

# Water Primrose (*Ludwigia adscendens*)

## Ecological Risk Screening Summary

U.S. Fish & Wildlife Service, May 2021

Revised, June 2021

Web Version, 8/9/2021

Organism Type: Plant

Overall Risk Assessment Category: Uncertain



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## 1 Native Range and Status in the United States

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### Native Range

From Cowie et al. (2000):

“A common species from India to China and N Australia (NT, Qld). Common on Top End [Australia] floodplains, from the Daly River floodplain to Arafura Swamp.”

From Diop (2020):

“This species has a wide range in tropical & subtropical Africa and Asia to north Australia, Mexico and Central America, including the Caribbean.”

“Australia (Queensland, Northern Territory); Bangladesh; Benin; Burkina Faso; Cambodia; China (Hainan, Yunnan, Guangxi, Hunan, Fujian, Jiangxi, Guangdong); Cuba; Côte d'Ivoire; Dominican Republic; Gambia; Ghana; Guinea; Guinea-Bissau; Haiti; Honduras; India; Indonesia; Lao People's Democratic Republic; Liberia; Malaysia; Mali; Mexico; Myanmar; Nepal; Niger; Nigeria; Pakistan; Papua New Guinea; Philippines; Senegal; Sierra Leone; Sri Lanka; Taiwan, Province of China; Thailand; Togo; Viet Nam”

## Status in the United States

No records of *Ludwigia adscendens* in trade or in the wild in the United States were found.

CABI (2019) reports *Ludwigia adscendens* as present in half of the States in the contiguous United States, but no confirmation, georeferenced location data or further information was found to support these reports.

## Means of Introductions in the United States

No information on means of introduction of *Ludwigia adscendens* in the wild in the United States were found.

## Remarks

Other common names for this species include: Creeping Water Primrose and Red Ludwigia (Diop 2020).

“Water Primrose” and variations thereof are commonly used to refer to several other species in the genus *Ludwigia* (CABI 2019; Khanna et al. 2018; Nayek and Banerjee 1987; Thiebaut et al. 2018).

The taxonomic authority used for plants by this screening process, World Flora Online (WFO 2021), considers *Ludwigia adscendens* a valid species with the subspecies *L. adscendens* subsp. *diffusa*, and the synonyms *Jussiaea adscendens* and *J. repens*. These names were used to search for information for this screening. Other sources (CABI 2019; GBIF Secretariat 2021) have considered other synonyms as part of this species, which are considered separate species or synonyms of other species by WFO (2021). GBIF Secretariat (2021) includes another subspecies, *L. adscendens* subsp. *adscendens*, which WFO (2021) does not comment on. Every effort has been made to only consider information pertaining to *L. adscendens* and not another valid species in this screening.

*Altica cyanea* (an aquatic beetle) is used as a biocontrol agent for *L. adscendens* in India (Mitra et al. 2020).

## 2 Biology and Ecology

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### Taxonomic Hierarchy and Taxonomic Standing

According to WFO (2021), *Ludwigia adscendens* is the current accepted name for this species.

From GBIF Secretariat (2021):

“Kingdom: Plantae  
Phylum: Tracheophyta  
Class: Magnoliopsida  
Order: Myrtales  
Family: Onagraceae  
Genus: *Ludwigia*  
Species: *Ludwigia adscendens*”

### Size, Weight, and Age Range

From Caton et al. (2010):

“Growth habit: herb; floating or rooted and creeping; up to 0.5 m”

From African Plant Database (2021):

“[...] Hydrophyte- Ht 0.5 – 1 m.”

### Environment

From Cowie et al. (2000):

“Grows around channels and billabongs, on floating mats, in back-water swamps, and to a lesser extent on open clay floodplains.”

From Caton et al. (2010):

“Light: partial shade to sunny”

### Climate

From African Plant Database (2021):

“Alt: 0 – 1100 m.”

From Caton et al. (2010):

“Elevation: up to 1,600 m”

## Distribution Outside the United States

### Native

From Cowie et al. (2000):

“A common species from India to China and N Australia (NT, Qld). Common on Top End [Australia] floodplains, from the Daly River floodplain to Arafura Swamp.”

From Diop (2020):

“This species has a wide range in tropical & subtropical Africa and Asia to north Australia, Mexico and Central America, including the Caribbean.”

“Australia (Queensland, Northern Territory); Bangladesh; Benin; Burkina Faso; Cambodia; China (Hainan, Yunnan, Guangxi, Hunan, Fujian, Jiangxi, Guangdong); Cuba; Côte d'Ivoire; Dominican Republic; Gambia; Ghana; Guinea; Guinea-Bissau; Haiti; Honduras; India; Indonesia; Lao People's Democratic Republic; Liberia; Malaysia; Mali; Mexico; Myanmar; Nepal; Niger; Nigeria; Pakistan; Papua New Guinea; Philippines; Senegal; Sierra Leone; Sri Lanka; Taiwan, Province of China; Thailand; Togo; Viet Nam”

### Introduced

GBIF Secretariat (2021) lists *Ludwigia adscendens* as invasive in Madagascar, Singapore, Comoros [islands off Madagascar], Sri Lanka, Bangladesh, and Senegal (primary source is Global Register of Introduced and Invasive Species, which was unavailable at the time of screening).

From Saleh et al. (2019):

“Often, the invasive plant *Ludwigia stolonifera* [*Ludwigia adscendens*] is found accompanied by the most common indigenous macrophyte, *Eichhornia crassipes* [in Egypt] (Adam et al., 2002).”

From Hameed et al. (2019):

“A specimen of an aquatic plant was collected by first author (Arshad Hameed) on 1st November, 2013. The plant (an attached hydrophyte with spongy white pneumatophores emerging from nodes) was collected from the bank of canal Lower Bari Duab and appeared to be a novelty for flora of Pakistan but the specimen in hand had no flowers. Later, another plant was collected from Head Treemu in April, 2014 and added to the live repository at National Herbarium, National Agricultural Research Center, Islamabad, Pakistan. Flower colour, white spindle shaped pneumatophores and spatulate leaves helped identification as *Ludwigia adscendens* (L.) Hara. The plant has not been documented in Stewart's annotated catalogue (1972) nor in the account of the family Onagraceae in the flora of Pakistan (Hoch and Raven, 1981) and hence represents a new record for Pakistan.”

## Means of Introduction Outside the United States

From Deshmukh et al. (2017):

“[...] unintentionally through trade exchange including grain import.”

Kalita et al. (2011) list *Ludwigia adscendens* as a potential ornamental plant in Assam (India).

From Cowie et al. (2000):

“Fragmentation resulting from mechanical damage or senescence of stems can lead to dispersal and vegetative establishment of new plants [...] in emergent species with trailing stems which root at the nodes (e.g. [...] *Ludwigia adscendens* [...])”

The following information pertains to the genus *Ludwigia* which includes *L. adscendens*.

From Chauhan et al. (2011):

“[*Ludwigia*] has been observed throughout the rice growing season in direct-seeded rice (DSR) and transplanted rice fields in Asia (Tomita et al. 2003) [...] In DSR fields, *ludwigia* has been reported to occur in seven countries in dry-seeded rice and six countries in wet-seeded rice (Rao et al. 2007). The widespread introduction of direct seeding in Asia may increase its abundance in rice crops.”

## Short Description

From WFO (2021):

“Herbs perennial, with creeping or floating stems, rooting at nodes, with white, erect, short (1-3 cm), spindle-shaped pneumatophores in clusters at nodes of floating stems. Floating stems to 400 cm, terrestrial stems 20-60 cm, much branched, tips ascending, glabrous or densely villous. Petiole 5-20 mm; leaf blade oblong to spatulate-oblong, 0.4-7 × 0.7-3 cm, glabrous, lateral veins 6-13 per side, submarginal vein not prominent, base narrowly cuneate or attenuate, margin entire, apex obtuse to subacute. Sepals 5, deltoid-acuminate, 5-11 mm, glabrous or villous. Petals creamy-white with yellow base, obovate, 9-18 × 6-10 mm. Stamens 10; filaments white, 2.5-4 mm; anthers 0.7-1.8 mm; pollen in monads. Style white, 4-10 mm, glabrous; stigma discoid. Capsule light brown with dark brown ribs, cylindric, terete, 1.2-2.7 cm, 3-4 mm in diam., glabrous or villous, thickly walled, tardily and irregularly dehiscent; pedicel 1.5-5.5 cm. Seeds in one row per locule, firmly embedded in coherent cubes of woody endocarp fused to capsule wall, pale brown, oblong or elliptic, 1.1-1.3 mm, raphe inconspicuous. Fl. Apr-Nov, fr. May-Nov.”

From Cowie et al. (2000):

“Perennial rooted aquatic herbs with floating stems; adventitious roots and white, spongy, spindle-shaped floats at nodes; vegetative parts glabrous or sparsely hairy with short and long, simple, hyaline hairs. Stipules persistent, ovate, c. 0.5 mm long. Petioles 3-40 mm long. Leaf blades elliptic, oblanceolate, spatulate or obovate, 11-80 mm long, 4-34 mm wide, L:W 1.8-2.7; base attenuate; apex obtuse with dark swollen gland on abaxial surface. Flowers in upper

axils, pubescent on upper part of ovary and calyx. Pedicels 6–26 mm long. Bracteoles persistent, subopposite, c. 1 mm long, inserted about middle of ovary. Sepals 5, narrowly triangular, 5–10 mm long. Petals white to pale yellow or yellow at base, obovate, 8–14 mm long. Stamens 10. Fruit brown, cylindrical, obscurely 10-ribbed, 22–27 mm long, c. 3 mm wide. Seeds c. 2 mm long, embedded in fruit tissue. Flowering & fruiting: all year depending on moisture availability.”

“[...] the dryland form of *Ludwigia adscendens* has reduced leaves, shortened internodes and lacks floats”

## Biology

From Cowie et al. (2000):

“Grows around channels and billabongs, on floating mats, in back-water swamps, and to a lesser extent on open clay floodplains. In the terrestrial state on drying wetland margins all parts are smaller, more densely pubescent and rarely fertile.”

“Many emergent species develop spongy or corky tissues in response to inundation. A conspicuous example is the development in *Ludwigia adscendens* of inflated, white, aerenchyma-filled float roots.”

From Kalita et al. (2011):

“Perennial, dicot, lentic, surface floating, reproduction by seeds and stolons”

## Human Uses

From Oyedele et al. (2011):

“[...] leaves of *Ludwigia adscendens* are fed to livestock in Mali. The seeds of all *Ludwigia* species are very rich in oil (Burkill, 1997). The medicinal use of *Ludwigia* species dates back to decades and previous studies on several species have revealed it to be of value in traditional medicine. Leaves of some species are used as poultice in wound dressings and as remedy for dysentery. The leaf sap is also taken orally to stave off threatened abortion, flatulence and constipation (Kirtikar and Basu, 1987). Extract of leaves and stems of *L. adscendens* possesses a strong antimicrobial activity and is used against various skin diseases while the flower possesses anti-inflammatory activity (Selim, 2003).”

From Ooh et al. (2014):

“Traditionally, [...] macerated leaf of *L. adscendens* is used to treat diarrhea and relieve gastrointestinal disorder [...]”

From Diop (2020):

“This species has a number of medicinal uses, including for treatment of dysentery, sexual transmitted diseases, inflammation, bites, parasites, fever, skin complains [sic] and coughs. In Papua New Guinea, it is considered to have contraceptive properties (Tropical Plant Database 2020). The aerial parts are mucilaginous and are considered antiseptic and emollient. Its leaves and young shoots can be eaten raw and as a salad. It is dangerous to cattle when eaten as it can cause gastroenteritis.”

From Khalifa et al. (2017):

“Economically, *L. stolonifera* [*Ludwigia adscendens*] can be used for water bioremediation, helping to improve quality of drinking water (Larson 1999); its roots and leaves can be used also as biofilters for heavy metals (Elifantz and Tel-or 2002). Many pharmacologists reported the clinical uses of *L. stolonifera* as hepatoprotective, anti-inflammatory, antidiabetic, antibacterial and fibrinolytic; its aerial parts are composed of metabolites including rutin, kaempferol, quercetin, terpenes and triterpenes. (Firoj et al. 2005; Barik and Banerjee 2003; Ghani 2003).”

## Diseases

CABI (2019) lists *Glomerella cingulata* as a pathogen of *Ludwigia adscendens*.

Chak et al. (2010) list *Ludwigia adscendens* as a host plant of *Cuscuta* spp., a genus of parasitic plants in the morning glory family.

From Chak et al. (2010):

“Severe damage caused by *Cuscuta* on native flora and a range of crop plants in humid and semi-arid parts of Asia and Africa have been reported by Dawson et al. (1994), Parker & Riches (1993), Marambe et al. (2002), Jeschke et al. (1994) and Sadler et al. (1997). Marcone et al. (1999) have reported the likelihood of *Cuscuta* as a vector in transferring viral diseases between various crop plants.”

According to Poelen et al. (2014), this species is a host of *Septoria jussiaeae*.

## Threat to Humans

From Mitra et al. (2020):

“Most of the *Ludwigia* species can block navigation channels and are considered as serious weeds in wet areas, particularly in rice fields (Moody, 1989; Holm et al., 1997; Tomita et al., 2003; Rao et al., 2007). [...] *Ludwigia adscendens* [...] are abundant in rice fields of West Bengal, India, and these weeds are a major impediment to rice production as they compete with rice for resources in fields (Mitra et al., 2019).”

Chak et al. (2010) list *Ludwigia adscendens* as a host plant of *Cuscuta* spp., a genus of parasitic plants in the morning glory family.

From Chak et al. (2010):

“Severe damage caused by *Cuscuta* on native flora and a range of crop plants in humid and semi-arid parts of Asia and Africa have been reported by Dawson et al. (1994), Parker & Riches (1993), Marambe et al. (2002), Jeschke et al. (1994) and Sadler et al. (1997). Marcone et al. (1999) have reported the likelihood of *Cuscuta* as a vector in transferring viral diseases between various crop plants.”

From Caton et al. (2010):

“[...] restricts waterways; reduces oxygen content in water; dangerous to cattle [in Asia]”

From Diop (2020):

“It is dangerous to cattle when eaten as it can cause gastroenteritis.”

### 3 Impacts of Introductions

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From Hameed et al. (2019):

“It [*Ludwigia adscendens*] is an invasive perennial species and has been recorded as a weed in rice in the various countries of South and Southeast Asia (Bangladesh, Indonesia, India, Kampuchea [Cambodia], Laos, Malaysia, Nepal, Philippines, Sri Lanka, Thailand and Vietnam) (Moody, 1989).”

From Diop (2020):

“It is dangerous to cattle when eaten as it can cause gastroenteritis.”

### 4 History of Invasiveness

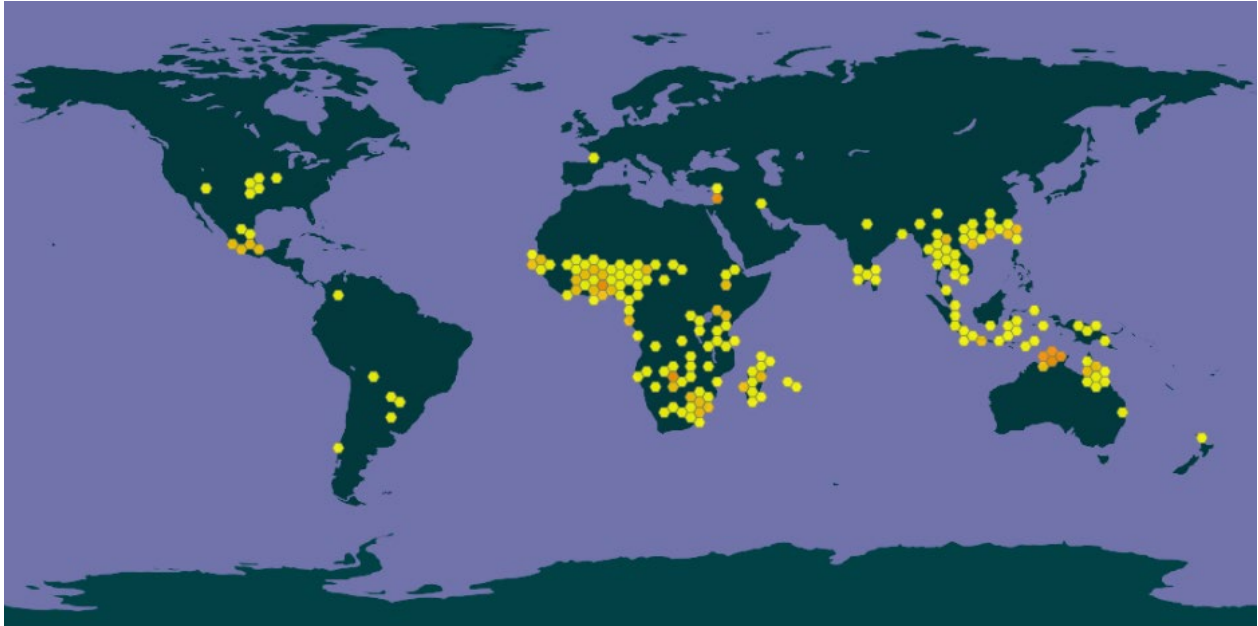
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The history of invasiveness for *Ludwigia adscendens* is Data Deficient. *L. adscendens* has been reported as introduced to Bangladesh, the Comoros Islands, Egypt, Madagascar, Pakistan, Singapore, Senegal, and Sri Lanka. It seems to be established in Egypt. No evidence of substantial trade or trade outside the native range for *L. adscendens* was found. The information surrounding native and introduced ranges for this species is ambiguous and often overlapping. The information on negative impacts of *L. adscendens* was vague and from areas reported in the literature to be both within the native range of the species and an introduced area. Not enough detailed information was available to determine if the species is native to one portion of those countries but introduced in another.



## 5 Global Distribution

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**Figure 1.** Known global distribution of *Ludwigia adscendens*. Observations are reported from North America, South America, sub-Saharan Africa, the Middle East, southern and southeastern Asia, and northern Australia. Map from GBIF Secretariat (2021). Points in the United States, South America, France, Israel, Syria, Iraq and New Zealand do not represent established populations and were not used to select source points for the climate match analysis.

## 6 Distribution Within the United States

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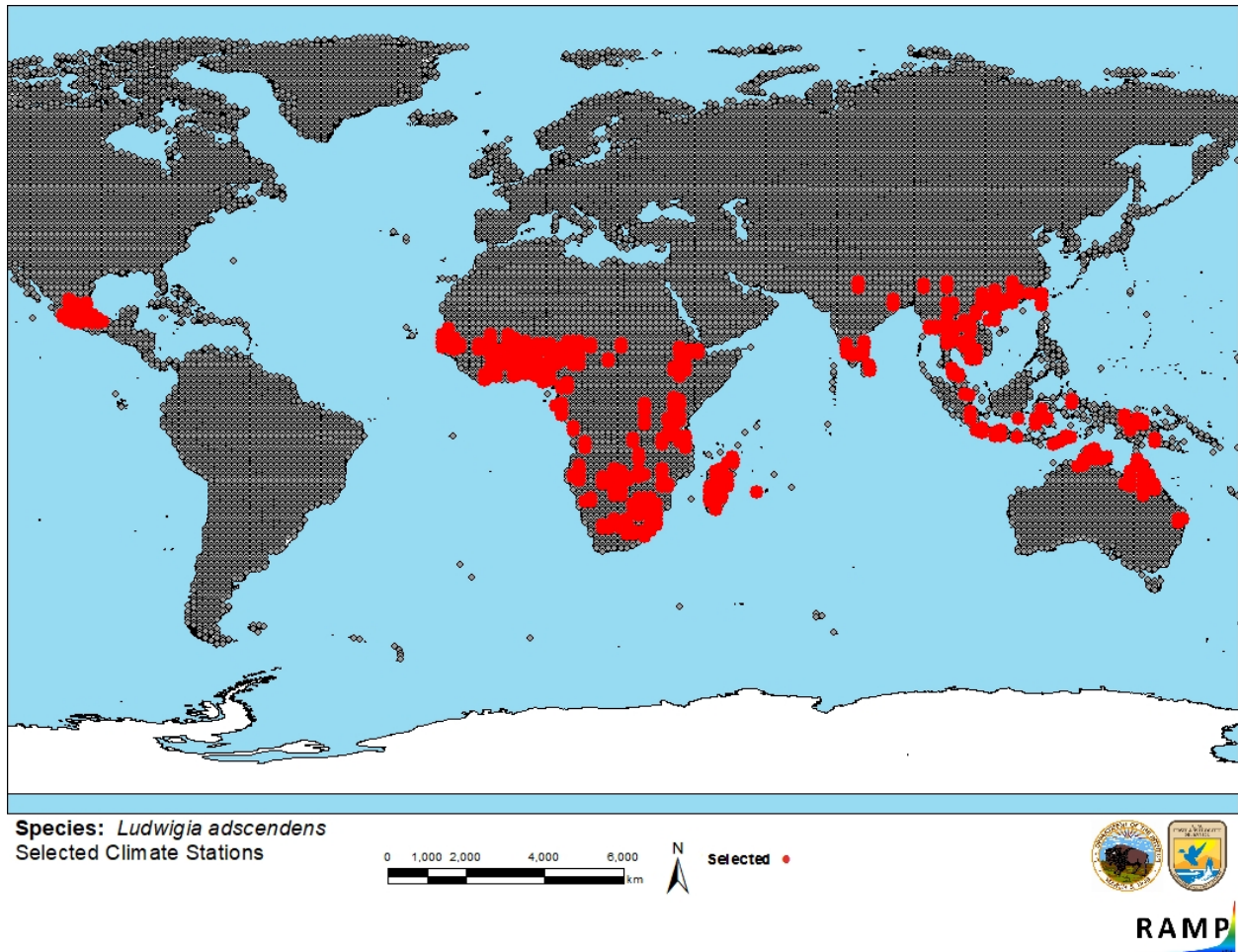
No records of *Ludwigia adscendens* in the wild in the United States were found.

## 7 Climate Matching

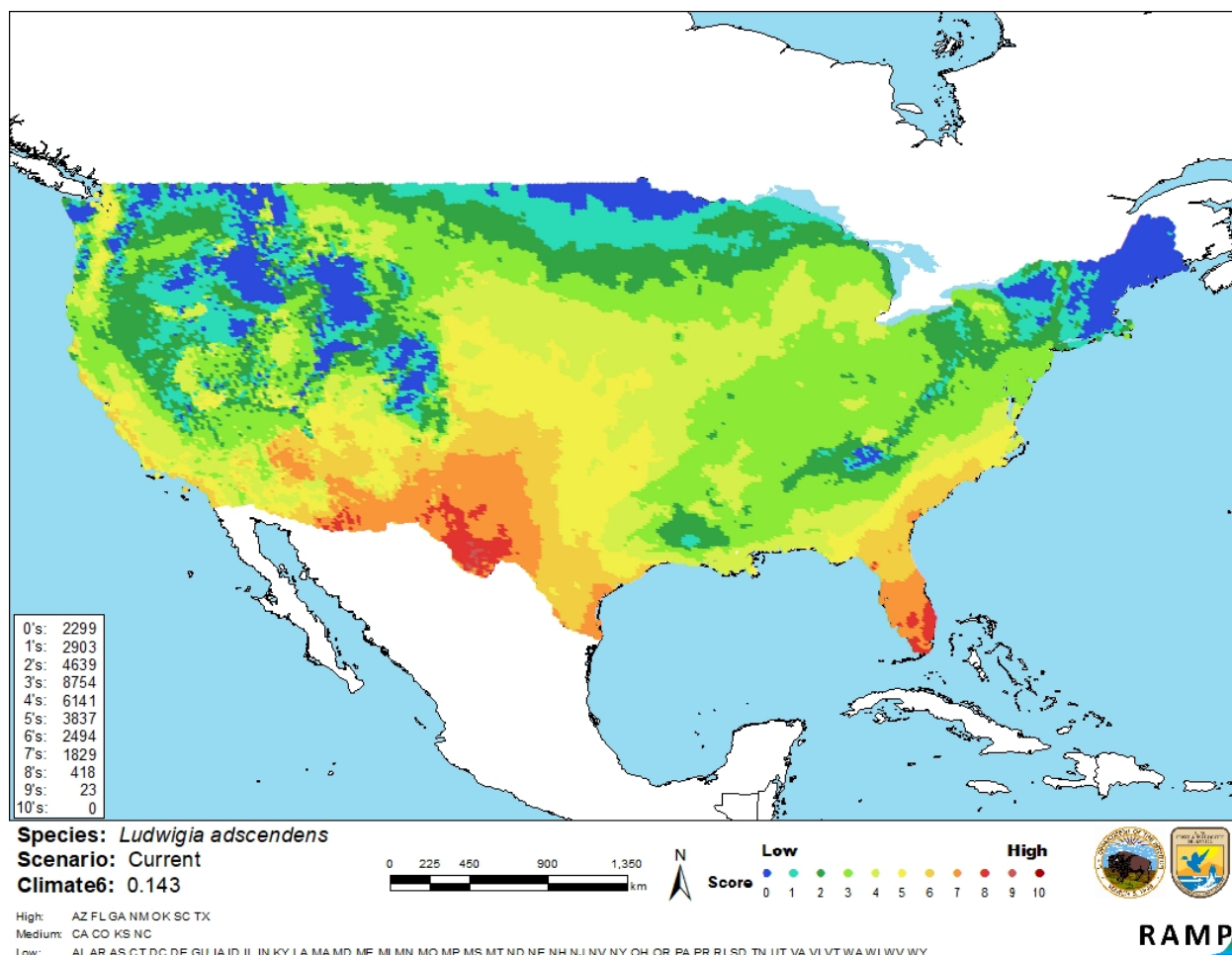
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### Summary of Climate Matching Analysis

The climate match for *Ludwigia adscendens* was highest in Southcentral, Southwest, and Southeast States, including along the southern border of the contiguous United States, and peninsular Florida. There was medium climate match across most of the Central Plains, as well as in parts of the Midwest and along the southeastern Atlantic Coast, and along the Pacific Coast. The overall Climate 6 score (Sanders et al. 2018; 16 climate variables; Euclidean distance) for the contiguous United States was 0.143, high. (Scores equal to or greater than 0.103 are classified as high.) The following States had high individual Climate 6 scores: Arizona, Florida, Georgia, New Mexico, Oklahoma, South Carolina, and Texas. The following States had medium individual Climate 6 scores: California Colorado, Kansas, and North Carolina. All remaining States had low individual Climate 6 scores.



**Figure 2.** RAMP (Sanders et al. 2018) source map showing weather stations in Mexico, sub-Saharan Africa, southern and southeastern Asia, and Australia selected as source locations (red: Mexico, Botswana, Kenya, Ghana, Ivory Coast, Guinea-Bissau, Mozambique, Benin, Senegal, Tanzania, Rwanda, Gabon, Chad, Ethiopia, Sudan, Burkina Faso, Mali, Niger, Nigeria, Zambia, Zimbabwe, Central African Republic, Togo, Namibia, Angola, Congo, Cameroon, South Africa, Eswatini, Réunion, Mauritius, Madagascar, India, Sri Lanka, China, Chinese Taipei, Hong Kong, Thailand, Vietnam, Laos, Cambodia, Myanmar, Singapore, Indonesia, Papua New Guinea, Timor-Leste, Australia) and non-source locations (gray) for *Ludwigia adscendens* 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 adscendens* 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
$0.000 \leq X \leq 0.005$	Low
$0.005 < X < 0.103$	Medium
$\geq 0.103$	High

## 8 Certainty of Assessment

The certainty of assessment for *Ludwigia adscendens* is Low. Information on the native range of this species is unclear, and further complicated by disagreement in the literature about synonyms and the designation of subspecies. There are reports of *L. adscendens* occurring and established outside its native range, however information on negative impacts is deficient outside the

reported native range. The information surrounding native and introduced ranges for this species is ambiguous and often overlapping. Not enough detailed information regarding distribution was available to determine if the species might be native in one section of a country but introduced in another. Many impacts were presented for the genus *Ludwigia*, rather than for individual species. Impacts specific to *L. adscendens* were not well substantiated or able to be attributed to a nonnative population with any certainty. Based on the ambiguity of the range and taxonomy for this species, and the lack of verifiable information on impacts, the certainty of this assessment is Low.

## 9 Risk Assessment

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### Summary of Risk to the Contiguous United States

*Ludwigia adscendens*, the Water Primrose, is an aquatic plant native to tropical and subtropical areas in Mexico, sub-Saharan Africa, southern and southeastern Asia, and northern Australia. *L. adscendens* is used locally as a food source and medicinal plant, potentially used as an ornamental plant, and also has potential for bioremediation of polluted water resources. It is also considered a major weed in some rice-growing areas where it is native, and has the potential to restrict waterways. *L. adscendens* has been reported as introduced to Bangladesh, the Comoros Islands, Egypt, Madagascar, Pakistan, Singapore, Senegal, and Sri Lanka, and seems to be established in Egypt. Information regarding negative impacts was either available for the *Ludwigia* genus as a whole or reported from areas that may or may not be outside the native range. Reported impacts beyond the weed concerns mentioned include reductions in oxygen in water bodies, posing a danger to cattle if ingested, and acting as a natural host for *Cuscuta* sp., a parasite of agricultural crops. Therefore, the history of invasiveness is Data Deficient. The overall climate match for the contiguous United States is High for *L. adscendens*, with the highest matches found in along the southern United States border and in the Southeast. The certainty of assessment for this species is Low due to ambiguity in taxonomic classification and native range, as well as a lack of well documented information on impacts of introduction. The overall risk assessment category for *Ludwigia adscendens* 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 information
- **Overall Risk Assessment Category: Uncertain**

## 10 Literature Cited

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**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

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**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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