

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):	Carpobrotus edulis L. (Bolus)
Synonyms:	
Common names:	highway iceplant
Evaluation date (mm/dd/yy):	3/17/05
Evaluator #1 Name/Title:	Elizabeth Brusati, project manager
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Evaluator #2 Name/Title:	Peter Warner
Affiliation:	California Dept. of Parks and Recreation
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Section below for list committee use—please leave blank

List committee members:	Jake Sigg, Peter Warner, Bob Case, John Knapp, Elizabeth Brusati
Committee review date:	7/8/05
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	A	Rev'd, Sci. Pub'n
1.2	Impact on plant community	A	Rev'd, Sci. Pub'n
1.3	Impact on higher trophic levels	U	No Information
1.4	Impact on genetic integrity	A	Rev'd, Sci. Pub'n

Impact

Enter four characters from Q1.1-1.4 below:

AAUA

Using matrix, determine score and enter below:

A

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

Invasiveness

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

15

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:

**High
No Alert**

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

Distribution

Using matrix, determine score and enter below:

A

Table 3. Documentation

Question 1.1 Impact on abiotic ecosystem processes	A Rev'd, Sci. Pub'n back
Identify ecosystem processes impacted: Reduces soil pH and influences nutrient dynamics (1).	
Rationale: enter text here	
Sources of information: 1. D'Antonio, C.M., Mahall, B.E. 1991. Root profiles and competition between the invasive exotic perennial <i>Carpobrotus edulis</i> and two native shrubs species in California USA coastal scrub. <i>American Journal of Botany</i> . 78(7): 885-894. enter text here	
Question 1.2 Impact on plant community composition, structure, and interactions	A Rev'd, Sci. Pub'n back
Identify type of impact or alteration: Dense fibrous root system interferes with water uptake by other plants. Native shrubs increased in canopy size when iceplant was removed (1). Outcompetes grasses	
Rationale: enter text here	
Sources of information: 1. D'Antonio and Mahall 1991 2. D'Antonio C.M. 1993. Mechanisms Controlling Invasion of Coastal Plant Communities by the Alien Succulent <i>Carpobrotus edulis</i> . <i>Ecology</i> 74(1): 83-95.	
Question 1.3 Impact on higher trophic levels	U No Information back
Identify type of impact or alteration: Presumable the plant would have an impact on other organisms within a dune and coastal bluff system, but no information is available to verify this.	
Rationale: enter text here	
Sources of information: enter text here	
Question 1.4 Impact on genetic integrity	A Rev'd, Sci. Pub'n back
Identify impacts: Hybridizes with native or long-naturalized congener <i>C. chilensis</i> , creating fertile hybrids (1). High potential for natural hybridization between <i>Carpobrotus</i> species (2).	
Rationale: Score depends on whether <i>C. chilensis</i> is considered native.	
Sources of information: 1. Weber, E. F., Vila, M., A. Marc, D'Antonio, C. M. 1998. Invasion by hybridization: <i>Carpobrotus</i> in coastal California. Starfinger, U, Edwards, K., Kowarik, I., Williamson, M. Plant invasions: Ecological mechanisms and human responses. 275-281 2. Vila, M., Weber, E., D'Antonio, C. M. 1998. Flowering and mating system in hybridizing <i>Carpobrotus</i> (Aizoaceae) in coastal California. <i>Canadian Journal of Botany</i> . 76(7). July: 1165-1169..	

Question 2.1 Role of anthropogenic and natural disturbance in establishment	B Rev'd, Sci. Pub'n back
Describe role of disturbance: Disturbance of the soil was required for colonization at a coastal grassland site, but soil disturbance did not promote establishment in coastal scrub or backdune. Without disturbance, <i>Carpobrotus</i> cannot become established within the matrix of annual grasses in the grassland. Needs rodent burrowing to open space for invasion (1). Commonly invades maritime chaparral after fire (2).	
Rationale: enter text here	
Sources of information: 1. D'Antonio C.M. 1993. Mechanisms Controlling Invasion of Coastal Plant Communities by the Alien Succulent <i>Carpobrotus edulis</i> . <i>Ecology</i> 74(1): 83-95. 2. D'Antonio, Carla M.; Odion, Dennis C.; Tyler, Claudia M.. 1993a. Invasion of maritime chaparral by the introduced succulent <i>Carpobrotus edulis</i> : The roles of fire and herbivory. <i>Oecologia</i> . 95(1): 14-21.	
Question 2.2 Local rate of spread with no management	A Other Pub. Mat'l back
Describe rate of spread: Individual plants can expand more than a meter in diameter per year (1).	
Rationale: enter text here	
Sources of information: 1. Esler, K., Rundell, P., Connors, P.. 1995. All That Glisters...Iceplants that leave California Cold. <i>Veld and Flora</i> 81(1): 12-13.	
Question 2.3 Recent trend in total area infested within state	B Observational back
Describe trend: May have occupied much of its habitat. In addition, there are a number of control programs around that have attempted to manage this species. Nevertheless, it is probably still expanding its range within the state.	
Rationale: enter text here	
Sources of information: DiTomaso, observational.	
Question 2.4 Innate reproductive potential	A Rev'd, Sci. Pub'n back
Describe key reproductive characteristics: Perennial succulent with indehiscent fleshy fruits. Does not need cross-pollination and can produce seeds without fertilization (1). Produces over 1500 seeds/fruit (2,3). Fruits are produced between February and May. Ungerminated seeds remain viable for at least two years. Uneaten fruits remain on the plant for several years (4).	
Rationale: enter text here	
Sources of information: 1. Vila, Montserrat, Weber, Ewald, D'Anotnio, Carla M. 1998. Flowering and mating system in hybridizing <i>Carpobrotus</i> (Aizoaceae) in coastal California. <i>Canadian Journal of Botany</i> . 76(7). July:	

1165-1169	
<p>2. Vila, Montserrat; D'Antonio, Carla M. 1998. Fitness of invasive <i>Carpobrotus</i> (Aizoaceae) hybrids in coastal California. <i>Ecoscience</i>. 5(2): 191-199</p> <p>3. Vila, Montserrat, D'Antonio, Carla M. 1998. Fruit choice and seed dispersal of invasive vs. noninvasive <i>Carpobrotus</i> (Aizoaceae) in coastal California. <i>Ecology</i>. 79(3): 1053-1060.</p> <p>4. D'Antonio, C.M. 1990. Seed production and dispersal in the non-native invasive succulent <i>Carpobrotus edulis</i> Aizoaceae in coastal strand communities of central California, USA. <i>Journal of Applied Ecology</i>. 27(2): 693-702.</p>	
Question 2.5 Potential for human-caused dispersal	A Rev'd, Sci. Pub'n back
Identify dispersal mechanisms: Planted by the California Department of Transportation along highways (1). Sold as an ornamental (2).	
Rationale: Found in Cal-IPC nursery survey 2004.	
Sources of information: 1. D'Antonio, C.M. 1990. Seed production and dispersal in the non-native invasive succulent <i>Carpobrotus edulis</i> Aizoaceae in coastal strand communities of central California, USA. <i>Journal of Applied Ecology</i> . 27(2): 693-702.	
2. Brenzel, K. N. 2001. <i>Sunset Western Garden Book</i> . Sunset Publishing Company, Menlo Park, CA.	
Question 2.6 Potential for natural long-distance dispersal	B Rev'd, Sci. Pub'n back
Identify dispersal mechanisms: Deer, brush rabbits, and jackrabbits eat the seeds and pass them intact. Seed germination is enhanced by ingestion. Viable seeds were found in deer feces >1km from the nearest plant, but this is not common (1, 2). Pieces can raft offshore and colonize stacks along coast (3).	
Rationale: .enter text here	
Sources of information: 1. D'Antonio, C.M. 1990. Seed production and dispersal in the non-native invasive succulent <i>Carpobrotus edulis</i> Aizoaceae in coastal strand communities of central California, USA. <i>Journal of Applied Ecology</i> . 27(2): 693-702.	
2. Vila, Montserrat, D'Antonio, Carla M. 1998. Fruit choice and seed dispersal of invasive vs. noninvasive <i>Carpobrotus</i> (Aizoaceae) in coastal California. <i>Ecology</i> . 79(3): 1053-1060.	
3. Peter Warner, California Dept. of Parks and Recreation	
Question 2.7 Other regions invaded	C Other Pub. Mat'l back
Identify other regions: Native to South Africa. Also an invasive plant in Mediterranean basin of Europe and in Australia (1). Also present in Florida (2).	
Rationale: Scoring as C because it already invades many habitats in California.	
Sources of information: 1. Esler, K., Rundell, P., Conners, P.. 1995. <i>All That Glisters...Iceplants that leave</i>	

<p>California Cold. Veld and Flora 81(1): 12-13.</p> <p>2. USDA, NRCS. 2004. The PLANTS Database, Version 3.5 (http://plants.usda.gov). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.</p>	
<p>Question 3.1 Ecological amplitude/Range</p>	<p>A Rev'd, Sci. Pub'n back</p>
<p>Describe ecological amplitude, identifying date of source information and approximate date of introduction to the state, if known: Invades coastal grassland, coastal scrub, dunes (1), coastal bluff scrub, maritime chaparral, oak woodlands, and the margins of wetlands (2). Was introduced into the western United States for dune stabilization in the early 1900's (2).</p>	
<p>Rationale: enter text here</p>	
<p>Sources of information: 1. D'Antonio C.M. 1993. Mechanisms Controlling Invasion of Coastal Plant Communities by the Alien Succulent <i>Carpobrotus edulis</i>. <i>Ecology</i> 74(1): 83-95.</p> <p>2. D'Antonio, Carla M.; Odion, Dennis C.; Tyler, Claudia M. 1993. Invasion of maritime chaparral by the introduced succulent <i>Carpobrotus edulis</i>: The roles of fire and herbivory. <i>Oecologia</i>. 95(1): 14-21.</p>	
<p>Question 3.2 Distribution/Peak frequency</p>	<p>B Other Pub. Mat'l back</p>
<p>Describe distribution: Found in many dune systems throughout California.</p>	
<p>Rationale: enter text here</p>	
<p>Sources of information: DiTomaso and Healy. 2006. Weeds of California. UC DANR Publ. #3488.</p>	

Worksheet A[back](#)

Reaches reproductive maturity in 2 years or less	No: 0 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	No: 0 pts
Viable seed produced with <i>both</i> self-pollination and cross-pollination	Yes: 1 pt
Has quickly spreading vegetative structures (rhizomes, roots, etc.) that may root at nodes	Yes: 1 pt
Fragments easily and fragments can become established elsewhere	Yes: 2 pts
Resprouts readily when cut, grazed, or burned	Yes: 1 pt
	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	B. 21-50%
	desert	score
	interior	score
Scrub and Chaparral	coastal bluff scrub	B. 21-50%
	coastal scrub	D. presen
	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	score
Grasslands, Vernal Pools, Meadows, and other Herb Communities	coastal prairie	D. presen
	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	score
	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).