

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):	Cynara cardunculus
Synonyms:	enter text here
Common names:	artichoke thistle, cardoon, wild artichoke
Evaluation date (mm/dd/yy):	08/12/04
Evaluator #1 Name/Title:	Scott Steinmaus Associate Professor
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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:	Carla Bossard, John Randall, Cynthia Roye, Jake Sigg, Peter Warner
Committee review date:	2/11/05
List date:	enter text here
Re-evaluation date(s):	enter text here

General comments on this assessment:

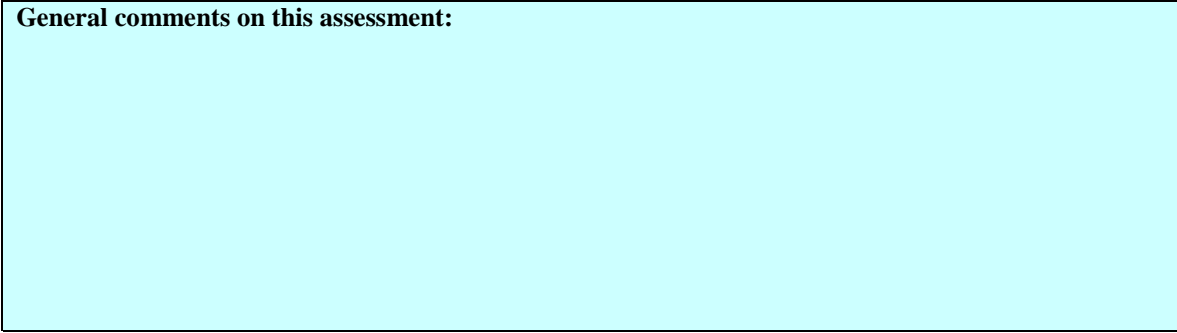


Table 2. Criteria, Section, and Overall Scores

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	Rev'd, Sci. Pub'n

<p>Impact</p> <p><i>Enter four characters from Q1.1-1.4 below:</i></p> <p>BABD</p> <p><i>Using matrix, determine score and enter below:</i></p> <p>B</p>

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)	Rev'd, Sci. Pub'n
2.3	Recent trend in total area infested within state	3 (1 pt)	Rev'd, Sci. Pub'n
2.4	Innate reproductive potential Wksht A	3 (3 pts)	Rev'd, Sci. Pub'n
2.5	Potential for human-caused dispersal	3 (2 pts)	Rev'd, Sci. Pub'n
2.6	Potential for natural long-distance dispersal	3 (1 pt)	Rev'd, Sci. Pub'n
2.7	Other regions invaded	3 (1 pt)	Rev'd, Sci. Pub'n

<p>Invasiveness</p> <p><i>Enter the sum total of all points for Q2.1-2.7 below:</i></p> <p>12</p> <p><i>Use matrix to determine score and enter below:</i></p> <p>B</p>
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<p>Plant Score</p> <p><i>Using matrix, determine Overall Score and Alert Status from the three section scores and enter below:</i></p> <p>Medium</p> <p>No Alert</p>

3.1	Ecological amplitude/Range	A	Rev'd, Sci. Pub'n
3.2	Distribution/Peak frequency Wksht C	D	Rev'd, Sci. Pub'n

<p>Distribution</p> <p><i>Using matrix, determine score and enter below:</i></p> <p>B</p>

Table 3. Documentation

<p>Question 1.1 Impact on abiotic ecosystem processes</p>	<p>B Other Pub. Mat'l back</p>
<p>Identify ecosystem processes impacted: Outcompetes native vegetation for light, water, and nutrients. No evidence of soil chemistry alteration because displaced species are able to recolonize following artichoke removal.</p>	
<p>Rationale: Large arching leaves together with a large aggressive tap root system preemptively intercept resources necessary for the growth of other species. .</p>	
<p>Sources of information: Kelly, M. <i>Cynara cardunculus</i>. In, <i>Invasive Plants of California's Wildlands</i>. Eds., C. Bossard, J. Randall, and M. Hoshovsky. UC Press, Berkeley;</p> <p>Pepper A. and M Kelly. 1994. Portrait of an invader. The ecology and management of the wild artichoke <i>Cynara cardunculus</i>. Cal EPPC News Winter pg. 4-6.</p>	
<p>Question 1.2 Impact on plant community composition, structure, and interactions</p>	<p>A Other Pub. Mat'l back</p>
<p>Identify type of impact or alteration: Artichoke thistle can create a monoculture leading to the decline of, for example, broom baccharis (<i>Baccharis sarothroides</i>). Artichoke thistle is a threat to the endangered San Diego thornmint. Usually displaces annual exotic grasses, which may be facilitated by fire. Seriously threatens grassland ecosystems and may affect coastal sage scrub and riparian habitat in southern California. In San Diego's Los Penasquitos Canyon, artichoke thistle invades open forb covered canyon bottomlands. It can also invade riparian woodlands under willow (<i>Salix</i> spp.), mulefat (<i>Baccharis glutinosa</i>) and sycamore (<i>Platanus racemosa</i>).</p>	
<p>Rationale: Artichoke thistle can reach stands of 22,000 plants per acre. Forms a basal rosette of leaves up to six feet in diameter. Reduces available habitat for grassland dependent species; displaces natives. There may be some alleopathic mechanism to neighbor plant suppression. When leaves die and fall to the ground they do not readily decompose, thus providing another barrier to competing species.</p>	
<p>Sources of information: Kelly, M. <i>Cynara cardunculus</i>. In, <i>Invasive Plants of California's Wildlands</i>. Eds., C. Bossard, J. Randall, and M. Hoshovsky. UC Press, Berkeley;</p> <p>The Nature Conservancy Wildland weed Management and Research 1998-1999 Weed Survey by Trish Smith;</p> <p>Pepper A. and M Kelly. 1994. Portrait of an invader. The ecology and management of the wild artichoke <i>Cynara cardunculus</i>. Cal EPPC News Winter pg. 4-6.</p>	
<p>Question 1.3 Impact on higher trophic levels</p>	<p>B Other Pub. Mat'l back</p>
<p>Identify type of impact or alteration: Artichoke thistle is a moderate threat to the Threatened species, California gnatcatcher and Coastal cactus wren. By displacing natives and annual grasses, it reduces the forage value for both livestock and wildlife. It is not used by birds for nesting or predatory activities.</p>	
<p>Rationale: Alters breeding success for threatened species by displacing native plants. The heavily armoured thistle flowerhead hinders herbivory, however, the seedlings may be subject to rabbit herbivory and the seeds may provide a food source for birds.</p>	

Sources of information: The Nature Conservancy Wildland weed Management and Research 1998-1999 Weed Survey by Trish Smith; Pepper A. and M Kelly. 1994. Portrait of an invader. The ecology and management of the wild artichoke <i>Cynara cardunculus</i> . Cal EPPC News Winter pg. 4-6.	
Question 1.4 Impact on genetic integrity	D Other Pub. Mat'l back
Identify impacts: Artichoke thistle is a progenator of the commercially cultivated, spineless globe artichoke (<i>Cynara scolymus</i>) while some taxonomists consider globe artichoke and artichoke thistle to be the same species because a few spiny wild types will appear within a population of globe artichoke seedlings. There are not any closely related California natives.	
Rationale: Cultivated globe artichoke and artichoke thistle readily hybridize. The globe artichoke can revert back to the wild 'thistle' state if allowed to grow from seed.	
Sources of information: Thomsen, C.D. , G. Barbe, W. Williams, and M. George. 1986. Escaped artichokes are troublesome pests. California Agriculture pg 7-9; Kelly, M. <i>Cynara cardunculus</i> . In, Invasive Plants of California's Wildlands. Eds., C. Bossard, J. Randall, and M. Hoshovsky. UC Press, Berkeley; Artichoke thistle Anonymous http://agric.wa.gov.au/agency/pubns/infonote/infonotes/AOO687.html	
Question 2.1 Role of anthropogenic and natural disturbance in establishment	B Other Pub. Mat'l back
Describe role of disturbance: Seems to require disturbance and most commonly heavily grazed areas. It has been observed to occasionally colonize riparian woodlands and natural openings in chaparral and costal sage scrub.. Artichoke thistle's appearance in California rangelands is linked to its introduction for ornamental and culinary purposes. It is found primarily on distrubed grasslands or abandoned agricultural fields especially those areas subjected to overgrazing practices. .	
Rationale: It occurrence along fire maintenance roads is linked to equipement carrying seeds; grazing and fire create openings for new artichoke thistle establishment; fire prone plant communities (grasslands and sage scrub) also tend to exist in climates that are conducive for artichoke thistle growth.	
Sources of information: The Nature Conservancy Wildland weed Management and Research 1998-1999 Weed Survey by Trish Smith; Kelly, M. <i>Cynara cardunculus</i> . In, Invasive Plants of California's Wildlands. Eds., C. Bossard, J. Randall, and M. Hoshovsky. UC Press, Berkeley;	
Question 2.2 Local rate of spread with no management	B Other Pub. Mat'l back
Describe rate of spread: Spread appeared to be rapid from the late 1800's into the 1930s. Control efforts in northern California (Benecia) have stabilized and even reduced its spread. Most artichoke thistle seeds (achenes) fall very near the parent plant and can disperse 70 feet by wind when attached to a pappus. Seeds can spread further with water, mud, soil movement, animals and human activities. Dispersal by root fragments is important only following mechanical disturbance. Seedlings appear to survive best when adult rosettes are removed but seedling emergence is not influenced by prescence or absence of adult rosettes.	

<p>Rationale: The seeds (achenes) are relatively large (6-8 mm long) so will typically not disperse far from the mother plant. A feathery pappus (25-40 mm long) is attached to the seeds while in the flower, which can facilitate long distance dispersal by wind. However, the pappus usually breaks off soon after exiting the flower.</p>	
<p>Sources of information: Thomsen, C.D. , G. Barbe, W. Williams, and M. George. 1986. Escaped artichokes are troublesome pests. California Agriculture March-April 1986 ppg 7-9;</p> <p>Kelly, M. Cynara cardunculus. In, Invasive Plants of California's Wildlands. Eds., C. Bossard, J. Randall, and M. Hoshovsky. UC Press, Berkeley;</p> <p>The Nature Conservancy Wildland weed Management and Research 1998-1999 Weed Survey by Trish Smith;</p> <p>Artichoke thistle Anonymous http://agric.wa.gov.au/agency/pubns/infonote/infonotes/AOO687.html;</p> <p>Marushia, R. and J.S. Holt. 2003. Patterns of seedling establishment in artichoke thistle, Cynara cardunculus. Proceedings to Cal EPPC 2003 Symposim pg 59.</p>	
<p>Question 2.3 Recent trend in total area infested within state</p>	<p>C Other Pub. Mat'l back</p>
<p>Describe trend: Infests about 150,000 acres statewide. Contra Costa, Solano, and Orange counties have 95% of the infested acreage. Santa Barabara and San Diego counties have some locally dense stands. California townships of past or present infestation are focused primarily in coastal area of southern California (Orange and San Diego Counties), the eastbay of the San Francisco bay area, and along the rangelands of the central coast. It has been reported that 70, 000 acres focused on the hillsides of Benecia have been infested but have been reduced due to substantial control efforts. In Irvine, 2000 acres are currently infested with another 6000 acres at risk of future invasion. In the 3500 acre Los Penasquitos Canyon Preserve in San Diego one 14 acre site was heavily infested and dense patches exist throughout the preserve.</p>	
<p>Rationale: Populations of this plant are either large or they are small. Rarely do you see huge expanses of land covered with species because control measures are instigated soon after these are spotted. Poor grazing practices and soil disturbance on coastal range south of the San Francisco Bay Area will invite new invasions by artichoke thistle.</p>	
<p>Sources of information: Thomsen, C.D. , G. Barbe, W. Williams, and M. George. 1986. Escaped artichokes are troublesome pests. California Agriculture March-April 1986 ppg 7-9; Kelly, M. Cynara cardunculus. In, Invasive Plants of California's Wildlands. Eds., C. Bossard, J. Randall, and M. Hoshovsky. UC Press, Berkeley; The Nature Conservancy Wildland weed Management and Research 1998-1999 Weed Survey by Trish Smith;</p>	
<p>Question 2.4 Innate reproductive potential</p>	<p>A Rev'd, Sci. Pub'n back</p>
<p>Describe key reproductive characteristics: Artichoke thistle seeds are dormant affording them discontinuous germination. The seeds germinate in a variety of habitats and at various times of year. The plant resprouts from perennial roots each year. Seeds survive for at about 5 years under field conditions. One year plants can flower but usually 2 year or older plants flower. Plants can survive for many years.</p>	
<p>Rationale: Plants can produce sufficient seed to attain densities of 20,000 plants per acre. Artichoke thistle reproduces and spreads primarily by seed. In San Diego, one mature plant produces more than a dozen flowerheads with as amany as 200 seeds per head.</p>	
<p>Sources of information: Thomsen, C.D. , G. Barbe, W. Williams, and M. George. 1986. Escaped artichokes are</p>	

troublesome pests. California Agriculture March-April 1986 ppg 7-9; Kelly, M. Cynara cardunculus. In, Invasive Plants of California's Wildlands. Eds., C. Bossard, J. Randall, and M. Hoshovsky. UC Press, Berkeley; Artichoke thistle Anonymous http://agric.wa.gov.au/agency/pubns/infonote/infonotes/AOO687.html	
Question 2.5 Potential for human-caused dispersal	B Other Pub. Mat'l back
Identify dispersal mechanisms: Is used for ornamental purposes and indiscriminant disposal of flowers could facilitate its spread. It appears to grow and progress along roadways.	
Rationale: Populations move along roadways either because seeds are blown as vehicles pass or the seeds are caught up in tires. Vegetative parts not likely except following mechanical operations, and then only for a short distance.	
Sources of information: Kelly, M. Cynara cardunculus. In, Invasive Plants of California's Wildlands. Eds., C. Bossard, J. Randall, and M. Hoshovsky. UC Press, Berkeley;	
Question 2.6 Potential for natural long-distance dispersal	C Other Pub. Mat'l back
Identify dispersal mechanisms: Long range dispersal likely if seeds were blown by strong winds. Perhaps seeds could be transport great distances along irrigation canals or along roadway corridors.	
Rationale:	
Sources of information: Kelly, M. Cynara cardunculus. In, Invasive Plants of California's Wildlands. Eds., C. Bossard, J. Randall, and M. Hoshovsky. UC Press, Berkeley;	
Question 2.7 Other regions invaded	C Rev'd, Sci. Pub'n back
Identify other regions: Proclaimed a noxious weed throughout Victoria and Queensland South Australia and part of New South Wales. Also found in New Zealand. It also is considered an important weed in the Argentine pampas areas of South America.	
Rationale: Appears to be well adapted to Mediterranean regions similar to the California central to southern coasts. Appears to be in grassland or coastal scrub-like communities abroad similar to those currently invaded in California.	
Sources of information: Parsons, W.T. 1973. Noxious Weeds of Victoria. Inkara Press, Melbourne. Pg. 70-73. Kelly, M. Cynara cardunculus. In, Invasive Plants of California's Wildlands. Eds., C. Bossard, J. Randall, and M. Hoshovsky. UC Press, Berkeley;	
Question 3.1 Ecological amplitude/Range	A Other Pub. Mat'l back
Describe ecological amplitude, identifying date of source information and approximate date of introduction to the state, if known: Artichoke thistle was presumably introduced to California in the mid-1800s as the cultivated, edible cardoon. Escape from cultivation and subsequent reversion to its 'wild', aggressive biotype probably	

<p>contributed to its invasive spread. Escaped cultivation in California in 1860-1864 according to botanical surveys.</p>	
<p>Rationale: The most successful invasions are in Contra Costa and Orange counties but also in the rangelands of San Diego, Santa Barbara, and other rangelands on California with coastal influence.</p>	
<p>Sources of information: Thomsen, C.D. , G. Barbe, W. Williams, and M. George. 1986. Escaped artichokes are troublesome pests. California Agriculture March-April 1986 ppg 7-9;</p> <p>Kelly, M. Cynara cardunculus. In, Invasive Plants of California's Wildlands. Eds., C. Bossard, J. Randall, and M. Hoshovsky. UC Press, Berkeley;</p>	
<p>Question 3.2 Distribution/Peak frequency</p>	<p>D Other Pub. Mat'l back</p>
<p>Describe distribution: Infestations are heaviest in rangelands south of the San Francisco bay area especially those subject to coastal influence. Populations are especially heavy in Contra Costa and Orange Counties. Seeds germinate with any significant rain in late November and December. Rosettes grow vigorously during the cool winter months and plants will bolt to form flowerheads in the spring. Leaves will die back in the summer as seeds are maturing and falling out of the flowerhead.</p>	
<p>Rationale: Artichoke thistle behaves as a typical winter annual thistle species originating from the Mediterranean region.</p>	
<p>Sources of information: Kelly, M. Cynara cardunculus. In, Invasive Plants of California's Wildlands. Eds., C. Bossard, J. Randall, and M. Hoshovsky. UC Press, Berkeley;</p>	

Worksheet A

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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	Unknown: 0 pts
Has quickly spreading vegetative structures (rhizomes, roots, etc.) that may root at nodes	No: 0 pt
Fragments easily and fragments can become established elsewhere	No: 0 pts
Resprouts readily when cut, grazed, or burned	Yes: 1 pt
	8 pts 1 unknown
	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	D. prese ₁
	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
	chaparral	D. prese ₁
Grasslands, Vernal Pools, Meadows, and other Herb Communities	coastal prairie	D. prese ₁
	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	score
	riparian woodland	D. prese ₁
	riparian scrub (incl. desert washes)	score
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).