Eichhornia heterosperma (a water hyacinth, no common name)

Ecological Risk Screening Summary

U.S. Fish & Wildlife Service, February 2021
Revised, February 2021
Web Version, 7/28/2021

Organism Type: Plant
Overall Risk Assessment Category: Uncertain

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1 Native Range and Status in the United States

Native Range

From Govaerts (2017):

"Brazil Southeast, Mexico Southeast, Brazil Northeast, Guyana, French Guiana, Venezuela, Brazil North, Costa Rica, El Salvador, Nicaragua, Panamá, Cuba, Trinidad-Tobago, Ecuador, Brazil West-Central, Bolivia, Colombia, Suriname"

Status in the United States

No records of *Eichhornia heterosperma* in trade or in the wild in the United States were found.

All *Eichhornia* species are listed as prohibited aquatic plants in Florida (Florida Department of State 2008).

Means of Introductions in the United States

No records of *Eichhornia heterosperma* in the wild in the United States were found.

Remarks

From Barrett (1988):

"*Eichhornia heterosperma*, first described in 1939 from Venezuela by Alexander (Smith, 1939) and very similar in vegetative traits to *E. azurea*, is widely distributed in Central and South America and is misidentified in most collections (Horn, 1987)."

Information for this assessment was searched for using the valid name *Eichhornia heterosperma* and the synonym *Pontederia heterosperma*.

The following section refers to a proposed, but not yet accepted, taxonomic revision regarding the genus *Eichhornia*.

From Pellegrini (2017):

"Pontederiaceae is now composed by four genera (i.e. *Eichhornia*, *Heteranthera*, *Monochoria* and *Pontederia*). However, since *Eichhornia* is hopelessly paraphyletic (Eckenwalder and Barrett 1986, Graham and Barrett 1995, Kohn et al. 1996, Barret and Graham 1997, Graham et al. 1998, Ness et al. 2011), accepting the broader *Pontederia* s.l. (including *Eichhornia*, *Monochoria* and *Pontederia* s.s.) seems to be the best taxonomic option, instead of pulverizing *Eichhornia* into several monospecific genera. With the recognition of *Pontederia* s.l., the family would be composed by only two monophyletic genera. Both genera are also morphologically coherent and easyly [*sic*] recognized, both in field and herbarium material."

From Pellegrini et al. (2018):

"Here, we present a total evidence phylogeny for Pontederiaceae, based on plastid and morphological data, in order to recircumscribe *Pontederia* to include *Eichhornia* and *Monochoria* and provide an identification key to the genera in Pontederiaceae. We also present a synopsis for *Pontederia s.l.*, with an updated description for the genus, propose five new subgenera, provide an identification key to the accepted subgenera of *Pontederia* and provide identification keys to the species of each subgenus."

"[…] it is our opinion that a broader sense of *Pontederia* should be accepted, instead of elevating each *Eichhornia* lineage (i.e. the herein proposed subgenera) to the generic rank."

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

According to the World Flora Online (2021), *Eichhornia heterosperma* (Alexander 1939) is the current valid name for the species.

From GBIF Secretariat (2021):

Kingdom Plantae
Phylum Tracheophyta
Class Liliopsida
Order Commelinales
Family Pontederiaceae
Genus *Einhornia* Kunth
Species *Eichhornia heterosperma* Alexander

Size, Weight, and Age Range

General size, weight and age data were not available.

Environment

From Barrett (1988):

"*Eichhornia heterosperma* commonly occurs in shallow lakes and ponds."

From Colonnello (2005):

"[…] *Eichhornia heterosperma* [can be observed] in the middle of the current."

From Areces-Mallea et al. (1999):

"[…] In slightly oligotrophic to eutrophic water […]"

Climate

From Barrett (1988):

"Neotropics"

From Machado-Filho et al. (2021):

"Tropical"

Distribution Outside the United States

Native

From Govaerts (2017):

"Brazil Southeast, Mexico Southeast, Brazil Northeast, Guyana, French Guiana, Venezuela, Brazil North, Costa Rica, El Salvador, Nicaragua, Panamá, Cuba, Trinidad-Tobago, Ecuador, Brazil West-Central, Bolivia, Colombia, Suriname"

Introduced

No records of introductions were found for *Eichhornia heterosperma.*

Means of Introduction Outside the United States

No records of introductions were found for *Eichhornia heterosperma.*

Short Description

From Barrett (1988):

"Over most of the range of *E. heterosperma* and *E. diversifolia*, populations are composed of a single floral phenotype with a mid-length style and one set of anthers positioned just above the stigma and another below […]."

"Field studies of *E. heterosperma* in Venezuela […] have revealed a different pattern of floral variation. In both species a second floral phenotype can be found in populations […] The two phenotypes differ in style length, style coloration, pollen size, and the relative positions of their reproductive parts […]."

"In […] *E. heterosperma* the styles of the two semi-homo- styles are pigmented to different degrees with the semi-homostylous L phenotype being […] pink (*E. heterosperma*) and the semi-homostylous M phenotype light pink or white. In *E. heterosperma*, the two morphs can also differ in perianth color, with the semi-homostylous L phenotype possessing dark blue tepals and the M phenotype pale blue tepals."

From Horn (1987):

"Perennial, rooted in mud. Vegetative stem elongate, developing to and growing at the water surface; flowering stem glabrous, 1.5-5 cm long. Sessile leaves alternate, linear, acuminate at apex, 6-11 cm long; petiolate leaves emersed, the blade round to oval, 3-9 cm long, 1.2-6.2 cm wide, with an obtuse to acute apex and truncate to obtuse base; petiole 6-14 cm long. Inflorecence [sic] a spike with 4-14 flowers, all opening the same day; peduncle glabrous or nearly so, 1.2-4 cm long; spathe linear to obovate, 1.8-4 cm long. Flowers chasmogamous; perianth blue, the tube 10-18 mm long, the lobes obtuse to acute at apex, 8-10 mm long, with entire margins, the upper lobes dark at base; upper stamens 5.0-8.8 mm long, and lower 11-15 mm long, the anthers 1.0-1.3 mm long; homostylous. Seeds 1.5-1.9 mm long, 0.7-1.1 mm wide with 11-15 longitudinal wings."

Biology

From Barrett (1988):

"*Eichhornia heterosperma* commonly occurs in shallow lakes and ponds. Its abundance in the highly seasonal environments of the Llanos of Venezuela and in the caatinga of northeast Brazil indicates that it is capable of withstanding habitat desiccation, presumably as rhizomes or seed."

"Populations of *E. diversifolia* and *E. heterosperma* that contain the two semi-homostylous phenotypes are largely self-pollinating, and it seems unlikely that the residual polymorphisms have any functional significance."

"Major breeding system: Semi-homostylous
Chromosome Number (n) : 15
Life Form: floating-leaved aquatic, perennial
Clonal Propogation: ++"

Human Uses

No information was found regarding the sale of *E. heterosperma* for ornamental or other uses. However, some research has been conducted to determine the use of *E. heterosperma* for water purification and remediation in hypereutrophic systems.

From Eckert et al. (2020):

"This exceptional high ability for nutrient and heavy metal uptake makes *Eichhornia heterosperma* an appropriate candidate for bioremediation in reservoirs."

From Velez et al. (2013):

"Aquatic plants (*E.crassipes, E.azurea, E.heterosperma*) are a type of macrophytes [sic], which help debugging contaminated effluents. The continued growth and proliferation of these plants, which are considered as a weed, can be used to develop materials for biofuels. […] The characterization of the materials showed that it is possible to develop a solid biofuel from compressed biomass, systematically increasing the density and some thermochemical properties of each kind of macrophyte and some plant materials."

Diseases

No information available.

Threat to Humans

No information available.

3 Impacts of Introductions

No records of introductions were found for *Eichhornia heterosperma*; therefore, there is no information on impacts of introduction.

All *Eichhornia* species are listed as prohibited aquatic plants in Florida (Florida Department of State 2008).

4 History of Invasiveness

The History of Invasiveness of *Eichhornia heterosperma* is classified as No Known Nonnative Population. The species has not been reported as introduced outside its native range. This species is not currently in trade.

5 Global Distribution

Figure 1. Known global distribution of *Eichhornia heterosperma*. Observations are reported from Central and South America as well as Cuba. Map from GBIF Secretariat (2021).

No georeferenced observations were available to represent the populations in Trinidad and Tobago.

6 Distribution Within the United States

No records of *Eichhornia heterosperma* in the wild in the United States were found.

7 Climate Matching

Summary of Climate Matching Analysis

The climate match for much of the contiguous United States was low. Areas of high match were found along the Gulf Coast and Florida's Atlantic Coast. Areas of medium match were found

from southern Texas, east to southeastern Virginia. There were a couple very small areas of medium match in southern Arizona and California. The overall Climate 6 score (Sanders et al. 2018; 16 climate variables; Euclidean distance) for the contiguous United States was 0.045, medium. (Scores between 0.005 and 0.103 are classified as medium.) The following states had high individual Climate 6 scores: Alabama, Florida, Georgia, Louisiana, Mississippi, and South Carolina. North Carolina and Texas had medium individual Climate 6 scores and the remaining States had low scores.

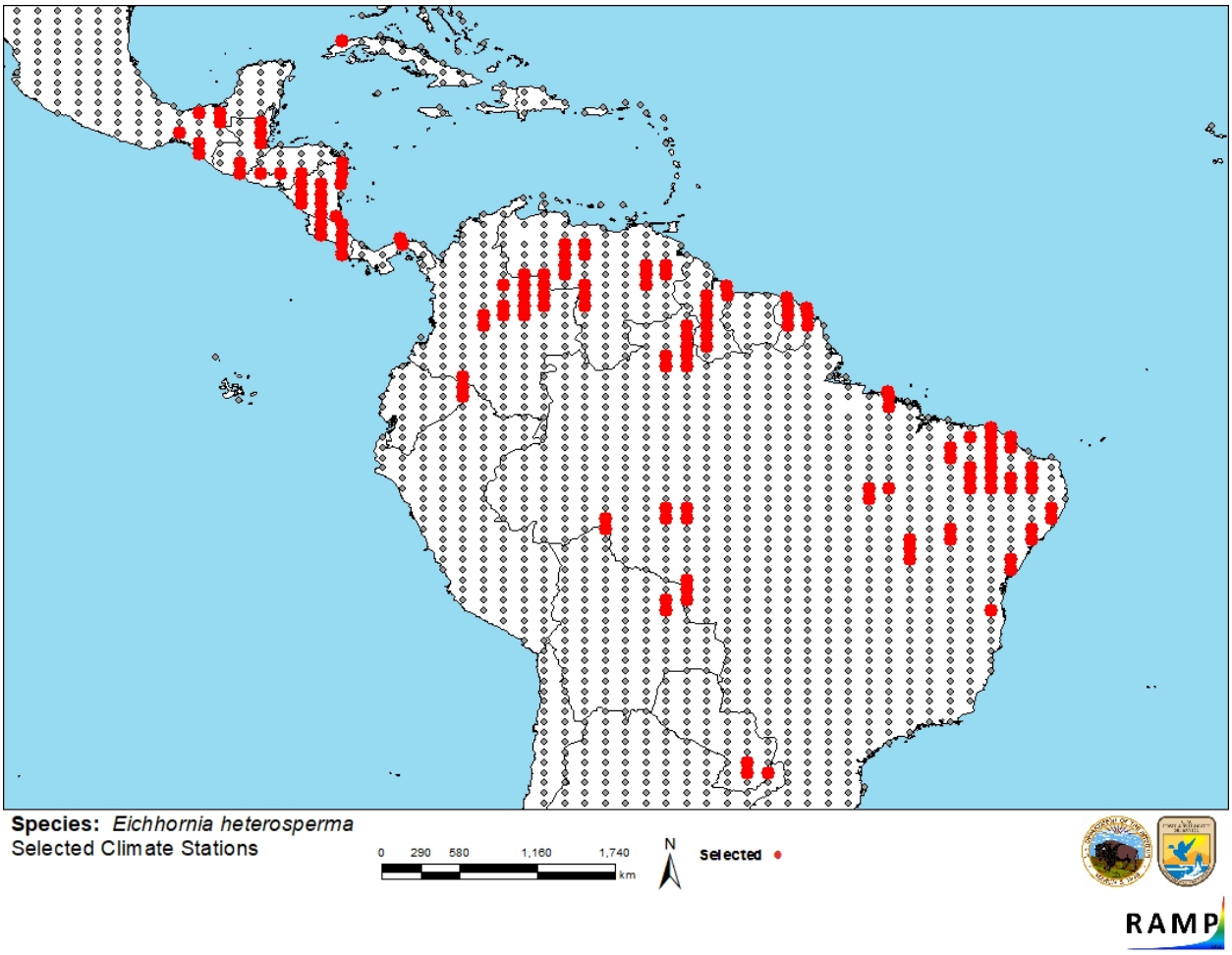

Figure 2. RAMP (Sanders et al. 2018) source map showing weather stations in Central and South America and Cuba selected as source locations (red; Cuba, Mexico, Belize, Guatemala, El Salvador, Nicaragua, Costa Rica, Panama, Colombia, Venezuela, Brazil, Guyana, French Guiana, Ecuador, Bolivia, and Paraguay) and non-source locations (gray) for *Eichhornia heterosperma* 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.

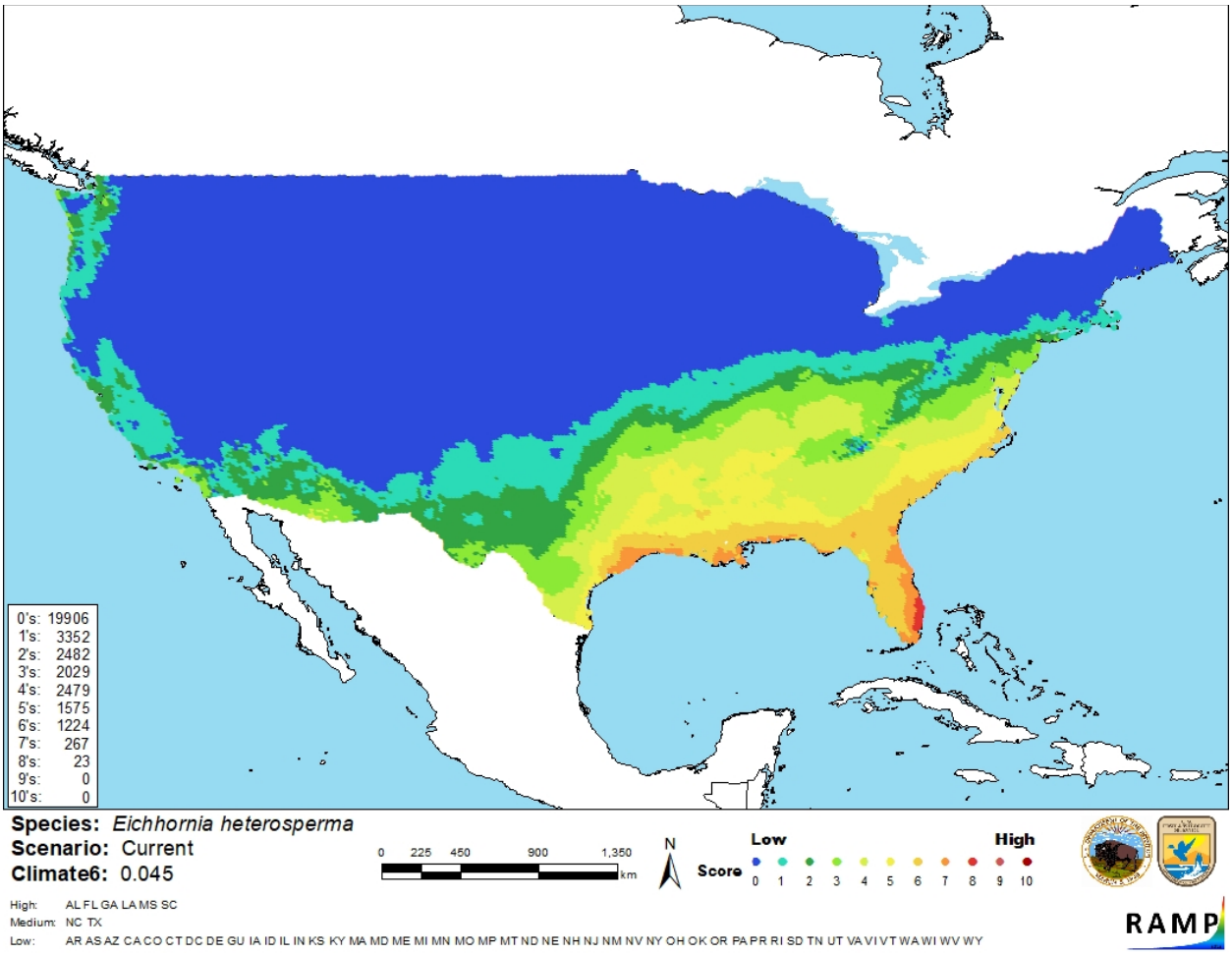

Figure 3. Map of RAMP (Sanders et al. 2018) climate matches for *Eichhornia heterosperma* in the contiguous United States based on source locations reported by GBIF Secretariat (2021). Counts of climate match scores are tabulated on the left. 0/Blue = Lowest match, 10/Red = Highest match.

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

The certainty of assessment is low. There were no records of introductions found, so impacts of introduction are unknown. There is currently a proposed, but not yet accepted, taxonomic revision for the genus *Eichhornia* to be combined with and under the name *Pontederia.* The species has also been misidentified as a congener in the literature. Furthermore, the bulk of the

scientific literature for this species was not available in English, further reducing certainty of assessment.

9 Risk Assessment

Summary of Risk to the Contiguous United States

Eichhornia heterosperma is a water hyacinth native to South and Central America (Brazil, Mexico, Guyana, French Guiana, Venezuela, Costa Rica, El Salvador, Nicaragua, Panamá, Cuba, Trinidad-Tobago, Ecuador, Bolivia, Colombia, and Suriname). *E. heterosperma* is being investigated for used in water purification and remediation. *Eichhornia* species are prohibited aquatic plants in Florida. There is no indication *E. heterosperma* is in trade or has been introduced outside of its native range. History of invasiveness is classified as No Known Nonnative Population. The overall climate match with the contiguous United States for *E. heterosperma* was medium, with high and medium matches along the coast from Texas to southern Virginia. Certainty of assessment is Low due to lack of information. The overall risk assessment category for *Eichhornia heterosperma* is Uncertain.

Assessment Elements

- **History of Invasiveness (Sec. 4): No Known Nonnative Population**
- **Overall Climate Match Category (Sec. 7): Medium**
- **Certainty of Assessment (Sec. 8): Low**
- **Remarks/Important additional information:** Prohibited in Florida.
- **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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World Flora Online. 2021. *Eichhornia heterosperma* Alexander. World Flora Online – a project of the World Flora Online Consortium. Available: http://www.worldfloraonline.org/taxon/wfo-0000401793 (February 2021).

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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Eckenwalder JE, Barrett SCH. 1986. Phylogenetic systematics of Pontederiaceae. Systematic Botany 11:373–391.

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