Ludwigia helminthorrhiza (a plant, no common name)

Ecological Risk Screening Summary

U.S. Fish & Wildlife Service, February 2021
Revised, February 2021
Web Version, 7/30/2021

Organism Type: Plant
Overall Risk Assessment Category: Uncertain

Photo: Mateo Hernandez Schmidt. Licensed under CC BY-NC-SA. Available: https://www.inaturalist.org/photos/111258712. (February 2021).

1 Native Range and Status in the United States

Native Range

From Hassler (2021):

"Guyana, Surinam, Peru, Costa Rica, Colombia, Ecuador, Belize, El Salvador, Honduras, Panama, N-Brazil (Para, Amazonas), NE-Brazil (Ceara, Bahia), WC-Brazil (Mato Grosso do Sul), Paraguay (Alto Paraguay, Central, Concepcion), Bolivia, Mexico (Chiapas, Tabasco, etc.),

Venezuela (Amazonas, Anzoategui, Apure, Aragua, Barinas, Bolivar, Carabobo, Delta Amacuro, Dependencias Federales, Distrito Federal, Guarico, Merida, Miranda, Portuguesa, Yaracuy, Zulia)"

From POWO (2021):

"Belize, Bolivia, Brazil North, Brazil Northeast, Brazil West-Central, Colombia, Costa Rica, Ecuador, Guatemala, Guyana, Honduras, Mexico Gulf, Mexico Southeast, Mexico Southwest, Panamá, Paraguay, Peru, Suriname, Venezuela"

From Rocha and Melo (2020):

"*Ludwigia helminthorrhiza* is distributed in Central America, Argentina, Mexico, Paraguay, Peru and Venezuela; Africa and Madagascar (Campos 2010). In Brazil, it is restricted to the states of Bahia, Ceará, Pará, Paraíba and Mato Grosso do Sul, associated to phytogeographic domains of the Amazon, Caatinga and Pantanal (Vieira 2015; Torres et al. 2016)."

Status in the United States

No records of *Ludwigia helminthorrhiza* in the wild in the United States were found.

Ludwigia helminthorrhiza is in trade and can potentially be purchased from the following aquarium websites: The Aqua Tank (2021) and Ruinemans Aquarium B.V. (2021).

Means of Introductions in the United States

No records of *Ludwigia helminthorrhiza* in the wild in the United States were found.

Remarks

Rocha and Melo (2020) list Africa and Madagascar as countries in which *L. helminthorrhiza* is distributed. However, the primary source they cite is not in English and these locations cannot be confirmed. Furthermore, there is no other mention of *L. helminthorrhiza* populations in Africa and Madagascar in scientific literature searchers or in trade.

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

According to the WFO (2021), *Ludwigia helminthorrhiza* (Mart.) H. Hara is the current valid name for the species. WFO (2021) lists the following synonyms: *Jussiaea helminthorrhiza* C.Martius, *Jussiaea natans* Bonpl., *Jussiaea natans* f. *latifolia* Hassl., *Jussiaea natans var. emersa* Hassl.

From GBIF Secretariat (2021):

Kingdom Plantae
Phylum Tracheophyta
Class Magnoliopsida

Order Myrtales
Family Onagraceae
Genus *Ludwigia*
Species *Ludwigia helminthorrhiza* (Mart.) H.Hara

Size, Weight, and Age Range

General size, weight and age data were not available.

Environment

From Aoki et al. (2016):

"Species such as *Oryza glumaepatula* Steud. *S. auriculata*, and *L. helminthorrhiza* occurred in waters with higher conductivity and pH, and more dissolved solids"

From Coutinho et al. (2019):

"Four species stood out for their frequency and high percentage cover on the nearshore of the Baía Grande lake: *Ludwigia helminthorrhiza (Mart.)* H.Hara […], *Eichhornia azurea* (Sw.) Kunth […], *Salvinia auriculata* Aubl. […] and *Cyperus* blepharoleptos Steud. […], consequently, these were the species with highest importance values, with highlight for *L. helminthorrhiza* with little more than 33 [importance value] […]."

"On floating meadows, two species stood out in frequency and cover, *C. blepharoleptos* […] and *L. helminthorrhiza* […], consequently, presented the highest importance values […]."

From Cunha et al. (2012):

"*Pontederia rotundifolia, Ludwigia helminthorrhiza* […] and *Panicum elephantipes* were the species most closely related to deeper waters (≥2 m)."

From Henry-Silva et al. (2010):

"[…] the emergent *Ludwigia helminthorrhiza* and *Heteranthera seubertiana* occurred in stretches less impacted by domestic-sewage discharge"

From Croat (1978):

"Apparently once common at the edge of the lake and no doubt still occurring in marshy areas on the southern and western edges of the island. Apparently flowers and fruits throughout the year. Southern Mexico to Peru and Paraguay. In Panama, known from tropical moist forest in the Canal Zone, Panama, and Darien."

From Rocha and Melo (2020):

"In the Paraíba State, it was collected in dams, temporary lakes, streams and rivers, linked to three mesoregions: Sertão, Agreste and Mata, associated with the Caatinga or Atlantic Rainforest."

Climate

From Machado Filho et al. (2021):

"Tropical"

Distribution Outside the United States

Native

From Hassler (2021):

"Guyana, Surinam, Peru, Costa Rica, Colombia, Ecuador, Belize, El Salvador, Honduras, Panama, N-Brazil (Para, Amazonas), NE-Brazil (Ceara, Bahia), WC-Brazil (Mato Grosso do Sul), Paraguay (Alto Paraguay, Central, Concepcion), Bolivia, Mexico (Chiapas, Tabasco, etc.), Venezuela (Amazonas, Anzoategui, Apure, Aragua, Barinas, Bolivar, Carabobo, Delta Amacuro, Dependencias Federales, Distrito Federal, Guarico, Merida, Miranda, Portuguesa, Yaracuy, Zulia)"

From POWO (2021):

"Belize, Bolivia, Brazil North, Brazil Northeast, Brazil West-Central, Colombia, Costa Rica, Ecuador, Guatemala, Guyana, Honduras, Mexico Gulf, Mexico Southeast, Mexico Southwest, Panamá, Paraguay, Peru, Suriname, Venezuela"

From Rocha and Melo (2020):

"*Ludwigia helminthorrhiza* is distributed in Central America, Argentina, Mexico, Paraguay, Peru and Venezuela; Africa and Madagascar (Campos 2010). In Brazil, it is restricted to the states of Bahia, Ceará, Pará, Paraíba and Mato Grosso do Sul, associated to phytogeographic domains of the Amazon, Caatinga and Pantanal (Vieira 2015; Torres et al. 2016)."

Introduced

Found in ornamental aquarium plant trade in the United Kingdom (CABI 2021), New Zealand (Champion and Clayton 2001), Netherlands, Belgium and potentially several other locations. However no known populations are established in these countries.

Ludwigia helminthorrhiza is established in Cuba (Mendez Santos and Gonzalez-Sivilla 2020).

Means of Introduction Outside the United States

From Mendez Santos and Gonazalez-Sivilla (2020):

"The introduction of *Ludwigia helminthorrhiza* (Mart.) H.Hara (Onagraceae) into Cuba, by an unknown route, as well as its successful naturalization and sustained increase in its area of occupation for over 40 years is here confirmed"

Short Description

From Munz (1959):

"Perennial herb, floating or prostrate on mud, rooting at nodes, some of the roots slender, branched, others apparently converted into spongy masses or pneumatophores 2-4 mm. thick and spindle-shaped; stems glabrous, few branched, leafy, scarcely if at all angled; leaves suborbicular to short-oblong, obtuse at base, narrowed abruptly into flattened glabrous petioles 1-4 cm. long, truncate to obtuse at apex, entire, shining and glabrous above, glabrous beneath, somewhat fleshy, veins quite conspicuous, about 8-12 principal ones on each side of midrib, sub marginal vein weakly developed; leaf-blades 1.5-5 cm. long, 1.5-3.5 cm. wide, not much reduced up the stem; flowers solitary in the axils; pedicels 1-5 cm. long, glabrous; bracteoles at apex of pedicel, squamate, 0.5 mm. long, thickened; sepals 5 (sometimes 4), lance-ovate, 4-6 mm. long, acute, 3-5-nerved; petals white with basal yellow spot, oblong-obovate, 8-14 mm. long, 7-10 mm. wide, with short broad claw; disc flat, pilose; stamens unequal, filaments flattened at base, 4-5 and 3-3.5 mm. long; anthers 1-2 mm. long; style 4-7 mm. long, white, stigma green and capitate, somewhat lobed, 1.5 mm. wide; ovary linear, cylindrical, glabrous, 9-12 mm. long; capsule subcylindric, sometimes curved, 10- (8-) nerved, gradually narrowed at base, 2-3 cm. long, 2.5-3 mm. thick, fairly thick-walled, sometimes externally marked into transverse divisions by the contained seeds; seeds in 1 row in each locule, completely invested by and adnate to the shining hard angular pale brown endocarp which is 1.5 mm. long. Usually in water. Southern Mexico to Peru and Paraguay."

From Croat (1978):

"*Ludwigia helminthorrhiza* (Mart.) Hara, J. Jap. Bot.28:292. 1953 *Jussiaea natans* H. & B. Aquatic herb, floating on water or prostrate on mud, ± glabrous; stem conspicuously rooting at nodes, seldom branching. Petioles 1-3 cm long; blades obovate to suborbicular, blunt at apex, abruptly narrowed to petiole, 2-7 cm long, 1.5-4.5 cm wide; lateral veins conspicuous, with a loop-connecting vein. Flowers solitary in axils, usually 5-parted; sepals lanceolate-ovate, ca 5 mm long; petals white with basal yellow spot, oblong-obovate, 8-14 mm long, shortly clawed; stamens 10, unequal, 3-5 mm long; anthers 1-2 mm long; style white, 4-7 mm long; stigma green, slightly lobed, ca 1.5 mm wide. Capsules subcylindrical, 2-3 cm long, ca 3 mm thick; endocarp hard, shining, ca 1.5 mm long; seeds contained in and adnate to the endocarp, uniseriate in each locule. Shattuck 1132."

From Rocha and Melo (2020):

"Herbs exclusively aquatic, decumbent; branches angular, floating, glabrous and hirsute, with white spongy pneumatophores emerging from each branch knot. Leaves petiolate; petiole 1.2–

3.0 cm long; blade 4.4–5.7 × 3.2–4.5 cm, with entire margin, membranous, orbicular, with rounded apex and decurrent base, sharply narrow at the petiole, glabrous to sparsely strigose. Flowers pentamerous, pedicellate; pedicels ca 8.5 cm long; bracteoles not visible; sepals 6–8 × 1.5–2 mm, green, lanceolate, with acute apex, external face sparsely hirsute; petals 1.3–1.6 × 1–1.1 cm, white, with basal yellow spot, obovate, unguiculated, with rounded apex; hypanthium 9–12 mm long, 5-locular; style 4.5–5 mm long, stigma capitate; stamens 10, anthers oblong; plain nectariferous disk with depressed nectaries, pilose, surrounding the base of each epipetalous stamens. Capsule 21–27 × 3–4 mm, subcylindrical, 10-ribbed, gradually tapering at the base, not internally dimorphic, pubescent. Seeds ca 1.5 mm long, obovoid, uniseriate, firmly embedded in woody coherent endocarp, raphe non-inflated, with diameter narrower than the body of the seed."

"The species differs from other species of the genus in the studied area by its exclusively aquatic habit. Furthermore, it has spongy pneumatophore roots, orbicular leaves, white corolla with a yellow spot at the base and capsules with uniseriate seeds firmly embedded in woody coherent endocarp. *Ludwigia helminthorrhiza* belongs to *Ludwigia* sect. *Jussiaea* (= former section Oligospermum (Micheli) H.Hara), characterized by seeds strongly embedded in a portion of the woody endocarp (Zardini & Raven 1992)."

Biology

From Albuquerque (2020):

"Form of growth: free-floating
Strategy Classes: R [Ruderal]"

"[…] ruderal species have a short lifecycle and high investment in reproduction and are related to environments with high degrees of disturbance and stress"

From Coutinho et al. (2017):

"Life form: RF, FF (Rooted floating, free floating)
Frequency in floating mats: 100%
Successional stage: Initial/Intermediate"

"The species with the highest relative cover on the initial edges of the floating meadows were *E. azurea* (3.29%), *Azolla filiculoides* Lam. (0.58%), *L. helminthorrhiza* (1.56%), *Funastrum clausum* (Jacq.) Schltr. (0.30%) and *V. longifolia* (0.32%), while this zone contained organic matter, and the floating layer was comprised mainly of living roots"

From Coutinho et al. (2019):

"The outstanding species for their frequency and a high percentage of cover nearshore were *Ludwigia helminthorrhiza* (Mart.) H.Hara and *Eichhornia azurea* (Sw.)"

"*Ludwigia helminthorrhiza*, species with the highest importance value in the nearshore and second in importance on floating meadows, increases with eutrophication and disturbance, being

one of the species present in pioneer stages in the succession of floating meadows, decreasing with the advance of age and thickness of the floating layer (Pott & Pott 2000, Coutinho et al. 2017)."

From Pozzobom et al. (2020):

"[…] mainly floating species, such as *Ludwigia helminthorrhiza, Pistia stratiotes, Eichhornia crassipes* and *Azolla filiculoides*, were most common across our lakes, contributing strongly to beta diversity. In general, floating macrophytes are good competitors in terms of resources, and, in addition, possess high growth rates and proliferation, which allows them to occupy different aquatic habitats (Henry-Silva et al. 2008)."

From Rocha and Melo (2020):

"It produced flowers all the year round and fruits between June and July and between October and November"

From Santana et al. (2019):

"Vegetative organs of *Ludwigia helminthorrhiza* (Myrtales, Onagraceae) can develop in aquatic environment and in soil free of flood. We believe that vegetative organs of plants of the second environment do not present typical adaptations (e.g. aerenchyma, lignification reduction, adventitious root development) of aquatic environments. The limb length, width and thickness; stem thickness; length of internodes; and roots length of individuals in the two environments were measured. The anatomy of the medial portions of the organs was analyzed and the stomata quantified. Vegetative organs were larger in plants developed in water; density of stomata similar to the limb faces in both environments, but higher in the dry soil. Adapting tissues to anoxia, as aerenchyma, expressed in greater quantity in water plants, facilitating the gases transport, reducing phytotoxins and giving plant support. There is similar anatomy in the individuals of both environments, however absence or reduction of aerenchyma in the aerial organs of dry soil plants, with presence of only "principal" adventitious root and lateral piliferous. In the water plants four [sic] types of adventitious roots (pneumatophores and root with addition of aerenchyma) were observed. We demonstrate morphological plasticity, important for success in establishing and surviving the species in the Pantanal."

Human Uses

Ludwigia helminthorrhiza is sold as an ornamental plant for aquariums. The species does appear for sale on aquarium trade websites based in the United States (The Aqua Tank 2021 and Ruinemans Aquarium B.V.), the United Kingdom (AquaFood 2020), Netherlands (Aquaplants Online 2021, AquaFlora 2017), Belgium (Aqua Blizen 2021) and is also reported in trade in New Zealand (Champion and Clayton 2001). Ruinemans Aquarium has global locations, but it is not clear from their website where this species can be shipped.

The species has also been proposed for biomonitoring of metals.

From Núñez et al. (2011):

"When the Cu and Zn sediment concentrations increased, these metal concentrations in tissues also increased in *P. punctatum, L. helminthorriza*, and *E. crassipes,* probably because they have a higher tolerance and metal accumulation capacity than the other species. Therefore*, E. crassipes, L. helminthorriza,* and *P. punctatum* could be proposed as Cu and Zn biomonitors."

Diseases

No disease information available on *Ludwigia helminthorrhiza.*

Threat to Humans

No information available.

3 Impacts of Introductions

The only information on impacts of introductions of *Ludwigia helminthorrhiza* is from Mendez Santos and Gonzalez-Sivilla (2020). The abstract is the only portion of the paper written in English, therefore details on the impacts of *L. helminthorrhiza* cannot be ascertained.

From Mendez Santos and Gonzalez-Sivilla (2020):

"The negative impacts (difficulties in the management of aquariums, sedimentation, blocking of light entry, reduction of oxygen exchange, and displacement of native species) and the positive impacts (food for fauna and bacteria housing that reduce pollution) of the introduction of this species were identified. An alert is issued regarding the possible expansion of this species to new freshwater reservoirs in the country."

4 History of Invasiveness

The History of Invasiveness of *Ludwigia helminthorrhiza* is classified as Data Deficient. *Ludwigia helminthorrhiza* is documented as becoming established in Cuba, where is not native. One source has stated there are negative impacts from that introduction. However, the body of the paper is not available in English so the basis of those statements could not be evaluated for scientific defensibility. It can be found for sale on websites in the United States and globally.

5 Global Distribution

Figure 1. Known global distribution of *Ludwigia helminthorrhiza*. Observations are reported from central Mexico to northern portions of Argentina, covering much of Central and South America. Map from GBIF Secretariat (2021).

Rocha and Melo (2020) list Africa and Madagascar as countries in which *L. helminthorrhiza* is distributed. However, the primary source they cite is not in English and these locations cannot be confirmed. Furthermore, there is no other mention of *L. helminthorrhiza* populations in Africa and Madagascar in the literature. Mendez Santos and Gonazalez-Sivilla (2020) document the introduction and establishment of *L. helminthorrhiza* in Cuba but no georeferenced observations were available to use in the climate match.

6 Distribution Within the United States

No records of *Ludwigia helminthorrhiza* in the wild in the United States were found.

7 Climate Matching

Summary of Climate Matching Analysis

There were areas of high match in the contiguous United States along the Gulf Coast from Texas to Florida, in most of Florida, and along the southern and mid-Atlantic Coast. Small areas of high match were found in western Texas and southern Arizona. Areas of medium match were found along the southern Pacific Coast, and from northern Arizona eastward to the mid-Atlantic. 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 0.105, high. (Scores of 0.103 or greater are classified as high.) The following states had high individual Climate 6 scores: Alabama, Florida, Georgia, Louisiana, Maryland, Mississippi, North Carolina, New Mexico, South Carolina, Texas and Virginia. States with medium individual Climate6 scores were Arkansas, Arizona, California, Oklahoma and Tennessee. The rest of the States had low climate matches.

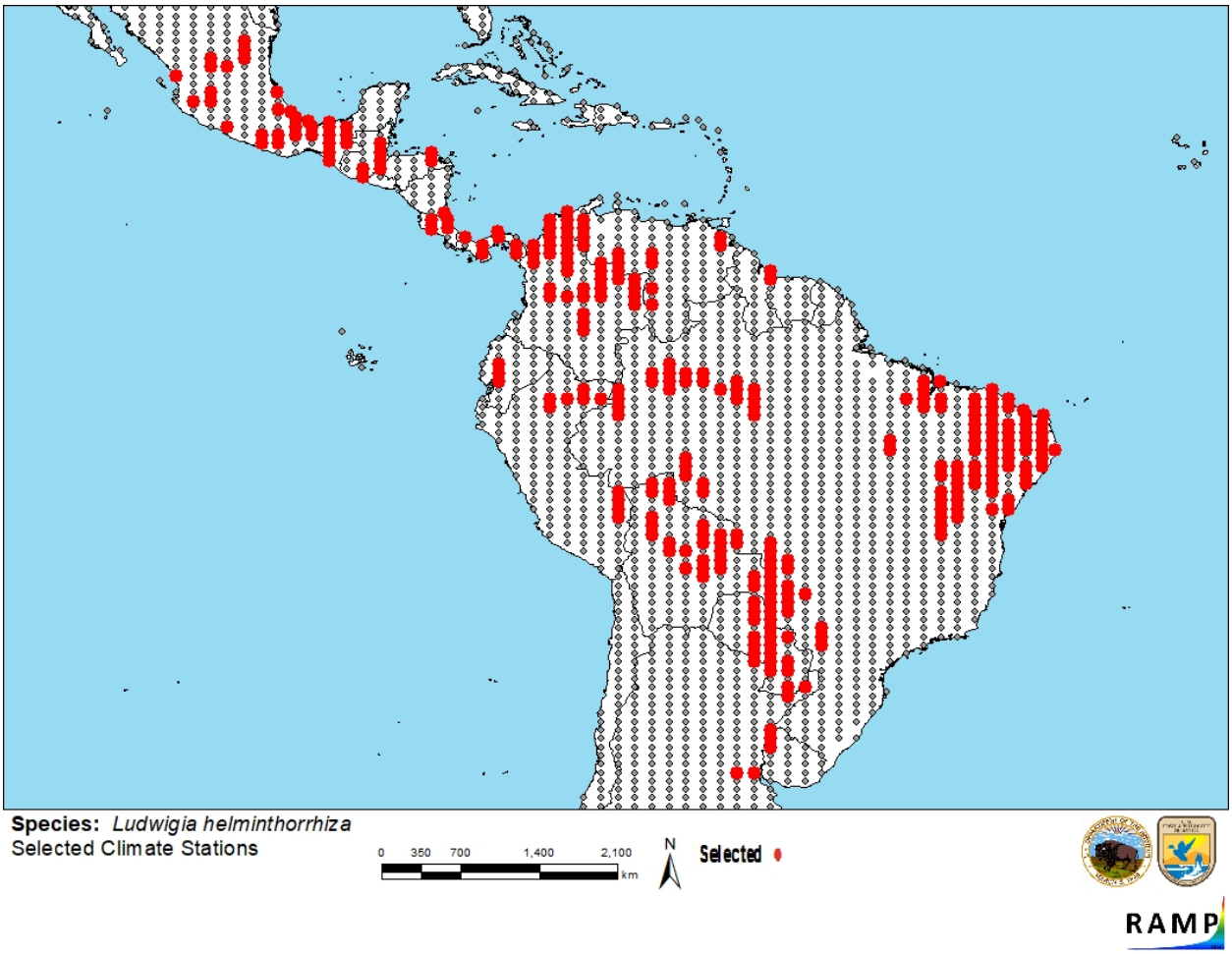

Figure 2. RAMP (Sanders et al. 2018) source map showing weather stations in Mexico and South America selected as source locations (red; Mexico, Guatemala, Belize, El Salvador, Honduras, Nicaragua, Costa Rica, Panama, Colombia, Venezuela, Guyana, Ecuador, Peru, Brazil, Bolivia, Paraguay, and Argentina)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

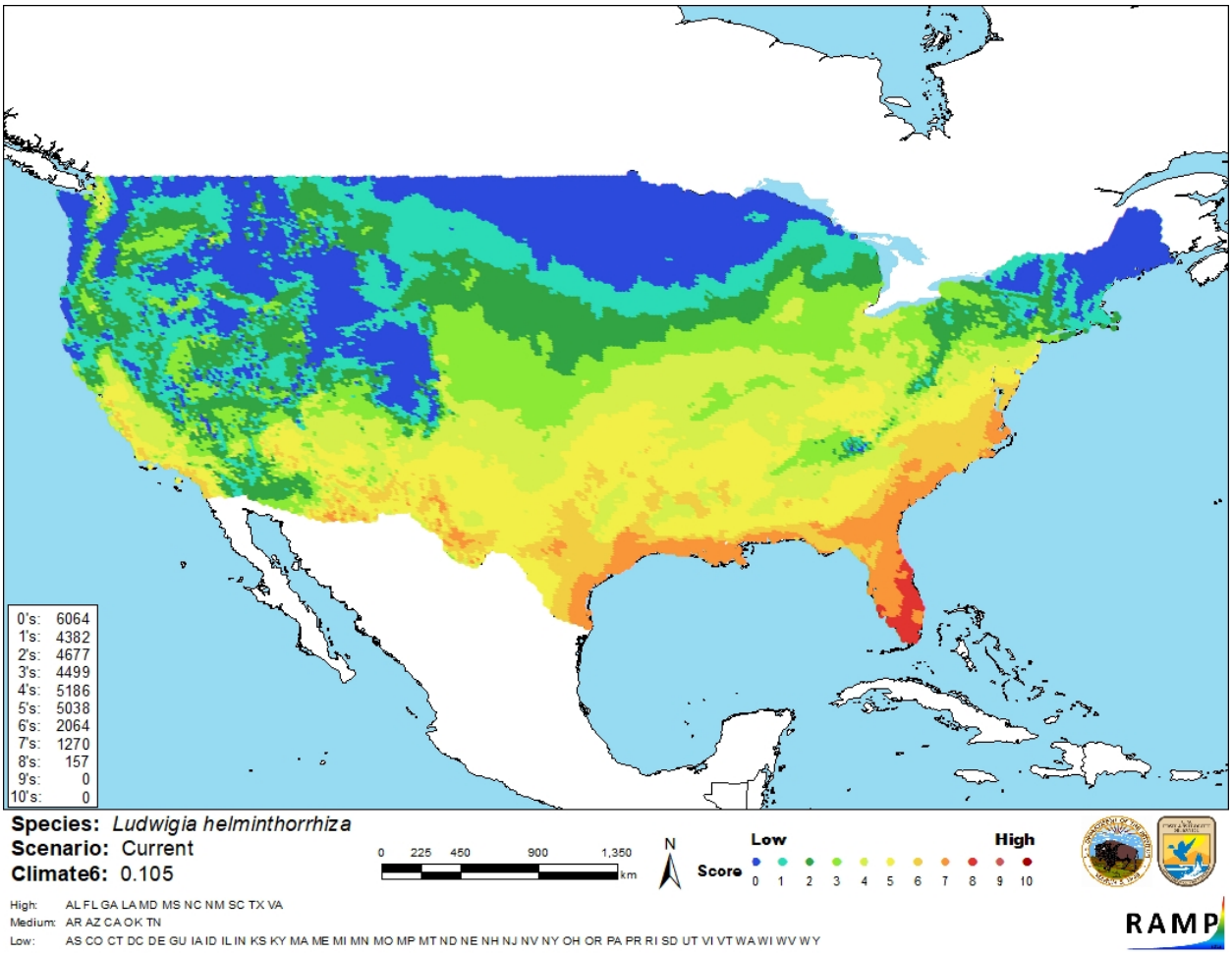

Figure 3. Map of RAMP (Sanders et al. 2018) climate matches for *Ludwigia helminthorrhiza* in the contiguous United States based on source locations reported by GBIF Secretariat (2021). Counts of climate match scores are tabulated on the left. 0/Blue = Lowest match, 10/Red = Highest match.

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 limited information available on *Ludwigia helminthorrhiza* in the literature and scientific databases. *Ludwigia helminthorrhiza* has been recorded outside of its native range and is established in Cuba (Mendez Santos and Gonzalez-Sivilla 2020). Negative impacts are reported in Cuba, but the basis of those impacts cannot be evaluated as the literature is not

available in English. Furthermore, *L. helminthorrhiza* can be found in trade around the world but there is no available record to indicate the volume or history of trade for this species. The bulk of scientific literature is not available in English. With the limited information available on the impact of invasion and trade of *L. helminthorrhiza,* the certainty of assessment is Low.

9 Risk Assessment

Summary of Risk to the Contiguous United States

Ludwigia helminthorrhiza is a plant in the evening primrose family (Onagraceae) native to Mexico, and Central and South America. *L. helminthorrhiza* is used as a decorative plant in aquariums and has been proposed for metals biomonitoring. There is evidence of *L. helminthorrhiza* in trade in the United States and globally. There are no known nonnative populations of the species in the United States, but it has been introduced and become established in Cuba. Negative impacts of the introduction to Cuba have been reported, however, only the abstract was available in English. Therefore, the basis of the impacts could not be evaluated. The History of Invasiveness category is classified as Data Deficient. The overall climate match category for the contiguous United States for *L. helminthorrhiza* was high. Areas of high match were centered on the Gulf and southern Atlantic Coasts. Areas of medium match were mostly found from southern California eastward to the mid-Atlantic. The certainty of assessment is low due to limited information on impacts of invasion. The overall risk assessment category for *Ludwigia helminthorrhiza* 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: 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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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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