

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

Electronic version, February 28, 2003

Table 1. Species and Evaluator Information

Species name (Latin binomial):	Centaurea diffusa Lamarck.
Synonyms:	Acosta diffusa (Lam.) Sojak
Common names:	diffuse knapweed
Evaluation date (mm/dd/yy):	11/28/05
Evaluator #1 Name/Title:	Elizabeth Brusati, project manager
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Evaluator #2 Name/Title:	Joseph M. DiTomaso/Coop. Ext. Specialist
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Section below for list committee use—please leave blank

List committee members:	Joe DiTomaso, John Randall, Peter Warner, Jake Sigg
Committee review date:	1/10/06
List date:	enter text here
Re-evaluation date(s):	enter text here

<p>General comments on this assessment: enter text here</p>
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Table 2. Criteria, Section, and Overall Scores

1.1	Impact on abiotic ecosystem processes	B	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	Rev'd, Sci. Pub'n
1.4	Impact on genetic integrity	D	Other Pub. Mat'l

Impact

Enter four characters from Q1.1-1.4 below:

BABD

Using matrix, determine score and enter below:

B

2.1	Role of anthropogenic and natural disturbance	3 (2 pts)	Rev'd, Sci. Pub'n
2.2	Local rate of spread with no management	3 (2 pts)	Observational
2.3	Recent trend in total area infested within state	0 (0 pts)	Other Pub. Mat'l
2.4	Innate reproductive potential Wksht A	3 (3 pts)	Rev'd, Sci. Pub'n
2.5	Potential for human-caused dispersal	3 (3 pts)	Rev'd, Sci. Pub'n
2.6	Potential for natural long-distance dispersal	2 (2 pts)	Other Pub. Mat'l
2.7	Other regions invaded	1 (1 pt)	Other Pub. Mat'l

Invasiveness

Enter the sum total of all points for Q2.1-2.7 below:

13

Use matrix to determine score and enter below:

B

Plant Score

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

Medium

No Alert

3.1	Ecological amplitude/Range	A	Other Pub. Mat'l
3.2	Distribution/Peak frequency Wksht C	D	Observational

Distribution

Using matrix, determine score and enter below:

B

Table 3. Documentation

Question 1.1 Impact on abiotic ecosystem processes	B Rev'd, Sci. Pub'n back
Identify ecosystem processes impacted: Increases erosion along streambanks.	
Rationale: enter text here	
Sources of information: 1. Sheley, R.L, J.S. Jacobs, and M. F. Carpinelli. 1998. Distribution, biology, and management of diffuse knapweed (<i>Centaurea diffusa</i>) and spotted knapweed (<i>Centaurea maculosa</i>). <i>Weed Technology</i> . 12:353-362	
Question 1.2 Impact on plant community composition, structure, and interactions	A Rev'd, Sci. Pub'n back
Identify type of impact or alteration: Reduces biodiversity (1). Compounds in shoots extracts reduce germination of other species through allelopathy (2,3) and it has a stronger negative effect on North American plants than on plants that evolved with knapweed in Eurasia (2). Can form monocultures, although populations in California are mostly small patches due to eradication efforts (1). Formation of monotypic stands is aided by the fact that seedling emergence is distributed over several weeks, allowing diffuse knapweed to occupy all available safe sites (4).	
Rationale: enter text here	
Sources of information: 1. Sheley et al. 1998 2. Callaway, R., and E. T. Aschehoug. 2000. Invasive plants versus their new and old neighbors: a mechanism for exotic invasion. <i>Science</i> . 290:521-523 3. Muir, A. D., and W. Majak. 1983. Allelopathic potential of diffuse knapweed (<i>Centaurea diffusa</i>) extracts. <i>Canadian Journal of Plant Sciences</i> . 63:989-996 4. Sheley, R. L., and L. L. Larson. 1996. Emergence date effects on resource partitioning between diffuse knapweed seedlings. <i>Journal of Range Management</i> . 49:241-244.	
Question 1.3 Impact on higher trophic levels	B Rev'd, Sci. Pub'n back
Identify type of impact or alteration: Reduces forage for livestock and wildlife, but is grazed by deer. Elk foraging was reduced by 98% on plots of <i>C. maculosa</i> (1). Presumably, diffuse knapweed would act the same. There is anecdotal evidence that diffuse knapweed contains a compound that, when absorbed through the skin through cuts or abrasions, can cause benign tumors in humans, although there is no medical literature on this. Anyone working with diffuse knapweed should wear gloves as a precaution (2).	
Rationale: enter text here	
Sources of information: 1. Sheley et al. 1998 2. Carpenter, A. T., and T. A. Murray. 1998. Element Stewardship Abstract for <i>Centaurea diffusa</i> . The Nature Conservancy, Arlington, VA. http://tncweeds.ucdavis.edu .	

Question 1.4 Impact on genetic integrity	D Other Pub. Mat'l back
Identify impacts: None. There are no native <i>Centaurea</i> spp. in California.	
Rationale: enter text here	
Sources of information: Hickman, J. C. (ed.) 1993. The Jepson Manual, Higher Plants of California. University of California Press. Berkeley, CA	
Question 2.1 Role of anthropogenic and natural disturbance in establishment	B Rev'd, Sci. Pub'n back
Describe role of disturbance: Invades highly disturbed areas such as roadsides and overgrazed grasslands, but can also invade after minor disturbance such as a hailstorm, rodent activity, or light grazing (1, 2,3). Disturbance greatly increases the the rate and final density of diffuse knapweed and allows it to invade a wider range of habitats (1).	
Rationale: enter text here	
Sources of information: 1. Sheley et al. 1998 2. Myers, J. H., and D. E. Berube. 1983. Diffuse knapweed invasion into rangeland in the dry interior of British Columbia. Canadian Journal of Plant Sciences. 63:981-987. 3. Lacey, J., P. Husby, and G. Handl. 1990. Observations on spotted and diffuse knapweed invasion into ungrazed bunchgrass communities in western Montana. Rangelands. 12: 30-32.	
Question 2.2 Local rate of spread with no management	B Doc'n level back
Describe rate of spread: Has spread at very rapid rates in other western states. In California, the rate of spread appears to be a bit slower, probably due to the efforts of CDFA to manage the species.	
Rationale: enter text here	
Sources of information: DiTomaso, observational.	
Question 2.3 Recent trend in total area infested within state	D Other Pub. Mat'l back
Describe trend: In California, diffuse knapweed primarily occurs as single plants or small patches and is under eradication through biological control in most areas (1). Stable to declining/decreasing statewide because of treatment efforts (2, 3). Once the seed production has been controlled, infestation levels drop rapidly (3).	
Rationale: enter text here	
Sources of information: 1. Joley, D. B., and D. M. Woods. 1996. Biological control of diffuse knapweed, <i>Centaurea diffusa</i> . California Department of Food and Agriculture, Biological Control Program Annual Summary, 1996. Sacramento, CA	

2. Carri Pirosko, California Dept. of Food and Agriculture. e-mail 11/29/05	
3. Marla Knight, botanist, Klamath National Forest. e-mail 11/29/05	
Question 2.4 Innate reproductive potential	A Rev'd, Sci. Pub'n back
Describe key reproductive characteristics: Typically biennial, sometimes annual or short-lived perennial. Obligate outcrosser. Flowers June-September. Seeds can persist in soil for many years. Purple-flowered plants were shown to set significantly more seed than white-flowered plants, even though white-flowered plants outnumbered purple-flowered plants and major insect visitors did not discriminate according to color. Seed production in Washington averaged 11,200 to 48, 100 seeds per square meter.	
Rationale:	
Sources of information: DiTomaso, J.M., and E. Healy. 2006. Weeds of California and Other Western States Harrod, R. J., and R. J. Taylor. 1995. Reproduction and pollination biology of Centaurea and Acroptilon species, with emphasis on C. diffusa. Northwest Science. 69:97-105.	
Question 2.5 Potential for human-caused dispersal	A Rev'd, Sci. Pub'n back
Identify dispersal mechanisms: Can be spread by hitchhiking in the frames of vehicles (1). Was originally introduced to the United States in contaminated alfalfa, and spread further in alfalfa and hay (2).	
Rationale: enter text here	
Sources of information: 1. Roche and Roche 1999 2. Sheley et al. 1998	
Question 2.6 Potential for natural long-distance dispersal	B Other Pub. Mat'l back
Identify dispersal mechanisms: Ball-shaped plants can be spread by the wind, similar to tumbleweed. Seeds are lost gradually, allowing them to spread long distances. Plants can also be carried in rivers and irrigation systems.	
Rationale: enter text here	
Sources of information: 1. Roche and Roche 1999	
Question 2.7 Other regions invaded	C Other Pub. Mat'l back
Identify other regions: Native to Eurasia. Occurs in all western states, some central and eastern states, especially Illinois and surrounding states. Listed as a noxious weed in several states (1).	
Rationale: enter text here	

Sources of information: 1. DiTomaso and Healy 2006	
Question 3.1 Ecological amplitude/Range	A Other Pub. Mat'l back
<p>Describe ecological amplitude, identifying date of source information and approximate date of introduction to the state, if known: Occurs in the North Coast, North Coast Ranges (Del Norte, Humboldt, Mendocino Cos.), Klamath Ranges (Trinity Co.), Cascade Ranges (Siskiyou, Shasta Cos.), north and central Sierra Nevada (Plumas, Nevada, sc Placer, e El Dorado, e Amador Cos), northern Sacramento Valley (c&e Tehama, sc Glenn, s Sutter, n Sacramento Cos), Modoc Plateau (Modoc, Lassen Cos), southern San Francisco Bay region (ne Santa Clara Co.), South Coast Ranges (se Monterey Co.), South Coast (Los Angeles, San Diego Cos), to 2300m. A population that has been eradicated occurred in the central area of the border between Mariposa and Madera counties (1).</p> <p>Habitats invaded (based on eradication projects listed in NRPI database): oak woodlands, blue oak-foothill pine, pasture, mixed evergreen forest, Great Basin scrub, coastal prairie, north coast coniferous forest, riparian forest and woodland, valley and foothill grassland (2)</p> <p>Mainly invades roadsides, waste areas, and rangelands. Found in some dry/seasonal creek beds in Siskiyou County. Mostly dry areas rather than true riparian areas (3).</p>	
Rationale: enter text here	
<p>Sources of information: 1. DiTomaso and Healy 2006</p> <p>2. Natural Resources Projects Inventory. Database of conservation and monitoring projects in California. Available: http://www.ice.ucdavis.edu/nrpi/. Accessed 11/28/05</p> <p>3. Carri Pirosko, California Dept. of Food and Agriculture. e-mail 11/29/05.</p>	
Question 3.2 Distribution/Peak frequency	D Observational back
Describe distribution: Mostly small infestations/patches; many single to small plants/patches that are eradicated.	
Rationale: enter text here	
Sources of information: Carri Pirosko, California Dept. of Food and Agriculture. e-mail 11/29/05	

Worksheet A[back](#)

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	Yes: 2 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	No: 0 pt
Fragments easily and fragments can become established elsewhere	Yes: 2 pts
Resprouts readily when cut, grazed, or burned	Unknown: 0 pts
	9 pts
	Total Unknowns
	A (6+ pts)
Note any related traits: enter text here	

Worksheet C - California Ecological Types

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(*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	D. present
	chenopod scrub	score
	montane dwarf scrub	score
	Upper Sonoran subshrub scrub	score
	chaparral	score
Grasslands, Vernal Pools, Meadows, and other Herb Communities	coastal prairie	D. present
	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	score
	marsh and swamp	score
Riparian and Bottomland	riparian forest	D. present
	riparian woodland	D. present
	riparian scrub (incl. desert washes)	score
Woodland	cismontane woodland	D. present
	piñon and juniper woodland	score
	Sonoran thorn woodland	score
Forest	broadleaved upland forest	score
	North Coast coniferous forest	D. present
	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).