Amazon Sword (*Echinodorus paniculatus*)

Ecological Risk Screening Summary

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

Organism Type: Plant
Overall Risk Assessment Category: Uncertain

Photo: James Lucas. Licensed under CC BY-NC-SA 4.0 Available: https://www.gbif.org/occurrence/1914192773. (February 2021).

1 Native Range and Status in the United States

Native Range

According to Rataj (1968), this species is native to Mexico, Panama, Colombia, Venezuela, British Guiana [Guyana], Ecuador, Bolivia, Brazil, Paraguay, and Argentina.

From GBIF Secretariat (2021):

"Llanura del Caribe, Orinoquia, Valle del Cauca [Colombia]"

Status in the United States

No records of *Echinodorus paniculatus* established in the wild in the United States were found.

This species is listed as present in Florida (CABI Data Mining 2011 in CABI 2019) but no further information was found in the scientific literature.

This species is available in trade in the United States. It can be purchased online through Arizona Aquatic Gardens (2021) for $4.88 – $14.79.

Means of Introductions in the United States

This species has not been reported as established in the wild in the United States.

Remarks

From Flowgrow (2021):

"This species is only rarely in cultivation. However, the name *E. paniculatus* is a household word in aquaristics, as it has been used in trade for many years, namely erroneously for *Echinodorus grisebachii* "bleherae" (= *E. bleheri*). True *Echinodorus paniculatus* sometimes is sold in trade, but then usually not under its real name, but as "*Echinodorus americanus*"."

Information for this assessment was searched for using the valid name *Echinodorus paniculatus* and the synonyms *Echinodorus paniculatus f. latifolius* Chodat & Hassl., *Echinodorus paniculatus var. brevifolius* Hauman, *Echinodorus paniculatus var. dubius* Fassett, *Echinodorus paniculatus var. paniculatus*, and *Sagittaria palifolia f. paniculata* (Micheli) Kuntze.

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

According to World Flora Online (2021), is the current, valid name for this species. It has the following synonyms: *Echinodorus paniculatus f. latifolius* Chodat & Hassl., *Echinodorus paniculatus var. brevifolius* Hauman, *Echinodorus paniculatus var. dubius* Fassett, *Echinodorus paniculatus var. paniculatus*, and *Sagittaria palifolia f. paniculata* (Micheli) Kuntze. According to GBIF Secretariat (2021), *Aquarius paniculatus* (Micheli) Christenh. & Byng is also a synonym, but this name is not listed by World Flora Online (2021).

From CABI (2019):

Domain: Eukaryota
  Kingdom: Plantae
    Phylum: Spermatophyta
      Subphylum: Angiospermae

Class: Monocotyledonae
Order: Alismatales
Family: Alismataceae
Genus: *Echinodorus*
Species: *Echinodorus paniculatus*

Size, Weight, and Age Range

From Rataj (1968):

"Stems longer than the leaves, 40-150 (-200) cm long, 0,3-1,5 cm thick at the base, […]"

From Flowgrow (2021):

"[…] grows up to around one metre high […]"

Environment

From Rataj (1968):

"[…] in water 0-30 cm deep […]"

According to Rataj (1968), there is also a terrestrial form of this species.

From Flowgrow (2021):

"It often inhabits waterbodies strongly influenced by human activities, like e.g. road ditches."

Climate

According to Flowgrow (2021), *E. paniculatus* grows in tropical climates, with air temperatures ranging from 15°C to 30°C.

From Rataj (1986):

"Tropical and subtropical America."

Distribution Outside the United States

Native

According to Rataj (1968), this species is native to Mexico, Panama, Colombia, Venezuela, British Guiana [Guyana], Ecuador, Bolivia, Brazil, Paraguay, and Argentina.

From GBIF Secretariat (2021):

"Llanura del Caribe, Orinoquia, Valle del Cauca [Colombia]"

Introduced
This species is listed as present in the United Kingdom (CABI Data Mining 2011 in CABI 2019) but no further information was found in the scientific literature.

Means of Introduction Outside the United States
No information available.

Short Description
From Flowgrow (2021)

"The emersed form of *E. paniculatus* has long, upright, triangular leaf stalks with rather soft tissue, and lanceolate to narrowly oval leaf blades. The inflorescence develops in emersed plants, grows upright, ramifies, and carries rather large flowers. It usually grows to the same height as the leaf rosette.

The submersed form has band-shaped to narrowly lanceolate leaves and rather long leaf stalks."

Biology
According to Rataj (1968), there is both an aquatic and a terrestrial form of this species.

From Flowgrow (2021):

"It often inhabits waterbodies strongly influenced by human activities, like e.g. road ditches."

Human Uses
International aquarium trade

From Flowgrow (2021):

"This species is only rarely in cultivation. However, the name *E. paniculatus* is a household word in aquaristics, as it has been used in trade for many years, namely erroneously for *Echinodorus grisebachii* "bleherae" (= *E. bleheri*).
True *Echinodorus paniculatus* sometimes is sold in trade, but then usually not under its real name, but as "*Echinodorus americanus*".
Several years ago, a plant was imported into Germany from the farthest east of Bolivia under the name *Echinodorus sp. "Pantanal*". This plant apparently belongs to *E. paniculatus*."

Diseases
Poelen et al. (2014) lists *Echinodorus paniculatus* as host of *Pseudocercospora eupatorii.*

Threat to Humans
No information available.

3 Impacts of Introductions

No verified records of introductions were found for *Echinodorus paniculatus*; therefore, there is no information on impacts of introductions available.

4 History of Invasiveness

The History of Invasiveness category is No Known Nonnative Population. There are vague records of *E. paniculatus* being introduced beyond its native range, but there was no evidence of established populations. This species is available in the ornamental trade, but specific information regarding duration or volume was not available. Misapplication of the name *E. paniculatus* to other species of *Echinodorus* in trade complicate the understanding of the trade history.

5 Global Distribution

Figure 1. Known global distribution of *Echinodorus paniculatus*. Observations are reported from Mexico, Belize, Guatemala, Costa Rica, El Salvador, Nicaragua, Panama, Bolivia, Ecuador, Colombia, Paraguay, Argentina, Brazil, Venezuela, and Peru. Map from GBIF Secretariat (2021). All records refer to *Echinodorus paniculatus*, not any other synonym. All source locations were used for climate match analysis. While Belize, Guatemala, Costa Rica, El Salvador, Nicaragua, and Peru were not explicitly listed as part of the native range of the species they are included in the climate match due to the proximity to the native range.

Occurrences reported in GBIF Secretariat (2021) for Singapore were not included in the climate matching analysis. These occurrences are not known to represent an established population of *E. paniculatus.*

No georeferenced observations in Guyana were available to use in the climate match.

This species is listed as introduced in United Kingdom (CABI Data Mining 2011 in CABI 2019) but no further information was found in the scientific literature. Therefore, it was not added in as a source location for climate match analysis.

6 Distribution Within the United States

This species has not been reported as established in the wild in the United States. This species is listed as introduced in Florida (CABI Data Mining 2011 in CABI 2019) but no further information was found in the scientific literature. Therefore, it was not added in as a source location for climate match analysis.

7 Climate Matching

Summary of Climate Matching Analysis

The climate match for *Echinodorus paniculatus* was generally low for most of the western, northern, and northeastern the contiguous United States. Areas of high match were found along the Gulf Coast, in peninsular Florida, and coastal Georgia. A large area of medium match was found just north of the high match from western Texas to the mid-Atlantic Coast. There were also areas of medium match in the desert southwest, and small patches along the Pacific Coast and Puget Sound. Everywhere else had a low match. The overall Climate 6 score (Sanders et al. 2018; 16 climate variables; Euclidean distance) for the contiguous United States was 0.064. (Scores between 0.005 and 0.103, exclusive, are classified as medium.) The following States had high individual Climate 6 scores: Florida, Georgia, Louisiana, South Carolina, and Texas. Alabama, Mississippi, and North Carolina have medium individual Climate 6 scores. All other States had low individual Climate 6 scores.

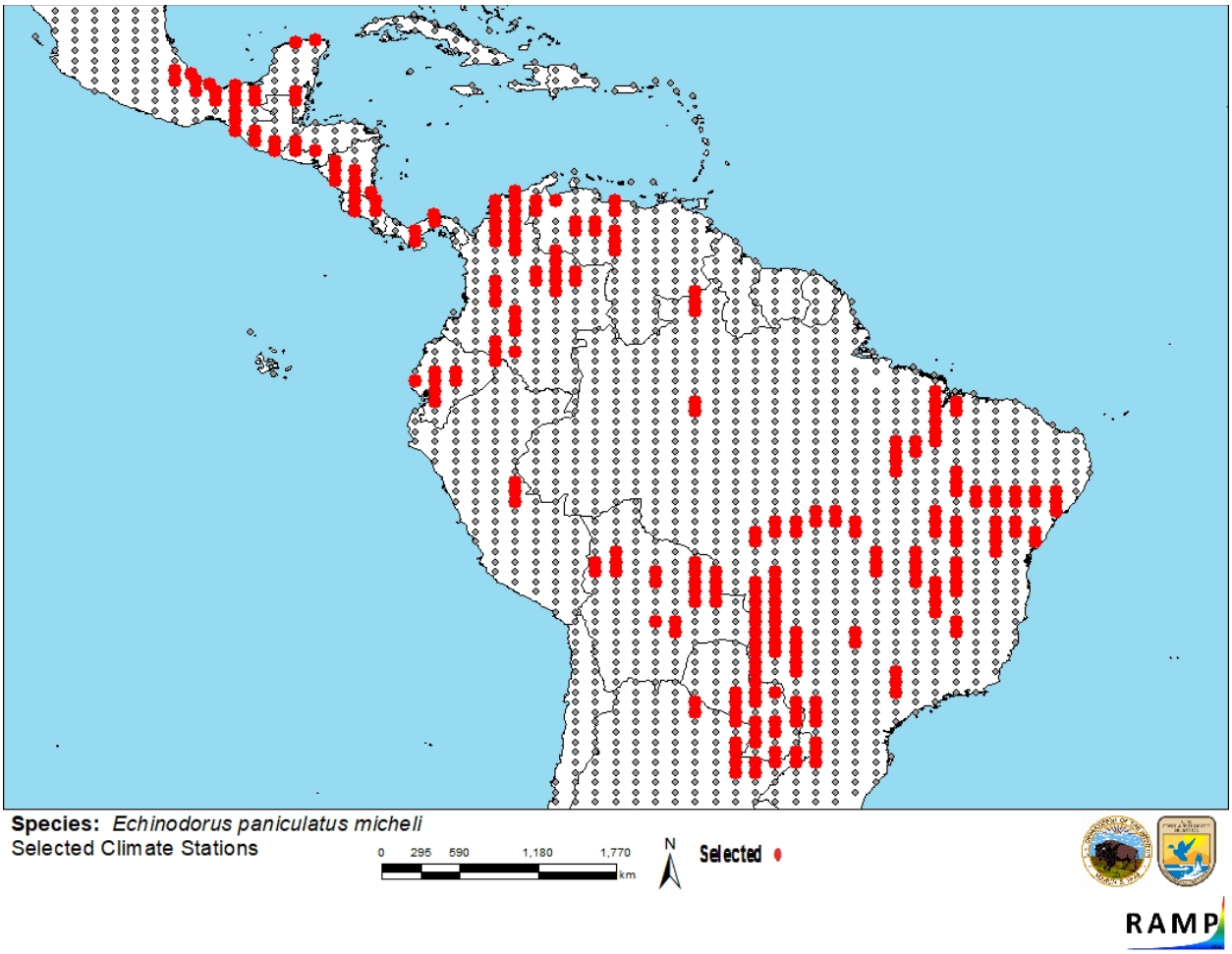

Figure 2. RAMP (Sanders et al. 2018) source map showing weather stations in Central and South America selected as source locations (red: Mexico, Belize, Guatemala, Honduras, Costa Rica, El Salvador, Nicaragua, Panama, Bolivia, Ecuador, Colombia, Paraguay, Argentina, Brazil, Venezuela, and Peru) and non-source locations (gray) for *Echinodorus paniculatus* climate matching. Source locations from GBIF Secretariat (2021). Selected source locations are within 100 km of one or more species occurrences.

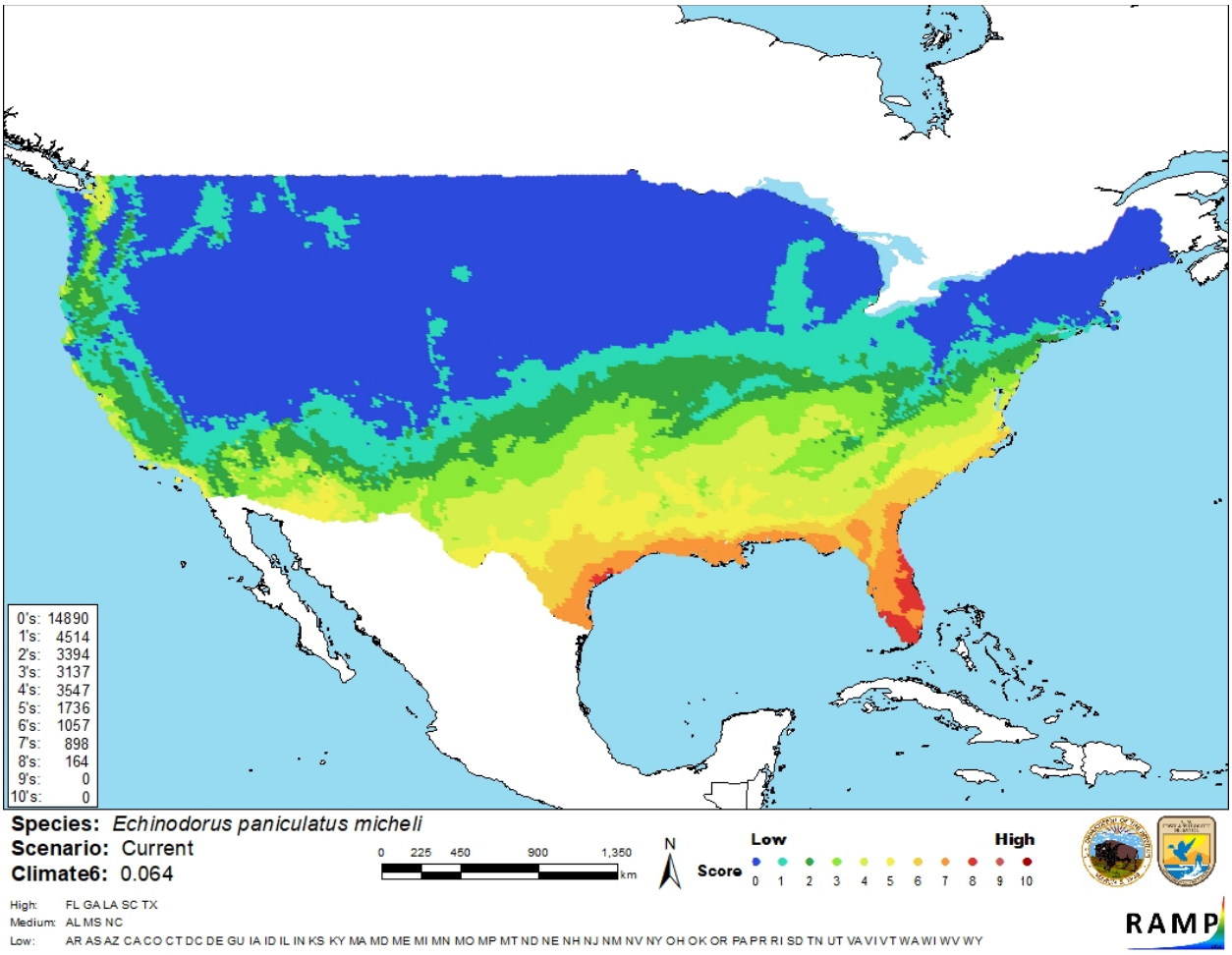

Figure 3. Map of RAMP (Sanders et al. 2018) climate matches for *Echinodorus paniculatus* in the contiguous United States based on source locations reported by GBIF Secretariat (2021). Counts of climate match scores are tabulated on the left. 0/Blue = Low match, 10/Red = High match.

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 some information is available on the biology and distribution of *E. paniculatus*. There are reports in the gray literature regarding introductions, but no further information was found on the status of those introductions and whether they caused any impacts. The bulk of the scientific

literature for this species is not translated into English. Additionally, the species is not always sold under its valid scientific name, making it more difficult to track its trade. Certainty of this assessment is low.

9 Risk Assessment

Summary of Risk to the Contiguous United States

Echinodorus paniculatus, Amazon Sword, is a plant that is native to much of Central and South America. It is sometimes present in the ornamental trade. *E. paniculatus* can be purchased online in the United States. However, sometimes plants sold under this scientific name are another species, and *E. paniculatus* is sometimes sold under a different scientific name, making it difficult to track trade volumes. There are reports of introductions in gray literature, but no peer reviewed studies documenting established non-native populations, or impacts of introductions. The History of Invasiveness is classified as No Known Nonnative Population. The overall climate match for the contiguous United States is medium. There are areas of high and medium match from Virginia to Texas, in the Southwest, and along the Pacific Coast. Everywhere else was low match. The certainty of assessment is low due to lack of data. The overall Risk Assessment Category 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: 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.

Arizona Aquatic Gardens. 2021. Amazon Sword *Echinodorus paniculatus.* Available: https://azgardens.com/product/amazon-sword-echinodorus-paniculatus/ (February 2021).

[CABI] CAB International. 2019. *Echinodorus paniculatus*. CABI Invasive Species Compendium. Wallingford, United Kingdom: CAB International. Available: https://www.cabi.org/isc/datasheet/114010 (February 2021).

Flowgrow. 2021. *Echinodorus paniculatus*. Available: https://www.flowgrow.de/db/aquaticplants/echinodorus-paniculatus (February 2021).

GBIF Secretariat. 2021. GBIF backbone taxonomy: *Echinodorus paniculatus* (Micheli, 1881). Copenhagen: Global Biodiversity Information Facility. Available: https://www.gbif.org/species/5328848 (February 2021).

Poelen JH, Simons JD, Mungall CJ. 2014. Global Biotic Interactions: an open infrastructure to share and analyze species-interaction datasets. Ecological Informatics 24:148–159.

Rataj K. 1968. *Echinodorus paniculatus* Micheli and its ally *E. lanceolatus* Rataj sp. nov. (American Alismataceae). Bulletin Du Jardin Botanique National De Belgique / Bulletin Van De National Plantentuin Van België 38(4):401–408.

Sanders S, Castiglione C, Hoff M. 2018. Risk Assessment Mapping Program: RAMP. Version 3.1. U.S. Fish and Wildlife Service.

World Flora Online. 2021. World Flora Online – a project of the World Flora Online Consortium. Available: http://www.worldfloraonline.org/taxon/wfo-0000766446 (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.

CABI Data Mining. 2011. Invasive Species Databases.