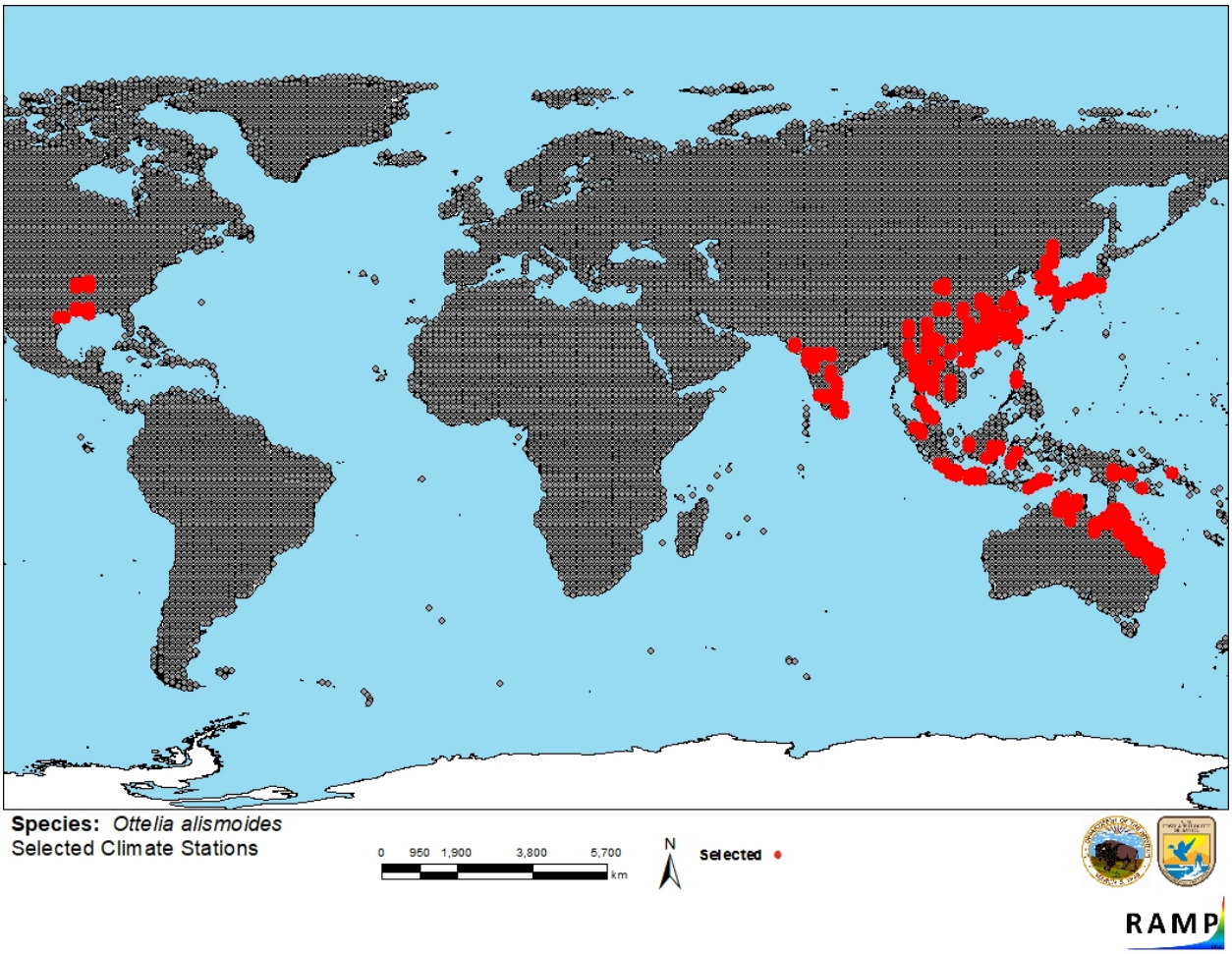

Figure 2. RAMP (Sanders et al. 2018) source map showing weather stations in Northern Australia, Japan, Korea, China, India, Southeast Asia, and the United States selected as source locations (red) and non-source locations (gray) for *Ottelia alismoides* climate matching. Source locations from GBIF Secretariat (2021). Selected source locations are within 100 km of one or more species occurrences, and do not necessarily represent the locations of occurrences themselves.

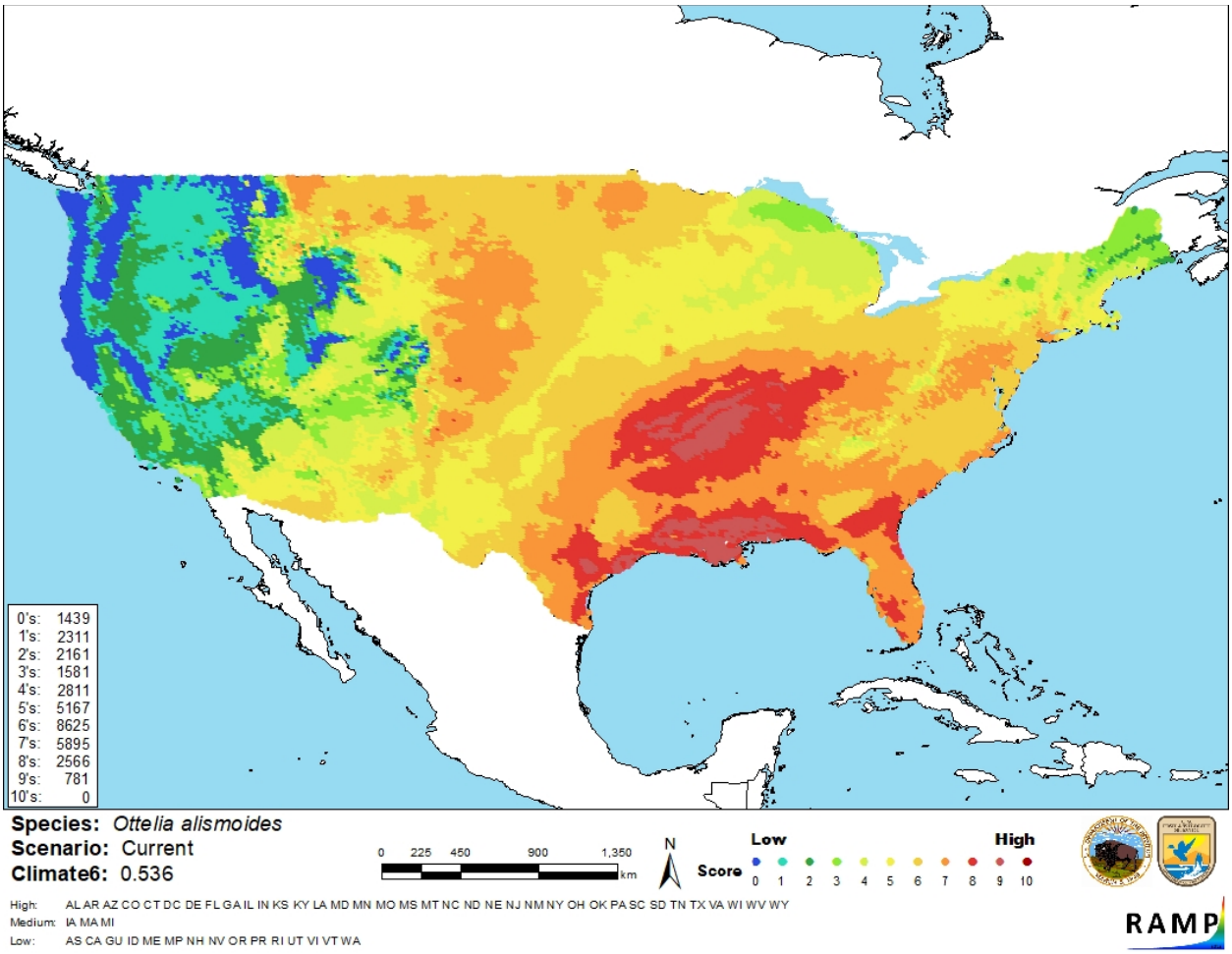

Figure 3. Map of RAMP (Sanders et al. 2018) climate matches for *Ottelia alismoides* in the contiguous United States based on source locations reported by GBIF Secretariat (2021). Counts of Climate Match scores are tabulated on the left. 0/Blue = Lowest match, 10/Red = Highest match.

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≤X≤0.005	Low
0.005<X<0.103	Medium
≥0.103	High

8 Certainty of Assessment

There is adequate information available on the biology and distribution of *Ottelia alismoides*. On the contrary, information pertaining to impacts of introductions are unknown. The certainty of this assessment is therefore classified as Low.

9 Risk Assessment

Summary of Risk to the Contiguous United States

Ottelia alismoides, Duck Lettuce, is an aquatic plant that is native to Southeast Asia, China, India, and northern Australia. This species has been documented outside of its native range in Egypt, Iraq, Italy, Sudan, Tanzania, and the United States. Within the United States *Ottelia alismoides* is listed as a noxious weed by the USDA and is prohibited within a number of states. Although this species is listed as a noxious weed there are data deficiencies with regards to its impacts of introductions, resulting in a history of invasiveness classification of Data Deficient. The climate match score for the contiguous United States is High. The majority of the contiguous United States had medium to high match with areas of low match in the northeast and pacific northwest. The certainty of assessment is classified as Low due to a lack of information relating to its history of invasiveness. The overall risk assessment category is Uncertain.

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: None**
- **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.

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11 Literature Cited in Quoted Material

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

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