

## California Pest Rating Proposal for

*Ludwigia peruviana* (L.) H. Hara, Peruvian primrose-willow, Peruvian water-primrose

Family: Onagraceae

Current Pest Rating: A

Proposed Pest Rating: A

Synonym: *Jussiaea peruviana* L.

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Comment Period: **03/15/2021 through 04/29/2021**

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### Initiating Event:

*Ludwigia peruviana* has been assigned an A-rating by the California Department of Food and Agriculture (CDFA), Plant Health and Pest Prevention Services. *Ludwigia peruviana* is designated as a noxious weed as defined by the California Food and Agricultural Code (FAC) Section 5004 and is listed in Title 3, California Code of Regulations (CCR), Section 4500. A pest rating proposal is required to evaluate the current rating and status of the species in California.

### History & Status:

**Background:** *Ludwigia peruviana* is a perennial, deciduous, freshwater, wetland shrub with numerous, erect and lateral, branching stems that grow 0.6 to four meters tall. Stems and leaves are covered with a villous pubescence (Raven, 1964). The root system consists of a woody taproot, shallow lateral roots, and, when submerged, white, spongy, vertical pneumatophores (PIER 2005; Raven, 1964). The leaves of *Ludwigia peruviana* are sessile or borne on short petioles and alternately arranged. Leaves are oval to lanceolate, dark green on the upper surface, and have prominent veins and entire margins (Jacobs et al., 1994). Bright yellow flowers originate from the upper leaf axils. Flowers have four to six petals and four to five persistent sepals. The fruit is a four-angled, elongated, pubescent, reddish-brown capsule containing 1,000-3,000 minute (0.6-0.8 mm), round, light brown seeds (Jacobs et al., 1994; Raven, 1964).

**Worldwide Distribution:** *Ludwigia peruviana* is native to North America (Mexico); Central America (Belize, Costa Rica, Guatemala, Honduras, Nicaragua, Panama, El Salvador); South America (Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Paraguay, Peru, Uruguay, and Venezuela); and the Caribbean (including Cuba, Cayman Islands, Dominican Republic, Haiti, Jamaica, Puerto Rico, and Trinidad and Tobago) (USDA/GRIN, 2020). *Ludwigia peruviana* has become naturalized in Australia, India, Indonesia, Malaysia, Sri Lanka, and the southeastern United States (USDA/GRIN, 2020). It occurs in the United States in portions of Alabama, Georgia, Florida, Mississippi, and Texas (USDA/NRCS, 2020), with most of the known populations occurring in Florida.

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**Official Control:** *Ludwigia peruviana* is listed on CCR Section 4500 as a noxious weed defined by California FAC Section 5004. The Department is mandated by California FAC, Division 1, Chapter 3, Section 403 to prevent the introduction and spread of noxious weeds. *Ludwigia peruviana* is a restricted noxious weed seed for the purposes of labeling seed containers offered for sale, planting, or distribution in California (CCR Section 3855) and for the purposes of interstate shipments of agricultural seed into California (Title 7, Code of Federal Regulations, Section 201.16[b].)

*Ludwigia peruviana* is designated as a noxious weed in Australia and New Zealand (USFWS, 2018).

**California Distribution:** There are no recorded collections of *Ludwigia peruviana* from populations naturalized in California (Calflora database, 2020; CCH, 2020).

**California Interceptions:** *Ludwigia peruviana* was collected as an aquatic plant offered for sale in a nursery in San Diego submitted to the CDFA Plant Pest Diagnostics Branch for identification in August 2001 (CDFA/PDR entry P113493, prior to the start of the online database; G.F. Hrusa, pers. comm., 12/31/2020).

## Consequences of Introduction

### 1) Climate/Host Interaction: Score is **Medium (2)**

*Ludwigia peruviana* occurs in freshwater wetlands, swamps, marshes, and areas of periodic flooding. It does not tolerate salinity (Champion and Clayton, 2000). *Ludwigia peruviana* can grow in stationary or slow-moving water up to one meter deep. When roots are submerged, pneumatophores can enable air to be carried to the submerged tissues (Jacobs et al., 1994).

*Ludwigia peruviana* grows in tropical and subtropical regions from sea level to 1,100 meters elevation (Raven, 1963), and has been more recently found at elevations of up to 1,450 meters (Chandrasana, 2005). Jacobs et al (1994) found that germination of *Ludwigia peruviana* “slowed appreciably” at temperatures below 10°C in experimental settings. Chandrasana (2005) states that *Ludwigia peruviana* has a “wide ecological amplitude.” The climatic match to known areas of occurrence for *Ludwigia peruviana* is low to medium in southern and central coastal California, compared to high for the areas of the southeastern United States in which the species has become established (USFWS, 2018), but the species has become established in areas of southeastern Australia that are more comparable in climatic regime to south coastal California.

- Low (1) Not likely to establish in California; or likely to establish in very limited areas
- **Medium (2) may be able to establish in a larger but limited part of California**
- High (3) likely to establish a widespread distribution in California

### 2) Known Pest Host Range: Score is **High (3)**

*Ludwigia peruviana* can wherever general ecological conditions exist that are conducive to its survival.

- Low (1) has a very limited host range
  - Medium (2) has a moderate host range
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- High (3) has a wide host range

**3) Pest Dispersal Potential: Score is High (3)**

*Ludwigia peruviana* reproduces both sexually and asexually from buds on broken stems and stem fragments. Jacobs et al. (1994) estimated seed production in dense stands of *Ludwigia peruviana* at approximately 400,000 seeds/m<sup>2</sup>, with seed viability ranging from 80-99% in the first year. Toth (2010) describes the presence of *Ludwigia peruviana* in the seed bank as “abundant.” Seeds float on the water surface and can be dispersed long distances by water currents, wind, clothing, hair, feathers and machinery (Jacobs et al., 1994).

Seedlings and stem fragments of *Ludwigia peruviana* can establish along shorelines or grow as floating, vegetative mats (Jacobs et al., 1994). Mats can be dispersed with water movements or become rooted in shallow water.

Disturbance to the canopy in stands of *Ludwigia peruviana*, or damage to the stems, will cause vigorous growth of lateral, overlapping branches (Jacobs et al., 1994). Stems break easily and colonies will expand as new, upright stems grow from the fallen stems and regrow from the base of the plant (Jacobs et al., 1994).

*Ludwigia peruviana* is reported to be used as an ornamental plant due to its showy flowers (GISD, 2020). Infestations of *Ludwigia peruviana* in wetland habitats in eastern Australia were likely due to accidental or intentional spread from a botanical garden where it was being cultivated in the early 1900's (Chandrasena, 2005).

Evaluate the natural and artificial dispersal potential of the pest.

- Low (1) does not have high reproductive or dispersal potential
- Medium (2) has either high reproductive or dispersal potential
- **High (3) has both high reproduction and dispersal potential**

**4) Economic Impact: Score is Low (1)**

Chandrasena (2005) reports that *Ludwigia peruviana* infestations in the eastern Australian engineered freshwater pond system known as the Botany Wetlands have increased the risk of flooding to adjacent properties. Additionally, the reductions in water flow, sedimentation, and recurrent toxic blue-green algal blooms caused by *Ludwigia peruviana* infestations have reduced recreational opportunities and could negatively impact the cultural and aesthetic value of the Botany Wetlands.

- A. The pest could lower crop yield.
  - B. The pest could lower crop value (includes increasing crop production costs).
  - C. The pest could trigger the loss of markets (includes quarantines).
  - D. The pest could negatively change normal cultural practices.
  - E. The pest can vector, or is vectored, by another pestiferous organism.
  - F. The organism is injurious or poisonous to agriculturally important animals.
  - G. The organism can interfere with the delivery or supply of water for agricultural uses.**
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Economic Impact:

- **Low (1) causes 0 or 1 of these impacts**
- Medium (2) causes 2 of these impacts
- High (3) causes 3 or more of these impacts

**5) Environmental Impact: Score is High (3)**

*Ludwigia peruviana* can form tall, dense, monotypic stands that can outcompete other species for light and reduce biodiversity. Toth (2010) observed that *Ludwigia peruviana* displaced native plant species and accounted for 80% of plant cover in an infested marsh habitat in central Florida. At infested wetlands in Australia, bird populations have diminished (Chandrasena, 2005).

Fallen stems and mats of vegetation can cause increased sedimentation, accumulation of organic material, and reduction of oxygen in the water column (Chandrasena, 2005).

- A. The pest could have a significant environmental impact such as lowering biodiversity, disrupting natural communities, or changing ecosystem processes.**
- B. The pest could directly affect threatened or endangered species.**
- C. The pest could impact threatened or endangered species by disrupting critical habitats.**
- D. The pest could trigger additional official or private treatment programs.**
- E. The pest significantly impacts cultural practices, home/urban gardening or ornamental plantings.

Environmental Impact:

- Low (1) causes none of the above to occur
- Medium (2) causes one of the above to occur
- **High (3) causes two or more of the above to occur**

Consequences of introduction to California for *Ludwigia peruviana* *Linaria dalmatica*: **Medium (12)**

Low = 5-8 points

**Medium = 9-12 points**

High = 13-15 points

**1) Post Entry Distribution and Survey Information: Score is Not Established (0)**

- Not established (0) Pest never detected in California or known only from incursions.**
  - Low (-1) Pest has a localized distribution in California or is established in one suitable climate/host area (region).
  - Medium (-2) Pest is widespread in California but not fully established in the endangered area, or pest established in two contiguous suitable climate/host areas.
  - High (-3) Pest has fully established in the endangered area, or pest is reported in more than two contiguous or non-contiguous suitable climate/host areas.
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**7) Final Score: Medium 12 (12-0=12)**

**Conclusion and Rating Justification:**

Due to the invasive potential of *Ludwigia peruviana* into freshwater wetlands of south coastal California and the ability of the species form dense stands excluding other aquatic species, establishment of the species in California could cause serious environmental damage. Because the species has been offered for sale as an aquatic ornamental and is not currently known to occur in this state, an A-rating is recommended.

**Uncertainty:**

Based on the climatic match models presented by USFWS (2018) it is not clear how much of the wetland area of California would support establishment of populations of the species.

**References:**

Calflora Database. 2020. Berkeley, California. Information on California plants for education, research and conservation, with data contributed by public and private institutions and individuals, including the Consortium of California Herbaria. <https://www.calflora.org/> Accessed December 31, 2020

California Department of Food and Agriculture (CDFA), Plant Pest Diagnostics Branch, Pest and Damage Record (PDR) Database. Accessed December 31, 2020.

Champion, P.D. and Clayton, J.S., 2000. Border control for potential aquatic weeds. Stage 1. Weed risk model. New Zealand Department of Conservation. Wellington.  
<https://niwa.co.nz/sites/niwa.co.nz/files/sfc141.pdf> Accessed September 25, 2020.

Chandrasena, N. 2005. *Ludwigia peruviana* (L.) Hara and *Ludwigia longifolia* (DC) Hara in Sydney: From Immigrants to Invaders. Proceedings of the 20th Asian-Pacific Weed Science Society Conference, Ho-Chi-Minh City, Vietnam, pp. 121-130.

Chandrasena, N., Pinto, L., and Sim, R. 2002. Reclaiming Botany Wetlands, Sydney through integrated management of *Ludwigia peruviana* and other weeds. Council of Australasian Weed Societies, Proceedings of the 13th Australian Weeds Conference, 2002, pp. 134-137. Perth, Australia.  
[http://caws.org.nz/old-site/awc\\_contents.php?yr=2002](http://caws.org.nz/old-site/awc_contents.php?yr=2002) Accessed September 17, 2020.

Consortium of California Herbaria (CCH), 2020. <https://cch2.org/portal/collections/map/index.php> Accessed December 31, 2020.

Global Invasive Species Database (GISD) (2020) *Ludwigia peruviana*.  
<http://www.iucngisd.org/gisd/species> Accessed September 24, 2020.

Hawaiian Ecosystems at Risk Project (HEAR), Pacific Island Ecosystems at Risk (PIER), 2005. *Ludwigia peruviana* (L.) H. Hara, Onagraceae. [http://www.hear.org/pier/species/ludwigia\\_peruviana.htm](http://www.hear.org/pier/species/ludwigia_peruviana.htm) Accessed September 17, 2020.

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Jacobs, S.W.L., Perrett, F., Sainty, G.R., Bowmer, K.H. and Jacobs, B.J. 1994. *Ludwigia peruviana* (Onagraceae) in the Botany Wetlands near Sydney, Australia. *Journal of Marine and Freshwater Research*, 45: 1481-1490.

Raven, P. H. 1964. The Generic Subdivision of Onagraceae, Tribe Onagreae. *Brittonia* 16, 3: 276-88. <http://www.jstor.org/stable/2805062> Accessed September 22, 2020.

Toth, L.A., 2010. Restoration response of relict broadleaf marshes to increased water depths. *Wetlands* 30, 2: 263-274. <https://link.springer.com/article/10.1007/s13157-010-0028-8> Accessed September 17, 2020.

United States Department of Agriculture (USDA), Agricultural Research Service (ARS), National Plant Germplasm System. 2019. Germplasm Resources Information Network (GRIN-Taxonomy) <https://npgsweb.ars-grin.gov/gringlobal/taxon/taxonomydetail?id=403743> Accessed September 24, 2020

United States Department of Agriculture (USDA), Natural Resource Conservation Service (NRCS) 2018. *Ludwigia peruviana*. The PLANTS database. National Plant Data Team, Greensboro, North Carolina. <https://plants.usda.gov/core/profile?symbol=LUPE6> Accessed September 15, 2020.

United States Fish and Wildlife Service (USFW) 2018. Peruvian Primrose (*Ludwigia peruviana*) Ecological Risk Screening Summary. <https://www.fws.gov/fisheries/ANS/erss/highrisk/ERSS-Ludwigia-peruviana-FINAL.pdf> Accessed September 15, 2020.

Wagner, W., Hoch, P., and Raven, P. 2007. Revised Classification of the Onagraceae. *Systematic Botany Monographs*, 83, 1-240. <https://www.jstor.org/stable/25027969> Accessed September 15, 2020.

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**\*Comment Period: 03/15/2021 through 04/29/2021**

**\*NOTE:**

You must be registered and logged in to post a comment. If you have registered and have not received the registration confirmation, please contact us at permits[@]cdfa.ca.gov.

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**Comment Format:**

- ❖ Comments should refer to the appropriate California Pest Rating Proposal Form subsection(s) being commented on, as shown below.
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**Example Comment:**

Consequences of Introduction: 1. Climate/Host Interaction: [Your comment that relates to “Climate/Host Interaction” here.]

- ❖ Posted comments will not be able to be viewed immediately.
  
  - ❖ Comments may not be posted if they:
    - Contain inappropriate language which is not germane to the pest rating proposal;
  
    - Contains defamatory, false, inaccurate, abusive, obscene, pornographic, sexually oriented, threatening, racially offensive, discriminatory or illegal material;
  
    - Violates agency regulations prohibiting sexual harassment or other forms of discrimination;
  
    - Violates agency regulations prohibiting workplace violence, including threats.
  
  - ❖ Comments may be edited prior to posting to ensure they are entirely germane.
  - ❖ Posted comments shall be those which have been approved in content and posted to the website to be viewed, not just submitted.
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**Proposed Pest Rating: [A]**

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