

Part IV. Plant Assessment Form

For use with “Criteria for Categorizing Invasive Non-Native Plants that Threaten Wildlands”
by the California Exotic Pest Plant Council and the Southwest Vegetation Management Association

Table 1. Species and Evaluator Information

Species name (Latin binomial):	Ludwigia hexapetala (Hook. & Arn.) Zardini, Gu, & Raven
Synonyms:	Jussiaea grandiflora (M. Michelli) Greuter & Burdet; Jussiaea repens L var. grandiflora M. Michelli; Jussiaea uruguayensis Camb.; Ludwigia uruguayensis (Camb.) Hara var. major (Hassler) Munz
Common names:	Creeping waterprimrose, Uruguay waterprimrose
Evaluation date (mm/dd/yy):	04/02/04
Evaluator #1 Name/Title:	Lily Verdone
Affiliation:	Sonoma State University, Marin-Sonoma Mosquito Vector Control District
Phone numbers:	cell 707 974 0033 home 707 865 9484
Email address:	lilyverdone@ecoisp.com
Address:	po boox 751 Monte Rio Ca 95462
Evaluator #2 Name/Title:	enter text here
Affiliation:	enter text here
Phone numbers:	enter text here
Email address:	enter text here
Address:	enter text here

Section below for list committee use—please leave blank

List committee members:	enter text here
Committee review date:	enter text here
List date:	enter text here
Re-evaluation date(s):	enter text here

Table 2. Criteria, Section, and Overall Scores

1.1	Impact on abiotic ecosystem processes	A	Rev'd, Sci. Pub'n
1.2	Impact on plant community	A	Observational
1.3	Impact on higher trophic levels	B	Observational
1.4	Impact on genetic integrity	U	Observational

“Impact”
Enter four characters from Q1.1-1.4 below:
AABU
Use matrix determine the score; enter below:
A

2.1	Role of anthropogenic and natural disturbance	B 2	Rev'd, Sci. Pub'n
2.2	Local rate of spread with no management	A 3	Observational
2.3	Recent trend in total area infested within state	B 2	Other Pub. Mat'l
2.4	Innate reproductive potential	A 3	Rev'd, Sci. Pub'n
2.5	Potential for human-caused dispersal	B 2	Observational
2.6	Potential for natural long-distance dispersal	B 2	Observational
2.7	Other regions invaded	C 1	Other Pub. Mat'l

“Invasiveness”
For questions at left, recall that an A gets 3 points, a B gets 2, a C gets 1, and a D or U gets=0. Enter the sum total of all points for Q2.1-2.7 below:
14
Use matrix to determine score and enter below:
B

“Plant Score”
Using matrix, determine the Overall Score and Alert Status from the three section scores and enter them below:
**High
 Red Alert**

3.1	Ecological amplitude	B	Rev'd, Sci. Pub'n
3.2	Distribution	U	No Information

“Distribution”
Use matrix determine the score; enter below:
C

Table 3. Documentation

Question 1.1 Impact on abiotic ecosystem processes
Identify ecosystem processes impacted: Species alters sedimentation and water flow, sequesters nutrients, creates anerobic conditions
Rationale: Species forms large, dense mats of vegetation above and below the water surface. Root and vegetative growth trap sediment, block hydrolic flow and shade soil and water surfaces disturbing natural ecosystem processes
Sources of information: Ellmore, G.S., 1981. Root dimorphism in <i>Ludwigia peploides</i> (Onagraceae): Structure and gas content of mature roots. <i>American Journal of Botany</i> , 68: 557-568. Verdone, Lily, 2004. From data collected in the Laguna de Santa Rosa, Sonoma County, Ca. 2003-present. lilyverdone@ecoisp.com Westerdahl, H.E. and Getsinger, K.D. (editors), 1988. <i>Aquatic Plant Identification and Herbicide Guide Volume II: Aquatic Plant and Susceptibility to Herbicides</i> . US Army Corps of Engineers Waterways Experiment Station. Technical Report A-88-9.
Question 1.2 Impact on plant community composition, structure, and interactions
Identify type of impact or alteration: Species out competes native aquatic and terrestrial vegetation, covers open water and terrestrial zones impacting native fauna, lowering species diversity and creates habitat benifical for disease vectors
Rationale: Once established, the species dominates and out competes native vegeation covering aquatic and transitional zones with a dense canopy above and below the water surface. Dense vegetative growth covers areas of once open water, degrading bird habitat, blocking fish passage and lowering the quality of water. The dnese canopy allows for standing water and moist conditions to persist years round creating ideal conditons for mosquitoes, possible West Nile Virus vectors.
Sources of information: Main Sonoma Mosquito and Vector Control District, 2004. Observations and collection data from the Laguna de Santa Rosa, Sonoma County, Ca., 2000-present. www.msosquito.com Verdone, Lily, 2004. From data collected in the Laguna de Santa Rosa, Sonoma County, Ca. 2003-present. lilyverdone@ecoisp.com
Question 1.3 Impact on higher trophic levels
Identify type of impact or alteration: Reduction of open water and riverine habitat for fish, migratory birds and waterfowl
Rationale: Possible reduction in connectivity in fish passages to upstream tributaries (example of Salmon moving up the Russian River Watershed through the Laguna de Santa Rosa) due to plant growth blocking waterways, lowering water quality (sedimentation, anerobic conditions and high nutrient levels). Reduction of open water may reduce nesting, feeding, breeding and resting sites for watrfowl and migratory birds (as seen in

the Laguna de Santa Rosa, part of the Pacific Flyway).
Sources of information: Verdone, Lily, 2004. From data collected in the Laguna de Santa Rosa, Sonoma County, Ca. 2003-present. lilyverdone@ecoisp.com
Question 1.4 Impact on genetic integrity
Identify impacts: Unknown, low possibility of hybridization
Rationale: Species was tested for seed viability in Fall 2003, results concluded population of species in the Laguna de Santa Rosa produces sterile seeds
Sources of information: Verdone, Lily, 2003. Lab experiment: Testing for seed viability using Tetrazolium. Sonoma State University, lilyverdone@ecoisp.com
Question 2.1 Role of anthropogenic and natural disturbance in establishment
Describe role of disturbance: The species establishes in areas with disturbed hydrology, high nutrient loading and flooding. Spread may be facilitated by nursery cultivation/commercial use and animals.
Rationale: Species favors areas of shallow, stagnant, nutrient rich water such as flood control channels, irrigation ditches, holding ponds, ect. Species established in upland areas through flood deposition and is possibly spread by waterfowl. It may be used in bioremediation to remove excess nutrients and herbicides from agricultural waters and waste water treatment ponds (as in Ludwigia peploides).
Sources of information: Bayer, D.E. and Rejmankova, E., 1990. Removal of herbicide residua and nitrates from agricultural waters by aquatic plants. WRC Project W-727. Report of Water Resources Center. University of California, Riverside, CA. 32 pp. DiTomaso, J. M. and Healy, E.A., 2003. Aquatic and Riparian Weeds of the West. University of California Agriculture and Natural Resources. Oakland, CA. pp. 253. Verdone, Lily, 2004. From data collected in the Laguna de Santa Rosa, Sonoma County, Ca. 2003-present. lilyverdone@ecoisp.com
Question 2.2 Local rate of spread with no management
Describe rate of spread: Rate of spread for species is rapid, in ideal conditions, exponential
Rationale: In the Laguna de Sata Rosa, Sonooma County, Ca. Ludwigia hexapetala covered approximately 1450 acres in roughly 3 miles of main channel of 100% cover in 2 years.

<p>Sources of information:</p> <p>Verdone, Lily. 2004. GIS/GPS mapping of the Laguna de Santa Rosa, Sonoma County, Ca. August 2003. lilyverdone@ecoisp.com</p>
<p>Question 2.3 Recent trend in total area infested within state</p>
<p>Describe trend: Trend of infestation is increasing. Exact rate of spread is unknown, possibly due to lack of information on the species as well as the difficulty to identify the species from others in its genera which are phenotypically plastic.</p>
<p>Rationale: Using Sonoma County as an example, the species has been documented in herbarium specimens and other reliable sources for over 25 years. Only in the last two - five years has the growth been documented as invasive or weedy. In that time, the species has grown exponentially.</p>
<p>Sources of information:</p> <p>California Department of Fish and Game, 2003. Invasive Exotic Plant Control on California Department of Fish and Game Lands During 2002. Office of Spill Prevention and response. Administrative Report 03-001.</p> <p>Verdone, Lily, 2004. Finding from the North Coast Herbarium, Sonoma State University and the Jepson Herbarium, U.C. Berkeley. August 2003. lilyverdone@ecoisp.com</p>
<p>Question 2.4 Innate reproductive potential</p>
<p>Describe key reproductive characteristics: Species reproduces vegetatively (roots, rhizomes, plant fragments) and produces only non viable, sterile seeds.</p>
<p>Rationale: Species is polyploid (2n=80), polyploids are characterized as having non viable seeds and vegetative growth. Seeds were tested from the Laguna de Santa Rosa population and found not to be viable. Literature shows Ludwigia polyploids to reproduce successfully when 95% of the stem material is removed.</p>
<p>Sources of information:</p> <p>Rejmankova, E., 1992. Ecology of creeping macrophytes with special reference to Ludwigia polyploides (H.B.K.) Raven. Aquatic Botany. 43 283-299.</p> <p>Verdone, Lily, 2003. Lab experiment: Testing for seed viability using Tetrazolium. Sonoma State University, lilyverdone@ecoisp.com</p>
<p>Question 2.5 Potential for human-caused dispersal</p>
<p>Identify dispersal mechanisms: Commercial use, spread through waterways, possible spread by boat and/or equipment</p>
<p>Rationale: Species could have been sold in the past or present as an aquatic nursery plant or used in bioremediation applications to sequester excess nutrients in foul waters. It is known to spread through waterways.</p>

<p>Sources of information:</p> <p>Verdone, Lily, 2004. From data collected in the Laguna de Santa Rosa, Sonoma County, Ca. 2003-present. lilyverdone@ecoisp.com</p>
<p>Question 2.6 Potential for natural long-distance dispersal</p>
<p>Identify dispersal mechanisms: Long distance dispersal includes vegetative propagules transported by flowing water and may also include movement by waterfowl.</p>
<p>Rationale: Main dispersal is by moving water. The species has been documented to be consumed and possibly transported by ducks and other waterfowl in the Laguna de Santa Rosa and the Delta regions.</p>
<p>Sources of information:</p> <p>Verdone, Lily, 2004. Email conversation with Thomas Moore, Bay/Delta Cluster Biologist Natural Resources Conservation Service. May 14, 2003. lilyverdone@ecoisp.com</p>
<p>Question 2.7 Other regions invaded</p>
<p>Identify other regions: Lakes, ponds, slow moving streams and marshes throughout California and other Western and Southern States</p>
<p>Rationale: Considered a State noxious weed in Florida, Oregon, Washington, North Carolina and Oklahoma.</p>
<p>Sources of information:</p> <p>Invasive Plants of the Thirteen Southern States. Accessed online at: http://www.invasive.org/seweeds.cfm</p> <p>North Carolina Center for Agriculture Services. Accessed online at: http://www.ncagr.com/plantind/plant/weed/urwpros.htm</p> <p>Washington State Department of Ecology: Water quality home. Accessed online at: http://www.ecy.wa.gov/programs/wq/plants/weeds/water_primrose.html</p>
<p>Question 3.1 Ecological amplitude</p>
<p>Describe ecological amplitude, identifying date of source information and approximate date of introduction to the state, if known: Freshwater aquatic systems (lakes, ponds, reservoirs, rivers, streams, canals), Bog and marsh, riparian and bottomland</p>
<p>Rationale: Species is an aquatic freshwater vascular plant able to persist in dry transitional zones</p>
<p>Sources of information:</p> <p>Hickman, J.C. (editor), 1996. The Jepson Manual Higher Plants of California. University of California Press. Berkeley, CA.</p>

Question 3.2 Distribution
Describe distribution: Percent of distribution is unknown for this species
Rationale: no information
Sources of information: no information

Worksheet A

Complete this worksheet to answer Question 2.4.

Reaches reproductive maturity in 2 years or less	Yes: 1 pt
Dense infestations produce >1,000 viable seed per square meter	No: 0 pts
Populations of this species produce seeds every year.	Yes: 1 pt
Seed production sustained over 3 or more months within a population annually	No: 0 pt
Seeds remain viable in soil for three or more years	No: 0 pts
Viable seed produced with <i>both</i> self-pollination and cross-pollination	No: 0 pt
Has quickly spreading vegetative structures (rhizomes, roots, etc.) that may root at nodes	Yes: 1 pt
Fragments easily and fragments can become established elsewhere	Yes: 2 pts
Resprouts readily when cut, grazed, or burned	Yes: 1 pt
	6 pts Total Unknowns
	A (6+ pts)
Note any related traits: enter text here	

Worksheet C - California Ecological Types

(*sensu* Holland 1986)

Major Ecological Types	Minor Ecological Types	Code*
Marine Systems	marine systems	score
Freshwater and Estuarine Aquatic Systems	lakes, ponds, reservoirs	Unknown
	rivers, streams, canals	Unknown
	estuaries	score
Dunes	coastal	score
	desert	score
	interior	score
Scrub and Chaparral	coastal bluff scrub	score
	coastal scrub	score
	Sonoran desert scrub	score
	Mojavean desert scrub (incl. Joshua tree woodland)	score
	Great Basin scrub	score
	chenopod scrub	score
	montane dwarf scrub	score
	Upper Sonoran subshrub scrub	score
Grasslands, Vernal Pools, Meadows, and other Herb Communities	coastal prairie	score
	valley and foothill grassland	score
	Great Basin grassland	score
	vernal pool	score
	meadow and seep	score
	alkali playa	score
	pebble plain	score
Bog and Marsh	bog and fen	Unknown
	marsh and swamp	Unknown
Riparian and Bottomland	riparian forest	Unknown
	riparian woodland	Unknown
	riparian scrub (incl. desert washes)	Unknown
Woodland	cismontane woodland	score
	piñon and juniper woodland	score
	Sonoran thorn woodland	score
Forest	broadleaved upland forest	score
	North Coast coniferous forest	score
	closed cone coniferous forest	score
	lower montane coniferous forest	score
	upper montane coniferous forest	score
	subalpine coniferous forest	score
Alpine Habitats	alpine boulder and rock field	score
	alpine dwarf scrub	score

* A. means >50% of type occurrences are invaded; B means >20% to 50%; C. means >5% to 20%; D. means present but ≤5%; U. means unknown (unable to estimate percentage of occurrences invaded).