U.S. Fish & Wildlife Service

Echinodorus scaber (a plant, no common name)

Ecological Risk Screening Summary

U.S. Fish & Wildlife Service, February 2021
Revised, May 2021
Web Version, 9/3/2021

Organism Type: Plant
Overall Risk Assessment Category: Uncertain

Photo: Daderot. Licensed under CC0 1.0. Available: https://commons.wikimedia.org/wiki/Main_Page. (April 2021).

1 Native Range and Status in the United States

Native Range

From Rataj (1969):

"Geographical area: Venezuela to Brazil."

From Lehtonen (2008):

"Nicaragua, Colombia, Venezuela, Guyana, Brazil […]."

Status in the United States

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

No data on trade was found for *E. scaber* specifically. Although, there is some trade of plants under the genus *Echinodorus* without specifying the species (buceplant.com 2021, modernaquarium.com 2021).

Means of Introductions in the United States

Echinodorus scaber has not been reported in the United States.

Remarks

WFO (2021) lists *Echinodorus scaber* as a valid species and *E. macrophyllus scaber* as a synonym, therefore, literature searches were conducted using those names.

From Lehtonen (2008):

"According to Rataj's (1969c) original description the species has small flowers with 14-18 stamens. Later Rataj changed his description, and in his new revision of the genus (Rataj 2004) the species is said to have 24 stamens, and his Fig. 3 on page 116 shows a large flower with overlapping petals that clearly represents a different species. *Echinodorus scaber* is readily distinguishable from other species by its flowers with peculiar tiny petals that are bent backwards, and 13-18 stamens. Herbarium material can be distinguished by the usually paniculate inflorescence with many branches from *E. emersus*, which has racemose, or sometimes paniculate inflorescences with only a few branches from the lowest whorl. Further, *E. scaber* usually has glandular achenes, while *E. emersus* lacks any glands. Haynes & Holm-Nielsen (1986) ranked this taxon as a subspecies of *E. macrophyllus*, but based on phylogenetic evidence (Lehtonen & Myllys 2008) it is here considered a separate species."

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From CABI (2019):

Domain: Eukaryota
  Kingdom: Plantae
    Phylum: Spermatophyta
      Subphylum: Angiospermae
        Class: Monocotyledonae
          Order: Alismatales
            Family: Alismataceae
              Genus: *Echinodorus*

Species: *Echinodorus scaber*

Size, Weight, and Age Range

From Lehtonen (2008):

"Perennial, from rhizomes, petioles and peduncles scabrous, to 300 cm dia. […]. Flowers 1 – 1.5 cm diam., sepals erect, 10 – 20-veined, 5 mm long, 4 mm wide, veins without papillae, petals reflexed, without claws, not overlapping, c. 4 mm long. c. 3 mm wide, stamens 13 -18m anthers versatile, 1 mm long, filament 2 mm long, carpels numerous. Fruit oblanceoloid, 5 – 6-ribbed, keeled, glandular, 2.3 – 3.3 mm long, 1 mm wide, glands 0 – 2, glands circular, between ribs, beak terminal, erect, 0.6 – 1 mm."

Environment

From Lehtonen (2008):

"Growing in wet depressions on inundated savannas."

"At elevations of 50 – 400 m."

Climate

No information on climate requirements were found.

Distribution Outside the United States

Native

From Rataj (1969):

"Geographical area: Venezuela to Brazil."

From Lehtonen (2008):

"Nicaragua, Colombia, Venezuela, Guyana, Brazil […]."

Introduced

No known confirmed introductions of *Echinodorus scaber* outside the United States.

CABI (2019) lists *Echinodorus scaber* as present in the UK. Given the distance between the UK and the native range of the species this can be assumed to be an introduction. However, since no further information could be found to confirm this or any status regarding establishment, the UK was not included in the climate match and this potential population was not considered when determining the History of Invasiveness.

Means of Introduction Outside the United States

Echinodorus scaber has not been confirmed as introduced or established outside of its native range.

Short Description

From Lehtonen (2008):

"Perennial, from rhizomes, petioles and peduncles scabrous, to 300 cm dia. Leaves emersed, bladed ovate, 5 – 9-veined, 9 – 30 cm long, 5 -15 cm wide, without pellucid markings, apex refuse to round-acute, base cordate, petioles terete, ridged, scabrous longer than blade, 30 – 100 cm long, 5 – 10 diam., base with sheath to 7 cm long. Inflorescence paniculate, of 5 – 21 whorls, each 3 – 6-flowered, erect, overtopping leaves, occasionally proliferating, to 75 cm long, to 50 cm wide, rachis terete, stellate, pubescent, peduncles terete and ridged, 30 – 150 cm long, 0.8 – 1 cm diam., bracts free, lanceolate, coarse, 1 – 2 cm long, c. 5 mm wide, 11 – 16-veined, apex acute, pedicels spreading in flower and fruit, 0.5 – 2.5 cm long, 0.7 – 1 mm diam. Flowers 1 – 1.5 cm diam., sepals erect, 10 – 20-veined, 5 mm long, 4 mm wide, veins without papillae, petals reflexed, without claws, not overlapping, c. 4 mm long. c. 3 mm wide, stamens 13 -18m anthers versatile, 1 mm long, filament 2 mm long, carpels numerous. Fruit oblanceoloid, 5 – 6-ribbed, keeled, glandular, 2.3 – 3.3 mm long, 1 mm wide, glands 0 – 2, glands circular, between ribs, beak terminal, erect, 0.6 – 1 mm."

Biology

From Lehtonen (2008):

"Flowering and fruiting year round."

Human Uses

From Lopes et al. (2015):

"*E. scaber* Rataj. (Alismataceae) known as "chapéu de couro" is used in Brazilian folk medicine mainly as anti-inflammatory, antirheumatic and diuretic. Chemical studies reported the presence of clerodane and labdane diterpenes as well as flavonoids as the main constituents of this specie [Tanus-Rangel et al. 2010]. The scientific literature presents many reports about the pharmacological properties of *E. scaber* extracts/preparations [Tanus-Rangel et al. 2010]. Antimicrobial and antinflamatory properties have been previously reported to clerodane/abietane-like diterpenes [Zhang et al. 2012]."

From Strada et al. (2017):

"*Echinodorus scaber* Rataj and *Echinodorus grandiflorus* (Cham. & Schltdl.) Micheli, Alismataceae, are popularly used to relieve inflammatory complaints and as diuretic."

Diseases

According to Poelen et al. (2014) *Echinodorus scaber* is a host of *Cochliobolus lunatus.*

Threat to Humans

No information on threats to humans was found.

3 Impacts of Introductions

Echinodorus scaber has not been confirmed as introduced outside of its native range, and no impacts of introduction have been reported.

4 History of Invasiveness

The history of invasiveness is classified as No Known Nonnative Population. *Echinodorus scaber* has not been confirmed as introduced outside of its native range, and no impacts of introduction have been reported. Although some trade information is available about the genus *Echinodorus*, there was no information specific to *E. scaber*.

5 Global Distribution

Figure 1. Known global distribution of *Echinodorus scaber.* Observations are reported from Argentina, Brazil, Bolivia, Colombia, Nicaragua, Paraguay, Suriname, and Venezuela. Map from GBIF Secretariat (2021).

6 Distribution Within the United States

Echinodorus scaber has not been reported in the wild in the United States.

7 Climate Matching

Summary of Climate Matching Analysis

High matches were found in southern peninsular Florida, Georgia, and Texas while medium matches were identified all along the southern edge of the continental United States from Arizona to South Carolina and extending into the southern Plains and eastern portion of the Desert Southwest regions. The rest of the contiguous United States had a low climate match. The overall Climate 6 score (Sanders et al. 2018; 16 climate variables; Euclidean distance) for the contiguous United States was 0.030, medium. (Scores between 0.005 and 0.103, exclusive, are classified as Medium.) Florida, Georgia, and Texas had high individual Climate 6 scores. Arizona and South Carolina had medium individual scores. All other States had low individual scores.

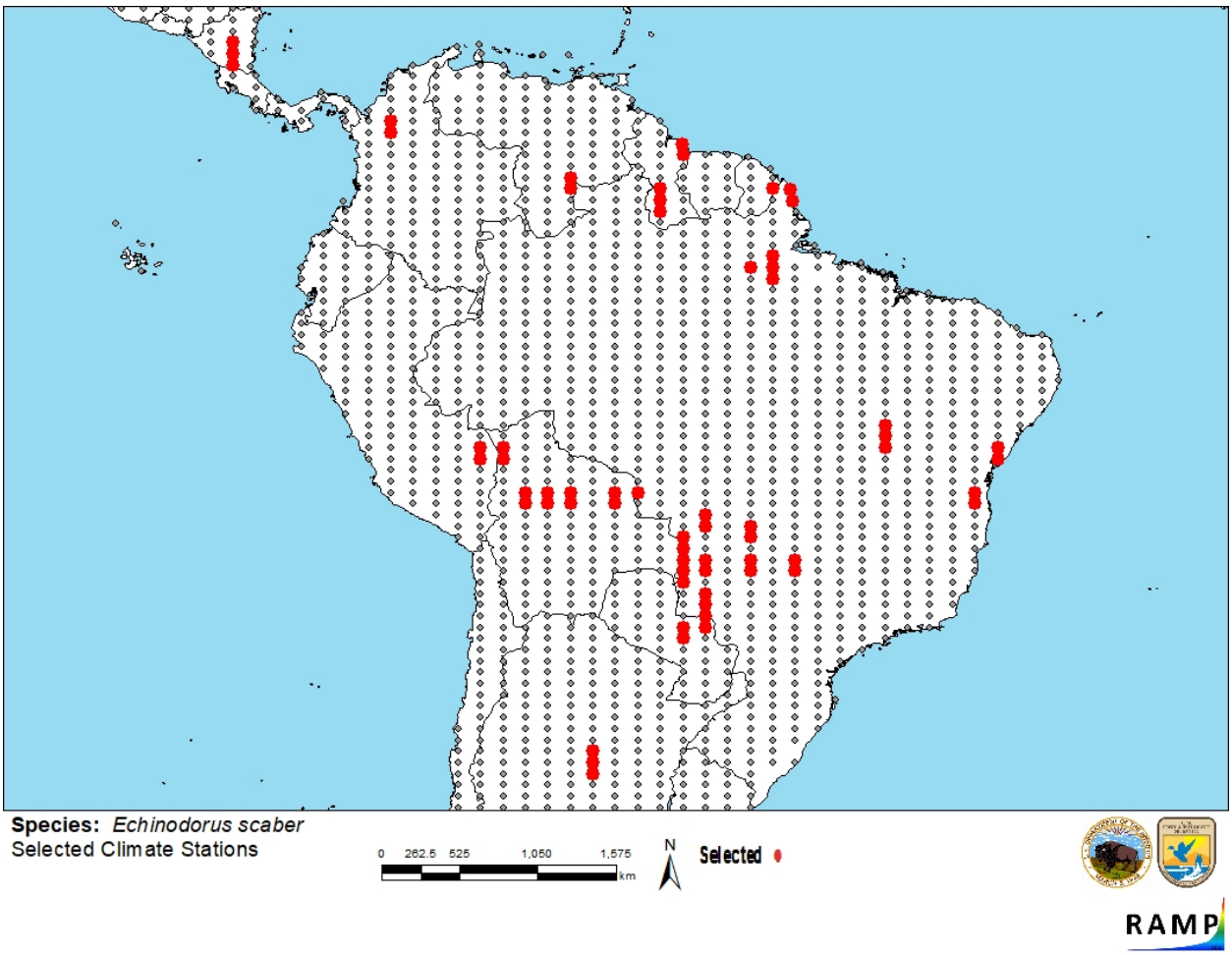

Figure 2. RAMP (Sanders et al. 2018) source map showing weather stations in Central and South America selected as source locations (red; Nicaragua, Colombia, Venezuela, Guyana, Brazil, Bolivia, Peru, Paraguay, Argentina) and non-source locations (gray) for *Echinodorus scaber* climate matching. Source 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.

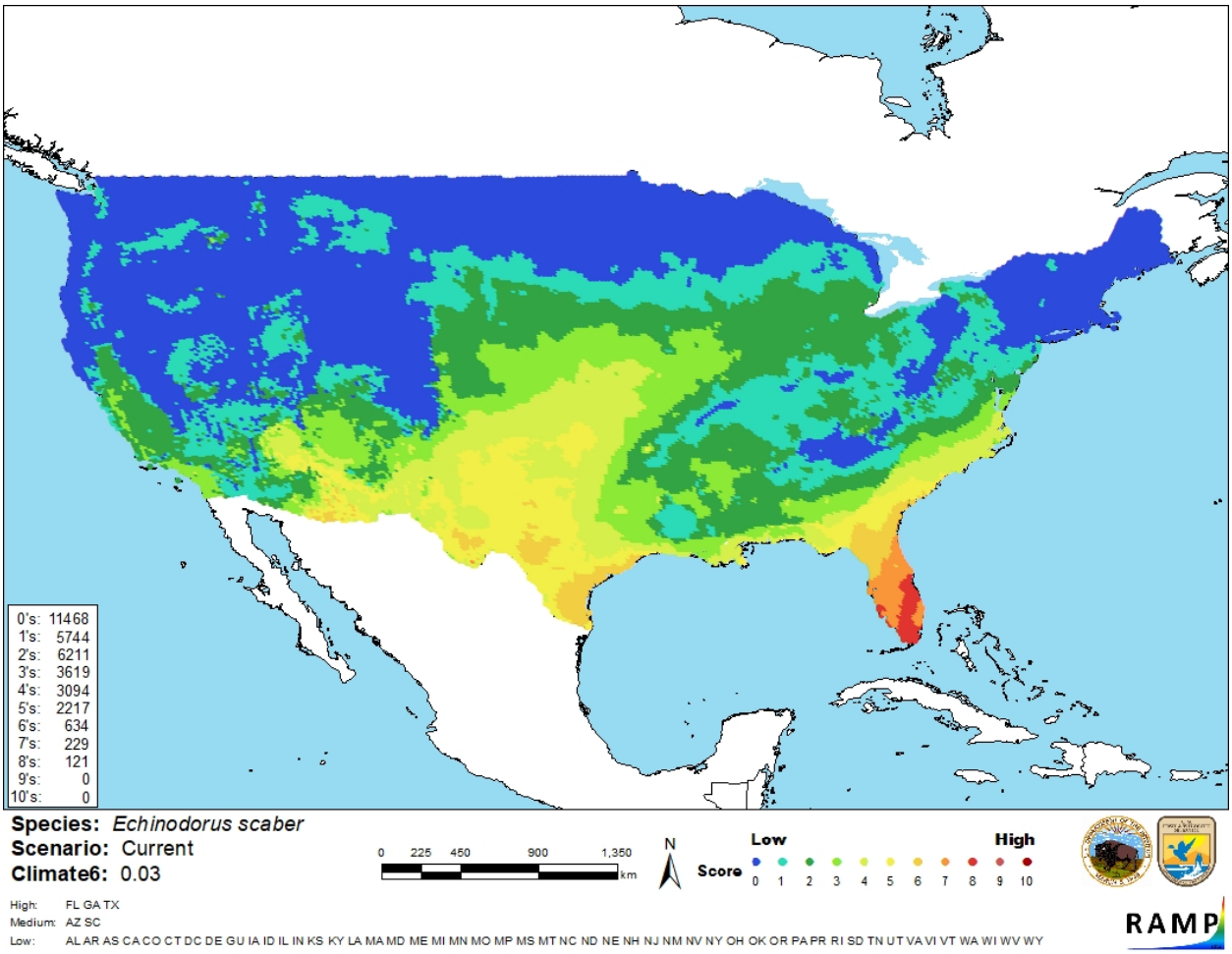

Figure 3. Map of RAMP (Sanders et al. 2018) climate matches for *Echinodorus scaber* in the contiguous United States based on source locations reported by GBIF Secretariat (2021). Counts of climate match scores are tabulated on the left. 0/Blue = Lowest match, 10/Red = Highest match.

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

Limited information is available on the biology and ecology of *Echinodorus scaber.* This species has not been confirmed as introduced, and no impacts of introduction have been documented. The certainty of assessment is Low.

9 Risk Assessment

Summary of Risk to the Contiguous United States

Echinodorus scaber is an aquatic plant that is found in Central and South America. It is used medicinally. *E. scaber* may be in the aquatic plant trade, although this could not be confirmed. History of invasiveness is classified as No Known Nonnative Population. There are no confirmed introductions or reported impacts of introductions. The overall climate match for the contiguous United States is medium. Areas of high and medium match were found in parts of the Southeast and Southwest. Due to lack of information, the certainty of assessment is Low. The overall risk assessment category for *Echinodorus scaber* 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:** No additional remarks.
- **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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Modern Aquarium. 2021. Live aquarium plants. Available https://www.modernaquarium.com/live-aquarium-plants/type/swords/ (March 2021)

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Rataj K. 1969[c]. Contribution to the knowledge of *Echinodorus macrophyllus* (Kunth) Mich. and *E. scaber* Rataj from Tropical America. Folia Geobotanica & Phytotaxonomica 4(4):435–442.

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

Strada C, Lima K, Silva V, Ribeiro R, Dores E, Dall'Oglio E, Schmeda- Hirschmann G, Carollo C, Martins D, Sousa Jr P. 2017. Isovitexin as marker and bioactive compound in the antinociceptive activity of the Brazilian crude drug extracts of *Echinodorus scaber* and *E. grandifloras*. Brazilian Journal of Pharmacognosy 27:619–626.

World Flora Online. 2021. World Flora Online – a project of the World Flora Online Consortium. Available: www.worldfloraonline.org (May 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.

Haynes RR, Holm-Nielsen L. 1986. Notes on *Echinodorus* (Alismataceae). Brittonia 38:325–332.

Lehtonen S, Myllys L. 2008. Cladistic analysis of *Echinodorus* (Alismataceae): simultaneous analysis of molecular and morphological data. Cladistics 24:218–239.

Rataj K. 2004. A new revision of the swordplant genus *Echinodorus* Richard, 1848 (Alismataceae). Aqua (Neu Isenburg), Special Publication 1.

Tanus-Rangel E, Santos SR, Lima JC, Lopes L, Noldin V, Monache FD, Cechinel-Filho V, Martins DT. 2010. Topical and systemic anti-inflammatory effects of *E. macrophyllus*. Journal of Medicinal Food 5:1161–1166.

Zhang J, Rahman AR, Jain S, Jacob MR, Khan S, Tekwani BL, Muhammad I. 2012. Antimicrobial and antiparasitic diterpenoids. Research and Reports in Medicinal Chemistry 2:1–6.