

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):	Silybum marianum
Synonyms:	<i>Carduus marianus</i> L., <i>Carduus mariae</i> Crantz, <i>Cirsium maculatum</i> Scop., <i>Cathamus maculatum</i> (Scop.) Lam., <i>Silybum maculatum</i> (Scop.) Moench, <i>Silybum mariae</i> (Crantz) Gray, <i>Mariana lactea</i> Hill
Common names:	milk thistle, variegated thistle, blessed milk thistle, Virgin Mary's thistle, Lady's milk, Holy thistle, spotted thistle, cabbage thistle, spotted thistle, St. Mary's thistle, white thistle
Evaluation date (mm/dd/yy):	07/20/04
Evaluator #1 Name/Title:	Brianna Richardson
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Evaluator #2 Name/Title:	Joseph M. DiTomaso
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Section below for list committee use—please leave blank

List committee members:	Peter Warner, Joe DiTomaso, Alison Stanton, Jake Sigg, Cynthia Roye, John Randall
Committee review date:	8/27/2004
List date:	enter text here
Re-evaluation date(s):	enter text here

General comments on this assessment:

enter text here

Table 2. Criteria, Section, and Overall Scores

1.1	Impact on abiotic ecosystem processes	D	Observational
1.2	Impact on plant community	C	Rev'd, Sci. Pub'n
1.3	Impact on higher trophic levels	D	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:

DCDD

Use matrix determine the score; enter below:

C

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

“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:

10

Use matrix to determine score and enter below:

C

“Plant Score”

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

Low

No Alert

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

“Distribution”

Use matrix determine the score; enter below:

A

Table 3. Documentation

Question 1.1 Impact on abiotic ecosystem processes	D Observational back
Identify ecosystem processes impacted: None identified in literature. Dead skeletons remain standing throughout the summer, often along roadways or other human corridors. These skeletons may serve to carry human-ignited fires into neighboring grasslands or shrubs. This could increase fire frequency in some grassland areas. Mostly found in disturbed areas and along roadsides and fencelines. Not very common in wildlands.	
Rationale: No mention of increases in fire frequency is made in the literature. My observations are just that.	
Sources of information: Personal observation, Brianna Richardson brichardson@cal-ipc.org.	
Question 1.2 Impact on plant community composition, structure, and interactions	C Rev'd, Sci. Pub'n back
Identify type of impact or alteration: Plants develop large (up to 3 feet in diameter) rosettes that block light to nearby vegetation and suppress germination and growth. Plants can reach 2-3 m in height, and skeletons continue to stand for several months, keeping an area bare of other vegetation. Infestations can be dense and dominate pasture. In nutrient enriched sites (ex. ruderal areas), where <i>S. marianum</i> grows more vigorously (than in un-enriched sites) species diversity can be considerably lower than where <i>S. marianum</i> grows less vigorously.	
<p><i>S. marianum</i> may have a competitively suppressive effect upon companion species other than <i>Avena</i> and <i>Hordeum</i>. <i>S. marianum</i> does not appear to significantly affect growth of <i>Avena sterilis</i>, <i>A. barbata</i>, and <i>H. spontaneum</i>. This suppression is likely due to the rapid growth and large biomass of the <i>S. marianum</i> in nutrient-enriched sites.</p>	
In Australia, <i>S. marianum</i> becomes densely established and excludes most other species. Very competitive once established, and can eliminate most other plants by shading and competition for moisture and nutrients.	
Often occurs in dense, competitive stands.	
Rationale: When densely established, <i>S. marianum</i> can eliminate native and other species. However, disturbance is required for establishment and spread, so most often sites that are dominated by <i>S. marianum</i> will be limited in scale and will not eliminate all neighboring plant communities and species. Requires nutrient rich sites.	
Sources of information: 1) Sindel, B.M. 1997. "The persistence and management of thistles in Australian pastures." New Zealand Plant Protection Society. Accessed July 19, 2004. www.hortnet.co.nz/publications/nzpps/proceedings/97/97_453.htm . 2) Tamar Valley Weed Strategy. date unknown. "Variegated thistle (<i>Silybum marianum</i>)." Accessed July 19, 04. www.weeds.asn.au/weeds/txts/var_thstle.html . 3) Gabay, R.; U. Plitmann; A. Danin. 1994. Factors affecting the dominance of <i>Silybum marianum</i> L. (<i>Asteraceae</i>) in its specific habitats. <i>Flora</i> v. 189: 201-206. 4) Parsons, W.T. 1973. <i>Noxious Weeds of Victoria</i> . Inkata Press, Melbourne. 5) Goeden, R.D. 1971. The phytophagous insect fauna of milk thistle in southern California. <i>Journal of Economic Entomology</i> . V.64, no 5: 1101-1104. 6) DiTomaso, J., E. Healy. unpublished. <i>Weeds of California and Other Western States</i> . 7) Observational, Peter Warner, Jake Sigg, John Randall, Joe DiTomaso, 2004.	

Question 1.3 Impact on higher trophic levels	D Rev'd, Sci. Pub'n back
Identify type of impact or alteration: Dense clumps provide shelter for rabbits. <i>S. marianum</i> invasion increases the food supply (seeds) for rodents and birds. More than 47 species of insect have been found to feed or reproduce on <i>S. marianum</i> in southern California. At least 26 of these insects are economically damaging crop pests. <i>S. marianum</i> can be toxic to sheep and cattle, especially under wet conditions or times of high soil moisture.	
Rationale: Though potentially poisonous to grazers (deer) no mention was made of grazers eating <i>S. marianum</i> . It is believed to be unpalatable unless damaged by cutting or herbicide application. No other significant impacts on higher trophic levels were mentioned. Though <i>S. marianum</i> can push out native plant cover (thereby impacting wildlife) this is usually limited in scale [see 1.2].	
Sources of information: 1) Parsons, W.T. 1973. Noxious Weeds of Victoria. Inkata Press, Melbourne. 2) Young J.A., Evans R.A., Hawkes R.B. "Milk Thistle (<i>Silybum marinum</i>) Seed Germination." Weed Science 26(4): 395-398. 1978. 3) Goeden, R.D. 1971. The phytophagous insect fauna of milk thistle in southern California. Journal of Economic Entomology. V.64, no 5: 1101-1104. 4) Bean C. "Element Stewardship Abstract for <i>Silybum marinum</i> ." http://tncweeds.ucdavis.edu/esadocs/documnts/silymar.html . 1985	
Question 1.4 Impact on genetic integrity	D Other Pub. Mat'l back
Identify impacts: None.	
Rationale: No native <i>Silybums</i> exist in California.	
Sources of information: Keil, D.J. 1993. Asteracea family. In: The Jepson Manual. Published by the University of California.	
Question 2.1 Role of anthropogenic and natural disturbance in establishment	C Rev'd, Sci. Pub'n back
Describe role of disturbance: Plants are larger, have more flowering heads, and a higher number of achenes per head in nutrient-enriched sites like waste places and ruderal zones, than those that grow in un-enriched sites. Plants are less likely to colonize and thrive in sites undisturbed by human activity. Occurs in pastures, waste lands, irrigation banks. Seedlings prefer disturbed soil, and don't establish in perennial pasture if the soil is well covered with vegetation during late summer and autumn. Requires disturbance to spread. Infestations will remain localized unless disturbance becomes more widespread. Grows on ant hills and rodent burrows.	
Rationale: Requires human or animal disturbance to establish and spread.	
Sources of information: 1) Gabay, R.; U. Plitmann; A. Danin. 1994. Factors affecting the dominance of <i>Silybum marianum</i> L. (Asteraceae) in its specific habitats. Flora v. 189: 201-206.	

2) Parsons, W.T. 1973. Noxious Weeds of Victoria. Inkata Press, Melbourne.	
3) Bean C. "Element Stewardship Abstract for Silybum marinum." http://tncweeds.ucdavis.edu/esadocs/documnts/silymar.html. 1985	
Question 2.2 Local rate of spread with no management	B Rev'd, Sci. Pub'n back
Describe rate of spread: Rapidly spread through the central valleys of CA in the 1940's. Can spread quickly to dominate discontinuous habitat. Requires disturbance to spread. Infestations will remain localized unless disturbance becomes more widespread.	
Rationale: enter text here	
Sources of information: 1)Young J.A., Evans R.A., Hawkes R.B. "Milk Thistle (Silybum marinum) Seed Germination." Weed Science 26(4): 395-398. 1978.	
2) Bean C. "Element Stewardship Abstract for Silybum marinum." http://tncweeds.ucdavis.edu/esadocs/documnts/silymar.html. 1985	
Question 2.3 Recent trend in total area infested within state	C Rev'd, Sci. Pub'n back
Describe trend: Increasing but not rapidly. Plants are larger, have more flowering heads, and a higher number of achenes per head in nutrient-enriched sites like waste places and ruderal zones, than those that grow in un-enriched sites. Plants are less likely to colonize and thrive in sites undisturbed by human activity. Requires disturbance to spread. Infestations will remain localized unless disturbance becomes more widespread.	
Rationale: Though the plant is not usually targeted by management efforts, its requirement for disturbance and its preference for nutrient rich soils limits its spread.	
Sources of information: 1) Gabay, R.; U. Plitmann; A. Danin. 1994. Factors affecting the dominance of Silybum marianum L. (Asteraceae) in its specific habitats. Flora v. 189: 201-206.	
2) Parsons, W.T. 1973. Noxious Weeds of Victoria. Inkata Press, Melbourne.	
3) Bean C. "Element Stewardship Abstract for Silybum marinum." http://tncweeds.ucdavis.edu/esadocs/documnts/silymar.html. 1985	
4) Personal observation: Brianna Richardson brichardson@cal-ipc.org	
5) Observational, Peter Warner, Jake Sigg, John Randall, Joe DiTomaso, 2004.	
Question 2.4 Innate reproductive potential	A Rev'd, Sci. Pub'n back
Describe key reproductive characteristics: Seeds can remain viable for at least 9 years. Dense stands in California can produce 1.4 million viable seeds per acre. Seed production can vary from 1.2 heads producing 42 seeds to 8.8 heads producing 876 seeds. One study found plants could produce as many as 6350 seeds/plant. Can establish in areas dominated by annuals.	
Rationale: Produces lots of seeds that are moved by animals, humans, and wind. Seeds are produced every year, and a plant reached reproductive maturity in one year. Seeds are viable for up to 9 years.	

Sources of information: 1) Written Findings of the Washington State Noxious Weed Control Board. 2003. Class A Weed: Milk thistle.

2) Bruzzese, E.; 1996. Ecology of *Cirsium vulgare* and *Silybum marianum* in relation to biological control. *Plant Protection Quarterly*. V.11 Supplement 2: 245-249.

3) Parsons, W.T. 1973. *Noxious Weeds of Victoria*. Inkata Press, Melbourne.

4) Young J.A., Evans R.A., Hawkes R.B. "Milk Thistle (*Silybum marianum*) Seed Germination." *Weed Science* 26(4): 395-398. 1978.

5) Roche, Cindy. 1991. *Weeds: Milk thistle*. Pacific Northwest Extension Publication #382.

Question 2.5 Potential for human-caused dispersal C Other Pub. Mat'l [back](#)

Identify dispersal mechanisms: Hay contamination is a common problem in Victoria, Australia. Seeds disperse long distances with human activities, often found along trail margins in grassland and chaparral. Long distance transport is probably rare though.

Rationale: Human dispersal does spread *S. marianum*, but the means (as a seed contaminate, by trail users) are less troublesome than if the plant were sold horticulturally or used in revegetation work.

Sources of information: 1) DiTomaso, J., E. Healy. unpublished. *Weeds of California and Other Western States*.

2) Wheatley, W.M. 1971. Thistles--Prickly problem of pasture improvement. *The Agricultural Gazette of New South Wales*.

Question 2.6 Potential for natural long-distance dispersal C Rev'd, Sci. Pub'n [back](#)

Identify dispersal mechanisms: Seeds equipped with a large pappus that enables effective though short-distance spread by wind. Seeds are consumed by birds, rodents, and insects. Seeds probably dispersed by water and soil movement. *S. marianum* spread rapidly through the central valleys of California during the 1940s. It spread to dominate a discontinuous habitat in a short period of time.

Rationale: Though evidence that the seeds are spread by birds and animals is somewhat lacking, and the seeds are too large to be wind-borne for long distances, this plant has historically spread quickly over large distances, and therefore may still be able to do so.

Sources of information: 1) Parsons, W.T. 1973. *Noxious Weeds of Victoria*. Inkata Press, Melbourne.

2) DiTomaso, J., E. Healy. unpublished. *Weeds of California and Other Western States*.

3) Wheatley, W.M. 1971. Thistles--Prickly problem of pasture improvement. *The Agricultural Gazette of New South Wales*.

4) Young J.A., Evans R.A., Hawkes R.B. "Milk Thistle (*Silybum marianum*) Seed Germination." *Weed Science* 26(4): 395-398. 1978.

5) Observational, Peter Warner, Jake Sigg, John Randall, Joe DiTomaso, 2004.

Question 2.7 Other regions invaded C Rev'd, Sci. Pub'n [back](#)

Identify other regions: Invades pastures, ruderal areas, and ant hills in Australia, Tasmania, Israel. Also found in

Alabama, Arizona, Arkansas, Connecticut, Indiana, Louisiana, Maryland, Massachusetts, Michigan, Nevada, New Hampshire, New Mexico, New York, Ohio, Oklahoma, Oregon, Pennsylvania, Tennessee, Texas, Virginia, Washington, West Virginia.	
Rationale: <i>S. marianum</i> is an invader in other Mediterranean climates, but largely invades habitat similar to the habitat it is already found in here.	
Sources of information: 1) Gabay, R.; U. Plitmann; A. Danin. 1994. Factors affecting the dominance of <i>Silybum marianum</i> L. (Asteraceae) in its specific habitats. <i>Flora</i> v. 189: 201-206. 2) Parsons, W.T. 1973. <i>Noxious Weeds of Victoria</i> . Inkata Press, Melbourne. 3) Plants Database http://plants.usda.gov	
Question 3.1 Ecological amplitude/Range	A Rev'd, Sci. Pub'n back
Describe ecological amplitude, identifying date of source information and approximate date of introduction to the state, if known: Widely naturalized in California, particularly in coastal counties, but also inland. First recorded in CA in 1854. Common in coastal and inland valleys.	
Rationale: Is found in at least 3 major ecological types and 7 minor ecological types.	
Sources of information: 1) Klinger, Rob. 1999. Weed Report: <i>Silybum marianum</i> . TNC Wildland Weed Survey. 2) Goeden, R.D. 1971. The phytophagous insect fauna of milk thistle in southern California. <i>Journal of Economic Entomology</i> . V.64, no 5: 1101-1104. 3) Roche, Cindy. 1991. Weeds: Milk thistle. Pacific Northwest Extension Publication #382. 4) San Francisco Estuary Institute: www.sfei.org/wetlands/Reports/Final%20Draft%20Plant%20speci~000.pdf 5) Los Angeles CNPS chapter. Invasive Plant List: www.lacnps.org 6) Catalina Island Conservancy www.catalinaconservancy.org 7) Plants of the Kaweah River Delta Region www.kaweahoaks.com 8) Big Creek Reserve plants http://www.redshift.com/~bigcreek/index.html	
Question 3.2 Distribution/Peak frequency	B Observational back
Describe distribution: I estimate it's in >50% of the grasslands in the SF Bay area. D.Chang estimates it's in 80% of the grasslands (rangelands) and oak woodlands in Santa Barbara County.	
Rationale: Present in 21-50% of valley and foothill grasslands in CA.	
Sources of information: 1) Personal observation: Brianna Richardson brichardson@cal-ipc.org 2) Personal communication: David Chang, Santa Barbara Co Agricultural Commissioner's Office dchang@co.santa-barbara.ca.us 3) Observational, Peter Warner, Jake Sigg, John Randall, Joe DiTomaso, 2004.	

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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	Unknown: 0 pts
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	No: 0 pt
	6 pts 2 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	D. present
	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. present
Grasslands, Vernal Pools, Meadows, and other Herb Communities	coastal prairie	C. 5-20%
	valley and foothill grassland	B. 21-50%
	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. present
	riparian scrub (incl. desert washes)	D. present
Woodland	cismontane woodland	D. present
	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).