Electronic version, February 26, 2003

Instructions

For each species assessed, complete and return the Plant Assessment Form including the three tables, Worksheet A, and the appropriate state ecological types worksheet (either Worksheet B, C, or D). All light blue cells should be filled in for each of these tables and worksheets. Note that this is the "electronic" version of the form—a "printable" version of this form is also available, with formatting designed to allow an evaluator to fill in blanks by hand. The electronic version is preferred for final submissions to the list committee.

Step 1: Complete Table 1with information on the species being assessed and the individual(s) performing the assessment. Enter the information in the light blue spaces below.

Table 1. Species and Evaluator Information

Species name (Latin binomial)**:**	*Ammophila arenaria* (L.) Link
Synonyms:	*Arundo arenaria*
Common names:	European beachgrass
Evaluation date (mm/dd/yy)**:**	8/30/03
Evaluator #1 Name/Title:	Peter J. Warner
Affiliation:	California Dept. of Parks and Recreation; CalEPPC
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Email address:	corylus@earthlink.net; pwarn@mcn.org; pwarn@parks.ca.gov
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Evaluator #2 Name/Title:	
Affiliation:	
Phone numbers:	
Email address:	
Address:	

Section below for list committee use—please leave blank

List committee members:	Matt Brooks, Peter Warner, Joe DiTomaso, Doug Johnson
Committee review date:	9/4/03, Berkeley
List date:	
Re-evaluation date(s):	

Table 2. Criteria, Section, and Overall Scores

1.1	Impact on abiotic ecosystem processes	**A**	***Reviewed scientific publication***
1.2	Impact on plant community	**A**	***Reviewed scientific publication***
1.3	Impact on higher trophic levels	**A**	**Published literature (other)**
1.4	Impact on genetic integrity	**D**	**Published literature (other)**

"Impact"

Enter four characters from Q1.1-1.4 below:

AAAD

Use matrix determine the score; enter below:

A

2.1	Role of anthropogenic and natural disturbance	**B 2**	**Published literature (other)**
2.2	Local rate of spread with no management	**A 3**	**Published literature (other)**
2.3	Recent trend in total area infested within state	**B 2**	**Published literature (other)**
2.4	Innate reproductive potential	**A 3**	**Published literature (other)**
2.5	Potential for human-caused dispersal	**B 2**	**Published literature (other)**
2.6	Potential for natural long-distance dispersal	**A 3**	***Reviewed scientific publication***
2.7	Other regions invaded	**C 1**	**Published literature (other)**

"Invasiveness"

For questions at left, recall that an A gets 3 points, a B gets 2, a C gets 1, and a D or U gets=0. Enter the sum total of all points for Q2.1-2.7 below:

16

Use matrix to determine score and enter below:

B

"Plant Score"

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

High

3.1	Ecological amplitude	**D**	**Published literature (other)**
3.2	Distribution	**A**	**Published literature (other)**

"Distribution"

Use matrix determine the score; enter below:

B

Table 3. Documentation

Question 1.1 Impact on abiotic ecosystem processes
Identify ecosystem processes impacted: 1. endophytic nitrogen fixation by plants resulting in increased ambient dune nitrogen levels; 2. disrupts aeolian formation of dunes resulting in altered dune geomorphology; 3. water availability;

Rationale: Published literature (other): 1. inference based on initial findings (Fusaro, S. 1997. Masters thesis) and formulated research hypothesis (Dalton, D., and M. Kahn) funded by National Science Foundation; 2. biology/ecology of beachgrass based on numerous studies on its rhizomatous growth, summarized in The Nature Conservancy element stewardship abstract and elsewhere;

Sources of information: 1. press release from Reed College (http://administration.reed.edu/news/news/taf?ID=123); 2. Danin, A., S. Rai, M. Barbour, N. Jurjavcic, P. Connors, and E. Uhlinger. 1998. Early primary succession on dunes at Bodega Head, California. Madroño 45(2):101-109. 3. The Nature Conservancy (http://tncweeds.ucdavis.edu/esadocs/documnts/ammoare.html); 4. National Park Service website (http://www.nps.gov/redw/beach-gr.htm); 5. Nikon website (http://www.microscopyu.com/galleries/confocal/beachgrass.htm); 6. Van Der Stoel, C. D., W. H. Van Der Putten, and H. Duyts. 2002. Development of a negative plant-soil feedback in the expansion zone of the clonal grass following root formation and nematode colonization. Journal of Ecology 90: 978-988.

Question 1.2 Impact on plant community composition, structure, and interactions

Identify type of impact or alteration: displacement of many native species, including rare, endangered, threatened, and significant changes in composition of native dune mat and dune scrub communities

Rationale: published information based on recorded data

Sources of information: 1. Pickart, AJ, and JO Sawyer. 1998. Ecology and Restoration of Northern California Coastal Dunes. The California Native Plant Society, Sacramento, CA. Pp. 46-47; 2. National Park Service website (http://www.nps.gov/redw/beach-gr.htm); 3. The Nature Conservancy (http://tncweeds.ucdavis.edu/esadocs/documnts/ammoare.html); 4. Danin, A., S. Rai, M. Barbour, N. Jurjavcic, P. Connors, and E. Uhlinger. 1998. Early primary succession on dunes at Bodega Head, California. Madroño 45(2):101-109; 5. Aptekar, R. 2000. *in* Bossard, C. C., J. M. Randall, and M. C. Hoshovsky. 2000. Invasive Plants of California's Wildlands. University of California Press, Berkeley. Pp. 42-46.

Question 1.3 Impact on higher trophic levels

Identify type of impact or alteration: displacement of habitat for nesting and breeding of western snowy plover (*Charadrius alexandrinus nivosus*); reduced arthropod diversity

Rationale: published literature

Sources of information: 1. Pickart, AJ, and JO Sawyer. 1998. Ecology and Restoration of Northern California Coastal Dunes. The California Native Plant Society, Sacramento, CA; 2. Aptekar, R. 2000. *in* Bossard, C. C., J. M. Randall, and M. C. Hoshovsky. 2000. Invasive Plants of California's Wildlands. University of California Press, Berkeley. Pp. 42-46;

Question 1.4 Impact on genetic integrity

Identify impacts: None known

Rationale: no closely related plant taxa in California

Sources of information: Hickman, J. C. 1993. The Jepson Manual. University of California Press, Berkeley.

Question 2.1 Role of anthropogenic and natural disturbance in establishment

Describe role of disturbance: sand accretion is essential to *Ammophila* growth; since human introduction to many dune systems, *Ammophila* has spread to many areas in active dune systems without human-caused disturbance, but does not survive well in stable sand dunes.

Rationale: published literature (other)

Sources of information: 1) Aptekar, R. 2000. *in* Bossard, C. C., J. M. Randall, and M. C. Hoshovsky. 2000. Invasive Plants of California's Wildlands. University of California Press, Berkeley. Pp. 42-46; 2) Pickart, AJ, and JO Sawyer. 1998. Ecology and Restoration of Northern California Coastal Dunes. The California Native Plant Society, Sacramento, CA. P. 44.

Question 2.2 Local rate of spread with no management

Describe rate of spread: increasing steadily, mostly due to continued growth of rhizomes and dune-building; some seed-germination has been documented in N. California.

Rationale: published literature (other)

Sources of information: Pickart, AJ, and JO Sawyer. 1998. Ecology and Restoration of Northern California Coastal Dunes. The California Native Plant Society, Sacramento, CA. P. 45

Bencie, R. 1990. Investigation of seedling emergence and seed bank of *Ammophila arenaria* (unpublished). The Nature Conservancy, Arcata, CA

Question 2.3 Recent trend in total area infested within state

Describe trend: most dunes already invaded, and some sites have been successfully eradicated, although complete eradication is probably a long-term process; overall trend is probably close to stable

Rationale: published literature (other)

Sources of information: Pickart, AJ, and JO Sawyer. 1998. Ecology and Restoration of Northern California Coastal Dunes. The California Native Plant Society, Sacramento, CA. Pp. 44-46.

Question 2.4 Innate reproductive potential

Describe key reproductive characteristics: rhizomes particularly effective in within-patch increase, and withstand saltwater immersion, allowing spread to new sites; species can also spread by seed

Rationale: peer-reviewed research; published literature (other)

Sources of information: Pickart, AJ, and JO Sawyer. 1998. Ecology and Restoration of Northern California Coastal Dunes. The California Native Plant Society, Sacramento, CA. Pp. 44-46.

Baye, PR 1990. Comparative growth responses and population ecology of European and American beachgrass (*Ammophila* spp.) in relation to sand accretion and salinity. Ph.D. dissertation, University of Western Ontario, London, Ontario, Canada.

Bencie, R. 1990. Investigation of seedling emergence and seed bank of *Ammophila arenaria* (unpublished). The Nature Conservancy, Arcata, CA

Huiskes, AHL. 1977. The natural establishment of *Ammophila arenaria* from seed. Oikos 29:133-136.

Question 2.5 Potential for human-caused dispersal

Identify dispersal mechanisms: introduction as a dune-stabilizing plan

Rationale: published literature (other)
Sources of information: 1) Pickart, AJ, and JO Sawyer. 1998. Ecology and Restoration of Northern California Coastal Dunes. The California Native Plant Society, Sacramento, CA. Pp. 44-46. 2) Aptekar, R. 2000. *in* Bossard, C. C., J. M. Randall, and M. C. Hoshovsky. 2000. Invasive Plants of California's Wildlands. University of California Press, Berkeley. Pp. 42-46;
Question 2.6 Potential for natural long-distance dispersal
Identify dispersal mechanisms: vegetative (rhizomatous growth or transport of rhizomes by sea water); seed (wind)
Rationale: published literature; published literature (other)
Sources of information: 1) Aptekar, R., and M. Rejmánek. 2000. The effect of sea-water submergence on rhizome bud viability of the introduced Ammophila arenaria and the native Leymus mollis in California. Journal of Coastal Conservation 6:107-111. 2 2) Pickart, AJ, and JO Sawyer. 1998. Ecology and Restoration of Northern California Coastal Dunes. The California Native Plant Society, Sacramento, CA. Pp. 44-46. 3)Aptekar, R. 2000. *in* Bossard, C. C., J. M. Randall, and M. C. Hoshovsky. 2000. Invasive Plants of California's Wildlands. University of California Press, Berkeley. Pp. 42-46;
Question 2.7 Other regions invaded
Identify other regions: North American west coast (San Diego Co. to British Columbia, Canada); Australia, New Zealand; present but not reported as invasive in South Africa
Rationale: published literature (other)
Sources of information: Pickart, AJ, and JO Sawyer. 1998. Ecology and Restoration of Northern California Coastal Dunes. The California Native Plant Society, Sacramento, CA. Pp. 44-46.
Question 3.1 Ecological amplitude
Describe ecological amplitude, identifying date of source information and approximate date of introduction to the state, if known: restricted to coastal strand and dunes, central and northern California (and further north); introduced to California in late 1800's
Rationale: published literature (other); based on observations and species biology
Sources of information: Pickart, AJ. 1997. Control of European beachgrass (*Ammophila arenaria*) on the west coast of the United States. *In* Kelly, M., E. Wagner, and P. Warner. Proceedings: California Exotic Pest Plant Council Symposium (3) Lamson-Scribner, F. 1895. Grasses as soil and soil binders. In Yearbook: U. S. Department of Agriculture 1894. U. S. Government Printing Office, Washington, D. C.
Question 3.2 Distribution
Describe distribution: essentially planted in or established in all dune systems from Santa Barbara northward
Rationale: published literature (other)
Sources of information: Pickart, AJ. 1997. Control of European beachgrass (Ammophila arenaria) on the west coast of the United States. *In* Kelly, M., E. Wagner, and P. Warner. Proceedings: California Exotic Pest Plant Council Symposium (3)

Worksheet A

Complete this worksheet to answer Question 2.4.

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

Note any related traits: rhizomes rely on sand accretion for growth and spread

Worksheet C - California Ecological Types

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	**A**
	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**
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).