

Plant Assessment Form

For use with the “Criteria for Categorizing Invasive Non-Native Plants that Threaten Wildlands”
by the California Exotic Pest Plant Council and the Southwest Vegetation Management Association
(Warner et al. 2003)

Printable version, February 28, 2003
(Modified for use in Arizona, 07/02/04)

Table 1. Species and Evaluator Information

Species name (Latin binomial):	<i>Centaurea melitensis</i> L. (USDA 2005)
Synonyms:	None identified in USDA (2005).
Common names:	Malta starthistle, Maltese star thistle, Napa star thistle, tocolote ¹
Evaluation date (mm/dd/yy):	03/26/04
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List committee members:	03/26/04: D. Backer, K. Brown, P. Guertin, J. Hall, B. Munda, F. Northam, M. Quinn, J. Ward 05/21/04: D. Backer, K. Brown, D. Casper, G. Ferguson, D. Foster, P. Guertin, J. Hall, C. Laws, D. Madison, F. Northam, J. Ward 04/15/05: J. Hall, H. Messing, B. Munda, F. Northam
Committee review date:	03/26/04, 05/21/04, and 04/15/05
List date:	05/21/04; revised 04/15/05
Re-evaluation date(s):	

Table 2. Scores, Designations, and Documentation Levels

Question		Score	Documentation Level	Section Scores	Overall Score & Designations
1.1	Impact on abiotic ecosystem processes	C	Other published material	<p>“Impact”</p> <p>Section 1 Score:</p> <p>B</p>	<p>“Plant Score”</p> <p>Overall Score:</p> <p>Medium</p> <p>Alert Status:</p> <p>None</p>
1.2	Impact on plant community	B	Reviewed scientific publication		
1.3	Impact on higher trophic levels	D	Other published material		
1.4	Impact on genetic integrity	D	Other published material		
				<p>“Invasiveness”</p> <p><i>For questions at left, an A gets 3 points, a B gets 2, a C gets 1, and a D or U gets=0. Sum total of all points for Q2.1-2.7:</i></p> <p>16 pts</p> <p>Section 2 Score:</p> <p>B</p>	<p>Something you should know.</p>
2.1	Role of anthropogenic and natural disturbance	B	Observational		
2.2	Local rate of spread with no management	A	Observational		
2.3	Recent trend in total area infested within state	B	Observational		
2.4	Innate reproductive potential	A	Other published material		
2.5	Potential for human-caused dispersal	A	Observational		
2.6	Potential for natural long-distance dispersal	C	Other published material		
2.7	Other regions invaded	B	Other published material		
				<p>“Distribution”</p> <p>Section 3 Score:</p> <p>B</p>	
3.1	Ecological amplitude	B	Observational		
3.2	Distribution	C	Observational		

Table 3. Documentation

Note: Working Group assigned scores were adjusted to fit new information resulting in an increase of overall score from **Low** to **Medium** as a result of Consistency Review Committee input on questions 1.2, 2.2, and 3.2.

Question 1.1 Impact on abiotic ecosystem processes	<i>Score: C Doc'n Level: Other pub.</i>
Identify ecosystem processes impacted: Potential increase in soil moisture depletion and erosion.	
Rationale: Congenerics are associated with depletion of soil moisture and increased susceptibility to erosion (Roche and Roche 1991). However, some researchers have inferred that <i>C. melitensis</i> is likely to have a smaller effect (than <i>C. solstitialis</i>) due to its shorter lifespan and smaller taproot (CDFA 2001).	
Sources of information: See cited literature.	

Question 1.2 Impact on plant community composition, structure, and interactions	<i>Score: B Doc'n Level: Rev. sci. pub.</i>
Identify type of impact or alteration: Reduced biomass of native grass (Callaway et al. 2001, 2003). Dense stands noted to displace native plants in California annual grasslands (DiTomaso and Gerlach 2000a) and locally in Southeastern Arizona (P. Guertin, personal communication, 2003).	
Rationale: Biomass of <i>Nassella pulchra</i> was reduced when grown with <i>C. melitensis</i> in greenhouse particularly when naturally occurring Arbuscular mycorrhizal fungi were present (Callaway et al. 2001, 2003). These authors suggest that <i>C. melitensis</i> may be exploiting fixed carbon or other resources from the native grass via a common network of Arbuscular mycorrhizal fungi. In Saguaro National Park, East, a small thick patch about two meters wide circumnavigated a ponded area in to the apparent exclusion of native vegetation (P. Guertin, personal communication, 2003). However, dense monotypic stands are rare and primarily along roadsides.	
Sources of information: See cited literature. Also considered personal observations by P. Guertin (Research Specialist, U.S. Geological Survey, Sonoran Desert Field Station, 2003).	

Question 1.3 Impact on higher trophic levels	<i>Score: D Doc'n Level: Other pub.</i>
Identify type of impact or alteration: Negligible impacts.	
Rationale: <i>Centaurea melitensis</i> can be poisonous to horses (DiTomaso and Gerlach 2000a), but because of the conditions in which this occurs long-term ingestion is probably unlikely with wildlife.	
Sources of information: See cited literature.	

Question 1.4 Impact on genetic integrity	<i>Score: D Doc'n Level: Other pub.</i>
Identify impacts: No known hybridization.	
Rationale: Arizona has two native species of <i>Centaurea</i> : <i>Centaurea americana</i> Nutt. and <i>Centaurea rothrockii</i> ; however, these species occur at high elevations in the White Mountains and the Chiricahua and Huachuca Mountains, respectively (Kearney and Peebles 1960).	
Sources of information: See cited literature.	

Question 2.1 Role of anthropogenic and natural disturbance in establishment	<i>Score: B Doc'n Level: Obs.</i>
Describe role of disturbance: <i>Centaurea melitensis</i> is favored by human-mediated disturbance but can occasionally establish with natural disturbance.	
Rationale: <i>Centaurea melitensis</i> most commonly occurs in cultivated and abandoned fields, along irrigation ditches and roads, and in other disturbed areas (Parker 1972, Felger 1990); however, it was also rarely observed in flat areas with finer soil textures along naturally disturbed washes (D. Foster, personal communication, 2004) and circumnavigating ponded areas in more remote locations in Saguaro National Park (P. Guertin, personal communication, 2003). Once it is well established in disturbed areas,	

<p>it has been observed to establish to a limited degree in adjacent undisturbed areas in Apache County (B. Sorenson, personal communication, 2004).</p>
<p>Sources of information: See cited literature. Also considered personal communications with P. Guertin (Research Specialist, U.S. Geological Survey, Sonoran Desert Field Station, 2003), D. Foster (Restoration Ecologist, National Park Service, Saguaro National Park, 2004), and B. Sorenson (District Conservationist, U.S. Department of Agriculture, Natural Resources Conservation Service, Apache County, Arizona, 2004).</p>

<p>Question 2.2 Local rate of spread with no management Score: A Doc'n Level: Obs.</p>
<p>Describe rate of spread: Increasing, but rate of increase unclear.</p>
<p>Rationale: Resource managers report that their observations of this winter annual have varied greatly due to amount of winter precipitation in a given year (B. Sorenson and R. Adams, personal communications, 2004), thus making the rate of spread difficult to ascertain. Felger (1990) reports that it does not appear to be spreading in Organ Pipe National Monument; however, its rate of spread in other areas is not documented. Observations exist of its increase in wet winters in natural areas (Greasewood Park) within Tucson, Arizona (B. Tellman, personal communication, 2001).</p>
<p>Sources of information: See cited literature. Also considered personal communications with B. Sorenson (District Conservationist, U.S. Department of Agriculture, Natural Resources Conservation Service, Apache County, Arizona, 2004), R. Adams (Rangeland Management Specialist, U.S. Department of Agriculture, Natural Resources Conservation Service, Chino Winds Natural Resource Conservation District [NRCD] and Triangle NRCD, 2004), and B. Tellman (personal communication at a Pima Invasive Species Council Meeting, July 2001).</p>

<p>Question 2.3 Recent trend in total area infested within state Score: B Doc'n Level: Obs.</p>
<p>Describe trend: Increasing, but rate of range expansion is unclear due to lack of comprehensive information and its tight coupling with winter precipitation.</p>
<p>Rationale: Kearney and Peebles (1960) reported it from Apache, Yavapai, Maricopa, Pinal, Cochise and Pima Counties in 1969. Parker (1972) added Graham county in 1972. MacDougal (1973) added Mojave County in 1973. Felger (1990) added Yuma County in 1990. New observations have recently been reported for the Cordes Junction area (R. Adams, personal communication, 2004).</p>
<p>Sources of information: See cited literature. Also considered personal communication with R. Adams (Rangeland Management Specialist, U.S. Department of Agriculture, Natural Resources Conservation Service, Chino Winds Natural Resource Conservation District [NRCD] and Triangle NRCD, 2004).</p>

<p>Question 2.4 Innate reproductive potential Score: A Doc'n Level: Other pub.</p>
<p>Describe key reproductive characteristics: <i>Centaurea melitensis</i> is a winter germinating annual that flowers from April to June with hidden flowers in the rosette stage (DiTomaso and Gerlach 2000a). Plants can support 1 to 100 heads with 1 to 60 seeds per head (DiTomaso and Gerlach 2000a). <i>Centaurea melitensis</i> has a mixed mating system and is highly self-compatible (Gerlach and Rice 2003) with cleistogamous (remaining closed and obligate selfing,) early and late season flowers and chasmogamous (open and capable of out-crossing) peak-season flowers (Porrás and Munoz 2000).</p>
<p>Rationale: <i>Centaurea melitensis</i> does not reproduce vegetatively but had compensatory growth when clipped to simulate grazing in the presence of a natural occurring Arbuscular mycorrhizal fungi and a native grass (Callaway et al. 2001). An infestation patch in Organ Pipe National Monument has been pulled for over three years in Organ Pipe National Monument prior to seed dehiscence; however, new plants continue to emerge (D. Casper, personal communication, 2003), indicating a seed longevity greater than three years.</p>

Sources of information: See cited literature. Also considered personal communication with D. Casper (Invasive Species Specialist, National Park Service, Organ Pipe National Monument, Ajo, Arizona, 2003).

Question 2.5 Potential for human-caused dispersal *Score: A Doc'n Level: Obs.*

Identify dispersal mechanisms: Non-certified (contaminated) hay and the transport thereof; road maintenance and off-road vehicles; and non-motorized recreation.

Rationale: Resource managers have observed Malta starthistle in contaminated hay (F. Archuleta, personal communication, 2004) and correlated observations with its initial appearance in irrigated pasture (B. Sorenson, personal communication, 2004). In conservation areas, seed transport is likely due to hikers and horseback riders (D. Foster, personal communication, 2004). These mechanisms have been clearly associated with *C. solstitialis* transport (DiTomaso and Gerlach 2000b) and likely occur with *C. melitensis* due to the very similar seed head morphology including spine-like phyllaries and bristles (DiTomaso and Gerlach 2000a).

Sources of information: See cited literature. Also used inference and considered personal communications with F. Archuleta (District Conservationist, Shiprock SWCD, U.S. Department of Agriculture, Natural Resources Conservation Service, 2004), B. Sorenson (District Conservationist, U.S. Department of Agriculture, Natural Resources Conservation Service, Apache County, Arizona, 2004), and D. Foster (Restoration Ecologist, National Park Service, Saguaro National Park, 2004).

Question 2.6 Potential for natural long-distance dispersal *Score: C Doc'n Level: Other pub.*

Identify dispersal mechanisms: Potential dispersal by animal in fur. Short distance by wind.

Rationale: Wind gusts up to 40 km/hour only move *C. solstitialis* seeds up to 5 m (Roche 1992 in DiTomaso and Gerlach 2000b). Seed head morphology of *C. melitensis* is comparable and likely illustrates a similar lack of wind dispersal efficiency (DiTomaso and Gerlach 2000a).

Sources of information: See cited literature.

Question 2.7 Other regions invaded *Score: B Doc'n Level: Other pub.*

Identify other regions: Occurs in *Adenostoma* chaparral communities in California which may be comparable to southwestern interior chaparral.

Rationale: Found in San Francisco Bay Area, North Coast Ranges and Sierra Nevada Foothills in California (DiTomaso and Gerlach 2000a).

Sources of information: See cited literature.

Question 3.1 Ecological amplitude *Score: B Doc'n Level: Obs.*

Describe ecological amplitude, identifying date of source information and approximate date of introduction to the state, if known: Observations from the Chihuahuan Desertscrub (M. Matthew, personal communication, 2004), Sonoran desertscrub (P. Guertin, personal communication, 2003), Mojave desertscrub (L. Walker, personal communication, 2004), and semi-desert grassland (R. Adams, personal communication, 2004). *Centaurea melitensis* is a winter annual that responds to winter rain, it is more frequent on deeper soiled bottoms than uplands, and occurs more commonly in mid-elevation ranges (1500 to 5,000 feet) (L. Walker and R. Adams, personal communications, 2004).

Centaurea melitensis is reported from Washington, Oregon, California, Nevada, Utah, Arizona, New Mexico, Texas, Missouri, Wisconsin, Alabama, Georgia, South Carolina, Pennsylvania, and Massachusetts (USDA 2005). As an annual species is likely able to shift its activity across time to meet temperature requirements. It is widespread in California but forms the largest populations in the southwestern and central-western portions of California. Further, although it is found in the California

annual grassland with the Mediterranean climate it is more common on disturbed or drier sites (DiTomaso and Gerlach 2000a).
Rationale: Observations from the Chihuahuan Desertscrub (M. Matthew, personal communication, 2004), Sonoran desertscrub (P. Guertin, personal communication, 2003), Mojave desertscrub (L. Walker, personal communication, 2004), and semi-desert grassland (R. Adams, personal communication, 2004). Occurs in two major types and four minor types.
Sources of information: See cited literature. Also considered personal communications with R. Matthew (U.S. Department of Agriculture, Natural Resources Conservation Service, Cochise County, 2004), P. Guertin (Research Specialist, U.S. Geological Survey, Sonoran Desert Field Station, 2003), L. Walker (Weed Specialist, Bureau of Land Management, Arizona Strip. St. George, Utah, 2004), and R. Adams (Rangeland Management Specialist, U.S. Department of Agriculture, Natural Resources Conservation Service, Chino Winds Natural Resource Conservation District [NRCD] and Triangle NRCD, 2004).

Question 3.2 Distribution	<i>Score: C Doc'n Level: Obs.</i>
Describe distribution: In the Chihuahuan Desertscrub (R. Matthew, personal communication, 2004), Sonoran desertscrub (P. Guertin, personal communication, 2003), Mojave desertscrub (L. walker, personal communication, 2004), and semi-desert grassland (R. Adams, personal communication, 2004) it is infrequent.	
Rationale: Appears to be much more common in disturbed or converted areas (Parker 1972) within where these ecological types would otherwise occur. Observations primarily in areas with increased moisture availability.	
Sources of information: See cited literature. Also considered personal communications with R. Matthew (U.S. Department of Agriculture, Natural Resources Conservation Service, Cochise County, 2004), P. Guertin (Research Specialist, U.S. Geological Survey, Sonoran Desert Field Station, 2003), L. Walker (Weed Specialist, Bureau of Land Management, Arizona Strip. St. George, Utah, 2004), and R. Adams (Rangeland Management Specialist, U.S. Department of Agriculture, Natural Resources Conservation Service, Chino Winds Natural Resource Conservation District [NRCD] and Triangle NRCD, 2004).	

Worksheet A. Reproductive Characteristics

Complete this worksheet to answer Question 2.4.

Reaches reproductive maturity in 2 years or less	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	1 pt.
Dense infestations produce >1,000 viable seed per square meter	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	2 pt.
Populations of this species produce seeds every year.	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	1 pt.
Seed production sustained for 3 or more months within a population annually	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	1 pt.
Seeds remain viable in soil for three or more years	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	2 pt.
Viable seed produced with <i>both</i> self-pollination and cross-pollination	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	1 pt.
Has quickly spreading vegetative structures (rhizomes, roots, etc.) that may root at nodes	<input type="checkbox"/> Yes	<input type="checkbox"/> No	1 pt.
Fragments easily and fragments can become established elsewhere	<input type="checkbox"/> Yes	<input type="checkbox"/> No	2 pt.
Resprouts readily when cut, grazed, or burned	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	1 pt.
Total pts: 8 Total unknowns: 0			
Score : A			

<p>Note any related traits:</p>
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Worksheet B. Arizona Ecological Types

(*sensu* Brown 1994 and Brown et al. 1998)

Major Ecological Types	Minor Ecological Types	Code*
Dunes	dunes	
Scrublands	Great Basin montane scrub	
	southwestern interior chaparral scrub	
Desertlands	Great Basin desertscrub	
	Mohave desertscrub	D
	Chihuahuan desertscrub	D
	Sonoran desertscrub	D
Grasslands	alpine and subalpine grassland	
	plains and Great Basin shrub-grassland	
	semi-desert grassland	D
Freshwater Systems	lakes, ponds, reservoirs	
	rivers, streams	
Non-Riparian Wetlands	Sonoran wetlands	
	southwestern interior wetlands	
	montane wetlands	
	playas	
Riparian	Sonoran riparian	
	southwestern interior riparian	
	montane riparian	
Woodlands	Great Basin conifer woodland	
	Madrean evergreen woodland	
Forests	Rocky Mountain and Great Basin subalpine conifer forest	
	montane conifer forest	
Tundra (alpine)	tundra (alpine)	

*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).

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