Wingleaf Primrose-willow (*Ludwigia decurrens*)
Ecological Risk Screening Summary

U.S. Fish and Wildlife Service, May 2021
Revised, June 2021
Web Version, 7/21/2021

Organism Type: Plant
Overall Risk Assessment Category: High

Photo: Clarence A. Rechenthin, USDA NRCS East Texas PMC. Public domain. Available: https://plants.sc.egov.usda.gov/ImageLibrary/original/lude4_002_php.jpg (June 2021).

1 Native Range and Status in the United States

Native Range

From Ramamoorthy and Zardini (1987):

"[…] from southeastern United States where it is widely distributed from southern Missouri, southern Ohio, and northern Virginia (one collection from southern Wisconsin), south to the

Gulf of Mexico and from central Texas and central Oklahoma, east to the Atlantic coast, reappearing in southern Mexico (Chiapas, Tabasco, and Veracruz) and extending south to northeastern Argentina, and east from central Minas Gerais in Brazil west to western Ecuador. Abundant in all countries of Central America except Belize; rare in the West Indies; common in Surinam, Guyana, Venezuela, Colombia, and Ecuador; scattered in Peru and Brazil; more common in Paraguay and northeastern Argentina."

From POWO (2021):

"Native to:
Alabama, Argentina Northeast, Argentina Northwest, Bolivia, Brazil North, Brazil Northeast, Brazil South, Brazil Southeast, Brazil West-Central, Colombia, Costa Rica, Cuba, Ecuador, French Guiana, Guatemala, Guyana, Honduras, Illinois, Kentucky, Mexico Southeast, Mexico Southwest, Nicaragua, Panamá, Paraguay, Peru, South Carolina, Suriname, Tennessee, Trinidad-Tobago, Uruguay, Venezuela, Windward Is. [a "Botanical Country" including the Lesser Antillean islands of Dominica, Martinique, St. Lucia, St. Vincent and the Grenadines, Barbados, and Grenada]"

From Acevedo-Rodríguez and Strong (2012):

"Native to […] Lesser Antilles (St. Vincent) […]"

According to USDA, NRCS (2021), this species is native to the following U.S. States: Alabama, Arkansas, Florida, Georgia, Louisiana, Illinois, Indiana, Kansas, Kentucky, Maryland, Mississippi, Missouri, North Carolina, Ohio, Oklahoma, Pennsylvania, South Carolina, Tennessee, Texas, Virginia, and West Virginia.

USDA, NRCS (2021) also reports *L. decurrens* as native to Puerto Rico. In contrast, The Institute for Regional Conservation (2020), POWO (2021), and Acevedo-Rodríguez and Strong (2012) all report the species as introduced there.

Status in the United States

According to USDA, NRCS (2021), this species is native to the United States, including the following States: Alabama, Arkansas, Florida, Georgia, Louisiana, Illinois, Indiana, Kansas, Kentucky, Maryland, Mississippi, Missouri, North Carolina, Ohio, Oklahoma, Pennsylvania, South Carolina, Tennessee, Texas, Virginia, and West Virginia.

From Ramamoorthy and Zardini (1987):

"[…] one collection from southern Wisconsin […]"

USDA, NRCS (2021) also reports *L. decurrens* as native to Puerto Rico. In contrast, The Institute for Regional Conservation (2020), POWO (2021), and Acevedo-Rodríguez and Strong (2012) all report the species as introduced there.

From Acevedo-Rodríguez and Strong (2012):

"[…] exotic in Puerto Rico and Virgin Islands (St. Croix, St. Thomas)."

From Fischer and Eckert (2012):

"Winged primrose willow is an invasive weed that was identified in Butte County [California] rice fields in 2011. Most infestations were along borders of fields and canals; however, this weed can thrive in the flooded environment within rice fields."

"After the initial discovery of winged primrose willow (*Ludwigia decurrens*) in Butte county [sic], it was determined by Farm Advisors and the Agricultural Commissioner that the infestation expands over several square miles. Most infestations are along borders of fields and irrigation canals. One field had an infestation throughout. It is likely that this weed has gone undetected for up to five years or more."

Ludwigia decurrens is listed as a noxious weed in California (CDFA 2021).

From USDA, NRCS (2021):

"Commercial Availability: No Known Source"

Means of Introduction into the United States

From Fischer and Eckert (2012):

"Seed capsules from this plant have thousands of seeds which are capable of floating on the water surface as a means of dispersal, especially along irrigation canals. Indeed, the Butte County Agricultural Commissioner believes this has been the main means of dispersal across the majority of the infested area [in California]. Other potential means of spread are by tillage equipment and combines. Additionally, it has been determined that plant fragments have the ability to grow roots within a day or two when in water. This suggests that mowing of levees as a means of control may potentially increase dispersal of this weed."

Remarks

Information for this assessment was sought using the valid name *Ludwigia decurrens* as well as all of the following synonyms from World Flora Online (2021):

"Synonyms
Diplandra compressa Raf.
Diplandra decurrens (Walter) Raf.
Diplandra heterophyla Raf.
Diplandra montana Raf.
Diplandra pumila Raf.
Jussiaea bertonii H. Lév.
Jussiaea decurrens (Walter) DC.
Jussiaea palustris G. Mey.

Jussiaea pterophora Miq.
Jussiaea tenuifolia Nutt.
Ludwigia uniflora Raf."

Other common names for this species include Wingleaf Waterprimrose (ITIS 2021), Willow Primrose and Upright Primrose (Davis 2003).

According to NatureServe (2021), this species is critically imperiled in Pennsylvania, imperiled in Maryland, and vulnerable in Indiana.

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

According to World Flora Online (2021), *Ludwigia decurrens* Walter is the current, valid name for this species.

From ITIS (2021):

Kingdom Plantae
Subkingdom Viridiplantae
Infrakingdom Streptophyta
Superdivision Embryophyta
Division Tracheophyta
Subdivision Spermatophytina
Class Magnoliopsida
Superorder Rosanae
Order Myrtales
Family Onagraceae
Genus *Ludwigia*
Species *Ludwigia decurrens* (DC.) Walter

Size, Weight, and Age Range

From Davis (2003):

"*Ludwigia decurrens*, a native [to the United States], is the tallest water primrose, reaching a height of 3-6 feet. […] It is considered an annual to perennial."

From Barua (2010):

"Annual, erect herbs, 150 – 200 cm high […]"

Environment

From USDA, NRCS (2021):

"Anaerobic Tolerance: High"

“pH, Maximum: 6.0
pH, Minimum: 4.0”

“Salinity Tolerance: None”

From Davis (2003):

“Unlike many of the floating water primroses, it is seldom found in sites that pond for long periods. Usually, it occurs on saturated soils and sites the [sic] pond for short duration (3-14 days).”

From Barua (2010):

“It grows in typical paddy growing wet situations.”

Climate

From USDA, NRCS (2021):

“Drought Tolerance: None”

“Frost Free Days, Minimum: 140”

“Precipitation, Maximum: 55 [no unit provided]
Precipitation, Minimum: 28 [no unit provided]”

“Temperature, Minimum (°F): 7”

From The Institute for Regional Conservation (2020):

“Low Elevations: < 500 m”

Distribution Outside the United States

Native

The native range of *Ludwigia decurrens* is partially within the United States; see Native Range in Section 1.

From Ramamoorthy and Zardini (1987):

“[…] southern Mexico (Chiapas, Tabasco, and Veracruz) and extending south to northeastern Argentina, and east from central Minas Gerais in Brazil west to western Ecuador. Abundant in all countries of Central America except Belize; rare in the West Indies; common in Surinam, Guyana, Venezuela, Colombia, and Ecuador; scattered in Peru and Brazil; more common in Paraguay and northeastern Argentina.”

From POWO (2021):

"Native to:
[…] Argentina Northeast, Argentina Northwest, Bolivia, Brazil North, Brazil Northeast, Brazil South, Brazil Southeast, Brazil West-Central, Colombia, Costa Rica, Cuba, Ecuador, French Guiana, Guatemala, Guyana, Honduras, […] Mexico Southeast, Mexico Southwest, Nicaragua, Panamá, Paraguay, Peru, […] Suriname, […] Trinidad-Tobago, Uruguay, Venezuela, Windward Is. [a "Botanical Country" including the Lesser Antillean islands of Dominica, Martinique, St. Lucia, St. Vincent and the Grenadines, Barbados, and Grenada]"

From Acevedo-Rodríguez and Strong (2012):

"Native to […] Lesser Antilles (St. Vincent) […]"

Introduced

According to Wagner et al. (2007), *L. decurrens* is naturalized outside its native range in Cameroon, Gambia, Nigeria, Japan, the Philippines, Sri Lanka, and France.

From Ramamoorthy and Zardini (1987):

"More recently, this species has also been collected in the Philippines (1964) and in France (1973), the latter being the first record from Europe."

CJB and SANBI (2012) report *L. decurrens* as "naturalised-introduced" in Tropical Africa, with validated occurrences in Guinea, Benin, Niger, Nigeria, and Cameroon.

Catarino et al. (2008) describe *L. decurrens* in Guinea-Bissau as "adventive in disturbed areas" and "Introduced species, sub-spontaneous."

From Harding and Jalloh (2013):

"The major rice weeds found in the lowlands of Sierra Leone [include] *Ludwigia decurrens* […]."

From Farooqui et al. (2019):

"[There are] seven extant *Ludwigia* species ([including] *L. decurrens* Walt.) commonly growing in swampy ecosystems of India."

From Kong et al. (2019):

"*Ludwigia decurrens* Walt., native to America, is recently found to be naturalized in Nanchang, Jiangxi Province, China."

From Hsu et al. (2010):

"In our recent inventory survey of the flora of Taiwan, three newly naturalized species of *Ludwigia* were found. They are […] *Ludwigia decurrens* Walt. from the northern and central regions […]"

Mito and Uedugi (2004) report that this species is established in Japan.

POWO (2021) lists introductions to Burkina Faso and the Central African Republic but establishment status in these locations could not be confirmed.

Means of Introduction Outside the United States

From Chandrasena (1988):

"There is little doubt that the seeds are carried to nearby fields and lands by irrigation water, rain water or by agricultural implements."

"These [new] occurrences were always close to the main roads [in Kegalle and Ratnapura districts, Sri Lanka], suggesting that the weed was spreading slowly to other districts as well."

Short Description

From Davis (2003):

"[*L. decurrens*] is somewhat 'woody', which is unusual for species of water primroses. […] It also stands upright in contrast to most *Ludwigia* species, which trail along the ground or water. The leaves are usually linear (hence the name willow primrose), alternate, and entire. The flowers are yellow with 4-5 petals (usually 4). Also, common to the *Ludwigia* genus is the 'seed box' located immediately below the flower. In fact, some refer to the entire genus as 'seedboxs.' [sic] Willow primrose has a very distinctive stem that is 4-winged and can be distinguished from all other water primroses by this unique characteristic."

"*Ludwigia decurrens* has one of the longer 'seedboxs' [*sic*] of all *Ludwigia*, attaining lengths of up to ¾ inch."

Biology

From Davis (2003):

"It is found as individual plants scattered within the plant community, but can make up over 50% of the plant community. […] *Ludwigia ducurrens* [sic] is commonly associated with species of *Polygonum* (smartweed) and *Cyperus* (flat sedge). It is typically found on wetter sites than *Ludwigia alternifolia*, but dryer than the more herbaceous species of water primroses (*L. peploides, L. repens,* and *L. palustris*)."

From Barua (2010):

"Flowering & Fruiting: July – November."

From USDA, NRCS (2021):

"Propagated by Sprigs: Yes"

"Seed Spread Rate: Slow
Seedling Vigor: Low"

"Vegetative Spread Rate: Rapid"

According to Ramírez and Brito (1992), the flowers of *Ludwigia decurrens* are pollinated by bees (*Pereirapis spp.*) and flies (*Chrysagria duodecimpun[c]tata* and *Toxomerus marginatus*).

Human Uses

From Oyedeji et al. (2011):

"*Ludwigia abyssinica* and *Ludwigia decurrens* are two plant species of the genus *Ludwigia* used traditionally for the treatment of various skin, gastrointestinal, wound and bone joint disorders in Nigeria."

From USDA, NRCS (2021):

"Commercial Availability: No Known Source"

Diseases

According to Poelen et al. (2014), *Ludwigia decurrens* as a host of the fungal pathogens *Pseudocercospora jussiaeae, Colletotrichum jussiaeae, Puccinia jussiaeae,* and *Septoria jussiaeae*.

Threat to Humans

From Akobundu and Agyakwa (1998):

"A common weed of lowland rice […]"

From Chandrasena (1988):

"This population [in the Galle district of Sri Lanka] was one of the heaviest infestations of the weed seen by the author anywhere, and covered an area of 2-4 ha of rice-fields as the most dominant weed."

3 Impacts of Introductions

From Boyette et al. (1979):

"It competes with rice and reduces yields, especially on levees and in thin crop stands. It also interferes with harvesting, slows drying, lowers the value of rough and milled rice, and impedes the flow of water in canals and ditches [Hurst et al. 1973; Smith et al. 1977]."

From Smith et al. (1977):

"Waterprimroses are not generally troublesome in rice, except where stands are thin. They compete with rice, interfere with harvesting, slow drying, lower the value of rough and milled rice, and impede the flow of water in canals and ditches."

From Dharmaratne and Ranamukaarachchi (1991):

"The results of this experiment reveal that *Ludwigia* is harmful to rice due to its competitive ability. […] The suppression of growth of rice occurred in all its components such as tiller and panicle number, leaf area index, spikelet number per panicle and eventually grain yield. During the *Maha* (relatively dry [season]), more than 4 *Ludwigia* plants/m^2 while during *Yala* [season] more than 2 plants/m^2 caused significant reduction in grain yield of rice in the low-country wet zone."

Ludwigia decurrens is listed as a noxious weed in California (CDFA 2021).

4 History of Invasiveness

The history of invasiveness for *Ludwigia decurrens* is High. There are known introductions of *Ludwigia decurrens* resulting in established populations in California as well as in West Africa (Guinea-Bissau, Guinea, Gambia, Sierra Leone, Benin, Niger, Nigeria, and Cameroon), Asia (mainland China, Taiwan, Japan, the Philippines, India, Sri Lanka), and France. As a weed of rice fields, *L. decurrens* reduces yields, interferes with harvesting and processing, and impedes water flow. Impacts of introduction on native species remain unknown. This species does not appear to be in trade commercially.

5 Global Distribution

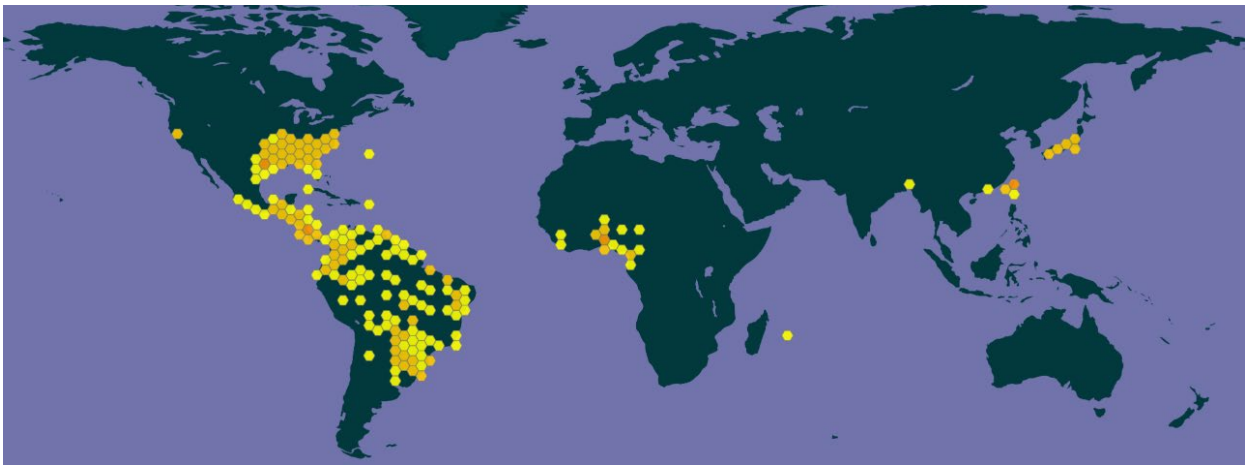

Figure 1. Known global distribution of *Ludwigia decurrens*. Observations are reported from North America, Central America, South America, West Africa, South Asia, East Asia and Mauritius. Map from GBIF Secretariat (2021). The location reported in the Atlantic Ocean was excluded from the climate matching analysis because this is a freshwater species, and the location reported in Mauritius was excluded from the climate matching analysis because no information was found to support the establishment of *L. decurrens* in this location.

Additional occurrences in Sri Lanka were estimated for the climate matching analysis based on the verbal descriptions of Chandrasena (1988). No georeferenced occurrences were available for parts of the native and introduced ranges in the Lesser Antilles.

6 Distribution Within the United States

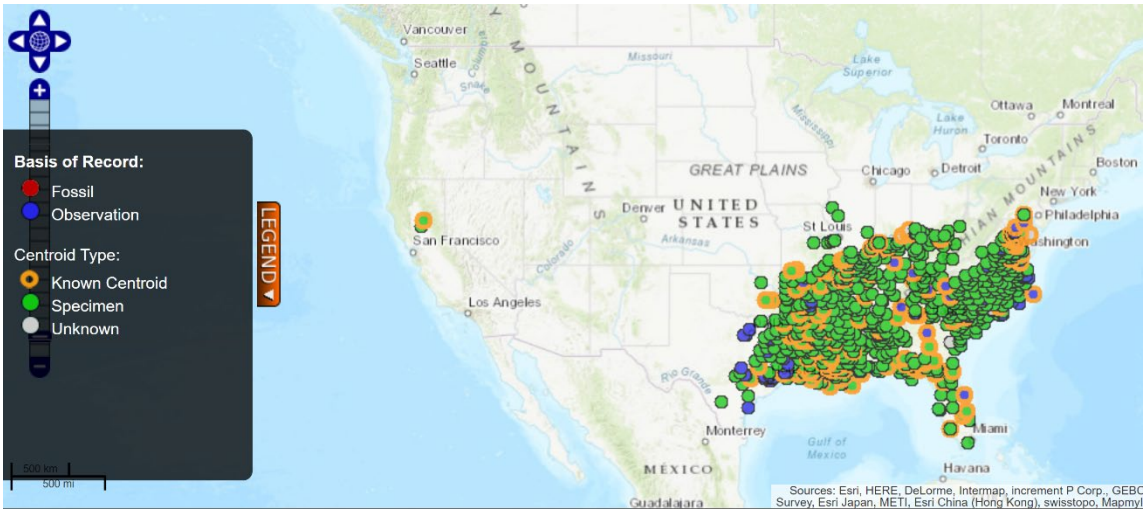

Figure 2. Known distribution of *Ludwigia decurrens* in the United States. Map from BISON (2021).

7 Climate Matching

Summary of Climate Matching Analysis

The Climate 6 score (Sanders et al. 2018; 16 climate variables; Euclidean distance) for *Ludwigia decurrens* in the contiguous United States was 0.487, indicating a high overall climate match. (Scores of 0.103 and greater are classified as high). The highest climate matches were found in the Southeastern United States, generally following the native distribution of the species, and in the Sacramento and San Joaquin Valleys of California. There were areas of low match along the Canadian border from Minnesota to Washington and in coastal Washington and much of the Rocky Mountain region. Everywhere else had medium match. Thirty-five States and the District of Columbia had high individual Climate 6 scores. The following States had medium individual Climate 6 scores: Maine, Nebraska, New Mexico and Washington. The following States had low individual Climate 6 scores: Colorado, Idaho, Minnesota, Montana, North Dakota, Nevada, South Dakota, Utah and Wyoming.

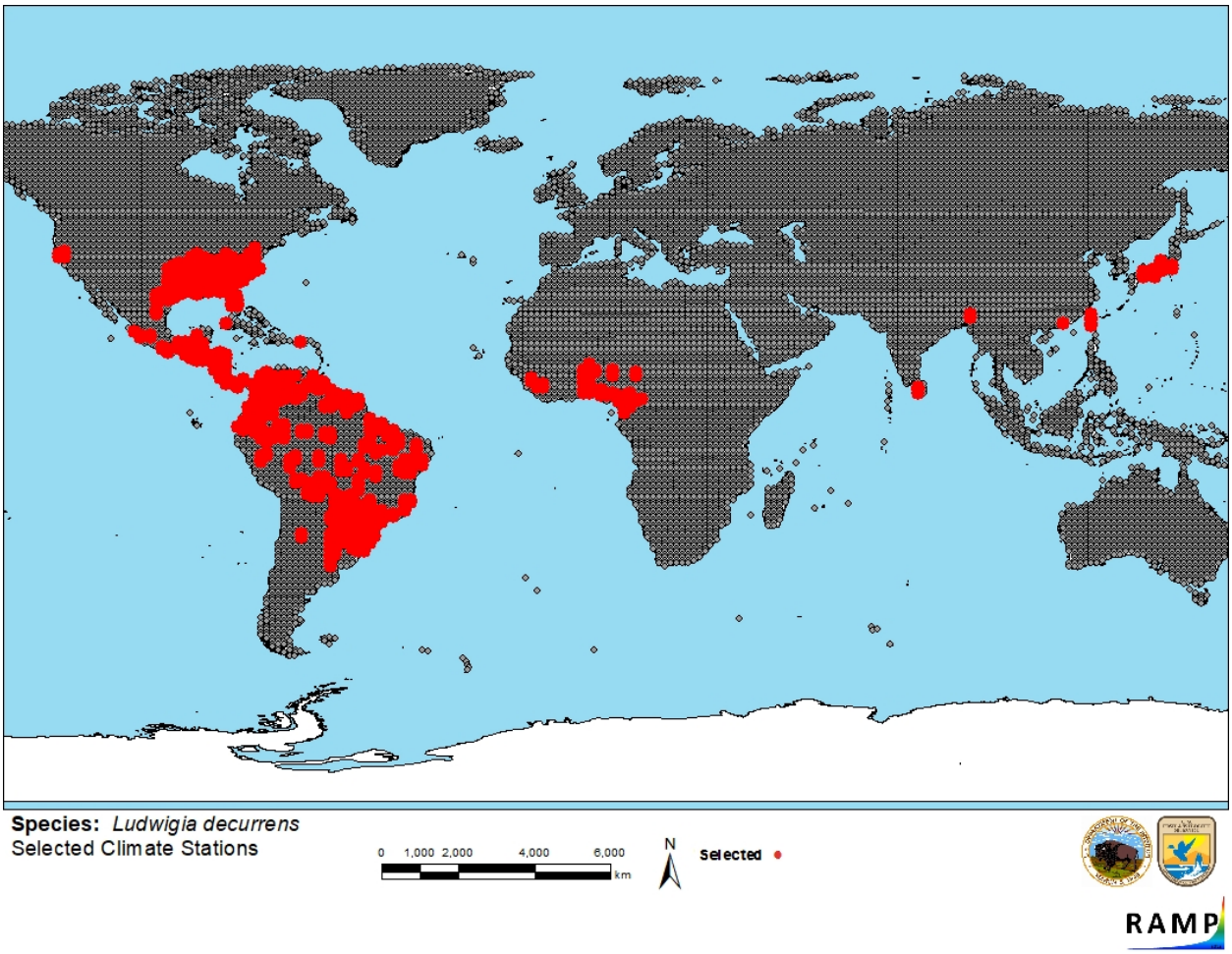

Figure 3. RAMP (Sanders et al. 2018) source map showing weather stations selected as source locations (red: United States including Puerto Rico, Cuba, Mexico, Belize, Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica, Panama, Venezuela, Colombia, Guyana, Suriname, French Guiana, Ecuador, Brazil, Bolivia, Paraguay, Peru, Argentina, Uruguay, Sierra Leone, Guinea, Liberia, Togo, Benin, Burkina Faso, Nigeria, Niger, Cameroon, Equatorial Guinea, Sri Lanka, India, China, Taiwan, and Japan) and non-source locations (gray) for *Ludwigia decurrens* climate matching. Source locations from GBIF Secretariat (2021), with additional source locations estimated for Sri Lanka based on Chandrasena (1988). Selected source locations are within 100 km of one or more species occurrences, and do not necessarily represent the locations of occurrences themselves.

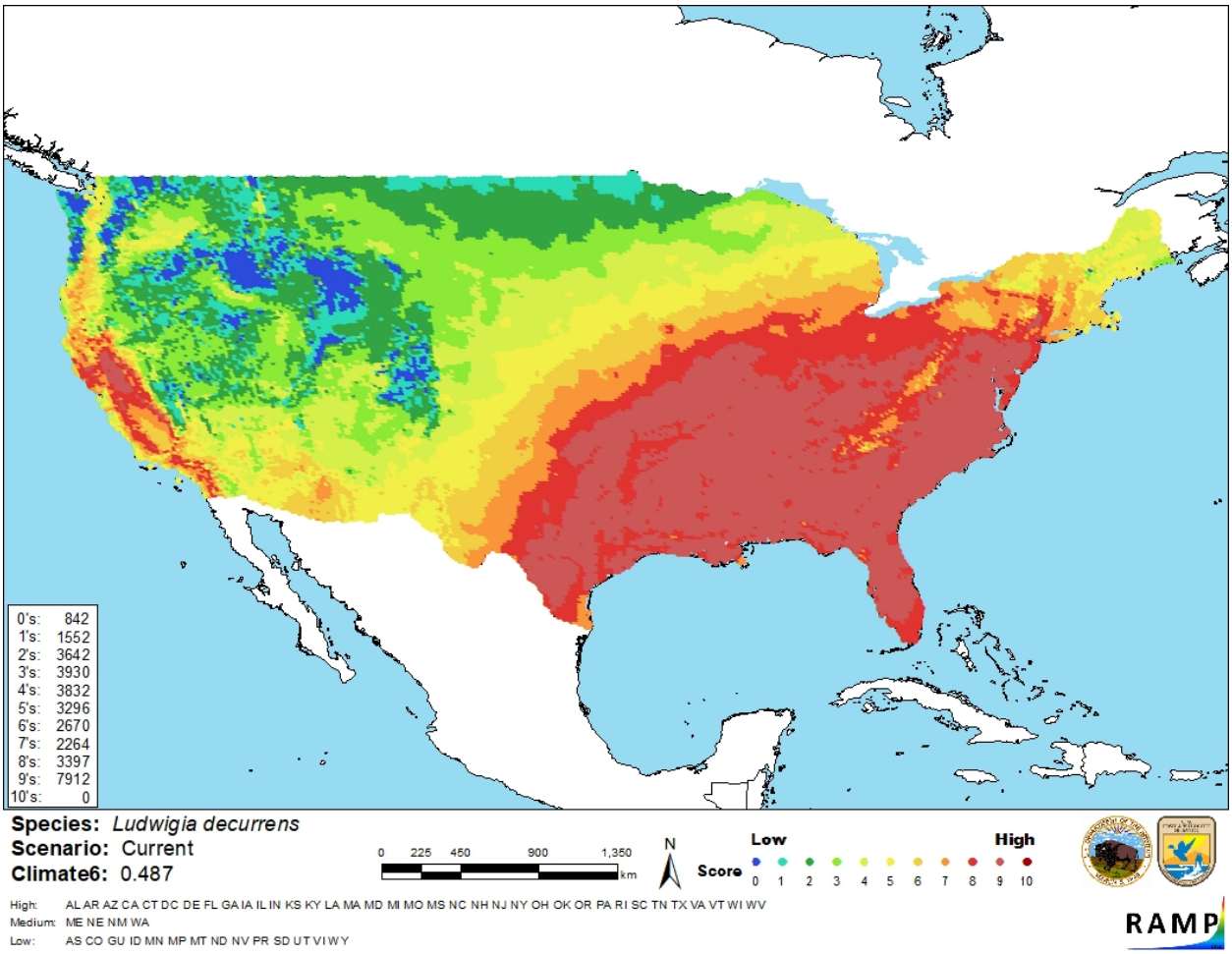

Figure 4. Map of RAMP (Sanders et al. 2018) climate matches for *Ludwigia decurrens* in the contiguous United States based on source locations reported by GBIF Secretariat (2021) and estimated from Chandrasena (1988). Counts of climate match scores are tabulated on the left. 0/Blue = Lowest match, 10/Red = 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 high. Information is readily available on the biology, ecology, and distribution of this species. Its establishment outside its native range is well documented, and one experiment published in a peer-reviewed journal demonstrates negative impacts of introduction to agriculture. Two other sources note impacts to agriculture when rice stands are thin.

9 Risk Assessment

Summary of Risk to the Contiguous United States

Wingleaf primrose-willow (*Ludwigia decurrens)* is a plant found in saturated soils and in ephemeral ponds. This species has a broad native range across parts of South, Central, and North America, including the southeastern United States. It does not appear to be in commercial trade in the United States or globally, but it is used medicinally in Nigeria. In 2011, *L. decurrens* was reported from rice fields in Butte County, California, outside its native range in the United States. It was likely present for several years prior to its identification in California and it is now labeled as a noxious weed in the State. *L. decurrens* has also established outside its native range in the U.S. Virgin Islands and Puerto Rico, although at least one source treats the species as native to Puerto Rico. Outside the United States, *Ludwigia decurrens* has been reported as established in West Africa (Guinea-Bissau, Guinea, Gambia, Sierra Leone, Benin, Niger, Nigeria, and Cameroon), Asia (mainland China, Taiwan, Japan, the Philippines, India, Sri Lanka), and France. The history of invasiveness is classified as High because the species has significant negative impacts on rice cultivation. However, impacts of introduced *L. decurrens* on native species remain unknown. The climate match for the contiguous United States is High. Most regions of the United States had medium or high climate match, with low match limited to the Rocky Mountains, the coastal Pacific Northwest, and along the Canadian border from Minnesota to eastern Washington. The certainty of the assessment is High. The overall risk assessment category for *Ludwigia decurrens* is High.

Assessment Elements

- **History of Invasiveness (Sec. 4): High**
- **Overall Climate Match Category (Sec. 7): High**
- **Certainty of Assessment (Sec. 8): High**
- **Remarks/Important additional information: NatureServe (2021) considers this species critically imperiled in Pennsylvania, imperiled in Maryland, and vulnerable in Indiana.**
- **Overall Risk Assessment Category: High**

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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