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)**:**	Lepidium latifolium L.
Synonyms:	Cardaria latifolia (L.) Spach
Common names:	perennial pepperweed, tall whitetop, broadleaved pepperweed
Evaluation date (mm/dd/yy)**:**	05/08/03
Evaluator #1 Name/Title:	Cynthia L. Roye/ Associate State Park Resource Ecologist
Affiliation:	California State Parks, Natural Resources Division
Phone numbers:	(916) 653-9083
Email address:	croye@parks.ca.gov
Address:	P.O. Box 942896, Sacramento, CA 94296-0001
Evaluator #2 Name/Title:	Joe DiTomaso
Affiliation:	UC Davis
Phone numbers:	530-754-8715
Email address:	DiTomaso@vegmail.ucdavis.edu
Address:	Weed Science Program, Robbins Hall, Univ. California, Davis CA 95616

Section below for list committee use—please leave blank

List committee members:	Carla Bossard, Joe DiTomaso, John Randall, Cynthia Roye, Jake Sigg, Alison Stanton, Peter Warner
Committee review date:	03/19/04
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**	**Rev'd, Sci. Pub'n**
1.3	Impact on higher trophic levels	**B**	**Other Pub. Mat'l**
1.4	Impact on genetic integrity	**U**	**Other Pub. Mat'l**

"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	**A 3**	**Other Pub. Mat'l**
2.2	Local rate of spread with no management	**A 3**	**Other Pub. Mat'l**
2.3	Recent trend in total area infested within state	**A 3**	**Other Pub. Mat'l**
2.4	Innate reproductive potential	**A 3**	**Other Pub. Mat'l**
2.5	Potential for human-caused dispersal	**B 2**	**Other Pub. Mat'l**
2.6	Potential for natural long-distance dispersal	**A 3**	**Other Pub. Mat'l**
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:

18

Use matrix to determine score and enter below:

A

"Plant Score"

Using matrix, determine the Overall Score and Alert Status from the three section scores and enter them below:

High

No Alert

3.1	Ecological amplitude	**A**	**Other Pub. Mat'l**
3.2	Distribution	**B**	**Observational**

"Distribution"

Use matrix determine the score; enter below:

A

Table 3. Documentation

Question 1.1 Impact on abiotic ecosystem processes
Identify ecosystem processes impacted: A. Alters soil salinity. May act as "salt pump" as it removes salts from deep in the soil profile and deposits them on soil surface. Builds a dense organic layer in soil surface that alters carbon/nitrogen ratio. May allow compact soil to become more friable after 5 to 10 years by plant-cycled nitrogen (Blank and Young, 1999, abstract as accessed on the Internet at:http:www.nal.usda.gov/ttic/tektran/data/000009/95/0000099552.html)
Rationale: Adapted to using water with high salt content, but not obligate. May act as "salt pump" as it removes salts from deep in the soil profile and deposits them on soil surface.
Sources of information: Blank and Young, 1997, as cited by Renz, M.J. 2000. TNC Element Stewardship Abstract as accessed over the Internet at:http://tncweeds.ucdavis.edu/esadocs/documnts/lepilat.pdf; Written findings of the State (WA) Noxious Weed Control Board as accessed over the Internet at:http://www.nwcb.wa.gov/weed_info/pepperweed.html; Young et al. 1995. Ecology and Control of Perennial Pepperweed (Lepidium latifolium L.). CalEPPC 1995 Symposium Proceedings. 4 pg.; Howald A. IN: Bossard et al. 2000. Invasive plants of California's wildlands. California Exotic Pest Plant Council. UC Press, Berkeley, pp. 222-224.
Question 1.2 Impact on plant community composition, structure, and interactions
Identify type of impact or alteration: A. Forms dense monospecific stands that exclude other plants, including natives. By altering salinity, favors halophytes overothers and shifts plant composition and diversity. Old stems take several years to degrade and can form a layer impenetrable to light. Annual plants may be unable to emerge. Encroaching on populations of several rare salt marsh plants including Cordylanthus mollis ssp. mollis, Circium hydrophilum var. hydrophilum, and Aster lentus.
Rationale: Forms dense monospecific stands that exclude other plants, including natives. By altering salinity, favors halophytes overothers and shifts plant composition and diversity. Old stems take several years to degrade and can form a layer impenetrable to light. Annual plants may be unable to emerge. Encroaching on populations of several rare salt marsh plants including Cordylanthus mollis ssp. mollis, Circium hydrophilum var. hydrophilum, and Aster lentus.
Sources of information: Renz, M. J. 2000. TNC Element Stewardship Abstract for Lepidium latifolium as accessed over the Internet at:http://tncweeds.ucdavis.edu/esadocs/documnts/lepilat.pdf; Howald, A. IN: Bossard et al. 2000.
Question 1.3 Impact on higher trophic levels
Identify type of impact or alteration: B. Poses threat to the habitat of endangered salt marsh harvest mouse, California clapper rail, California black rail. Lessens food availability for nesting waterfowl.
Rationale: Prefers habitat higher than that where pickleweed grows but has invaded Salifornia-dominated marshes in Alviso Slough. Outcompetes grasses that provide food for waterfowl.
Sources of information: Howald, A. IN: Bossard et al. 2000.

Question 1.4 Impact on genetic integrity
Identify impacts: U. Has fifteen closely related California natives and four related non-natives.
Rationale: Unknown if genetic contamination occurs.
Sources of information: Howald, A. IN: Bossard et al. 2000.
Question 2.1 Role of anthropogenic and natural disturbance in establishment
Describe role of disturbance: B. Most frequently found in areas with some natural or anthropogenic disturbance such as riparian areas, marshes, estuaries, irrigation channels, wetlands and floodplains. If introduced, can proliferate in roadsides, native hay meadows (unplowed), alfalfa fields, and rangelands.
Rationale: most of the areas where this plant occurs are subject to some form of disturbance.
Sources of information: Howald, A. IN: Bossard et al. 2000; Renz, M.J. 2002. Biology, Ecology, and Control of Perennial Pepperweed (Lepidium latifolium L.). Ph. D. Dissertation in Plant Biology, University of California, Davis. 128 p. as accessed on the Internet at:http://wric.ucdavis.edu/information/pepperweed-renz.pdf.
Question 2.2 Local rate of spread with no management
Describe rate of spread: A. Expansion of populations occurs primarily at the leading edge of the infestation, rarely more than 2 m from previious infestation. Althouogh the plants can produce many seeds annually, seedlings are rarely found in the field, populations spread clonally, per Renz. Without treatment, the spread at Renz' three sites was measured at 44% to 129% over a two year period. At this rate doubling would occur in fewer than ten years.
Rationale: Undisturbed populations spread clonally along the leading edge of the infestation. Density of the stems also increases over time making control of the infestation and re-establishment of native plants more difficult.
Sources of information: Renz, M.J. 2002. Biology, Ecology, and Control of Perennial Pepperweed (Lepidium latifolium L.). Ph. D. Dissertation in Plant Biology, University of California, Davis. 128 p., as accessed on the Internet at:http://wric.ucdavis.edu/information/pepperweed-renz.pdf.
Question 2.3 Recent trend in total area infested within state
Describe trend: A. The first record of this plant in California is from a ranch north of Oakdale in 1936. The plant is now found in most California counties.
Rationale: Distribution map as shown in species treatment in Bossard et al. 2000.
Sources of information: Howald, A. IN: Bossard et el. 2000.

Question 2.4 Innate reproductive potential
Describe key reproductive characteristics: A. seeds, rhizomes, fragments
Rationale: Prolific seeder producing up to 6 billion seeds per acre; seeds transported by wind, water, and waterfolw but have no mechanisms for long-distance dispersal; also produces rhizomes that can fragment and sprout.
Sources of information: Howald, A. IN: Bossard et al. 2000; Keuger and Sheley. 1996. MT9906 Agriculture, Perennial Pepperweed as accessed on the Internet at: http://www.montana.edu/wwwpb/pubs/mt9906.html. Renz, M.J. 2002. Biology, Ecology, and Control of Perennial Pepperweed (Lepidium latifolium L.). Ph. D. Dissertation in Plant Biology, University of California, Davis. 128 p., as accessed on the Internet at:http://wric.ucdavis.edu/information/pepperweed-renz.pdf.
Question 2.5 Potential for human-caused dispersal
Identify dispersal mechanisms: B. Collected for dried flower arrangements; seed or plant fragments may be a contaminant of rice straw bales used in erosion control, may be moved on agricultural equipment, or by waterfowl.
Rationale: Collected for dried flower arrangements, seed or plant fragments may be a contaminant of rice straw bales used in erosion control or may be moved on agricultural equipment.
Sources of information: Howald, A. IN: Bossard et al. 2000; Washington State Noxious Weed Control Board as accessed on the Internet at:http://www.nwcb.wa.gov/weed_info/pepperweedwf.html
Question 2.6 Potential for natural long-distance dispersal
Identify dispersal mechanisms: Seeds have no special mechanisms for long-range dispersal. Can be transported by wind, water and, possibly, waterfowl.
Rationale: Seeds have no special mechanisms for long-range dispersal. Can be spreadf by pieces od undergrounf stems.
Sources of information: Howald, A. IN: Bossard et al. 2000.
Question 2.7 Other regions invaded
Identify other regions: C. Native range Mediterranean Basin to temperate Europe and east to Middle East, Asia, and Himilayas. Introduced New England to Mexico and occurs in all far-western states. Appears to occupy similar habitats to those occupied in California.
Rationale: Introduced New England to Mexico and occurs in all far-western states. Appears to occupy similar habitats to those occupied in California.

Sources of information: Washington State Noxious Weed Control Board as accessed on the Internet at:http://www.nwcb.wa.gov/weed_info/pepperweedwf.html.
Question 3.1 Ecological amplitude
Describe ecological amplitude, identifying date of source information and approximate date of introduction to the state, if known: A. The first record of this plant in California is from a ranch north of Oakdale in 1936. The plant is now found in most California counties. It is found in riparian areas, marshes, estuaries, irrigtion channels, wetlands, and floodplains but may also occur on roadsides, native hay meadows, alfalfa fields, and rangelands.
Rationale: This plant occurs in 12 California State Park units from Bidwell SacramentoRiver SP in the Great Central Valley to San Pasqual Battlefirld SHP east of Escondido. It was listed among the Top Ten Most Unwanted Weeds in 24 California Counties according to a poll taken by the California Department of Food and Agriculture published in the Noxious Times as accessed on the Internet at: http://www.cdfa.ca.gov/phpps/ipc/noxioustimes/pdfs/2003spring.pdf.
Sources of information: Howald, A. IN: Bossard et al. 2000; California State Parks 2002 Natural Resources Condition Assessment, Natural Resources Division, Sacramento, CA; Noxious Times as on the Internet at: http://www.cdfa.ca.gov/phpps/ipc/noxioustimes/pdfs/2003spring.pdf. Young et al. 1995. Ecology and Control of Perennial Pepperweed (Lepidium latifolium L.). CalEPPC 1995 Symposium Proceedings. 4 pg.
Question 3.2 Distribution
Describe distribution: B.
Rationale: Consensus of Committee member observations as expressed 2/10/03 and 3/19/04 meeting s in Davis.
Sources of information: Observations of Weed Ranking Committee members. I lack published sources to document these observations.

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	**Yes: 2 pts**
Populations of this species produce seeds every year.	**Yes: 1 pt**
Seed production sustained over 3 or more months within a population annually	**Yes: 1 pt**
Seeds remain viable in soil for three or more years	**No: 0 pts**
Viable seed produced with *both* self-pollination and cross-pollination	**Yes: 1 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**
	10 pts **Total Unknowns**
	A (6+ pts)
Note any related traits: most seed germinates on first year.	

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	**score**
	rivers, streams, canals	**score**
	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	**C. 5-20%**
	Great Basin grassland	**C. 5-20%**
	vernal pool	**D. presen**
	meadow and seep	**C. 5-20%**
	alkali playa	**Unknown**
	pebble plain	**score**
Bog and Marsh	bog and fen	**score**
	marsh and swamp	**B. 21-50%**
Riparian and Bottomland	riparian forest	**C. 5-20%**
	riparian woodland	**C. 5-20%**
	riparian scrub (incl.desert washes)	**C. 5-20%**
Woodland	cismontane woodland	**D. presen**
	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).