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 anglica C.E. Hubbard
Synonyms:	
Common names:	English Cordgrass, common cordgrass
Evaluation date (mm/dd/yy)**:**	April 15, 2004, July 21, 2005
Evaluator #1 Name/Title:	Dr. Debra Ayres
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Section below for list committee use—please leave blank

List committee members:	Carla Bossard, Joe DiTomaso, John Randall, Jake Sigg, Alison Stanton, Peter Warrner, Cynthia Roye
Committee review date:	05/14/04, revised 8/15/05
List date:	enter text here
Re-evaluation date(s):	enter text here

General comments on this assessment:
This plant is found in one population in Creekside Park, Marin County, on the west side of San Francisco Bay where it has spread about slowly from the site of its introduction in the 1970s. Despite this slow spread here, the plant has been known to have invaded estuaries worldwide including Puget Sound, WA, Tasmania, France, New Zealand, and the UK.

Table 2. Criteria, Section, and Overall Scores

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

Impact

Enter four characters from Q1.1-1.4 below:

ACUD

Using matrix, determine score and enter below:

B

2.1	Role of anthropogenic and natural disturbance	A (3 pts	Rev'd, Sci. Pub'n
2.2	Local rate of spread with no management	B (2 pts	Rev'd, Sci. Pub'n
2.3	Recent trend in total area infested within state	B (2 pts	Rev'd, Sci. Pub'n
2.4	Innate reproductive potential Wksht A	B (2 pts	Other Pub. Mat'l
2.5	Potential for human-caused dispersal	D (0 pts	Anecdotal
2.6	Potential for natural long-distance dispersal	A (3 pts	Observational
2.7	Other regions invaded	C (1 pt)	Rev'd, Sci. Pub'n

Invasiveness

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

13

Use matrix to determine score and enter below:

B

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

Distribution

Using matrix, determine score and enter below:

D

Plant Score

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

Medium

Red Alert

Table 3. Documentation

Question 1.1 Impact on abiotic ecosystem processes A Rev'd, Sci. Pub'n back
Identify ecosystem processes impacted: Sediment accretion.
Rationale: S. anglica accretes sediument and elevates marsh, transforming naturally open tidal mudflats into meadows.
Sources of information: This has NOT occurred in SF Bay (observational information); sediment accretion has been observed in other estuaries (including within native British range); sediment accretion has been documented: Pringle, A.W. 1993. Spartina anglica colonisation and physical effects in the Tamar Estuary, Tasmania 1971-91. Papers and Proceedings of the Royal Society of Tasmania 127:1-10.
Question 1.2 Impact on plant community composition, structure, and interactions B Rev'd, Sci. Pub'n back
Identify type of impact or alteration: S. anglica is slowly spreading in a single marsh in Marin County. (Creekside Park) at about the elevation of S. foliosa.
Rationale: Where this species has been introduced, it transforms open mud into cordgrass meadows. In Britain S. anglica has also invaded low intertidal eel grass beds. However, it is not rapidly spreading in SF Bay, possibly due to climatic restrictions (Daehler and Strong, 1996).
Sources of information: Ayres, D.R., K. Zaremba, S. Klohr, D.R.Strong.. 2004. Spread of exotic cordgrasses and hybrids (Spartina sp.) in the tidal marshes of San Francisco Bay. Biological Invasions 6:221-231. Daehler, C.C., and D.R. Strong. 1996. Status, prediction, and prevention of introduced cordgrass Spartina spp. invasions in Pacific estuaries, USA. Biological Conservation 78:51-58.
Question 1.3 Impact on higher trophic levels U Other Pub. Mat'l back
Identify type of impact or alteration: Potential removal of bird foraging habitat through cordgrass overgrowth of open mudflat habitat -- this is NOT occurring in SF Bay.
Rationale: Open mudflat is valuable forage ground for migratory and residential shorebirds, but there is no evidence of this in SF Bay at this time.
Sources of information: Pt. Reyes Bird Obswervatory has assembled a bibliography on maritime cordgrsass impacts on shorebirds. An example (for S. anglica) Goss-Custard, J.D., R.T. Clarke, Dit Durell, S.V., Caldow, R.W., and B.J. Ens. 1995. Populatrion consequences of winter habitat loss in a migratory shorebird. II Model predictions. Journal of Applied Ecology 32: 337-351.
Question 1.4 Impact on genetic integrity D Rev'd, Sci. Pub'n back
Identify impacts: S. anglica cannot interbreed with any native species due to wide differences in chromosome

numbers (62 for foliosa, 122 for anglica).
Rationale: enter text here
Sources of information: Aryes, D.R. and D.R. Strong. 2001. Origin and genetic diversity of Spartina anglica C.E. Hubbard (Poaceae). American Journal of Botany 88:1863-1867.
Question 2.1 Role of anthropogenic and natural disturbance in establishment A Rev'd, Sci. Pub'n back
Describe role of disturbance: Initially planted, slow spread occurring by seed.
Rationale: Seedlings likely to establish in open mud, as do other maritime cordgrasses. However, S. anglica has not spread more than 200 m from the largest (and possibly founding "mother") in 25 years.
Sources of information: Ayres et al. 2004.
Question 2.2 Local rate of spread with no management B Rev'd, Sci. Pub'n back
Describe rate of spread: Slowly spreading.
Rationale: S. anglica has not spread more than 200 m from the largest (and possibly founding "mother") in 25 years.
Sources of information: Ayres, D.R., D.L. Smith, K. Zaremba, S. Klohr, D.R. Strong. 2004. Spread of exotic cordgrasses and hybrids (Spartina sp.) in the tidal marshes of San Francisco Bay. Biological Invasions 6: 221-231.
Question 2.3 Recent trend in total area infested within state B Rev'd, Sci. Pub'n back
Describe trend: Slowly spreading
Rationale: S. anglica has not spread more than 200 m from the largest (and possibly founding "mother") in 25 years.
Sources of information: Ayres, D.R., D.L. Smith, K. Zaremba, S. Klohr, D.R. Strong. 2004. Spread of exotic cordgrasses and hybrids (Spartina sp.) in the tidal marshes of San Francisco Bay. Biological Invasions 6: 221-231.
Question 2.4 Innate reproductive potential B Other Pub. Mat'l back
Describe key reproductive characteristics: S. anglica produces fertile seed and persists as long-lived clones spreading via rhizomes.
Rationale: Although Ayres original score was "A," the committee questioned the number of viable seeds

produced per square meter and the reference originally cited (Ayres et al. 2004) did not quantify the answer to this question definitively. Written Findings of the Washington State Weed Control Board suggest fewer viable seeds per square m. This document also states that seed production is sustained for more than three months per year, resulting in a score of 5 (B), for question 2.4. The overall plant score remains Medium.

Sources of information: Written Findings of the Washington State Weed Control Board as accessed on the Web @ http://www.nwcb.wa.gov/weed_info/commoncordgrass.html on 08/20/04.

Ayres, D.R., D.L. Smith, K. Zaremba, S. Klohr, D.R. Strong. 2004. Spread of exotic cordgrasses and hynrids (Spartina sp.) in the tidal marshes of San Francisco Bay. Biological Invasions 6: 221-231.

Question 2.5 Potential for human-caused dispersal D Anecdotal back

Identify dispersal mechanisms: Intentional introduction only.

Rationale: enter text here

Sources of information: Anecdotal.

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-contaihng wrack is able to move long distances. Long distance dispersal on tidal currents is feasible.

Sources of information: Huiskes, A.H.L., B.P. Koustaal, W.G. Beeflink, M.M. Markusse, and W. De Munck. 1995. Seed dispersal of halophytes in tidal salt marshes. Journal of Ecology 83: 559-567.

Sayce, Kathleen. Personal Communicarion on dispersal of S. alterniflora from Willapa Bay to Greys Harbor, WA.

Question 2.7 Other regions invaded C Rev'd, Sci. Pub'n back

Identify other regions: Spartina anglica has invaded estuaries worldwide including Puget Sound, WA, Tasmania, France, and the UK, but only this habitat type.

Rationale: Open musflat habitat is native to the Pacific coast and may be vulnerable to invasion by S. anglica.

Sources of information: Daehler, C.C., and D.R. Strong. 1996. Status, prediction, and prevention of introduced cordgrass Spartina spp. invasions in Pacific estuaries, USA. Biological Conservation 78:51-58.

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: Introduced to San Francisco Bay during the 1977 restoration of Creekside Park in Marin

County. Currently grows in a small total area, 324 square meters, of the park, growing at the same elevations as the native S. foliosa (channel sides and bottoms; i.e. wetter areas).
Rationale:
Sources of information: Ayres et al. 2004. Strong and Lee, unpublished data.
Question 3.2 Distribution/Peak frequency D Rev'd, Sci. Pub'n back
Describe distribution: Plants occur 200m or less from the original discovery (Spicher, pers. obs.) in Creekside Park, Marin Coubty in channels radiating from this plant.
Rationale: Has not been found in other California estuaries.
Sources of information: Ayres, D.R., D.L. Smith, K. Zaremba, S. Klohr, D.R. Strong. 2004. Spread of exotic cordgrasses and hynrids (Spartina sp.) in the tidal marshes of San Francisco Bay. Biological Invasions 6: 221-231.

Worksheet A

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Reaches reproductive maturity in 2 years or less	**Unknown: 0 pts**
Dense infestations produce >1,000 viable seed per square meter	**No: 0 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 *both* 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	**No: 0 pts**
Resprouts readily when cut, grazed, or burned	**Yes: 1 pt**
	5 pts **1 unknown**
	B (4-5 pts)

Note any related traits: Spread generally occurs in three phases: an initial colonisation period, followed by slow clonal growth as seedlings establish. Once established, a burst of prolific clonal expansion.
Seed production increases with marsh development. The answers are based on observations elsewhere.

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	**D. prese**
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	**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).