



**Table 2. Criteria, Section, and Overall Scores**

<a href="#">1.1</a>	Impact on abiotic ecosystem processes	<b>U</b>	<b>Rev'd, Sci. Pub'n</b>
<a href="#">1.2</a>	Impact on plant community	<b>C</b>	<b>Rev'd, Sci. Pub'n</b>
<a href="#">1.3</a>	Impact on higher trophic levels	<b>U</b>	<b>Rev'd, Sci. Pub'n</b>
<a href="#">1.4</a>	Impact on genetic integrity	<b>D</b>	<b>Other Pub. Mat'l</b>

**Impact**

*Enter four characters from Q1.1-1.4 below:*

**UCUD**

*Using matrix, determine score and enter below:*

**C**

<a href="#">2.1</a>	Role of anthropogenic and natural disturbance	<b>B (2 pts)</b>	<b>Rev'd, Sci. Pub'n</b>
<a href="#">2.2</a>	Local rate of spread with no management	<b>B (2 pts)</b>	<b>Rev'd, Sci. Pub'n</b>
<a href="#">2.3</a>	Recent trend in total area infested within state	<b>C (1 pt)</b>	<b>No Information</b>
<a href="#">2.4</a>	Innate reproductive potential <a href="#">Wksht A</a>	<b>B (2 pts)</b>	<b>Rev'd, Sci. Pub'n</b>
<a href="#">2.5</a>	Potential for human-caused dispersal	<b>A (3 pts)</b>	<b>Rev'd, Sci. Pub'n</b>
<a href="#">2.6</a>	Potential for natural long-distance dispersal	<b>D (0 pts)</b>	<b>Rev'd, Sci. Pub'n</b>
<a href="#">2.7</a>	Other regions invaded	<b>U (0 pts)</b>	<b>No Information</b>

**Invasiveness**

*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 Overall Score and Alert Status from the three section scores and enter below:*

**Low**

**No Alert**

<a href="#">3.1</a>	Ecological amplitude/Range	<b>B</b>	<b>Other Pub. Mat'l</b>
<a href="#">3.2</a>	Distribution/Peak frequency <a href="#">Wksht C</a>	<b>D</b>	<b>Other Pub. Mat'l</b>

**Distribution**

*Using matrix, determine score and enter below:*

**C**

**Table 3. Documentation**

<p><b>Question 1.1</b> Impact on abiotic ecosystem processes</p>	<p>U Rev'd, Sci. Pub'n <a href="#">back</a></p>
<p>Identify ecosystem processes impacted: Individual plants and stands may be less flammable than native chaparral stands, may have the potential to reduce brush fire frequency. <i>C. ladanifer</i> may be potentially useful in phytostabilization procedures on contaminated mining sites, and may be able to reduce the risks of metals mobility in soil.</p>	
<p>Rationale: Though there are indications in the literature that <i>C. ladanifer</i> may affect fire frequency or soil chemistry, neither has been studied conclusively.</p>	
<p>Sources of information: Montgomery, K.R., T.W. Strid. 1976. Regeneration of introduced species of <i>Cistus</i> (Cistaceae) after fire in southern California. <i>Madrono</i> V. 23: 417-427.</p> <p>Alvarenga, P.M., M.F. Araujo, J.A.L. Silva. 2003. Elemental uptake and root-leaves transfer in <i>Cistus ladanifer</i> L. growing in a contaminated pyrite mining area (Aljustrel, Portugal). <i>Water, Air, and Soil Pollution</i>. V. 152: 81-96.</p>	
<p><b>Question 1.2</b> Impact on plant community composition, structure, and interactions</p>	<p>C Rev'd, Sci. Pub'n <a href="#">back</a></p>
<p>Identify type of impact or alteration: In the Montgomery study site, <i>Cistus</i> was planted in 1961, by 1972 it accounted for 30% of the relative cover, the remaining cover being composed of native shrubs and annual grasses (this site was manipulated heavily, potentially resulting in less native shrub cover than would occur naturally). In Alados, <i>C. ladanifer</i> grows as densely on serpentine soils as it does on siliceous soils.</p>	
<p>Rationale: Because <i>C. ladanifer</i> grows on serpentine soils, often a refuge for endemic native plants, it may threaten rare plants if established in their areas (personal inference). <i>Cistus</i> can grow in shrublands in southern California, but doesn't seem to dominate. This is a toss-up between level C and D, but the potential for serpentine invasion led me to choose C.</p>	
<p>Sources of information: Montgomery, K.R., T.W. Strid. 1976. Regeneration of introduced species of <i>Cistus</i> (Cistaceae) after fire in southern California. <i>Madrono</i> V. 23: 417-427.</p> <p>Alados, C.L., T Navarro, B. Cabezudo. 1999. Tolerance assessment of <i>Cistus ladanifer</i> to serpentine soils by developmental stability analysis. <i>Plant Ecology</i>. V. 143: 51-66.</p>	
<p><b>Question 1.3</b> Impact on higher trophic levels</p>	<p>U Rev'd, Sci. Pub'n <a href="#">back</a></p>
<p>Identify type of impact or alteration: Flowers are visited by a diverse array of insects (beetles, flies, bees) in the plant's native range. Seeds eaten by many species of ant.</p>	
<p>Rationale: May interfere with native pollination relationships when populations are dense. More information is needed.</p>	
<p>Sources of information: Talavera, S., P.E. Gibbs, J. Herrera. 1992. Reproductive biology of <i>Cistus ladanifer</i>. <i>Plant Systematica and Evolution</i>. V.186: 123-134.</p> <p>Bastida, F., S. Talavera. 2002. Temporal and spatial patterns of seed dispersal in two <i>Cistus</i> species. <i>Annals of Botany</i> V. 89: 427-434.</p>	

<b>Question 1.4</b> Impact on genetic integrity	D Other Pub. Mat'l <a href="#">back</a>
Identify impacts: No native Cistus in California.	
Rationale: No opportunity to hybridize with natives.	
Sources of information: CalFlora database <a href="http://www.calflora.org">www.calflora.org</a>	
<b>Question 2.1</b> Role of anthropogenic and natural disturbance in establishment	B Rev'd, Sci. Pub'n <a href="#">back</a>
Describe role of disturbance: Seed germinability may be positively affected by fire, or post fire conditions may promote germination. In the Mediterranean basin, Cistus "populations constitute early successional stages adapted to disturbances operating in Med. ecosystems, particularly fire..."	
Rationale: Disturbance encourages establishment, but no information was found on whether disturbance is essential to establishment.	
Sources of information: Montgomery, K.R., T.W. Strid. 1976. Regeneration of introduced species of Cistus (Cistaceae) after fire in southern California. Madrono V. 23: 417-427. Bastida, F., S. Talavera. 2002. Temporal and spatial patterns of seed dispersal in two Cistus species. Annals of Botany V. 89: 427-434. Observational, Peter Warner, Joe DiTomaso, 2004.	
<b>Question 2.2</b> Local rate of spread with no management	B Rev'd, Sci. Pub'n <a href="#">back</a>
Describe rate of spread: A planting in 1964 of 150 surviving plants produced no volunteer seedlings during "early inspections" despite heavy flower and seed production. Plants deposit seeds immediately underneath themselves, and shade inhibits germination, therefore without removal of parent plant (ex. by fire) germination is minimal. In the Montgomery study site, Cistus was planted in 1961, by 1972 it accounted for 30% of the relative cover, the remaining cover being composed of native shrubs and annual grasses. Doesn't seed far from parent, so increase in area is slow (can be faster on a slope, where seeds can roll downhill). Spreading but not rapidly in San Diego County and on Fort Ord. Another Cistus spp. is spreading, again slowly, in Mendocino County.	
Rationale: Does not double in less than 10 years, but may increase more slowly.	
Sources of information: Montgomery, K.R., T.W. Strid. 1976. Regeneration of introduced species of Cistus (Cistaceae) after fire in southern California. Madrono V. 23: 417-427. Bastida, F., S. Talavera. 2002. Temporal and spatial patterns of seed dispersal in two Cistus species. Annals of Botany V. 89: 427-434. Personal communication: Mike Kelly 7/30/04 (email) Personal communication: Sue Hubbard 7/30/04 (email) Personal communication: Peter Warner 7/30/04 (email)	

<b>Question 2.3</b> Recent trend in total area infested within state	C Observational <a href="#">back</a>
Describe trend: enter text here	
Rationale: Stable.	
Sources of information: Observational Joe DiTomaso, Peter Warner, 2004.	
<b>Question 2.4</b> Innate reproductive potential	B Rev'd, Sci. Pub'n <a href="#">back</a>
Describe key reproductive characteristics: Well adapted to frequent burning in the Mediterranean basin, some <i>Cistus</i> resprout from root crown buds and readily grow from seed. In Montgomery study, <i>C. ladanifer</i> reproduced by seed after fire, but not stump sprouting. Hand-pollination studies find that seed is not set unless cross-pollination occurs. When population densities are high, <i>Cistus</i> produces 3,000 - 27,000 seeds per plant. Plants reach reproductive age at 3-4 years. Flowering occurs for two months in <i>Cistus</i> ' native range. "High" seed longevity, persistent soil seed banks, no special adaptations for distance dispersal. Flower for two months, but release seeds over an 8-10 month period. Mean seed rain in Bastida population 35,496 / sq. meter.	
Rationale: enter text here	
Sources of information: Montgomery, K.R., T.W. Strid. 1976. Regeneration of introduced species of <i>Cistus</i> (Cistaceae) after fire in southern California. <i>Madrono</i> V. 23: 417-427. Talavera, S., P.E. Gibbs, J. Herrera. 1992. Reproductive biology of <i>Cistus ladanifer</i> . <i>Plant Systematica and Evolution</i> . V.186: 123-134. Bastida, F., S. Talavera. 2002. Temporal and spatial patterns of seed dispersal in two <i>Cistus</i> species. <i>Annals of Botany</i> V. 89: 427-434.	
<b>Question 2.5</b> Potential for human-caused dispersal	A Rev'd, Sci. Pub'n <a href="#">back</a>
Identify dispersal mechanisms: <i>Cistus</i> has been planted for erosion control on barren and disturbed sites in southern California (it's unclear whether it is still used). Sold horticulturally.	
Rationale: Sold horticulturally from many sources in California.	
Sources of information: Montgomery, K.R., T.W. Strid. 1976. Regeneration of introduced species of <i>Cistus</i> (Cistaceae) after fire in southern California. <i>Madrono</i> V. 23: 417-427. Monrovia Nursery website: <a href="http://www.monrovia.com">www.monrovia.com</a> (and other garden supply sites).	
<b>Question 2.6</b> Potential for natural long-distance dispersal	D Rev'd, Sci. Pub'n <a href="#">back</a>
Identify dispersal mechanisms: No adaptations for distant dispersal. Seeds can roll down hill, spreading infestation down steep slopes.	
Rationale: enter text here	

Sources of information: Bastida, F., S. Talavera. 2002. Temporal and spatial patterns of seed dispersal in two <i>Cistus</i> species. <i>Annals of Botany</i> V. 89: 427-434.	
Personal communication: Mike Kelly 7/30/04 (email)	
<b>Question 2.7</b> Other regions invaded	U No Information <a href="#">back</a>
Identify other regions: Occurs widely (native to) in Mediterranean macchia (maquis) and garrigue plant associations, analogous to chaparral and coastal sage scrub. Exists in Mediterranean matorral scrub in N. Africa and Morocco.	
Rationale: Little information available on other places it's invaded and the ecotypes it occupies elsewhere.	
Sources of information: Montgomery, K.R., T.W. Strid. 1976. Regeneration of introduced species of <i>Cistus</i> (Cistaceae) after fire in southern California. <i>Madrone</i> V. 23: 417-427.	
Alados, C.L., T Navarro, B. Cabezudo. 1999. Tolerance assessment of <i>Cistus ladanifer</i> to serpentine soils by developmental stability analysis. <i>Plant Ecology</i> . V. 143: 51-66.	
<b>Question 3.1</b> Ecological amplitude/Range	B Other Pub. Mat'l <a href="#">back</a>
Describe ecological amplitude, identifying date of source information and approximate date of introduction to the state, if known: "An uncommon ornamental escape of disturbed areas." Found in chaparral in Santa Barbara. A problem on Nipomo Mesa in oak woodland, maritime chaparral, and coastal scrub.	
Rationale: Occurs in at least 2 major ecotypes in CA.	
Sources of information: DiTomaso, J.; E. Healy. <i>Weeds of California and Other Western States</i> . unpublished.	
Personal communication: Tom Dudley 7/30/04 (email).	
Personal communication: David Fross 7/30/04 (email).	
<b>Question 3.2</b> Distribution/Peak frequency	D Other Pub. Mat'l <a href="#">back</a>
Describe distribution: Reported in southern SLO County, Santa Barbara County, San Gabriel Mtns, southern central coast, Los Angeles, and San Bernadino counties, San Diego, Fort Ord (Monterey Co.), east of San Diego along I8 between Alpina and Pine Valley (looks like Caltrans remnants). Not known to escape in Contra Costa County. Has not been seen anywhere from Malibu south to Palos Verdes (M. O'Brien reports there is no <i>Cistus</i> in the wildlands around San Bernadino and Los Angeles). <i>C. creticus</i> reported at Hollister Ranch and Rattlesnake Canyon. Another <i>Cistus</i> occurs occasionally along the Mendocino coast, but doesn't spread quickly.	
Rationale: Seems to be in a number of places around the state, but is still relatively limited in its distribution. Most report seeing only a few plants, or remnants of intentional plantings. Unlikely to occupy more than 5% of any ecotype within the state.	
Sources of information: DiTomaso, J.; E. Healy. <i>Weeds of California and Other Western States</i> . unpublished.	

Personal communication: Tom Dudley 7/30/04 (email).  
 Personal communication: David Fross 7/30/04 (email).  
 Personal communication: David Chang 7/30/04 (email)  
 Personal communication: Mary Carroll 7/30/2004 (email)  
 CalFlora database: www.calflora.org, accessed 7/30/04  
 Personal communication: Bethallyn Black 7/30/04 (email)  
 Personal communication: Mike Kelly 7/30/04 (email)  
 Personal communication: Sue Hubbard 7/30/04 (email)  
 Personal communication: Michael O'Brien 7/30/04 (email)  
 Personal communication: Carl Bell 8/2/04 (email)  
 Personal communication: Brad Burkhart 8/2/04 (email)  
 Personal communication: Peter Warner 8/1/04 (email)  
 Observational, Peter Warner, Joe DiTomaso, 2004.

**Worksheet A**

[back](#)

Reaches reproductive maturity in 2 years or less	<b>No: 0 pt</b>
Dense infestations produce >1,000 viable seed per square meter	<b>Yes: 2 pts</b>
Populations of this species produce seeds every year.	<b>Yes: 1 pt</b>
Seed production sustained over 3 or more months within a population annually	<b>Yes: 1 pt</b>
Seeds remain viable in soil for three or more years	<b>Unknown: 0 pts</b>
Viable seed produced with <i>both</i> self-pollination and cross-pollination	<b>No: 0 pt</b>
Has quickly spreading vegetative structures (rhizomes, roots, etc.) that may root at nodes	<b>No: 0 pt</b>
Fragments easily and fragments can become established elsewhere	<b>No: 0 pts</b>
Resprouts readily when cut, grazed, or burned	<b>No: 0 pt</b>
	<b>4 pts      1 unknown</b>
	<b>B (4-5 pts)</b>

**Note any related traits:** flowers for 2 months, but releases seeds over 8-10 months

## Worksheet C - California Ecological Types

[back](#)

(*sensu* Holland 1986)

Major Ecological Types	Minor Ecological Types	Code*
<b>Marine Systems</b>	marine systems	score
<b>Freshwater and Estuarine Aquatic Systems</b>	lakes, ponds, reservoirs	score
	rivers, streams, canals	score
	estuaries	score
<b>Dunes</b>	coastal	score
	desert	score
	interior	score
<b>Scrub and Chaparral</b>	coastal bluff scrub	score
	coastal scrub	Unknown
	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	Unknown
<b>Grasslands, Vernal Pools, Meadows, and other Herb Communities</b>	coastal prairie	score
	valley and foothill grassland	score
	Great Basin grassland	score
	vernal pool	score
	meadow and seep	score
	alkali playa	score
	pebble plain	score
<b>Bog and Marsh</b>	bog and fen	score
	marsh and swamp	score
<b>Riparian and Bottomland</b>	riparian forest	score
	riparian woodland	score
	riparian scrub (incl. desert washes)	score
<b>Woodland</b>	cismontane woodland	Unknown
	piñon and juniper woodland	score
	Sonoran thorn woodland	score
<b>Forest</b>	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
<b>Alpine Habitats</b>	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).