SITE WEED MANAGEMENT PLAN

FOR

COX ISLAND PRESERVE
FLORENCE, OREGON

FOR THE PERIOD 2000-2005

DRAFTED: January 2000

PREPARED BY DEBBIE L. PICKERING
OREGON COAST STEWARDSHIP ECOLOGIST
THE NATURE CONSERVANCY

Edited by Mandy Tu
The Nature Conservancy's
Wildland Invasive Species Program
Edit date: December 2001

I. INTRODUCTION

A. Description and purpose of the preserve:

Cox Island is a 188-acre salt marsh island in the Siuslaw River estuary approximately seven river miles from the Pacific Ocean and about two miles east of the city of Florence, Oregon. The island has natural levees on the upriver and active channel sides and tidal creeks that penetrate the interior of the island from the western side. The majority of the island is covered by low, middle, and high marsh vegetation with some transitional and upland vegetation on the slightly higher ground of the levees. Sometime in the 1930s the island was invaded by *Spartina patens,* a grass species native to East Coast salt marshes but alien to the western states.

Ecological goals for the preserve are to:

1) Restore the natural structure, composition and function of the intertidal salt marsh community by halting the spread of *Spartina patens* and reducing the number of established patches on the island within 5 years.

2) Determine if the size of the native *Sidalcea hendersonii* population at Cox Island is increasing, decreasing or remaining stable over the next 5 years.

3) Avoid disturbance to the *Zostera* (native eelgrass) beds during general management activities.

Spartina patens is limited to the middle marsh which is composed of three closely related plant communities at Cox Island. It is most often found in the *Deschampsia caespitosa-Scirpus maritimus* community (Frenkel and Boss 1988). This area is characterized by abundant bare ground, a level surface ranging from 1.8 to 2.1 m above mean low water in elevation, and many developing tidal creeks.

B. Description of how certain plant species ("weeds") interfere with management goals.

Spartina patens is native to the Atlantic and Gulf coasts of the United States from Newfoundland to Texas (Frenkel and Boss 1988). It was introduced to the western United States probably around the turn of the century. *S. patens* invades middle marsh communities at elevations ranging from 1.83 to 2.05 m above mean low water (Frenkel and Boss 1988). It spreads primarily by rhizomes and forms circular, monotypic stands. These *Spartina* patches accumulate sediment and litter at a faster rate than the surrounding marsh vegetation, potentially altering vegetation succession of the site. *S. patens* at Cox Island apparently established in relatively undisturbed vegetation before 1939; it has spread at an exponential rate and may continue until all available habitat is occupied (Frenkel and Boss 1988).

C. Inventory of plant species that interfere with management goals

Spartina patens was extensively mapped using aerial photos from 1939 to 1981. It has expanded at a rate of 200 m^2/yr and in 1981 it occupied more than 3,000 m^2 (Frenkel and Boss

1988). Cox Island was surveyed on the ground in 1996 and 1998 to locate all *S. patens* patches. A total of 890 patches covering approximately 10,600 m^2 (about 2½ acres) were found in 1996 and 1100 patches were flagged in 1998.

II. OVERVIEW OF WEED MANAGEMENT PLAN

A. General Management Philosophy

Weed control is part of the overall site restoration program. We focus on the species and communities we want in place of the weed species, rather than on simply eliminating weeds. We will implement preventative programs to keep the site free of species that are not yet established there but which are known to be pests elsewhere in the region. We will set priorities for the control or elimination of weeds that have already established on the site, according to their actual and potential impacts on native species and communities. We will take action only when careful consideration indicates leaving the weed unchecked will result in more damage than controlling it with available methods.

We use an adaptive management strategy. First, we establish and record the goals for the site. Second, we identify species that block us from reaching these goals and assign them priorities based on the severity of their impacts. Third, we consider methods for controlling them or otherwise diminishing their impacts and, if necessary, re-order priorities based on likely impacts on target and non-target species. Fourth, we develop weed control plans based on this information, then implement them. Fifth, we monitor the results of our management actions and evaluate them in light of the site goals. Finally, this information is used to modify and improve control priorities, methods and plans, starting the cycle again.

B. How priorities are determined.

We set priorities in the hope of minimizing the total, long-term workload. Therefore, we act to prevent new infestations and assign highest priority to existing infestations that are the fastest growing, most disruptive, and affect the most highly valued area(s) of the site. We also consider the difficulty of control, giving higher priority to infestations we think we are most likely to control with available technology and resources.

Spartina patens is well established on Cox Island. While it is a long way from occupying all of the available habitat on the island, it is spreading rapidly. It has increased from three patches covering about 90 m^2 in 1939 to over 90 patches covering more than 3,000 m^2 in 1980 (Frenkel and Boss 1988). Several small outlier plants were observed in 1993. From a broader perspective, this population of *Spartina patens* needs to be controlled because it is the only known occurrence of the plant in Oregon. The Oregon Department of Agriculture has listed it as a noxious species and is interested in containing it at this site before it can spread. Although it will take a concerted effort and significant resources, I believe we will be able to control or eliminate this species with available technology and that native species will replace it with little further input.

Other non-native, invasive species such as English ivy (*Hedera helix*), Scot's broom (*Cytisus scoparius*), and Himalayan blackberry (*Rubus discolor*) occur on the island, but they are limited to the small upland areas and do not threaten the community and species of interest on the preserve. They are therefore a low priority for control.

C. Summary of Specific Actions Planned

Spartina patens is the only species that currently threatens the ecological goals for the site. Therefore, it is the only species currently scheduled for control. The species is well-established on the island, but this site is the only known occurrence in the state. The ultimate goal is to contain the current infestation and eventually reduce it to a level that is ecologically insignificant. Due to the size of the infestation, this may take 8 to 10 years to accomplish.

Field trials* conducted from 1996-1998 determined that the most cost-effective and efficient control method is covering the *Spartina* patches with heavy-duty landscaping fabric. This method is applicable for all patch sizes. The patches remain covered for 2 years, then the fabric is moved to new patches to be covered. After removal of the fabric, the patches are surveyed for the presence of live *Spartina* for at least 2 years. Active planting of native vegetation is not necessary as recolonization by native plants occurs within 2-3 years after the fabric is removed without further intervention.

***Note:** Mowing, inundating, and digging up the *S. patens* patches were control methods tested during earlier field trials.

III. SPECIFIC CONTROL PLANS FOR HIGH PRIORITY WEED SPECIES

Scientific name: Spartina patens ***Common name*****: Salt Meadow Cordgrass**
Updated: March 1996 & December 1998

A. PRIORITY: 1

B. DESCRIPTION

Spartina patens is native to the Atlantic and Gulf Coasts of North America where it dominates the upper salt marsh zone, but also occupies middle marsh, sand dunes and flats, grassy swales, and coastal scrublands (Aberle 1990). It is a slender, low-growing, perennial, rhizomatous grass that spreads primarily by clonal growth, forming dense, monotypic colonies (Frenkel and Boss 1988). *Spartina* utilizes the C^4 pathway of photosynthesis, which makes it tolerant of drought conditions (Aberle 1990).

Dispersal mechanisms of *S. patens* at Cox Island are not well understood. During the 1980s, no pollen or viable seeds of *S. patens* were found so it was believed that rhizome growth and fragments were responsible for its expansion (Frenkel and Boss 1988). In 1996 and 1998, some seeds were found and many small outlier plants were seen to be establishing some distance from large patches. This implies that some viable seed is now being produced, perhaps sporadically.

C. CURRENT DISTRIBUTION ON THE SITE

Spartina patches occur in the middle marsh *Deschampsia caespitora-Scirpus maritimus* community. Elevation ranges from 1.83 to 2.05 m above MLLW (Frenkel and Boss 1988). Most of the patches are concentrated in the southeast corner of the island (see map in Frenkel and Boss 1988). However, much of the suitable middle marsh habitat on the preserve has been invaded by *S. patens* to some extent, including the associated islets. A large isolated patch was found in 1998 on the eastern side of the island separated from other *Spartina* patches by a large area of high marsh. Also, on one of the islets at the SW end of the preserve, a large patch was located in a monotypic low marsh community of *Carex lyngbyei*.

As of October 1999, there were 775 patches covered, 29 patches that had been killed and uncovered, and 5 patches that were mostly killed but still had some small *Spartina* patches around the edges when they were uncovered. None of the uncovered patches had been re-invaded by *Spartina* and native salt marsh vegetation was successfully colonizing these former *Spartina* patches. All known patches on the north half of the island and the western portion of the island had been covered and we had started covering patches on the outskirts of the main infestation area.

D. DAMAGE & THREATS

This introduced species forms dense, monotypic stands that displace native salt marsh communities. It captures sediment and detritus at a faster rate than native vegetation thus raising

the elevation of the marsh. This could alter the natural succession of the marsh. Removal of detritus from the water column may alter the base of the food web that supports young salmonids in the estuary. *Spartina* reduces the diversity of the marsh and alters wildlife habitat.

E. GOALS

Contain the current infestation and eventually reduce it to a level that is ecologically insignificant.

F. OBJECTIVES (Measurable)

Objective 1: Control all established outlier patches by FY 2002.

Objective 2: Eliminate at least half of the large patches in the main infestation area (southeast quarter of the island) by 2005.

Objective 3: Inhibit further spread of *S. patens* by mowing untreated patches once each summer to remove flowering culms before the seeds mature.

Objective 4: Eliminate the remainder of the large patches in the main infestation area by 2010.

Objective 5: Conduct surveys of the island for new *Spartina* patches at least once every 3 years until no more live *Spartina* has been found for a period of 6 years.

G. MANAGEMENT OPTIONS

Viable control options are:

(1) Covering;
(2) Inundation;
(3) Mowing;
(4) Digging

A number of different methods for controlling *Spartina patens* have been tried or proposed by others. Agency workers in Washington and California have killed large patches of this species by covering them with Mirafi 700 brand landscaping fabric (Karen Kovacs, Lewellyn Jones, Harry Louch; personal communication). Repeated mowing has also had some success (James Hidy, USF&WS; personal communication). *S. patens* is restricted to a limited elevation range (Frenkel and Boss 1988), indicating that it is intolerant of inundation for periods of time longer than those experienced within this range (Gecy 1987). One potential strategy for control is to create an environment with an increased period of inundation at *S. patens* patches. A possible method for doing this is to use plastic cylinders pushed into the soil around *S. patens* patches, which should fill with water during high tide events and hold the water over the patch when the tide recedes (Minter 1990). In some cases, manual digging to remove patches has also been effective (Aberle 1990).

Burning of *S. patens* was tried at Cox Island in the early 1980s with very limited success (Frenkel, personal communication). The patches were apparently very hard to ignite. Those that did burn were relatively free of *S. patens* for only a few years, after which the species grew back. Taylor *et al.* (1994) reported that June burning reduced *S. patens* biomass for at least ten weeks but they cite a study that found new growth promoted by late winter to early spring fires. Fire was probably not a historic process at Cox Island. Thus, in addition to having a negligible effect on the invasive *Spartina*, the burning may have undesirable effects on the native vegetation.

Herbicide treatments were also tried at Cox Island in the early 1980s with very limited success. The herbicide glyphosate (tradename RoundUp or Rodeo) did not effectively control *S. patens* during these trials (Boss 1983), but it has been cited as an effective control for another invasive *Spartina* species, *Spartina alterniflora*. The head of the Oregon Department of Agriculture's Noxious Weed Division has said he does not believe herbicides are a viable long-term solution to the *S. patens* problem at Cox Island (Dennis Isaacson, personal communication). Since *S. patens* has been listed as a noxious weed in Oregon, "no action" is also not an option.

Field trials conducted from 1996-1998 determined the most cost-effective and efficient control method is covering the *Spartina* patches with heavy-duty landscaping fabric (see 1995-2000 version of this plan for details).

H. ACTIONS PLANNED (Treatments and monitoring)

The preferred method of control is to cover the *Spartina* patches with landscaping fabric (either Mirafi 500 or Amoco 2002), secured with gutter spikes or staples every three to four feet along the edges. The patches will remain covered for two years. The technique is to identify the spatial limits of the patch, snip around the boundary of the patch so the fabric lays flat, cut a piece of fabric of sufficient size to extend well beyond the border of the patch, and pin in place with spikes or staples. The fabric should extend a minimum of six inches beyond the edge of small patches and one to two feet beyond large patches to prevent any rhizomes from growing out beyond the covering. The edge of the fabric is folded under and a spike with a washer (to keep the head of the spike from going through the fabric) or 10” U-shaped staple is then pushed through and pounded into the substrate. Spikes should be angled toward the center of the covering as they are driven in to help prevent the tidal currents and wind from pulling up on the edges.

The locations of covered *S. patens* patches will be mapped using a Trimble GeoExplorer Global Positioning System unit. Patches will be coded by the year they were covered to facilitate re-locating patches to be uncovered after two years. Patches less than 10 m in diameter are recorded as points and those over 10-m in diameter are recorded as polygons. Anything less than 1 m in diameter is considered a small point, 1-5 m a medium point, and 5-10 m large points. For polygons, GPS readings will be taken while walking slowly around the perimeter of the patch.

When the fabric is removed, the patch will be searched for any *Spartina* that remains alive. If any is found, that portion of the patch will be re-covered. If none is found, the fabric will be moved to another patch to be covered. After fabric removal, the native saltmarsh vegetation will

be allowed to re-colonize naturally. Patches larger than 5 m in diameter will be re-visited annually for two years after fabric removal to search for re-infestation by *Spartina*. Due to the large number of smaller patches and the difficulty of re-locating them after native vegetation has re-colonized, these will not be individually surveyed but any live *Spartina* should show up in the periodic surveys of the island.

Flowering patches that have not yet been covered will be mowed annually to prevent seed set. Observations made in 1998 indicate the majority of medium and large patches were in bloom in late August. Generally no more than one to three percent of the stems within a patch were showing blooms and these seemed to be mostly concentrated toward the center of the patch. What appear to be mature seeds were collected in late October.

I. HOW ACTIONS WILL BE EVALUATED (Criteria for success)

The control method being used produces very obvious results making it unnecessary to conduct detailed monitoring. Basically all that is required is to check treated patches for the presence or absence of *S. patens*. All uncovered patches will be searched for the presence of *S. patens*. If any live *Spartina* is found, the area will be re-covered. Previously treated patches will continue to be monitored for two years after the coverings are removed. We will survey the island periodically for at least the next 10 years to search for viable *S. patens*. GPS data collected during implementation of the treatments will help measure our success at meeting our objectives.

J. RESOURCE NEEDS

The following budget reflects anticipated ongoing annual expenses needed for the successful control of *S. patens* on Cox Island. An additional $3000 will be needed the first year for one time purchase of supplies and equipment (2 rolls of fabric w/anchoring spikes, a string trimmer, & outboard motor).

Personnel:	
Seasonal Field Steward (@ $8.50 + benefits)	4427
Stewardship Ecologist (about 3 wks/yr)	2431
Volunteers (150 hrs valued @ $8.50 + benefits)	1383
Travel:	
Mileage	500
Moorage	324
Board and Lodging	150
Supplies/Materials:	
Replacement anchoring spikes	200
Boat fuel	75
Other	100
Total:	$9,590

IV. References

Aberle, B. 1990. The biology, control, and eradication of introduced *Spartina* (cordgrass) worldwide and recommendations for its control in Washington. Washington State Department of Natural Resources. Draft Report.

Boss, T.R. 1983. Control of Spartina patens (Ait.) Muhl. with Roundup on Cox Island, Oregon. Report prepared for The Nature Conservancy Oregon Stewardship Program.

Chamberlain, S.J. 1995. Comparison of methods to control *Spartina alterniflora* in San Francisco Bay. Masters thesis submitted to San Francisco State University, San Francisco, California.

Cox, C. 1991. Glyphosate. Journal of Pesticide Reform 11(2):35-38.

Frenkel, R.E. and T.R. Boss. 1988. Introduction, establishment and spread of *Spartina patens* on Cox Island, Siuslaw Estuary, Oregon. Wetlands 8:33-49.

Gecy, L. 1987. Population influences on salt marsh community development: A review and preliminary research on the population dynamics of an introduced species. Report prepared for The Nature Conservancy.

Minter, D.J. 1990. Spartina patens control methods -- A proposal. Submitted to The Nature Conservancy Oregon Stewardship Program.

Taylor, K.L., J.B. Grace, G.R. Guntenspergen, and A.L. Foote. 1994. The interactive effects of herbivory and fire on an oligohaline marsh, Little Lake, Louisiana, USA. Wetlands 14(2):82-87.