

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):	Spartina densiflora Brogn.
Synonyms:	enter text here
Common names:	Dense-flowered cordgrass, Chilean cordgrass.
Evaluation date (mm/dd/yy):	April 15, 2004, revised July 25, 2005, Roye
Evaluator #1 Name/Title:	Dr. Debra Ayres
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Section below for list committee use—please leave blank

List committee members:	Peter Warner, Jake Sigg, Joe DiTomaso, Cynthia Roye
Committee review date:	8/15/05
List date:	enter text here
Re-evaluation date(s):	enter text here

General comments on this assessment:

This plant has invaded all available habitat in Humboldt Bay. Populations are found in San Francisco Bay at Corte Madera Creek, Point Pinole and Pickleweed Park. Infestations in Tomales Bay and Bolinas Bay have been controlled.

Table 2. Criteria, Section, and Overall Scores

1.1	Impact on abiotic ecosystem processes	A	Other Pub. Mat'l
1.2	Impact on plant community	A	Rev'd, Sci. Pub'n
1.3	Impact on higher trophic levels	B	Other Pub. Mat'l
1.4	Impact on genetic integrity	C	Observational

Impact

Enter four characters from Q1.1-1.4 below:

AABC

Using matrix, determine score and enter below:

A

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

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
Red Alert**

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

Distribution

Using matrix, determine score and enter below:

C

Table 3. Documentation

<p>Question 1.1 Impact on abiotic ecosystem processes</p>	<p>A Other Pub. Mat'l back</p>
<p>Identify ecosystem processes impacted: colonizes open mudflats and openings in marshes. May slow water flow and increase sedimentation.</p>	
<p>Rationale: enter text here</p>	
<p>Sources of information: San Francisco Invasive Spartina Project N.D. Introduced <i>Spartina densiflora</i> (dense-flowered cordgrass) as accessed on the Internet at: www.spartina.org/species/spartina-densiflora_v2.pdf</p>	
<p>Question 1.2 Impact on plant community composition, structure, and interactions</p>	<p>A Rev'd, Sci. Pub'n back</p>
<p>Identify type of impact or alteration: <i>S. densiflora</i> has shown high tolerance to salinity and co-occurs with <i>Salicornia virginica</i> in the higher tidal marsh. It is able to grow under a wide variety of conditions and ultimately covers the entire area. Has invaded much of Humboldt Bay.</p>	
<p>Rationale: The main impacts of <i>S. densiflora</i> are the potential replacement of <i>Salicornia virginica</i> dominated marshes, and the invasion and dominance of upper elevations of restored marshes.</p>	
<p>Sources of information: Ayres DR, Smith DL, Zaremba K, Klohr S, Strong DR. 2004. Spread of exotic cordgrasses and hybrids (<i>Spartina</i> sp.) in the tidal marshes of San Francisco Bay. <i>Biological Invasions</i>. 6: 221-231</p>	
<p>Kittleson PM and Boyd MJ. 1997. Mechanims of expansion for an introduced species of cordgrass, <i>Spartina densiflora</i>, in Humboldt Bay, California. <i>Estuaries</i> 20: 770-778.</p>	
<p>Castillo JM et al. 2000. Lower limits of <i>Spartina densiflora</i> and <i>S. maritima</i> in a Mediterranean salt marsh determined by different ecophysiological tolerances.</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: Overgrowth of native <i>Salicornia</i> may impact a listed species Salt marsh harvest mouse, which relies on this habitat. California Clapper Rail nests in <i>Salicornia</i>, forages in open channel and may also be negatively effected.</p>	
<p>Rationale: enter text here</p>	
<p>Sources of information: San Francisco Invasive Spartina Project N.D. Introduced <i>Spartina densiflora</i> (dense-flowered cordgrass) as accessed on the Internet at: www.spartina.org/species/spartina-densiflora_v2.pdf</p>	
<p>Question 1.4 Impact on genetic integrity</p>	<p>C Observational back</p>
<p>Identify impacts: <i>Spartina densiflora</i> x <i>foliosa</i> hybrids have been found where the 2 species occur at Creekside Park, Marin Co. This is under investigation by the Ayres lab, but thus far it appears there are only F1 hybrids (no backcrossing or hybrid crossing), which means impact to the genetic integrity of the native will be limited. The new hybrids however, may create problems on their own if they find a way to produce good seed.</p>	

Rationale: enter text here	
Sources of information: Ayres, Strong et al. Unpublished data.	
Question 2.1 Role of anthropogenic and natural disturbance in establishment	A Rev'd, Sci. Pub'n back
Describe role of disturbance: <i>S. densiflora</i> colonizes the open mud of restoration sites, and naturally caused bare patches in established marshes.	
Rationale: Continuing restoration of salt ponds into tidal marsh will likely create recruitment sites for cordgrass seed.	
Sources of information: Ayres DR, Smith DL, Zaremba K, Klohr S, Strong DR. 2004. Spread of exotic cordgrasses and hybrids (<i>Spartina</i> sp.) in the tidal marshes of San Francisco Bay. <i>Biological Invasions</i> . 6: 221-231. Ayres and Strong, unpublished data.	
Question 2.2 Local rate of spread with no management	B Rev'd, Sci. Pub'n back
Describe rate of spread: moderate to rapid	
Rationale: plants have been found 10s of km (and in Tomales Bay and Puget Sound WA!) from known populations due to tidally borne seed and/or human aided transport (see below).	
Sources of information: Ayres DR, Smith DL, Zaremba K, Klohr S, Strong DR. 2004. Spread of exotic cordgrasses and hybrids (<i>Spartina</i> sp.) in the tidal marshes of San Francisco Bay. <i>Biological Invasions</i> . 6: 221-231.	
Question 2.3 Recent trend in total area infested within state	B Rev'd, Sci. Pub'n back
Describe trend: increasing	
Rationale: enter text here	
Sources of information: Ayres et al, 2004	
Question 2.4 Innate reproductive potential	B Rev'd, Sci. Pub'n back
Describe key reproductive characteristics: <i>S. densiflora</i> is highly fertile and its caespitose habit of dense culms produces many inflorescences. Seed is viable.	
Rationale: Long-lived clones, plus high seed set confer high persistence and high reproductive potential on <i>S.</i>	

densiflora.	
Sources of information: Ayres DR, Smith DL, Zaremba K, Klohr S, Strong DR. 2004. Spread of exotic cordgrasses and hybrids (<i>Spartina</i> sp.) in the tidal marshes of San Francisco Bay. <i>Biological Invasions</i> . 6: 221-231. Spicher, D. Master's thesis, SF State. Ayres, Strong and Lee. Unpublished data.	
Question 2.5 Potential for human-caused dispersal	C Anecdotal back
Identify dispersal mechanisms: limited - however, the occurrence of <i>S. densiflora</i> populations near oystering areas in Tomales Bay and in Puget Sound, WA suggests possible human aided movement during transport of oyster spat	
Rationale: enter text here	
Sources of information: Katy Zaremba, personal communication and pers. communication from WA <i>Spartina</i> workers. Ayres et al, 2004	
Question 2.6 Potential for natural long-distance dispersal	A Rev'd, Sci. Pub'n back
Identify dispersal mechanisms: seed floating on the tides; seed contained in rafts of cordgrass wrack	
Rationale: Cordgrass seed is able to float for long periods; seed-containing wrack is able to move long distances. Long distance dispersal on tidal currents is feasible.	
Sources of information: Huiskes AHL, Koutstaal BP, Herman PMJ, Beefink WG, Markusse MM and De Munck W (1995) Seed dispersal of halophytes in tidal salt marshes. <i>Journal of Ecology</i> 83: 559-567; Kathleen Sayce, personal communication on dispersal of <i>S. alterniflora</i> from Willapa Bay to Greys Harbour, WA	
Question 2.7 Other regions invaded	B Rev'd, Sci. Pub'n back
Identify other regions: <i>S. densiflora</i> has completely colonized all available habitat in Humboldt Bay, and is a problem in Spanish marshes, dunes, salt pans.	
Rationale: enter text here	
Sources of information: Kittleson and Boyd, 1997, and pers. comm. Kittleson. Castillo et al 2000 and references therein	

Question 3.1 Ecological amplitude/Range	D Rev'd, Sci. Pub'n back
Describe ecological amplitude, identifying date of source information and approximate date of introduction to the state, if known: <i>S. densiflora</i> was introduced into Humboldt bay within the past 100 years during lumber shipping between there and Chile. Plants thought to be an ecotype of <i>S. foliosa</i> were transplanted into Creekside Park during the 1970s. Other plants were planted into Richardson Bay as part of a landscaping project.	
Rationale: One major type invaded, salt marsh	
Sources of information: Kittleson and Boyd, 1997. Ayres et al, 2004. Spicher, D. MS thesis	
Question 3.2 Distribution/Peak frequency	C Rev'd, Sci. Pub'n back
Describe distribution: Plants have spread from points of deliberate introduction sometimes a very long distance (80 km).	
Rationale: In addition to Corte Madera Creek, the plant has been found in small infestions up coast and has occupied much of Humboldt Bay; probably more than 5% of the marsh habitat in California. Marshes and creeks (i.e. Corte Madera Creek) neighboring invaded marshes are especially vulnerable to invasion.	
Sources of information: Ayres DR, Smith DL, Zaremba K, Klohr S, Strong DR. 2004. Spread of exotic cordgrasses and hybrids (<i>Spartina</i> sp.) in the tidal marshes of San Francisco Bay. <i>Biological Invasions</i> . 6: 221-231.	

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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	No: 0 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
	5 pts 2 unknowns
	B (4-5 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	C. 5-20%
Dunes	coastal	score
	desert	score
	interior	score
Scrub and Chaparral	coastal bluff scrub	score
	coastal scrub	score
	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	score
	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	Unknow
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).