

**Final Report on
Implementation of the
Aquatic Plant Surveys, Outreach, and Management Planning in
2010-2011**

Prepared for
Noxious Weed Program
Oregon Department of Agriculture

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Introduction

Several invasive aquatic plants have the potential to invade Oregon estuaries, lakes, reservoirs and rivers. Invasive aquatic plants are particularly problematic since they are often more difficult to detect, control and eradicate than terrestrial invasive plants. Excessive growth of aquatic vegetation can clog turbines and irrigation canals; alter flow patterns, water chemistry, and nutrient cycling in lakes, reservoirs and streams; and can prevent beneficial uses such as fishing, boating and swimming.

Several emergent aquatic species known as cordgrasses (*Spartina* spp.) threaten to invade Oregon estuaries. Large populations of *Spartina*, covering thousands of acres, have altered mudflat and salt marsh habitat in multiple bays and estuaries in both California and Washington. Recent control efforts in both neighboring states have drastically reduced major infestations (in both Willapa Bay, WA and San Francisco Bay, CA), thereby reducing propagule pressure to Oregon. Significant stands of *Spartina* still exist along the west coast, producing seed that travels via ocean currents to potentially start new infestations; especially worrisome is the 900+ acre infestation in Humboldt Bay, CA of *Spartina densiflora*. An estimated 49,500 to 60,000 acres of Oregon estuaries are colonizable by *Spartina* (Howard et al. 2007). Based on an ODA-funded report (ODA 2000), *Spartina* costs are anticipated to be about \$666/acre (Radtke & Davis 2000). Therefore, potential cost of a *Spartina* invasion of Oregon estuaries exceeds \$33 million per year. In recent years, we have followed a three year survey cycle for *Spartina*, with two years focused on ground and boat surveys in large geographic regions and a third year of aerial surveys along the entire coast. This year we deviated from this cycle and instead focused on a fine-scale surveys of the Siuslaw River estuary. The Siuslaw has been home to two of the three confirmed *Spartina* infestations in the state and there is concern that *S. patens* may be establishing in new areas but remaining small enough to escape our previous working detection limits.

Resources spent on prevention, early detection and rapid response are sound investments, since infestations found early have higher chances of being eradicated or controlled, while simultaneously using fewer funds and less effort. The Oregon *Spartina* Response Plan, created by Portland State University (PSU) Center for Lakes and Reservoirs with ODA funding, stresses early detection of new infestations, rapid response to any findings of *Spartina* and education of the threat and potential losses so as to increase public awareness (Howard et al. 2007). This report describes the results of early detection surveys, outreach efforts and management planning for aquatic plants conducted by PSU during the 2010/2011 project period.

Priority Tasks for 2010-2011

Task 1. *Spartina* and Freshwater Aquatic Plant Surveys

Spartina patens surveys: A fine-scale, intensive survey of the Siuslaw River estuary was warranted based on the persistence of *Spartina patens* on Cox Island. Surveys during 2010 focused on documenting the remaining extent of *Spartina patens* within the Siuslaw River Estuary in areas not surveyed in 2009. Between August 2 and September 3, a two person crew spent 230 hours (460 person hours) surveying both Cox Island and surrounding areas of the estuary. Surveyors walked in tandem two meters apart in highly susceptible habitat and four to eight meters apart through areas with scattered pockets of highly susceptible habitat, and surveyed areas using a Trimble Recon with a differential correcting satellite receiver (Table 1). On Cox Island, 180 clones with a total net area of 139.4 m² were found this year (Figure 1). We marked patches with survey flags and provided TNC's coastal ecologist and seasonal field steward with the GIS files documenting these patches. TNC field crews worked over the summer and into early October covering all the clones found during our 2009 and 2010 surveys (D. Pickering, pers. comm.)

In the surrounding areas of the estuary, we surveyed 112 acres of salt marsh and found no new clones of *S. patens*. Two properties with potentially suitable habitat were unsurveyed due to owners prohibiting access. Each of these properties may have repeated disturbance from heavy equipment and/or grazing, which may provide bare substrate suitable for *Spartina* colonization. Of the two *S. patens* clones found on the Port of Siuslaw property in 2009, one was treated chemically in early October by ODA staff; the other was covered either by sand driven by high water or wave action and therefore could not be treated (T. Forney, pers. comm.). The full report detailing these survey efforts is attached as Appendix A.

Table 1: Summary of 2010 *Spartina patens* survey results.

	Cox Island	Other Marsh Habitat	Total
Area surveyed (acres)	67.6	112.1	179.7
# clones found	180	0	180
Average clone size (m ²)	0.78	-	0.78
Net infestation (m ²)	139.4	0	139.4
Survey time (hrs)	130	100	230

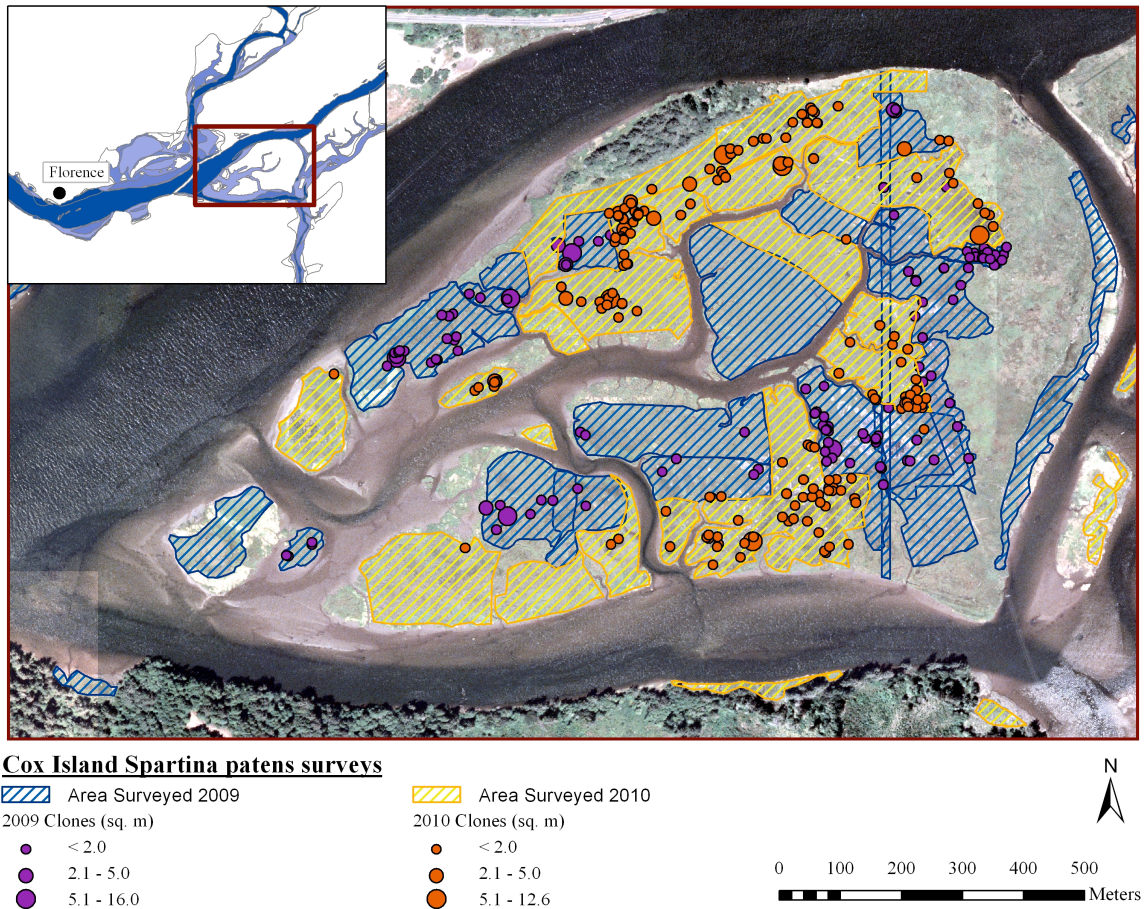


Figure 1: Locations and relative sizes of *Spartina patens* patches on Cox Island in both 2009 and 2010. Cross-hatching indicates areas surveyed.

Spartina densiflora Surveys: This was the fourth year of conducting winter surveys to search specifically for *S. densiflora*, which grows in the higher intertidal areas amidst native salt-marsh vegetation. This species of cordgrass infests over 900 acres of Humboldt Bay and has expanded to at least five new Pacific coast sites in recent years. It is of particular concern to Oregon waters given known ocean currents and the proximity of a large, seed-producing infestation in Humboldt Bay. To improve detection efforts, authorities in Humboldt Bay and Grays Harbor, Washington suggested surveying for *S. densiflora* in the winter months when most native plants have senesced. There is little vegetation to block the view of any potential *S. densiflora* plants since most native marsh species are dormant at this time of the year. The only native plant similar in appearance to *S. densiflora* was *Deschampsia caespitosa* (tufted hairgrass), but this species could be distinguished by its shorter, more relaxed stature, and the presence of lingering, branched inflorescences that exceed the height of the leaves.

In early April, we surveyed Lint Slough and McKinny Slough and other portions of Alsea Bay; the southern portion of Sand Lake, and the Salmon River estuary. No *Spartina densiflora* was found at any of these locations.

Monitoring of previous infestations: There was no regrowth of *S. alterniflora* at both the Siuslaw River-Port of Siuslaw and Columbia River-Alder Bay sites, marking this the fifth and first year, respectively, of no regrowth at these sites. Neither we nor staff at South Slough NERR were able to visit the Barview Mitigation site in Coos Bay last year, but will do so this summer.

Freshwater aquatic surveys: We conducted biomass sampling of *Ludwigia peploides* ssp. *montedivensis* at Smith-Bybee Lake in North Portland prior to Metro's chemical treatment there in early October 2010. We will resample this coming year to assess treatment efficacy of the two different herbicides used at that site. We additionally surveyed aquatic areas along the Fort to Sea Trail in Clatsop County, where a record of *Hydrilla verticillata* was noted in 2007 when a comprehensive plant list for the park was compiled (W. Bluhm, pers. comm.). No specific location information accompanied the plant in question and no voucher specimen was available. We found *Elodea canadensis* and *Egeria densa* at various sites along the trail and suspect either of these plants may have been misidentified as *Hydrilla*.

Task 2. Database development

We have established an MS Access database to house distribution information on aquatic plant populations across Oregon. This OR Aquatic Plant Database (ORAPD) will coalesce information on known populations of native and non-native aquatic plants and facilitate retrieval of plant distribution data in order to streamline occurrence reporting for Weedmapper, iMapInvasives, and the OSU Oregon Plant Atlas, prioritize future EDRR surveys, and supplement the Atlas of Oregon Lakes. The database has been populated with lists of aquatic plants, including OR "A" and "B" listed noxious weed species, water body information and data from a limited number of aquatic plant surveys. Future inputs will include other CLR surveys (BLM, Forest Service, Clatsop Lakes, etc) and OSU Herbarium records (voucher specimens and observations).

Task 3. Education and Outreach

We have made numerous presentations regarding aquatic weed identification and management options. These included talks at: the Crooked River WMA (Redmond, September 17, 2010); the Oregon Society of Weed Science (Hood River, October 20, 2010); the Oregon Vegetation Management Association (Seaside, October 22, 2010); Portland Parks & Recreation (Portland, November 16, 2010); Chemeketa Community College (Salem, December 3, 2010); the Interagency Weed Symposium (Corvallis, December 8, 2010); the Non-crop Vegetation Management Course (Corvallis, January 25, 2011); and Wilbur-Ellis University (Oregon City, January 27, 2011). In total we reached a minimum of 410 attendees at these various venues.

At the request of Ed Peachy at Oregon State University, we edited the chapter on aquatic weed control options in the Pacific Northwest Weed Management Handbook (<http://pnwhandbooks.org/weed>) to include recent modifications to labeled aquatic herbicides as well as summaries of other manual, physical and biological management options. This handbook was originally intended as a primer for extension agents, but also targets pesticide applicators and consultants, herbicide dealers, teachers, and some producers. Our edits are being reviewed for web-publication in the coming month.

Task 4: Outreach Materials

We produced tri-fold brochures following the ODA template for yellow flag iris (*Iris pseudacorus*), common reed (*Phragmites australis* ssp. *australis*), and water primrose (*Ludwigia* spp.). Of the currently listed aquatic or wetland noxious weeds, only purple loosestrife (*Lythrum salicaria*) does not yet have a brochure completed.

We distributed previously developed outreach materials for aquatic weed species at various meetings, forums and sporting events and other public and commercial venues. We are working to identify contacts within various agencies (State Parks, USFWS, BOR, etc.) whose users may be a target audience for these and other aquatic invasive species outreach efforts and/or materials.

Task 5: Aquatic plant identification and questions

Correct identification of aquatic plants is critical to early detection efforts as well as citizen outreach and involvement. We have logged 25 phone inquiries and/or email requests regarding weed identification, management options and survey techniques. Tracking these calls has allowed us to identify emerging weed issues such as non-native *Phragmites* and *Ludwigia* spp., helped develop educational events and inform managers on high-priority invasive threats to aquatic resources. On an ongoing basis, we continue to provide assistance to: private landowners at Blue Heron Meadows in North Portland, who have acquired a Metro grant to treat non-native *Ludwigia* in their ponds; the Crooked River Weed Management Area who have secured funds from the ODA Noxious Weed Small Grant Program to survey for aquatic plants in Central Oregon lakes; and *Phragmites australis* treatments at Ft. Stevens State Park in conjunction with State Parks and the Clatsop County Soil and Water District.

Conclusions and Recommendations

Considerable progress has been made towards the goal of eradicating *Spartina patens* from the Siuslaw River estuary. All portions of Cox Island have been intensively surveyed in the last two years, as have the majority of surrounding suitable salt marsh habitat. With the exception of one clone that was either covered by sand or underwater, all known clones have been treated either with covering or herbicide. Certain measures need to be taken to make certain this forward momentum is retained. We will work with the 2011 TNC field staff and Debbie Pickering, their coastal ecologist, to inform their survey methods and stay informed of their findings. Funding for TNC's field staff this season will come from the West Coast Governors' Agreement on Ocean Health, which the CLR secured. We anticipate a cooperative and transparent relationship regarding Cox Island's eradication efforts in this and future years, per the agreement reached between ODA and TNC.

Additionally, the two properties along the North Fork of the Siuslaw River which were unsurveyed last year due to owner's declining access need to be evaluated. Totalling approximately 60 acres, aerial photographs and previously gathered wetland data suggest considerable portions of these properties may provide habitat suitable to colonization by *S. patens* or other species of *Spartina*. The property owners contact information has been provided to ODA and once access is secured, we will assist as needed to survey these properties. We will also revisit the Port of Siuslaw property where two clones were found in 2009 to evaluate the need for retreatment.

Freshwater aquatic habitats are susceptible to invasions by many listed aquatic weeds. Some, like Eurasian watermilfoil (*Myriophyllum spicatum*) and Brazilian waterweed (*Egeria densa*) are already widespread in Western Oregon or, like water primrose (*Ludwigia* spp.) in regions such as the Willamette River valley. Other species such as yellow floating heart (*Nymphoides peltata*) and flowering rush (*Butomus umbellatus*) are thought to have limited distributions or are not thought to be naturalized anywhere within the state. We recommend undertaking lake/reservoirs surveys in a methodical, prioritized fashion to gain better understanding of weed infestations as well as baseline native aquatic plant assemblages. We propose prioritizing waterbodies to be surveyed according to likelihood of

introduction as determined by access to motorized boating, high boater use days and sites of known fishing tournaments (OSMB 2008, Wells et al. 2010).

The OR Aquatic Plant Database we have developed will help gather a broader understanding of aquatic populations, both of introduced and noxious weeds as well as native macrophytes, within the state. We believe this process will streamline reporting to Weedmapper, the USGS NAS database and the Oregon Floral Atlas; these resources are used by a wide variety of agency staff, scientists, botanists and the general public.

Education, and outreach remains a critical component of all effective weed programs. In recent years, an increased interest in aquatic habitats and resource impacts has become apparent. We recommend continued outreach to private property owners, watershed councils, soil and water conservation districts, pesticide applicators and other interested parties regarding aquatic weeds of high priority, the importance of early detection and available management techniques. Additionally, we believe that the correct identification of aquatic plants is key in early detection. We will continue to identify aquatic plant samples from ODA, other agencies and/or private citizens and promptly report any A-listed species to ODA to facilitate development of an appropriate response.

References

- Howard, V., M. Pfauth, M. Sytsma and D. Isaacson (2007) *Oregon Spartina Response Plan*. Prepared for Oregon Department of Agriculture by Portland State University, Portland, Oregon. 70 pp.
- Oregon State Marine Board (OSMB) (2008). Boating in Oregon: Triennial Survey Results. Prepared by Randy Henry. Salem, OR.
- Radtke, H.D. and S.W. Davis (2000) *Economic analysis of containment programs, damages, and production from noxious weeds in Oregon*. Salem, OR, Oregon Department of Agriculture.
- Wells, S., T.D. Counihan, A. Puls, M. Sytsma and B. Adair (2010) Prioritizing Zebra and Quagga Mussel Monitoring in the Columbia River Basin. Prepared for Bonneville Power Administration and the Pacific States Marine Fisheries Commission. April 2010. 92 pp.

APPENDIX A:
Report on *Spartina patens* surveys in the Siuslaw River estuary

Report on *Spartina patens* surveys in the Siuslaw River estuary

January 17, 2011

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Portland State University

This report presents the results of a survey in the Siuslaw Estuary for *Spartina patens* between August 2 and September 3, 2010. The goal of the survey was aid future eradication efforts by determining the extent of the *S. patens* infestation in the estuary within areas not surveyed in 2009.

Methods: A two-person crew walked in tandem, two meters apart in highly susceptible habitat and 4-8 meters apart through areas with pockets of highly susceptible habitat. Susceptible habitat was determined by vegetation assemblages outlined in Frenkel and Boss (1988). Surveyed areas were recorded using a Trimble Recon with a differential correcting satellite receiver. GPS coordinates (WGS 1984) and estimated sizes (m^2) of individual *S. patens* clones were recorded and each was marked with a survey flag.

Results: Cox Island: We recorded 180 *S. patens* clones in the 67.6 acres we surveyed on Cox Island. Patches ranged in size between 5 cm^2 and 12.6 m^2 , with a mean size of 0.78 m^2 (Figure 1, Table 1).

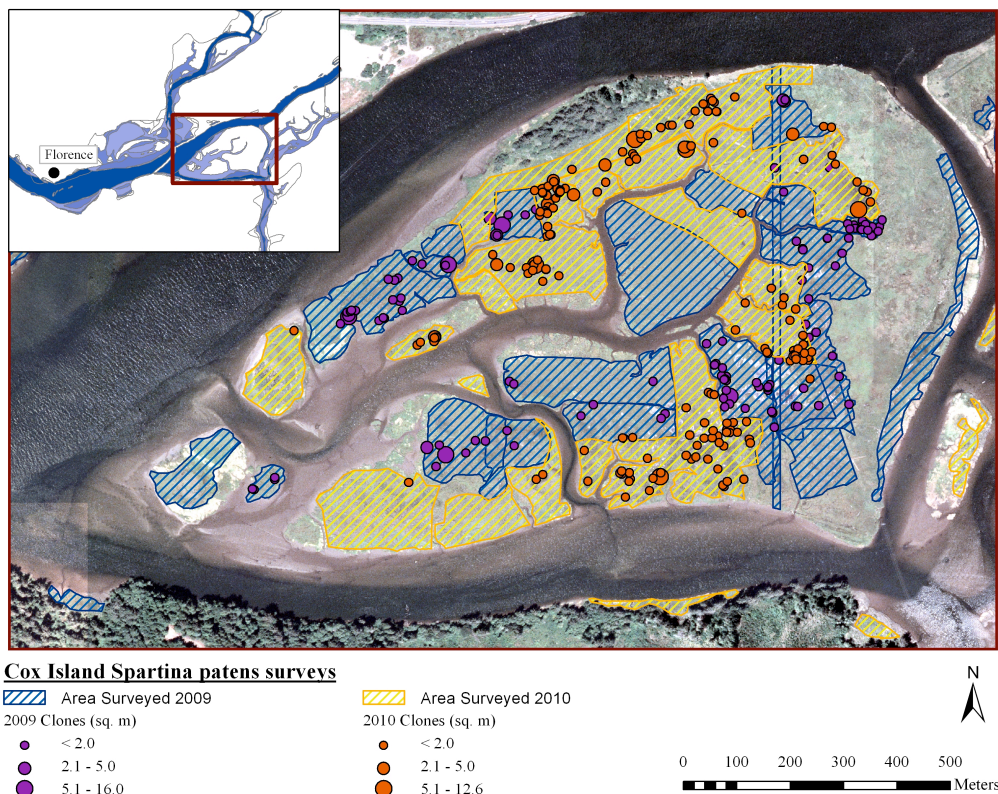


Figure 2. Locations and relative sizes of *Spartina patens* patches on Cox Island in both 2009 and 2010. Cross-hatching indicates areas surveyed.

Table 2: Summary of *Spartina patens* survey results for 2009 and 2010.

		Cox Island	Other Marsh	Total
2009	Area surveyed (acres)	74.7	59.2	133.9
	# clones found	126	2	128
	Average clone size (m ²)	0.71	2.4	0.73
	Net infestation (m ²)	88.9	4.8	93.7
	Survey time (hrs)	107	43	150
2010	Area surveyed (acres)	67.6	112.1	179.7
	# clones found	180	0	180
	Average clone size (m ²)	0.78	0	0.78
	Net infestation (m ²)	139.4	0	139.4
	Survey time (hrs)	130	100	230
Total (2009-2010)	# clones found	306	2	308
	Average clone size (m ²)	0.8	2.4	1.6
	Net infestation (m ²)	228.3	4.8	233.1

Similar to the surveys conducted in 2009, clones were distributed across many portions of the island, both in areas previously treated for large meadows and in more remote regions with relatively fewer previously documented clones (Figure 2). We generally found small (mean diameter 0.35 m²) patches on the southern and southeastern portions of the island close to the previous core infestation. In contrast, larger patches (mean diameter 1.1 m²) were generally found on the northern half of the island (Figure 3).

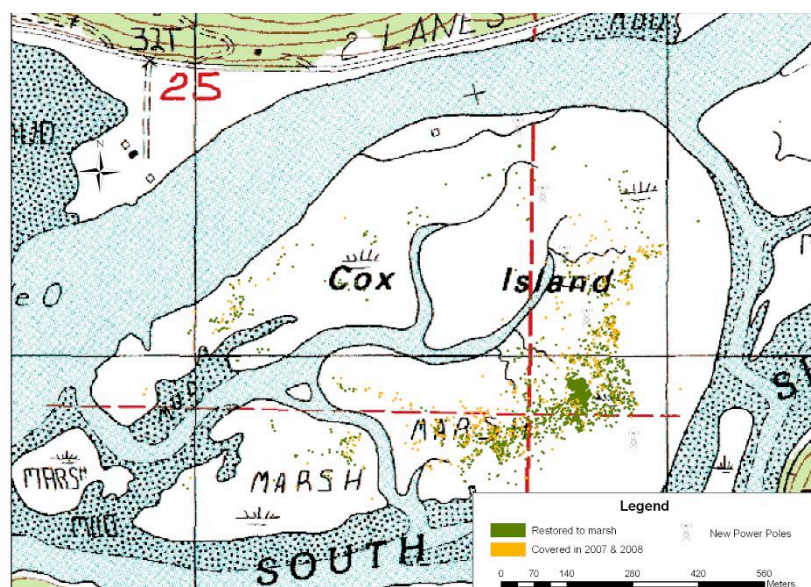


Figure 3: Areas treated for *Spartina patens* between 1998-2008, showing both areas restored to native marsh and those covered in 2007 & 2008. Map courtesy of D. Pickering, TNC.

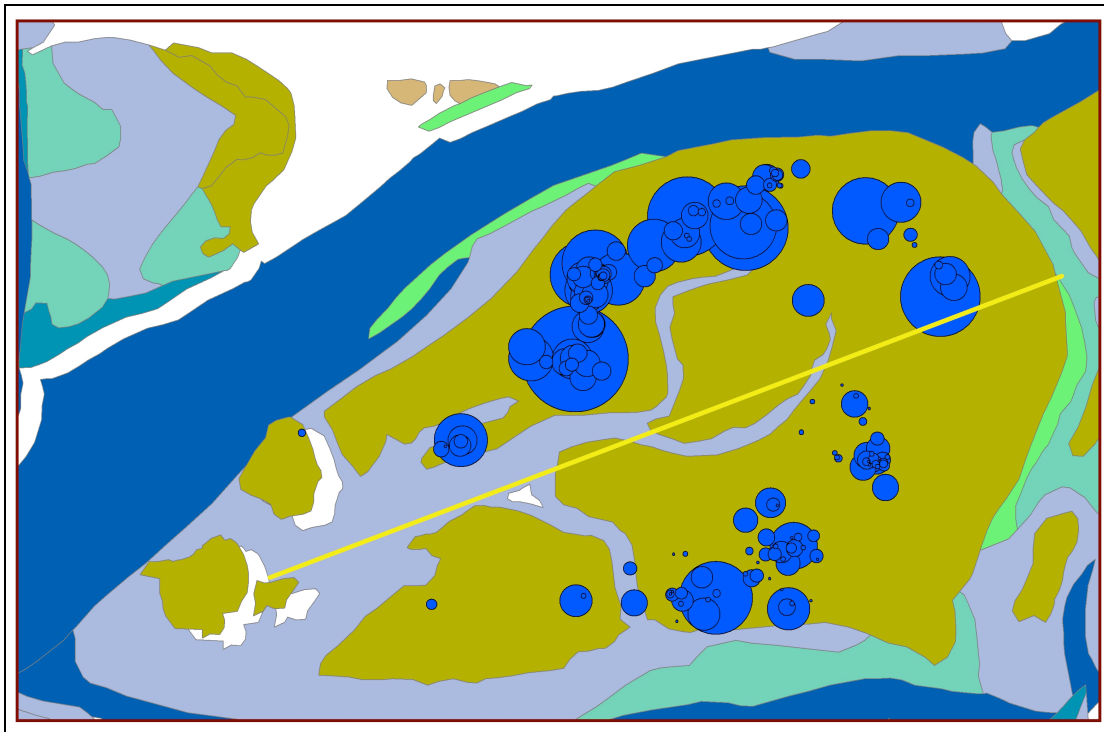


Figure 4. Patches of *Spartina patens* found in 2010 using proportional symbols. The yellow line denotes what we herein term the Northern and Southern portions of the island.

Surrounding areas:

Off of Cox Island, we surveyed approximately 112 acres containing suitable marsh habitat and found no *S. patens*. Areas surveyed included USFS and privately held property along the North Fork of the Siuslaw River; additional areas on Don Wilbur's property to the east of Cox Island, where two clones of *S. patens* have been found and treated in the last decade; an isolated salt marsh near the mouth of the Siuslaw River and elsewhere (Figure 4). Many of these portions of salt marsh are not optimal for *S. patens* colonization due to tidal elevation and competition from other dominant species such as sedges (*Carex* spp.), bulrushes (*Schoenoplectus* spp.), tufted hair grass (*Deschampsia cespitosa*) and other native salt marsh species. Where highly susceptible habitat was ample, surveys were conducted at the 2 meter interval; where habitat was less optimal, wider transects (up to 8 meters apart) were used to efficiently cover the area while still allowing identification and close inspection of "pockets" of optimally suitable *S. patens* habitat.

Two property owners would not allow surveys on their properties; although the owners or their representatives were informed of the nature of the surveys, each expressed reluctance. Both parcels (Lane County Map Lot #1812240000900 and 1812240001100) lay between the North Fork of the Siuslaw River and North Fork Siuslaw Road (Figure 5). Property records indicated these parcels cover 35 and 27.5 acres respectively. Considerable portions of those acreages contain salt marsh habitat, though suitability for *S. patens* colonization is currently unknown. Information regarding these property owners was provided to ODA and we will facilitate surveys of these areas once an understanding of access has been established.

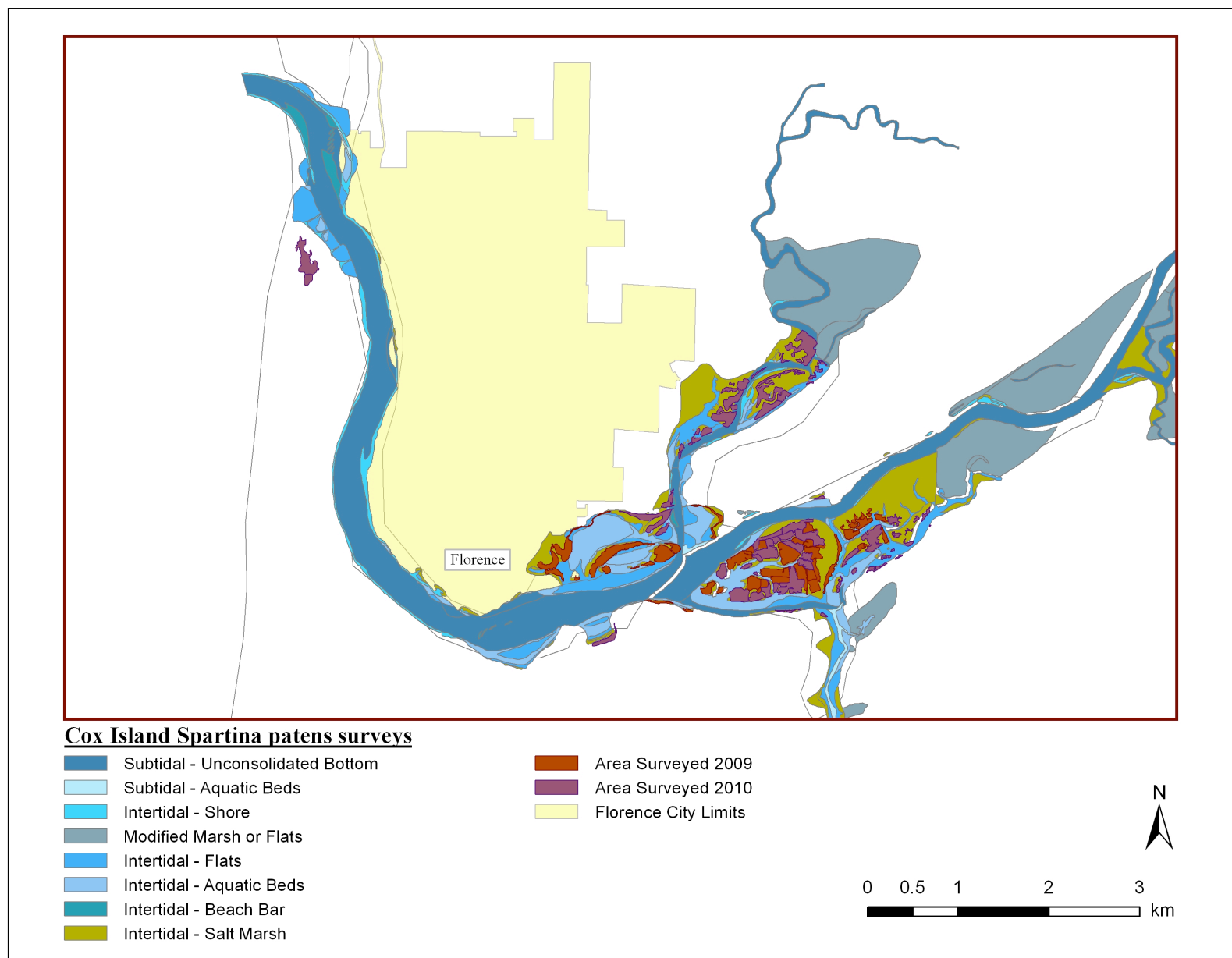


Figure 5: Habitat classes (Cowardin 1979) and areas surveyed in 2009 and 2010 for *Spartina patens* within the Siuslaw River estuary.



Figure 6. Unserved parcels (a) and (b) with susceptible habitat along the North Fork of the Siuslaw River (LaneCountyMaps).

Treatment Updates and Recommendations:

All *S. patens* clones found on Cox Island in the 2009 and 2010 surveys were reportedly covered by TNC field staff as of early October 2010 (D. Pickering, pers. comm.). The two clones of *S. patens* found in 2009 just east of the Port of Siuslaw Marina on Port of Siuslaw property were revisited by ODA staff in October 2010. High water or wave action appears to have covered one of the patches with sand, but the other patch was located and treated (T. Forney, pers. comm.).

Work on Cox Island in the 2011 summer field season will be funded through the West Coast Governor's Agreement Action Plan (\$20K) as well as TNC (\$5,781). A two-person TNC field crew will survey the Cox Island preserve for any remaining *S. patens* using methods similar to those used by

PSU in 2009 and 2010 (walking in tandem ~ 2 to 8 meters apart using a GPS unit to record the location of any *S. patens* patches. Any new *S. patens* found on Cox Island in 2011 will be treated by TNC with their fabric covering technique. In following years any newly discovered, small patches and individual plants on or off of Cox Island will be treated with herbicide.

Chemical treatment using imazapyr is providing good control of *S. patens* in Washington, but it's limited use in the Siuslaw on just a single patch this year will not yield much information regarding efficacy in this system. The treated patch off of Cox Island as well as the supposedly buried patch should be monitored in 2011 for regrowth. Any regrowth should be treated as promptly as possible in order to avoid additional growth and potential seed set later this summer.

Areas with suitable habitat that were not surveyed due to reluctant landowners should be high priority for detailed surveys, preferably in 2011 and at a similar resolution (2-8 meter walking transects). Surveys in areas of heavy *Carex* are not recommended, but high marsh habitat sometimes harbor small gullies, pans or other depressions with suitable elevation and/or bare soil where *S. patens* could establish. ODA will inform property owners of the Oregon Revised Statute 569.185 that clarifies their authority to "have access to all lands within this state" to carry out noxious weed management.

References

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.

Local contacts:

- Debbie Pickering, The Nature Conservancy. E-mail: dpickering@tnc.org; office phone: 541-994-5564; cell phone: 503-781-0145
- Port of Siuslaw. E-mail: port@portofsiuslaw.com; phone: 541-997-3426
- Don Wilbur and/or Sally Owens, Don Wilbur LTD, property owner. Office phone: 541-964-3345; cell phone: 541-554-1108
- Don Saxon, property owner. Home phone: 541-997-2086
- Wilbur Ternyik, wetland consultant. Email: ternyik1@hotmail.com; phone: 541-997-2401
- R&R King Logging, N. Fork property owner, physical address: 5450 N Fork Siuslaw Rd, Florence, OR, 97439; mailing address: PO Box 219, Florence, OR 97439; phone: 541-997-8212
- Brian Cole, N. Fork property owner, physical address: 05502 N Fork Road, Florence, OR 97439; phone: 541-991-1095