

Duck Lettuce (*Ottelia alismoides*)

Ecological Risk Screening Summary

U.S. Fish and Wildlife Service, April 2024

Revised, August 2024

Web Version, 3/31/2025

Organism Type: Flowering Plant

Overall Risk Assessment: Uncertain



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https://commons.wikimedia.org/wiki/File:Ottelia_alismoides_W_IMG_0775.jpg (August 2024).

1 Native Range and Status in the United States

Native Range

From Pfingsten (2025):

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

From POWO (2024):

“Assam [India], Bangladesh, Borneo [Brunei, Indonesia, Malaysia], Cambodia, China North-Central, China South-Central, China Southeast, Hainan [China], India, Japan, Jawa [Indonesia], Khabarovsk [Russia], Korea, Lesser Sunda Is. [Indonesia], Malaya [Malaysia], Maluku [Indonesia], Manchuria [China], Myanmar, Nansei-shoto [Japan], Nepal, New Guinea [Indonesia, Papua New Guinea], Northern Territory [Australia], Philippines, Primorye [Russia], Queensland [Australia], Solomon Is., Sri Lanka, Sulawesi [Indonesia], Sumatera [Indonesia], Taiwan, Thailand, Vietnam”

Status in the United States

According to Pfingsten (2025), *Ottelia alismoides* has been reported as introduced in Arkansas, California, Florida, Louisiana (including established populations in the Mermentau basin and Bayou Teche), Missouri, and Texas.

From Pfingsten (2025):

“Eradicated in California (Turner 1980); unknown status in Arkansas, Florida, Louisiana [presumed to refer to parts of Louisiana other than those mentioned above], Missouri, and Texas.”

“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.).”

From Yatskievych and Raveill (2001):

“In July 2000, a population of *Ottelia [alismoides]* was located in southeastern Missouri by herpetologist Jeff Briggler, who, with other biologists from the Missouri Department of Conservation, was conducting reptile and amphibian surveys in two adjacent artificial wetlands at the Big Cane Conservation Area, in Butler County. These sites had been excavated in 1998 to create marsh habitat for the state-endangered western chicken turtle (*Deirochelys reticularia miaria*). [...] The shallow depressions in sandy soil presently contain a young successional wetland plant community [...] Plants of *Ottelia* originally were noted flowering in the northernmost of the two areas, but a subsequent visit by local botanist Stanton Hudson (who is completing a floristic survey of Butler County) disclosed a few plants in the more southern area as well. Other sites in the vicinity have not been searched yet for the presence of duck lettuce. The Missouri Department of Conservation is preparing to attempt the eradication of plants at the known sites and to survey for the occurrence of duck lettuce in adjacent areas.”

No records of *Ottelia alismoides* in trade in the United States were found.

Regulations

Ottelia alismoides is designated by the U.S. Department of Agriculture as a Noxious Weed (USOFR 2024).

Ottelia alismoides is regulated in Illinois (Illinois DNR 2015), Indiana (Indiana DNR 2022), Louisiana (LDWF 2022), Massachusetts (MDAR 2023), Oklahoma (ODWC 2023), South Carolina (SCDNR 2010), Texas (TPWD 2022), Wisconsin (Wisconsin DNR 2022), and West Virginia (WVDA 2023). Please refer back to state agency regulatory documents for details on the regulations, including restrictions on activities involving this species. While effort was made to find all applicable regulations, this list may not be comprehensive. Notably, it does not include regulations that do not explicitly name this species or its genus or family, for example, when omitted from a list of authorized species with blanket regulation for all unnamed species.

Means of Introductions within the United States

From Pfingsten (2025):

“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).”

“Potential Pathway: hitch hiker on small watercraft”

From Yatskievych and Raveill (2001):

“There is no evidence that propagules of *Ottelia* were transported to the site [in Butler County, Missouri] accidentally on the equipment used for the excavations, so the plants are presumed to have been introduced into the area by migratory waterfowl.”

Remarks

Ottelia alismoides is also known as *Stratiotes alismoides* (USDA 2024; World Flora Online 2024). Online database and literature searches were conducted using both the valid scientific name and synonym.

This ERSS was previously published in July 2021. Revisions were completed to incorporate new information and conform to updated standards.

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From ITIS (2024):

Kingdom Plantae
Subkingdom Viridiplantae
Infrakingdom Streptophyta
Superdivision Embryophyta
Division Tracheophyta
Subdivision Spermatophytina
Class Magnoliopsida
Superorder Lilianae

Order Alismatales
Family Hydrocharitaceae
Genus *Ottelia*
Species *Ottelia alismoides* (L.) Pers.

According to WFO (2024), *Ottelia alismoides* is the current accepted name for this species.

Size, Weight, and Age Range

From Pfingsten (2025):

“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 Pfingsten (2025):

“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).”

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

From Jiang and Kadono (2001):

“*Ottelia alismoides* grew best in nutrient-rich water with mud substratum. The optimal water depth for the growth of the species was approximately 50 cm compared with 20 and 90 cm. However, the reproductive allocation and seed set rate did not change much in different nutrient and water depth conditions.”

Climate

From Pfingsten (2025):

“Tropical and warmer areas [...]”

From POWO (2024):

“[...] grows primarily in the wet tropical biome.”

Distribution Outside the United States

Native

From Pfingsten (2025):

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

From POWO (2024):

“Assam [India], Bangladesh, Borneo [Brunei, Indonesia, Malaysia], Cambodia, China North-Central, China South-Central, China Southeast, Hainan [China], India, Japan, Jawa [Indonesia], Khabarovsk [Russia], Korea, Lesser Sunda Is. [Indonesia], Malaya [Malaysia], Maluku [Indonesia], Manchuria [China], Myanmar, Nansei-shoto [Japan], Nepal, New Guinea [Indonesia, Papua New Guinea], Northern Territory [Australia], Philippines, Primorye [Russia], Queensland [Australia], Solomon Is., Sri Lanka, Sulawesi [Indonesia], Sumatera [Indonesia], Taiwan, Thailand, Vietnam”

Introduced

From POWO (2024):

“Introduced into: [...] Egypt, Iraq, Italy, [...] Sudan, Tanzania”

From El Moghraby et al. (1986):

“The diversity and range of aquatic taxa in the Nile System seem to be increasing. In April 1984 we found *Ottelia alismoides* at ed Deim (at the Sudanese-Ethiopian borders) and in a pool in the bed of River Dinder. [...] In 1985 *P. crispus*, *P. pectinatus* and *O. alismoides* were encountered near el Guneid [...]”

From El-Ghani and Fawzy (2006):

“In certain instances they [water bodies at five oases of the Western Desert of Egypt] are devoid of vegetation, while in others an extensive growth of water plants such as *Ottelia alismoides*, *Zannichellia palustris* and *Lemna gibba* may occur.”

From Al-Saadi and Al-Mousawi (1988):

“Other common hydrophytes in the neighbourhood of the studied area [Al-Hammar marsh, Iraq] include: [...] *Ottelia alismoides* [...]”

From Brunel (2009):

“*Ottelia alismoides* (Hydrocharitaceae) [...] has naturalized in Italy since 1952 (Piacco, 1952) [...]”

No further information was found on the status of *Ottelia alismoides* in 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 Pfingsten (2025):

“**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 Pfingsten (2025):

“*Ottelia alismoides* is an annual or perennial herb, rooted, and completely submersed (Godfrey and Wooten 1979; Cook and Urmi-König 1984).”

“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* [sic] does not have perrenating [sic] 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 floating [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.”

Brunel (2009) reports a total of 10 *Ottelia alismoides* plants imported into the Netherlands for aquarium use throughout the year 2006. The same study found no import records for the species in nine other countries in the European and Mediterranean Plant Protection Organization (France, Latvia, Estonia, Czech Republic, Germany, Hungary, Austria, Turkey, Switzerland, Israel) for a similar time frame.

Diseases

No information was found on diseases associated with *Ottelia alismoides*.

Threat to Humans

No information available.

3 Impacts of Introductions

From Pfingsten (2025):

“The impacts of this species are currently unknown, as no studies have been done to determine how it has affected ecosystems in the invaded range. The absence of data does not equate to lack of effects. It does, however, mean that research is required to evaluate effects before conclusions can be made.”

From Van Dyke (2024):

“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.”

The following pertains to **potential** impacts of *Ottelia alismoides*:

From CAIP (2024):

“Potential impacts include inhibiting recreational activities, degrading water quality, and reducing biodiversity. It could also cause problems in rice production.”

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.”

Ottelia alismoides is regulated in the following U.S. States: Illinois (Illinois DNR 2015), Indiana (Indiana DNR 2022), Louisiana (LDWF 2022), Massachusetts (MDAR 2023), Oklahoma (ODWC 2023), South Carolina (SCDNR 2010), Texas (TPWD 2022), Wisconsin (Wisconsin DNR 2022), West Virginia (WVDA 2023). *Ottelia alismoides* is also designated by the U.S. Department of Agriculture as a Noxious Weed (USOFR 2024). See section 1.

4 History of Invasiveness

The History of Invasiveness for *Ottelia alismoides* is classified as Data Deficient. *O. alismoides* has been documented as introduced in Egypt, Iraq, Italy, Sudan, Tanzania, and the United States. There is evidence to suggest at least localized population establishment in most of these locations. Although there is concern for negative impacts of introduction of *O. alismoides*, no documented impacts of introductions were found.

5 Global Distribution

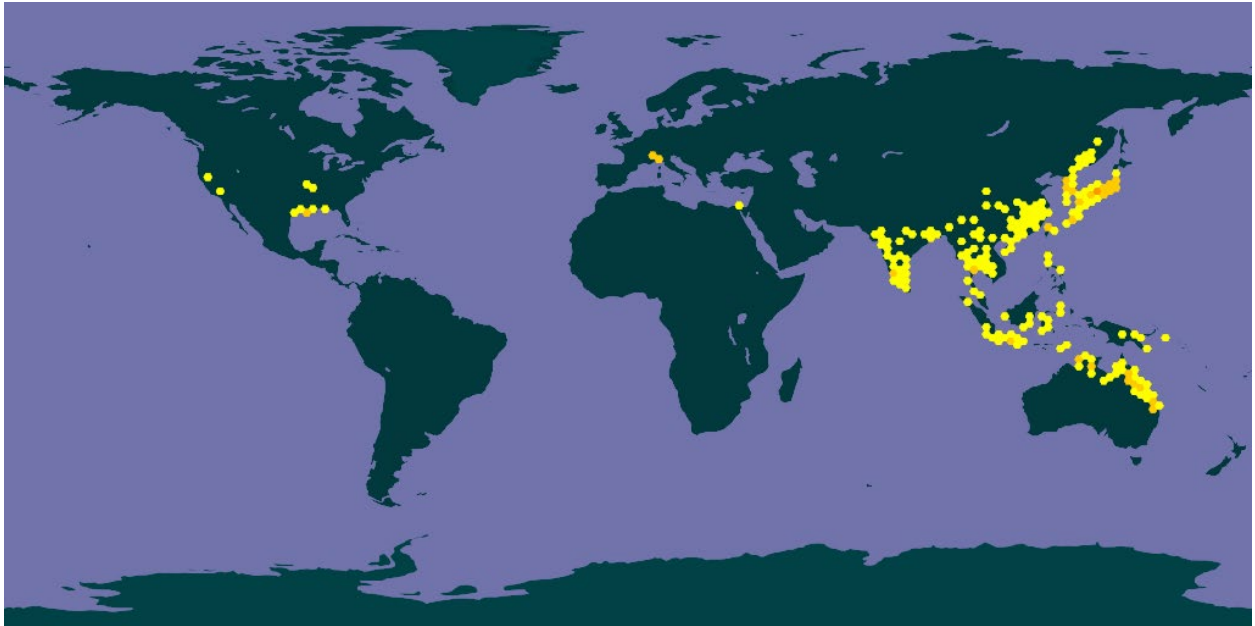


Figure 1. Reported global distribution of *Ottelia alismoides*. Map from GBIF Secretariat (2024). Observations are reported from Northern Australia, India, Japan, Southeast Asia, Italy, Egypt, and the United States. Except for southern Louisiana, reported locations in the United States are not known to represent established populations and were not used to select source locations for the climate matching analysis. The northernmost point in central China was a country centroid rather than an exact occurrence location and was not used to select source locations for the climate matching analysis.

No georeferenced occurrences were found for established nonnative populations in Iraq and Sudan, or for parts of the native range in Nepal and Malaysia.

6 Distribution Within the United States

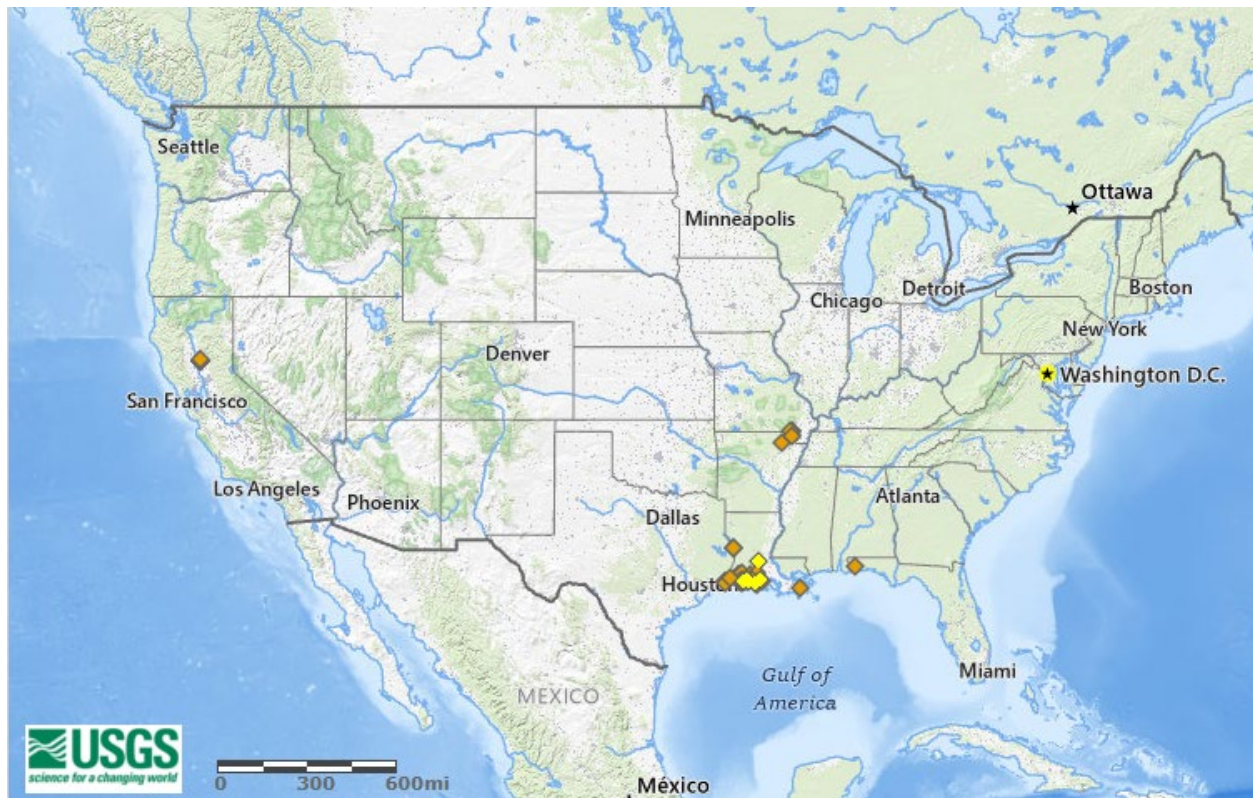


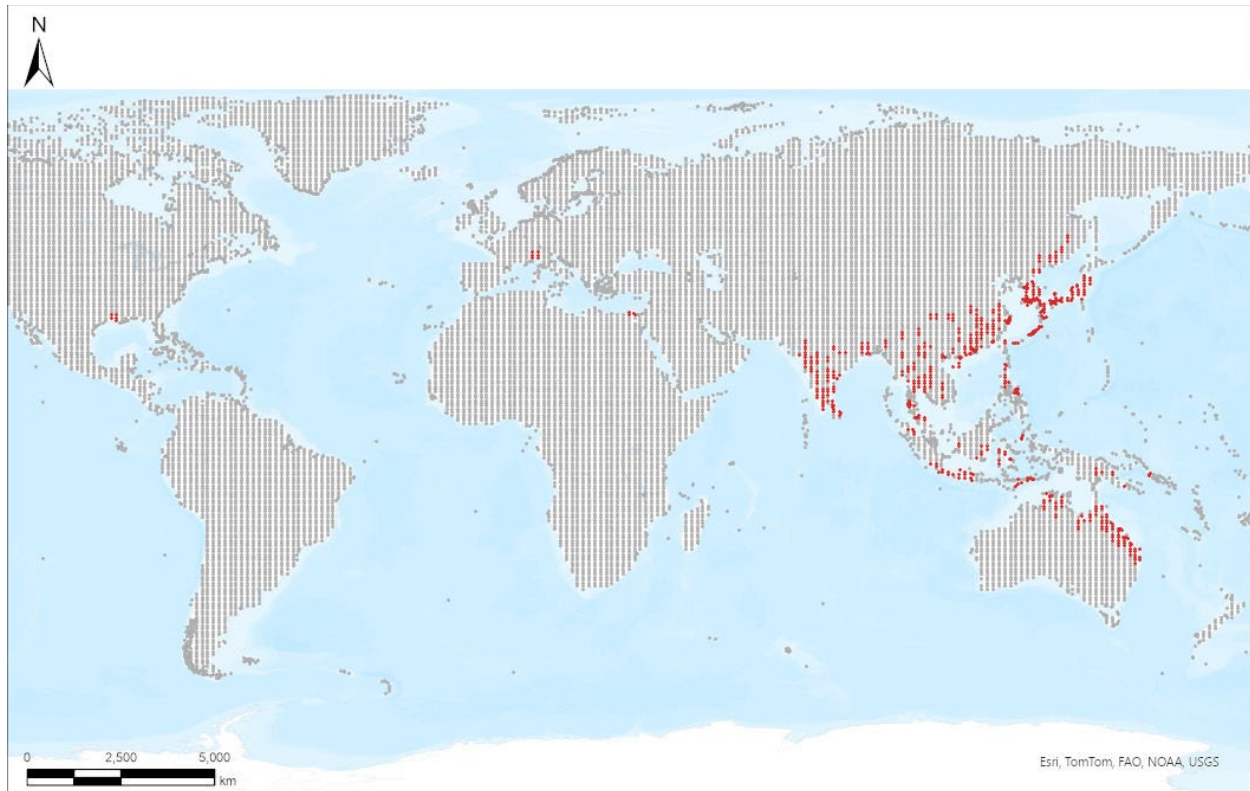
Figure 2. Reported distribution of *Ottelia alismoides* in the United States. Map from Pflingsten (2025). Observations are reported from California, Missouri, Arkansas, Louisiana, Texas, and Florida. Only the observations from southern Louisiana, highlighted in yellow, were used in the climate matching analysis because the status of populations in other U.S. locations is unknown.

7 Climate Matching

Summary of Climate Matching Analysis

The climate match for *Ottelia alismoides* was high along the Gulf Coast, Florida peninsula, and the Southern Atlantic Coast. Additional areas of high match were found in the Northern Plains, southern California, and in a band stretching from Texas to the southern Great Lakes. Most of the rest of the contiguous United States east of the Rocky Mountains showed medium climate match. Low climate matches were observed primarily in the Great Basin and along the Pacific Coast, with medium-low matches in the Rocky Mountains and northern New England. The overall Climate 6 score (Sanders et al. 2023; 16 climate variables; Euclidean distance) for the contiguous United States was 0.762, indicating that Yes, there is establishment concern for this species. The Climate 6 score is calculated as: $(\text{count of target points with scores} \geq 6) / (\text{count of all target points})$. Establishment concern is warranted for Climate 6 scores greater than or equal to 0.002 based on an analysis of the establishment success of 356 nonnative aquatic species introduced to the United States (USFWS 2024).

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



Species: *Ottelia alismoides*

Selected Climate Stations ●



RAMP

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Figure 3. RAMP (Sanders et al. 2023) source map showing weather stations throughout the world selected as source locations (red; Australia, Papua New Guinea, Indonesia, Thailand, Laos, Vietnam, Myanmar, the Philippines, Japan, North Korea, South Korea, Taiwan, China, India, Russia, Italy, Egypt, United States) and non-source locations (gray) for *Ottelia alismoides* climate matching. Source locations from GBIF Secretariat (2024). Selected source locations are within 100 km of one or more species occurrences, and do not necessarily represent the locations of occurrences themselves.

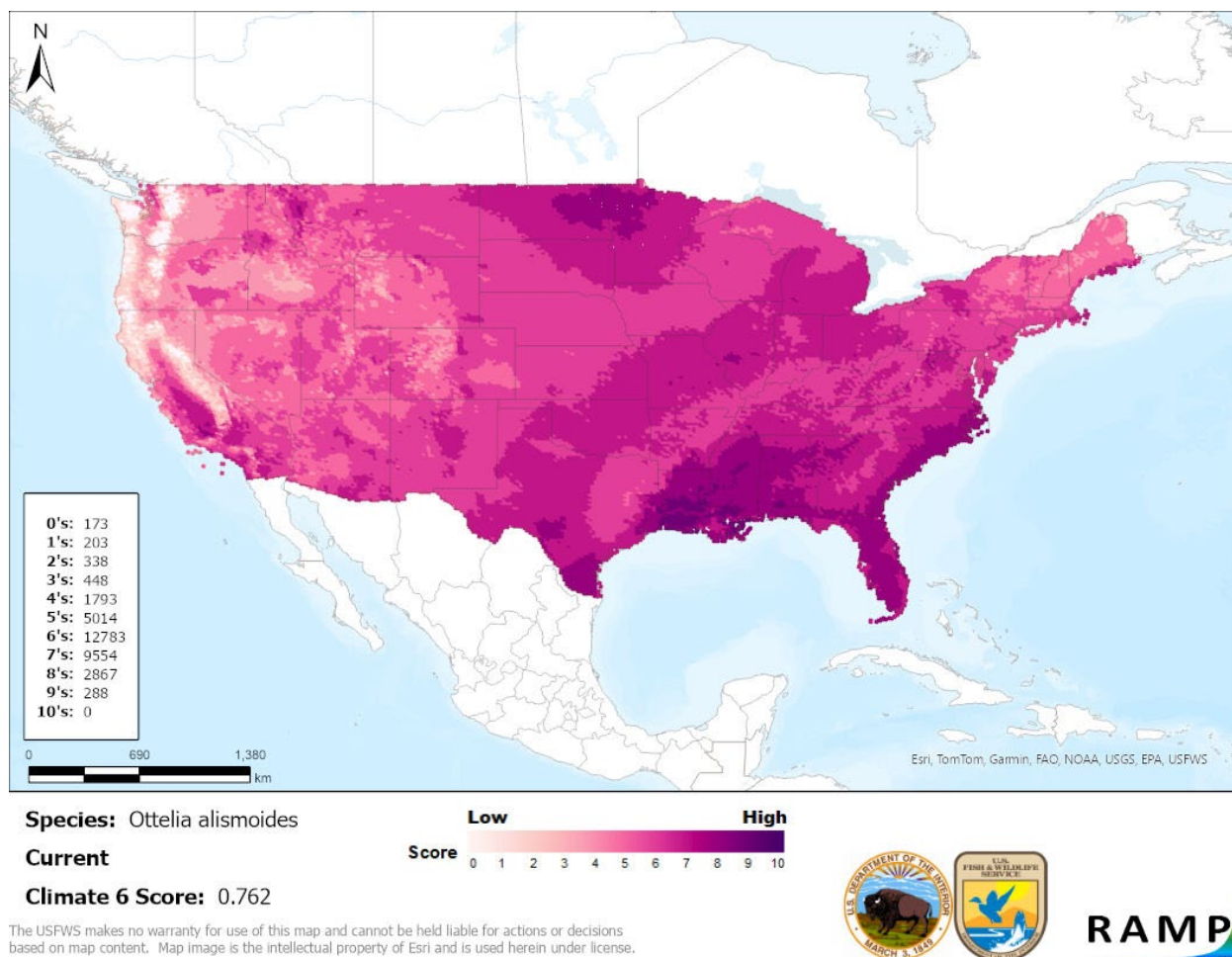


Figure 4. Map of RAMP (Sanders et al. 2023) climate matches for *Ottelia alismoides* in the contiguous United States based on source locations reported by GBIF Secretariat (2024). Counts of climate match scores are tabulated on the left. 0/Pale Pink = Lowest match, 10/Dark Purple = Highest match.

8 Certainty of Assessment

The Certainty of Assessment for *Ottelia alismoides* is classified as Low. There is adequate information available on the biology and distribution of *O. alismoides*, but no information documenting observed impacts of introductions (or lack thereof) was found.

9 Risk Assessment

Summary of Risk to the Contiguous United States

Ottelia alismoides, Duck Lettuce, is a submergent aquatic plant that is native to freshwaters in southern and eastern Asia and Australia. *O. alismoides* can have an annual or perennial lifecycle depending on the climate, and reproduces only by seed. It has been introduced to Africa, Europe, and at least six U.S. states; established populations are present in Louisiana, Italy, Egypt, Iraq, Sudan, and possibly Tanzania. There is little information available on historical pathways of introduction, although hitchhiking on construction equipment, watercraft, waterfowl, and with

rice seed have all been proposed as potential pathways. The species is rare but present in the global aquarium trade. *O. alismoides* is federally listed as a Noxious Weed, and is also regulated in at least nine U.S. states; there is concern that the species will negatively affect recreational activities, ecosystem functions, and rice production. However, the History of Invasiveness for *O. alismoides* is classified as Data Deficient because there is no information to determine the observed, actual impact from introduced and established populations. The climate matching analysis for the contiguous United States indicates establishment concern for this species. Climate match was highest along the Gulf and Southern Atlantic Coasts. The Certainty of Assessment is classified as Low due to lack of information on impacts caused by introductions. The Overall Risk Assessment Category for *Ottelia alismoides* in the contiguous United States is Uncertain.

Assessment Elements

- **History of Invasiveness (see Section 4): Data Deficient**
- **Establishment Concern (see Section 7): Yes**
- **Certainty of Assessment (see Section 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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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 (2024).

Under the future climate scenarios (figure A1), on average, high climate match for *Ottelia alismoides* was projected to occur consistently in the Southern Atlantic Coast region of the contiguous United States. In time step 2050, there were also areas of high match in the Southeast and the Great Lakes. Areas of low climate match were projected to occur in the Northern Pacific Coast region and along the Sierra Nevada. The Climate 6 scores for the individual future scenario models (figure A2) ranged from a low of 0.584 (model: UKESM1-0-LL, SSP5, 2085) to a high of 0.772 (model: MRI-ESM2-0, SSP3, 2085). All future scenario Climate 6 scores were above the Establishment Concern threshold, indicating that Yes, there is establishment concern for this species under future scenarios. The Climate 6 score for the current climate match (0.768, figure 4) falls within 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. Overall, relatively little change was projected to occur at the 2055 time step, but change was projected to be much more widespread at the 2085 time step. Under the 2085 time step, areas within the Appalachian Range, Colorado Plateau, Great Lakes, Mid-Atlantic, Northeast, Northern Pacific Coast, and Western Mountains 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 the 2085 time step, primarily, areas within the Great Basin, Gulf Coast, Northern Plains, Southeast, Southern Atlantic Coast, Southern Florida, Southwest, and Western Mountains saw a moderate decrease in the climate match relative to current conditions. No large decreases were observed regardless of time step and climate scenarios. Additional, very small areas of large or moderate change may be visible on the maps (figure A3).

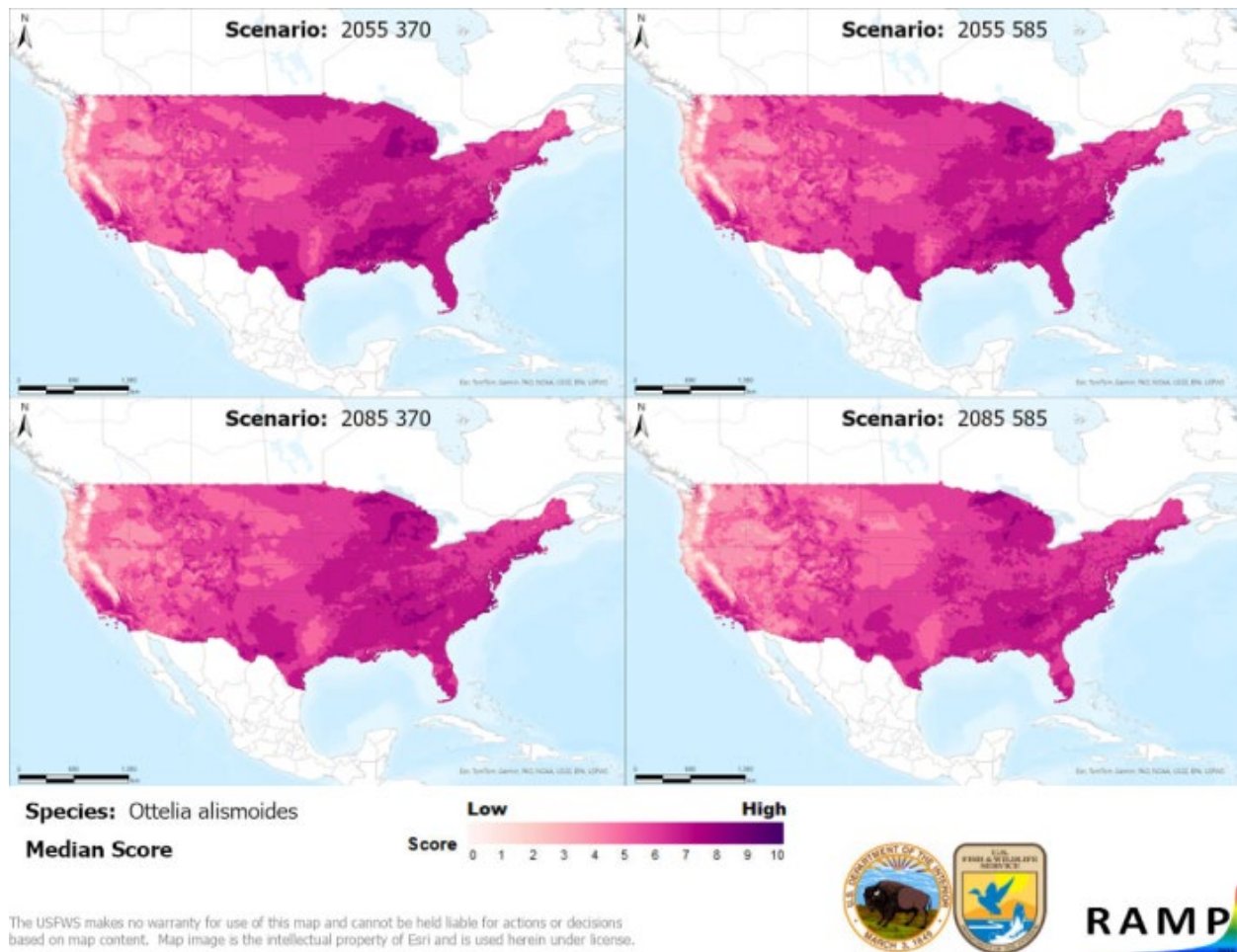


Figure A1. Maps of median RAMP (Sanders et al. 2023) climate matches projected under potential future climate conditions using five global climate models for *Ottelia alismoides* in the contiguous United States. Climate matching is based on source locations reported by GBIF Secretariat (2024). Shared 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.

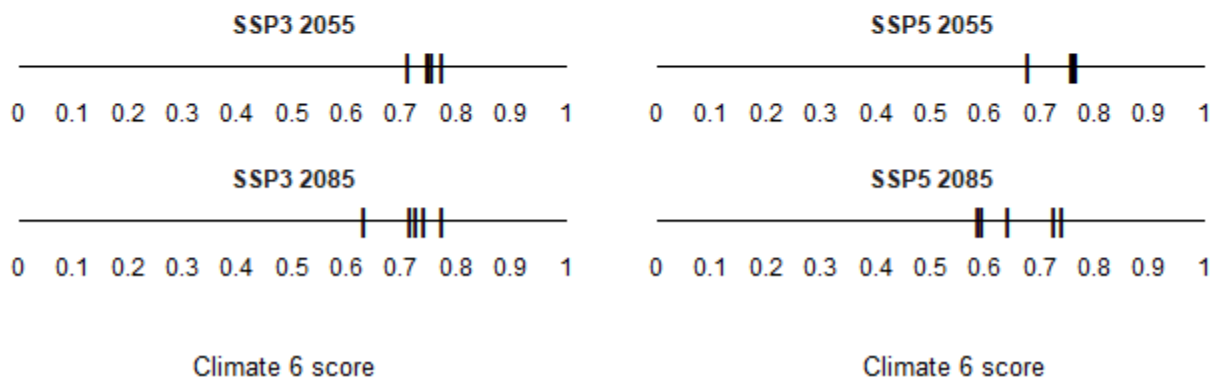


Figure A2. Comparison of projected future Climate 6 scores for *Ottelia alismoides* in the contiguous United States for each of five global climate models under four combinations of Shared Socioeconomic Pathway (SSP) and time step. SSPs used (from left to right): SSP3, SSP5 (Karger et al. 2017, 2018;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

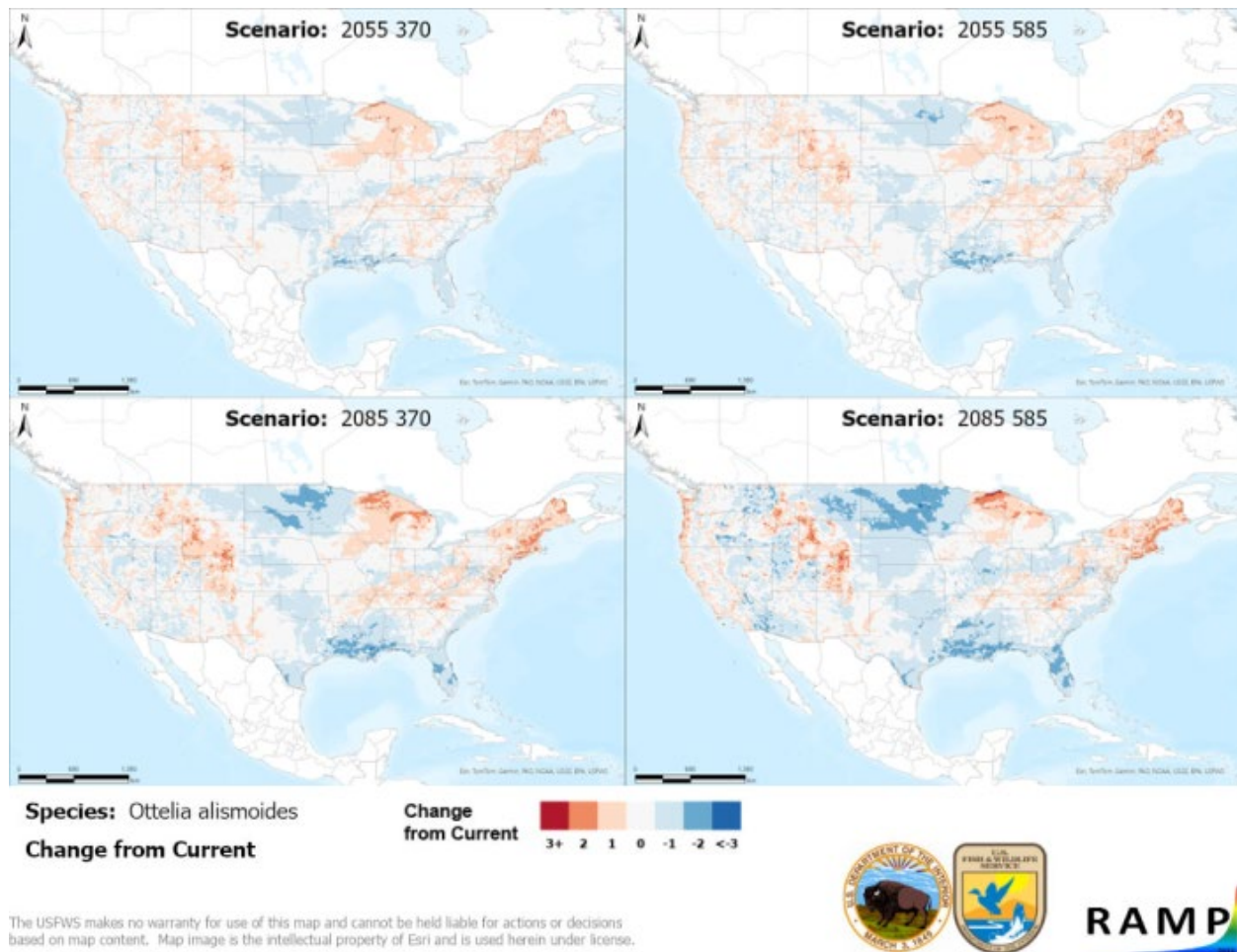


Figure A3. RAMP (Sanders et al. 2023) maps of the contiguous United States showing the difference between the current climate match target point score (figure 4) and the median target point score for future climate scenarios (figure A1) for *Ottelia alismoides* based on source locations reported by GBIF Secretariat (2024). 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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