

WEED RISK ASSESSMENT FORM

Botanical name: *Spartina alterniflora* Loisel., *Spartina anglica* C.E. Hubbard, *S. densiflora* Brongn., and *S. patens* (Ait.) Muhl.

Common name: Atlantic cordgrass, saltmarsh cordgrass, smooth cordgrass

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Outcome score:

A. Climatic Comparison		
This species is present or may potentially establish in the following eco-geographic regions:		
1 South Coastal	Yes	
2 Interior-Boreal		No
3 Arctic-Alpine		No

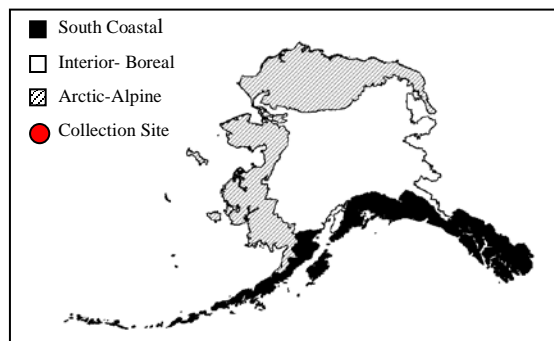
B.	Invasiveness Ranking	Total (Total Answered*) Possible	Total
1	Ecological impact	40 (40)	40
2	Biological characteristic and dispersal ability	25 (25)	17
3	Ecological amplitude and distribution	25 (25)	23
4	Feasibility of control	10 (10)	6
	Outcome score	100 (100) ^b	86 ^a
	Relative maximum score†		0.86

* For questions answered "unknown" do not include point value for the question in parentheses for "Total Answered Points Possible."

† Calculated as ^a/_b.

A. CLIMATIC COMPARISON:

1.1. Has this species ever been collected or documented in Alaska?	
	Yes – continue to 1.2
No	No – continue to 2.1
1.2. Which eco-geographic region has it been collected or documented (see inset map)? <i>Proceed to Section B. Invasiveness Ranking.</i>	
	South Coastal
	Interior-Boreal
	Arctic-Alpine



Documentation: No one species of *Spartina* has been collected in Alaska (ALA 2004, Weeds of Alaska Database 2004).

Sources of information:

Weeds of Alaska Database. 2004. AKEPIC Mapping Project Inventory Field Data. Alaska Natural Heritage Program, University of Alaska – US Forest Service – National Park Service.

Available: <http://akweeds.uaa.alaska.edu/>

2.1. Is there a 40% or higher similarity (based on CLIMEX climate matching) between climates any where the species currently occurs and

a. Juneau (South Coastal Region)?

Yes – record locations and similarity; proceed to Section B.
Invasiveness Ranking

No

b. Fairbanks (Interior-Boreal)?

Yes – record locations and similarity; proceed to Section B.
Invasiveness Ranking

No

c. Nome (Arctic-Alpine)?

Yes – record locations and similarity; proceed to Section B.
Invasiveness Ranking

No

– If “No” is answered for all regions, reject species from consideration

Documentation: *Spartina alterniflora* is native to the Atlantic and Gulf coasts of North America, occurring from Newfoundland south to Florida and Texas (USDA 2002, WAPMS 2004). Using CLIMEX matching program, climatic similarity between Juneau, Alaska and Grand Banks and St. Johns, Newfoundland is high (55% and 54% respectively). There is a 45% similarity between Juneau and Eastport, Maine. Further, aquatic species are generally less impacted by variation in terrestrial climates. It is therefore likely to establish in the South Coastal Region of Alaska.

Sources of information: CLIMEX for Windows, Version 1.1a. 1999. CISRO Publishing, Australia. USDA (United States Department of Agriculture), NRCS (Natural Resource Conservation Service). 2002. The PLANTS Database, Version 3.5 (<http://plants.usda.gov>). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

WAPMS - The Western Aquatic Plant Management Society. 2004. *Spartina alterniflora* – Smooth cordgrass – A problem aquatic plant in the Western USA. Available: <http://www.wapms.org/index.html> [December 13, 2004].

B. INVASIVENESS RANKING

1. ECOLOGICAL IMPACT

1.1. Impact on Ecosystem Processes

- | | | |
|----|---|----|
| A. | No perceivable impact on ecosystem processes | 0 |
| B. | Influences ecosystem processes to a minor degree (e.g., has a perceivable but mild influence on soil nutrient availability) | 3 |
| C. | Significant alteration of ecosystem processes (e.g., increases sedimentation rates along streams or coastlines, reduces open water that are important to waterfowl) | 7 |
| D. | Major, possibly irreversible, alteration or disruption of ecosystem processes (e.g., the species alters geomorphology; hydrology; or affects fire frequency, altering community composition; species fixes substantial levels of nitrogen in the soil making soil unlikely to support certain native plants or more likely to favor non-native species) | 10 |
| U. | Unknown | |

Score

10

Documentation:

Identify ecosystem processes impacted:

The dense stands of smooth cordgrass trap and holds sediments, decrease water flow and circulation and lead to flooding. Unvegetated mudflat associated invertebrate communities are replaced by saltmarsh species due to *Spartina* invasion (Daehler 2000,

Jacono 1998, WAPMS 2004).

Rational:

Sources of information:

Daehler, C.C. 2000. *Spartina alterniflora* Loisel. In: Invasive plants of California's wildlands. Edited by Bossard, C.C., J.M. Randall, and M.C. Hoshovsky. University of California Press. p. 296-299.

Jacono, C. 1998. *Spartina alterniflora* Loisel. Nonindigenous aquatic species. U.S. Department of the Interior. Geological Survey. Biological Resources Division. Center for Aquatic Resource Studies. Available:

http://nas.er.usgs.gov/plants/docs/sp_alter.html [November 8, 2004].

WAPMS - The Western Aquatic Plant Management Society. 2004. *Spartina alterniflora* – Smooth cordgrass – A problem aquatic plant in the Western USA. Available: <http://www.wapms.org/index.html> [December 13, 2004].

1.2. Impact on Natural Community Structure

- A. No perceived impact; establishes in an existing layer without influencing its structure 0
- B. Influences structure in one layer (e.g., changes the density of one layer) 3
- C. Significant impact in at least one layer (e.g., creation of a new layer or elimination of an existing layer) 7
- D. Major alteration of structure (e.g., covers canopy, eradicating most or all layers below) 10
- U. Unknown

Score

10

Documentation:

Identify type of impact or alteration:

Spartina colonizes bare sites, creating a new vegetative layer (Daehler 2000, Walkup 2004, WAPMS 2004).

Rational:

Sources of information:

Daehler, C.C. 2000. *Spartina alterniflora* Loisel. In: Invasive plants of California's wildlands. Edited by Bossard, C.C., J.M. Randall, and M.C. Hoshovsky. University of California Press. p. 296-299.

Walkup, C.J. *Spartina alterniflora*. In: Fire Effects Information System, (Online). U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: www.fs.fed.us/database/feis/ [2004, December 13].

WAPMS - The Western Aquatic Plant Management Society. 2004. *Spartina alterniflora* – Smooth cordgrass – A problem aquatic plant in the Western USA. Available: <http://www.wapms.org/index.html> [December 13, 2004].

1.3. Impact on Natural Community Composition

- A. No perceived impact; causes no apparent change in native populations 0
- B. Influences community composition (e.g., reduces the number of individuals in one or more native species in the community) 3
- C. Significantly alters community composition (e.g., produces a significant reduction in the population size of one or more native species in the community) 7
- D. Causes major alteration in community composition (e.g., results in the extirpation of one or several native species, reducing biodiversity or change the community composition towards species exotic to the natural community) 10
- U. Unknown

Score

10

Documentation:

Identify type of impact or alteration:

Spartina displaces native plants, such as *Zostera marina*, *Salicornia virginica*, and *Triglochin maritimum* (WAPMS 2004). It also results in decreases in benthic invertebrates and algae populations. Studies indicate that populations of invertebrates in the sediments of *Spartina alterniflora* clones are smaller than in mudflats (WAPMS 2004, Jacono 1998).

Rational:

Sources of information:

Jacono, C. 1998. *Spartina alterniflora* Loisel. Nonindigenous aquatic species. U.S. Department of the Interior. Geological Survey. Biological Resources Division. Center for Aquatic Resource Studies. Available: http://nas.er.usgs.gov/plants/docs/sp_alter.html [November 8, 2004].
WAPMS - The Western Aquatic Plant Management Society. 2004. *Spartina alterniflora* – Smooth cordgrass – A problem aquatic plant in the Western USA. Available: <http://www.wapms.org/index.html> [December 13, 2004].

1.4. Impact on higher trophic levels (cumulative impact of this species on the animals, fungi, microbes, and other organisms in the community it invades)

- A. Negligible perceived impact 0
- B. Minor alteration 3
- C. Moderate alteration (minor reduction in nesting/foraging sites, reduction in habitat connectivity, interference with native pollinators, injurious components such as spines, toxins) 7
- D. Severe alteration of higher trophic populations (extirpation or endangerment of an existing native species/population, or significant reduction in nesting or foraging sites) 10
- U. Unknown

Score

10

Documentation:

Identify type of impact or alteration:

Spartina stands lower light levels and cause decreases in algae production (Walkup 2004). Subsequently, it causes a reduction in refuge and food sources for clams, fish, crabs, waterfowl, and other marine life (Daehler 2000, WAPMS 2004). In Alaska chum salmon (*Oncorhynchus keta*), English sole (*Pleuronectes vetulus*), and Dungeness crab (*Cancer magister*) depend on mud-flat habitats; they would likely be affected by cordgrass invasion (Jacono 1998). Large populations of *Spartina* can also cause loss of important foraging and refuge habitat for shorebirds and waterfowl (WAPMS 2004). In its native range, it is a favorite of muskrats, nutria, and other grazing animals (Materne 2000, Walkup 2004).

Rational:

Sources of information:

Daehler, C.C. 2000. *Spartina alterniflora* Loisel. In: Invasive plants of California's wildlands. Edited by Bossard, C.C., J.M. Randall, and M.C. Hoshovsky. University of California Press. p. 296-299.
Jacono, C. 1998. *Spartina alterniflora* Loisel. Nonindigenous aquatic species. U.S. Department of the Interior. Geological Survey. Biological Resources Division. Center for Aquatic Resource Studies. Available: http://nas.er.usgs.gov/plants/docs/sp_alter.html [November 8, 2004].
Materne, M. 2000. Plant guide – Smooth cordgrass – *Spartina alterniflora* Loisel. USDA, NRCS, Louisiana State Office, Plant Materials, Baton Rouge, Louisiana. Available: <http://plants.usda.gov/> [December 13, 2004].
Walkup, C.J. *Spartina alterniflora*. In: Fire Effects Information System, (Online). U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: www.fs.fed.us/database/feis/ [2004, December 13].
WAPMS - The Western Aquatic Plant Management Society. 2004. *Spartina alterniflora* – Smooth cordgrass – A problem aquatic plant in the Western USA. Available: <http://www.wapms.org/index.html> [December 13, 2004].

Total Possible

40

Total

40

2. BIOLOGICAL CHARACTERISTICS AND DISPERSAL ABILITY

2.1. Mode of reproduction

- A. Not aggressive reproduction (few [0-10] seeds per plant and no vegetative reproduction) 0

- B. Somewhat aggressive (reproduces only by seeds (11-1,000/m2) 1
- C. Moderately aggressive (reproduces vegetatively and/or by a moderate amount of seed, <1,000/m2) 2
- D. Highly aggressive reproduction (extensive vegetative spread and/or many seeded, >1,000/m2) 3
- U. Unknown

Score 3

Documentation:

Describe key reproductive characteristics (including seeds per plant):

Smooth cordgrass reproduces both by seed and rhizomes. While seeds are important for colonizing new areas, the expansion of established stands is primarily due to vegetative growth. Clones spread laterally by vegetative shoots often more than three feet per year, producing a characteristic circular growth pattern (Daehler 2000, WAPMS 2004).

Rational:

Sources of information:

Daehler, C.C. 2000. *Spartina alterniflora* Loisel. In: Invasive plants of California's wildlands. Edited by Bossard, C.C., J.M. Randall, and M.C. Hoshovsky. University of California Press. p. 296-299.

WAPMS - The Western Aquatic Plant Management Society. 2004. *Spartina alterniflora* – Smooth cordgrass – A problem aquatic plant in the Western USA. Available: <http://www.wapms.org/index.html> [December 13, 2004].

2.2. Innate potential for long-distance dispersal (bird dispersal, sticks to animal hair, buoyant fruits, wind-dispersal)

- A. Does not occur (no long-distance dispersal mechanisms) 0
- B. Infrequent or inefficient long-distance dispersal (occurs occasionally despite lack of adaptations) 2
- C. Numerous opportunities for long-distance dispersal (species has adaptations such as pappus, hooked fruit-coats, etc.) 3
- U. Unknown

Score 2

Documentation:

Identify dispersal mechanisms:

Seed can be dispersed by water. Waterfowl can potentially transport seeds to new areas. Dispersal by floating wracks of vegetation is probably the most important long-distance dispersal mechanism (Sytsma et al. 2003). Vegetative fragments may be spread at sites prone to erosion (Daehler 2000).

Rational:

Sources of information:

Daehler, C.C. 2000. *Spartina alterniflora* Loisel. In: Invasive plants of California's wildlands. Edited by Bossard, C.C., J.M. Randall, and M.C. Hoshovsky. University of California Press. p. 296-299.

Sytsma, M., M. Pfauth, and D. Isaacson. 2003. *Spartina* response plan for Oregon. 4th Alaska noxious and invasive plants management workshop.

2.3. Potential to be spread by human activities (both directly and indirectly – possible mechanisms include: commercial sales, use as forage/revegetation, spread along highways, transport on boats, contamination, etc.)

- A. Does not occur 0
- B. Low (human dispersal is infrequent or inefficient) 1
- C. Moderate (human dispersal occurs) 2
- D. High (there are numerous opportunities for dispersal to new areas) 3
- U. Unknown

Score 3

Documentation:

Identify dispersal mechanisms:

It was intentionally introduced on the West Coast for erosion control. Additional

pathways of introduction include shipping, commercial shellfish operations, ballast water, boats and other equipment (Sytsma et al. 2003, WAPMS 2004).

Rational:

Sources of information:

Sytsma, M., M. Pfauth, and D. Isaacson. 2003. *Spartina* response plan for Oregon. 4th Alaska noxious and invasive plants management workshop.

WAPMS - The Western Aquatic Plant Management Society. 2004. *Spartina alterniflora* – Smooth cordgrass – A problem aquatic plant in the Western USA. Available: <http://www.wapms.org/index.html> [December 13, 2004].

2.4. Allelopathic

- A. No 0
- B. Yes 2
- U. Unknown

Score

Documentation:

Describe effect on adjacent plants:

This species has no allelopathy potential (USDA 2002).

Rational:

Sources of information:

USDA (United States Department of Agriculture), NRCS (Natural Resource Conservation Service). 2002. The PLANTS Database, Version 3.5 (<http://plants.usda.gov>). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

2.5. Competitive ability

- A. Poor competitor for limiting factors 0
- B. Moderately competitive for limiting factors 1
- C. Highly competitive for limiting factors and/or nitrogen fixing ability 3
- U. Unknown

Score

Documentation:

Evidence of competitive ability:

Once it is established, smooth cordgrass outcompetes native vegetation (Jacono 1998).

It does not compete well with mature established plants (Walkup 2004).

Rational:

Sources of information:

Jacono, C. 1998. *Spartina alterniflora* Loisel. Nonindigenous aquatic species. U.S. Department of the Interior. Geological Survey. Biological Resources Division. Center for Aquatic Resource Studies. Available: http://nas.er.usgs.gov/plants/docs/sp_alter.html [November 8, 2004].

Walkup, C.J. *Spartina alterniflora*. In: Fire Effects Information System, (Online). U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: www.fs.fed.us/database/feis/ [2004, December 13].

2.6. Forms dense thickets, climbing or smothering growth habit, or otherwise taller than the surrounding vegetation

- A. No 0
- B. Yes 2
- U. Unknown

Score

Documentation:

Describe grow form:

Smooth cord grass forms dense, monospecific stands in salt and brackish marshes (Jacono 1998).

Rational:

Sources of information:
 Jacono, C. 1998. *Spartina alterniflora* Loisel. Nonindigenous aquatic species. U.S. Department of the Interior. Geological Survey. Biological Resources Division. Center for Aquatic Resource Studies. Available: http://nas.er.usgs.gov/plants/docs/sp_alter.html [November 8, 2004].

2.7. Germination requirements

- A. Requires open soil and disturbance to germinate 0
- B. Can germinate in vegetated areas but in a narrow range or in special conditions 2
- C. Can germinate in existing vegetation in a wide range of conditions 3
- U. Unknown

Score

Documentation:
 Describe germination requirements:
 Seedlings are unable to survive under the vegetative canopy, and maximum establishment is recorded on bare patches (Walkup 2004, WAPMS 2004).
 Rational:

Sources of information:
 Walkup, C.J. *Spartina alterniflora*. In: Fire Effects Information System, (Online). U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: www.fs.fed.us/database/feis/ [2004, December 13].
 WAPMS - The Western Aquatic Plant Management Society. 2004. *Spartina alterniflora* – Smooth cordgrass – A problem aquatic plant in the Western USA. Available: <http://www.wapms.org/index.html> [December 13, 2004].

2.8. Other species in the genus invasive in Alaska or elsewhere

- A. No 0
- B. Yes 3
- U. Unknown

Score

Documentation:
 Species:
Spartina anglica C.E. Hubbard, *S. densiflora* Brongn., and *S. patens* (Ait.) Muhl. are considered invasive on the West Coast (Daehler 2000, Sytsma et al. 2003).
 Sources of information:
 Daehler, C.C. 2000. *Spartina alterniflora* Loisel. In: Invasive plants of California's wildlands. Edited by Bossard, C.C., J.M. Randall, and M.C. Hoshovsky. University of California Press. p. 296-299.
 Sytsma, M., M. Pfauth, and D. Isaacson. 2003. *Spartina* response plan for Oregon. 4th Alaska noxious and invasive plants management workshop.

2.9. Aquatic, wetland, or riparian species

- A. Not invasive in wetland communities 0
- B. Invasive in riparian communities 1
- C. Invasive in wetland communities 3
- U. Unknown

Score

Documentation:
 Describe type of habitat:
Spartina alterniflora is a plant of the intertidal zone, colonizing, bays, lagoons, ponds, and ditches (Walkup 2004, WAPMS 2004).
 Rational:

Sources of information:
 Walkup, C.J. *Spartina alterniflora*. In: Fire Effects Information System, (Online). U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station,

Fire Sciences Laboratory (Producer). Available: www.fs.fed.us/database/feis/ [2004, December 13].

WAPMS - The Western Aquatic Plant Management Society. 2004. *Spartina alterniflora* – Smooth cordgrass – A problem aquatic plant in the Western USA. Available: <http://www.wapms.org/index.html> [December 13, 2004].

Total Possible	25
Total	17

3. DISTRIBUTION

3.1. Is the species highly domesticated or a weed of agriculture

- A. No 0
- B. Is occasionally an agricultural pest 2
- C. Has been grown deliberately, bred, or is known as a significant agricultural pest 4
- U. Unknown

Score

4

Documentation:

Identify reason for selection, or evidence of weedy history:

Few cultivars have been developed, and they are commercially sold. They are used for erosion control and oil spill mediation along shorelines (Materne 2000, USDA 2002, Walkup 2004).

Rational:

Sources of information:

Materne, M. 2000. Plant guide – Smooth cordgrass – *Spartina alterniflora* Loisel. USDA, NRCS, Louisiana State Office, Plant Materials, Baton Rouge, Louisiana. Available: <http://plants.usda.gov/> [December 13, 2004].

USDA (United States Department of Agriculture), NRCS (Natural Resource Conservation Service). 2002. The PLANTS Database, Version 3.5 (<http://plants.usda.gov>). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

Walkup, C.J. *Spartina alterniflora*. In: Fire Effects Information System, (Online). U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: www.fs.fed.us/database/feis/ [2004, December 13].

3.2. Known level of impact in natural areas

- A. Not known to cause impact in any other natural area 0
- B. Known to cause impacts in natural areas, but in dissimilar habitats and climate zones than exist in regions of Alaska 1
- C. Known to cause low impact in natural areas in similar habitats and climate zones to those present in Alaska 3
- D. Known to cause moderate impact in natural areas in similar habitat and climate zones 4
- E. Known to cause high impact in natural areas in similar habitat and climate zones 6
- U. Unknown

Score

6

Documentation:

Identify type of habitat and states or provinces where it occurs:

In Willapa Bay, Washington, *Spartina alterniflora* has displaced approximately 20% of critical habitat for wintering and breeding aquatic birds (WAPMS 2004). In California, it has invaded San Francisco and Humboldt Bays, threatening to transform open mudflats into a single-species tall grass community (Daehler 2000, Daehler and Strong 1994). A population established in the Siuslaw estuary in Oregon, and numerous sites are known from Washington (Jacono 1998).

Sources of information:

Daehler, C.C. 2000. *Spartina alterniflora* Loisel. In: Invasive plants of California's wildlands. Edited by Bossard, C.C., J.M. Randall, and M.C. Hoshovsky. University of California Press. p. 296-299.

Daehler, C.C., and D.R. Strong. 1994. Variable reproductive output among clones of

Spartina alterniflora (Poaceae) invading San Francisco Bay, California: The influence of herbivory, pollination, and establishment site. American Journal of Botany. 81(3): 307-313.

Jacono, C. 1998. *Spartina alterniflora* Loisel. Nonindigenous aquatic species. U.S. Department of the Interior. Geological Survey. Biological Resources Division. Center for Aquatic Resource Studies. Available: http://nas.er.usgs.gov/plants/docs/sp_alter.html [November 8, 2004].

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3.3. Role of anthropogenic and natural disturbance in establishment

- A. Requires anthropogenic disturbances to establish 0
- B. May occasionally establish in undisturbed areas but can readily establish in areas with natural disturbances 3
- C. Can establish independent of any known natural or anthropogenic disturbances 5
- U. Unknown

Score

5

Documentation:

Identify type of disturbance:

Spartina has been recorded established on sites with no anthropogenic disturbances (Daehler 2000, Jacono 1998, WAPMS 2004).

Rational:

Sources of information:

Daehler, C.C. 2000. *Spartina alterniflora* Loisel. In: Invasive plants of California's wildlands. Edited by Bossard, C.C., J.M. Randall, and M.C. Hoshovsky. University of California Press. p. 296-299.

Jacono, C. 1998. *Spartina alterniflora* Loisel. Nonindigenous aquatic species. U.S. Department of the Interior. Geological Survey. Biological Resources Division. Center for Aquatic Resource Studies. Available: http://nas.er.usgs.gov/plants/docs/sp_alter.html [November 8, 2004].

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3.4. Current global distribution

- A. Occurs in one or two continents or regions (e.g., Mediterranean region) 0
- B. Extends over three or more continents 3
- C. Extends over three or more continents, including successful introductions in arctic or subarctic regions 5
- U. Unknown

Score

3

Documentation:

Describe distribution:

Smooth cordgrass is native to the Atlantic and Gulf Coast marshes of North America. Its introduced range includes the west coast of North America, Europe, and New Zealand (Baird and Thieret 1993, Daehler 2000, WAPMS 2004).

Rational:

Sources of information:

Daehler, C.C. 2000. *Spartina alterniflora* Loisel. In: Invasive plants of California's wildlands. Edited by Bossard, C.C., J.M. Randall, and M.C. Hoshovsky. University of California Press. p. 296-299.

WAPMS - The Western Aquatic Plant Management Society. 2004. *Spartina alterniflora* – Smooth cordgrass – A problem aquatic plant in the Western USA. Available: <http://www.wapms.org/index.html> [December 13, 2004].

3.5. Extent of the species U.S. range and/or occurrence of formal state or provincial listing

- A. 0-5% of the states 0

- B. 6-20% of the states 2
- C. 21-50%, and/or state listed as a problem weed (e.g., “Noxious,” or “Invasive”) in 1 state or Canadian province 4
- D. Greater than 50%, and/or identified as “Noxious” in 2 or more states or Canadian provinces 5
- U. Unknown

Score

5

Documentation:

Identify states invaded:

Spartina alterniflora occurs in all coastal states from Newfoundland to Florida and Texas (USDA 2002, WAPMS 2004). It is declared noxious in Oregon and Washington (Invader Database System 2003).

Rational:

Sources of information:

Invaders Database System. The University of Montana. 2003. Montana Noxious Weed Trust Fund. Department of Agricultural. <http://invader.dbs.umt.edu/>
 USDA (United States Department of Agriculture), NRCS (Natural Resource Conservation Service). 2002. The PLANTS Database, Version 3.5 (<http://plants.usda.gov>). National Plant Data Center, Baton Rouge, LA 70874-4490 USA. WAPMS - The Western Aquatic Plant Management Society. 2004. *Spartina alterniflora* – Smooth cordgrass – A problem aquatic plant in the Western USA. Available: <http://www.wapms.org/index.html> [December 13, 2004].

WAPMS - The Western Aquatic Plant Management Society. 2004. *Spartina alterniflora* – Smooth cordgrass – A problem aquatic plant in the Western USA. Available: <http://www.wapms.org/index.html> [December 13, 2004].

Total Possible

25

 Total

23

4. FEASIBILITY OF CONTROL

4.1. Seed banks

- A. Seeds remain viable in the soil for less than 3 years 0
- B. Seeds remain viable in the soil for between 3 and 5 years 2
- C. Seeds remain viable in the soil for 5 years and more 3
- U. Unknown

Score

0

Documentation:

Identify longevity of seed bank:

The seeds remain viable for only 8 – 12 months, and they do not withstand desiccation. The species does not have a persistent seed bank (Daehler 2000, Mooring et al. 1971, WAPMS 2004).

Rational:

Sources of information:

Daehler, C.C. 2000. *Spartina alterniflora* Loisel. In: Invasive plants of California’s wildlands. Edited by Bossard, C.C., J.M. Randall, and M.C. Hoshovsky. University of California Press. p. 296-299.

Mooring, M.T., A.W. Cooper, and E.D. Seneca. 1971. Seed germination response and evidence for height ecophenes in *Spartina alterniflora* from North Carolina. American Journal of Botany. 58(1): 48-55.

WAPMS - The Western Aquatic Plant Management Society. 2004. *Spartina alterniflora* – Smooth cordgrass – A problem aquatic plant in the Western USA. Available: <http://www.wapms.org/index.html> [December 13, 2004].

4.2. Vegetative regeneration

- A. No resprouting following removal of aboveground growth 0
- B. Sprouts from roots or stumps 2

- C. Any plant part is a viable propagule 3
 U. Unknown

Score

2

Documentation:

Describe vegetative response:

After removal of aboveground growth plant can resprout (WAPMS 2004).

Rational:

Sources of information:

WAPMS - The Western Aquatic Plant Management Society. 2004. *Spartina alterniflora* – Smooth cordgrass – A problem aquatic plant in the Western USA. Available: <http://www.wapms.org/index.html> [December 13, 2004].

4.3. Level of effort required

- A. Management is not required (e.g., species does not persist without repeated anthropogenic disturbance) 0
 B. Management is relatively easy and inexpensive; requires a minor investment in human and financial resources 2
 C. Management requires a major short-term investment of human and financial resources, or a moderate long-term investment 3
 D. Management requires a major, long-term investment of human and financial resources 4
 U. Unknown

Score

4

Documentation:

Identify types of control methods and time-term required:

Smooth cordgrass can grow on very soft, deep mud, making infestations nearly inaccessible by foot or boat. Hand-pulling or digging seedlings is suggested for small infestations (less than 5 acres). Special care should be taken to remove both shoots and roots. Shading small *Spartina* clones with woven geotextile fabric was successful in Oregon. Mowing and herbicide treatment can limit growth and seed set (Daehler 2000, Sytsma et al. 2003).

Rational:

Sources of information:

Daehler, C.C. 2000. *Spartina alterniflora* Loisel. In: Invasive plants of California's wildlands. Edited by Bossard, C.C., J.M. Randall, and M.C. Hoshovsky. University of California Press. p. 296-299.

Sytsma, M., M. Pfauth, and D. Isaacson. 2003. *Spartina response* plan for Oregon. 4th Alaska noxious and invasive plants management workshop.

Total Possible

10

Total

6

Total for 4 sections Possible

100

Total for 4 sections

86

References:

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