2005 Progress Report to the USFW – Willapa Wildlife Refuge

RESTORATION OF PORTER POINT UNIT, WILLAPA NATIONAL WILDLIFE REFUGE: CHANGE IN NATIVE MARSH SPECIES DISTIBUTION FOLLOWING *SPARTINA* CONTROL. [1]

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Introduction

Spartina is a perennial, deep-rooted saltmarsh grass, which re-sprouts each year from a dense, persistent root mass. It has colonized and eliminated much of the upper part of the wide expansive intertidal mudflats of Willapa Bay. The long-term ecological impacts of this colonization include major declines in shorebird and waterfowl species, biodiversity, eelgrass beds (*Zostera marina* L.), macroalgae beds, native saltmarsh habitat, and commercial shellfish beds.

The objective of this study was to document what happens to native marsh plant species after large *Spartina* meadows infesting tidal mudflats of the Porter Point Unit of the Willapa National Wildlife Refuge are controlled.

Methods

Transect studies: In 2004 and 2005, the locations of native plants in the tidal marsh were assessed using a series of transect lines extending directly out (south to north) from the native marsh line. Eight 500 m long transects were made in adjacent areas: 1) tilled - a large area that was treated in 2000/2001 with mowing and tilling, and spot-treated (2003 to 2005) to remove any residual *Spartina,* and 2) sprayed - a large area treated with herbicide in 2004 and 2005. Plant density (by number) was assessed using quarter-meter quadrats randomly dropped every 33 meters along the transect lines.

Visual survey for greatest extent of each species: In 2004 and 2005, walking and/or air boat surveys were made to GPS the greatest range of each plant species into the tideland. These surveys extended across the Porter Point Unit.

Results

Plant densities for mature plants and seedlings of Pickleweed (*Salicornia virginica*), Brass Buttons (*Cotula coronopifolia*), Lamb's Quarters (*Chenopodium rubrum*), Sea Arrow-grass (*Triglochin maritimum*) and Canadian Sand-spurry (*Spergularia canadensis*) are plotted by location (treatment) and year (Figure 1 to 5). These show density changes over time of species at the tilled and sprayed sites. The randomness of dropping quadrats combined with spraying of herbicide detracted from the accuracy of these data in detailing exact changes in population

[1] This research was sponsored by Willapa National Wildlife Refuge, Migratory Birds and Habitat Programs - Pacific Region of U.S. Fish and Wildlife Service and Pacific Joint Ventures.

densities. However, there are a few trends that are very noticeable. At the tilled site, mature plant density and seedling density did not change significantly for any of the species, except for a slight increase in Sand-spurry at greater distances from the traditional marsh line. For spray sites, the density of mature plants and seedlings increased at greater distances from the marsh line for all species, with the exception of Brass Buttons. A healthy density of mature Arrow-grass plants was established between 50 to 300 meters out from the shoreline. Very high densities (> 40/ ¼ m^2) of Sand-spurry reached onwards of 500 m from the shoreline.

These data are also presented in a format that shows the greatest reach/distance from the current native marsh. For transect lines, this is recorded in Figure 6. At the tilled site, Salicornia, Arrow-grass and Lamb's Quarters did not vary between years, but Brass Buttons and Sand-spurry were 300m and 133m farther out in 2005, respectively. While for the sprayed site only Arrow-grass remained unchanged, Sand-spurry, Lamb's Quarters, and pickleweed were 120, 400, and 140m farther out in 2005, respectively. Brass Buttons however, retracted by 400m in 2005.

The results from our walking and airboat surveys are a little less clear. They indicate little change in the maximum range for Sand-spurry, pickleweed, and Arrow-grass between 2004 and 2005. Pickleweed and Brass Buttons, on the east side of the Porter Point unit, appear to be expanding outward (Figure 7). Walking survey data were similar overall to the data obtained by transect lines (Figure 8).

The general range for these species appears to be within the outer edge of the 8 foot tide line (Figure 9). This area encompasses a considerable portion of the South Bay tideflat ecosystem. Table 1 indicates the general range that has been noted for each of these species. Apparently, all species observed remain short of their maximum extended range. It will be interesting to observe the stability of these plant populations, as well as to observe whether or not they continue to progress outward. Our data match what Jefferson (1973) hypothesized would be the species succession in a coastal salt marsh: *Salicornia* and *Spegularia* to *Triglochin.* It will also be interesting to note changes in population density that occur once spraying ceases, as well as to compare this rate of outward succession to what normally occurs in a coastal salt marsh.

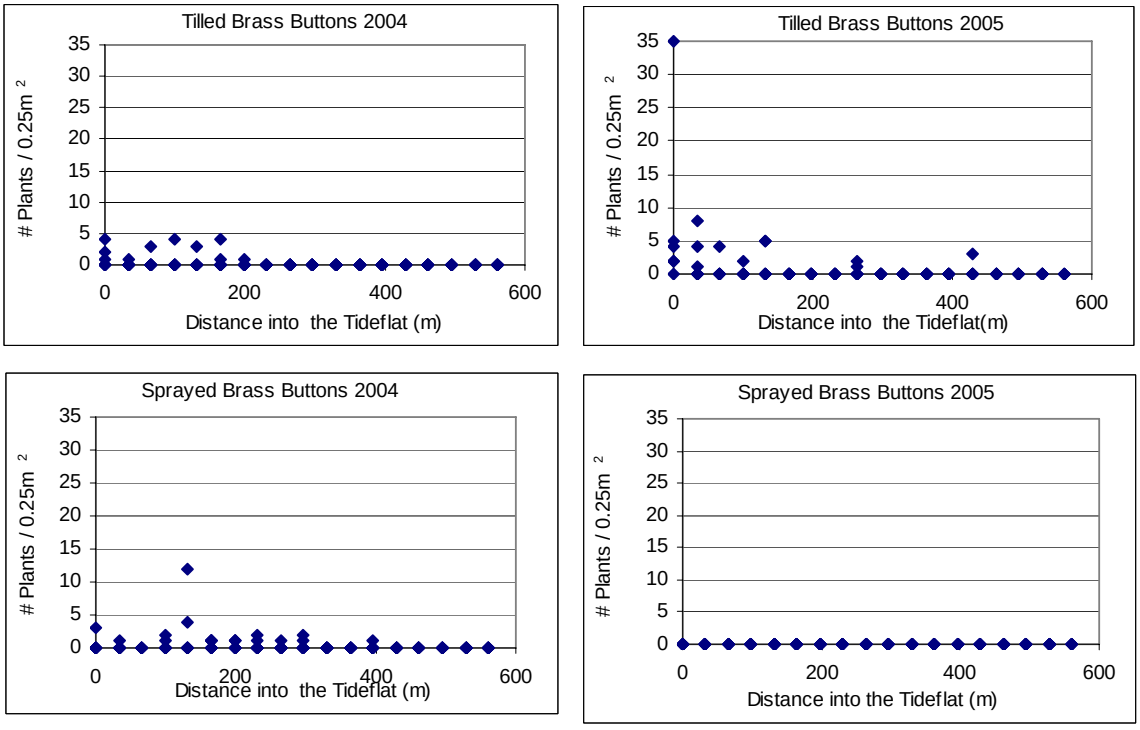

Figure 1. Distribution density of Brass Buttons (*Cotula coronopifolia*) across the Porter Point mudlfats as a function Spartina control method and time.

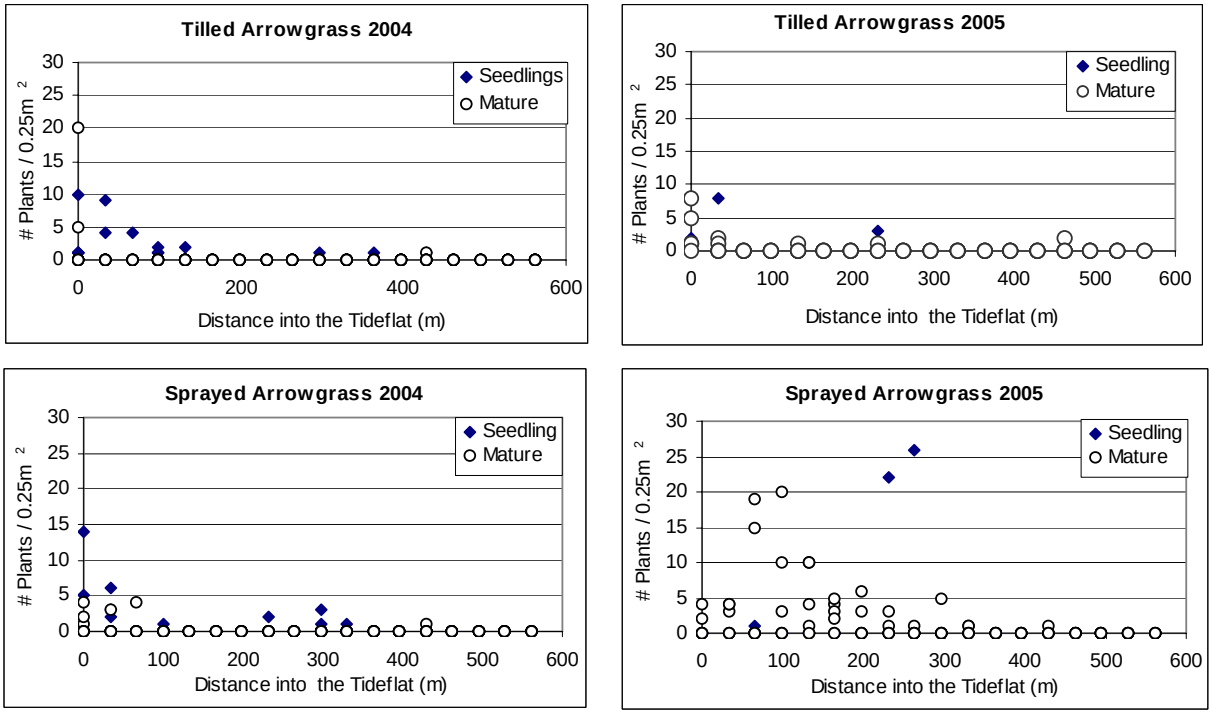

Figure 2. Distribution density of Sea Arrow-grass (*Triglochin maritimum*) across the Porter Point mudlfats as a function Spartina control method and time.

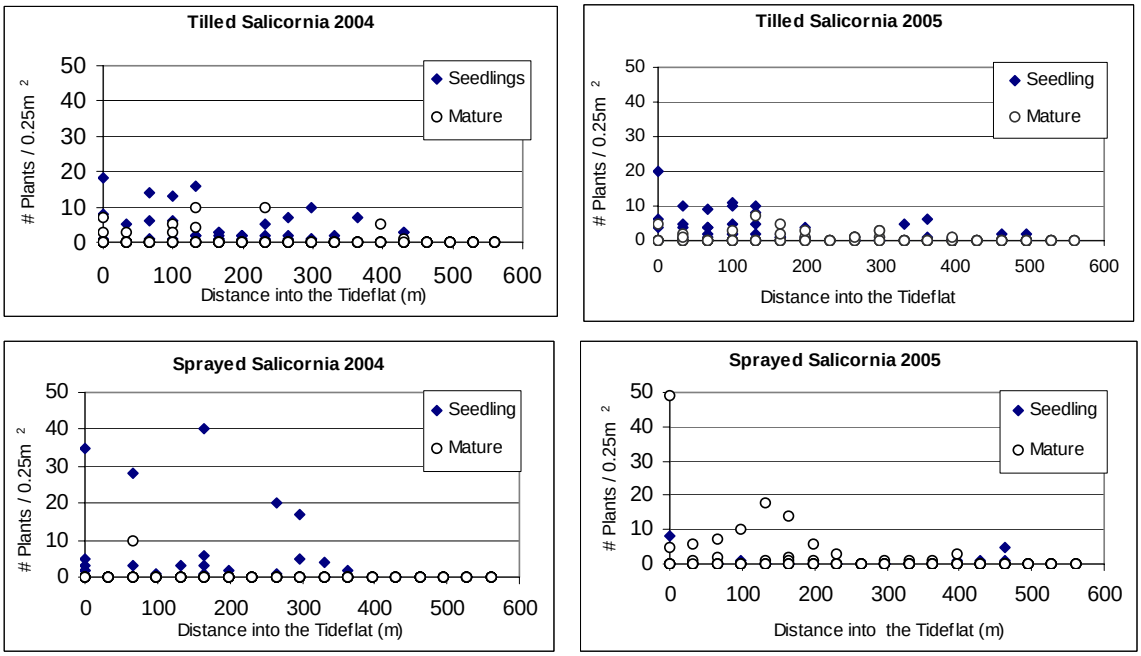

Figure 3. Distribution density of Pickleweed (*Salicornia virginica*) across the Porter Point mudlfats as a function Spartina control method and time.

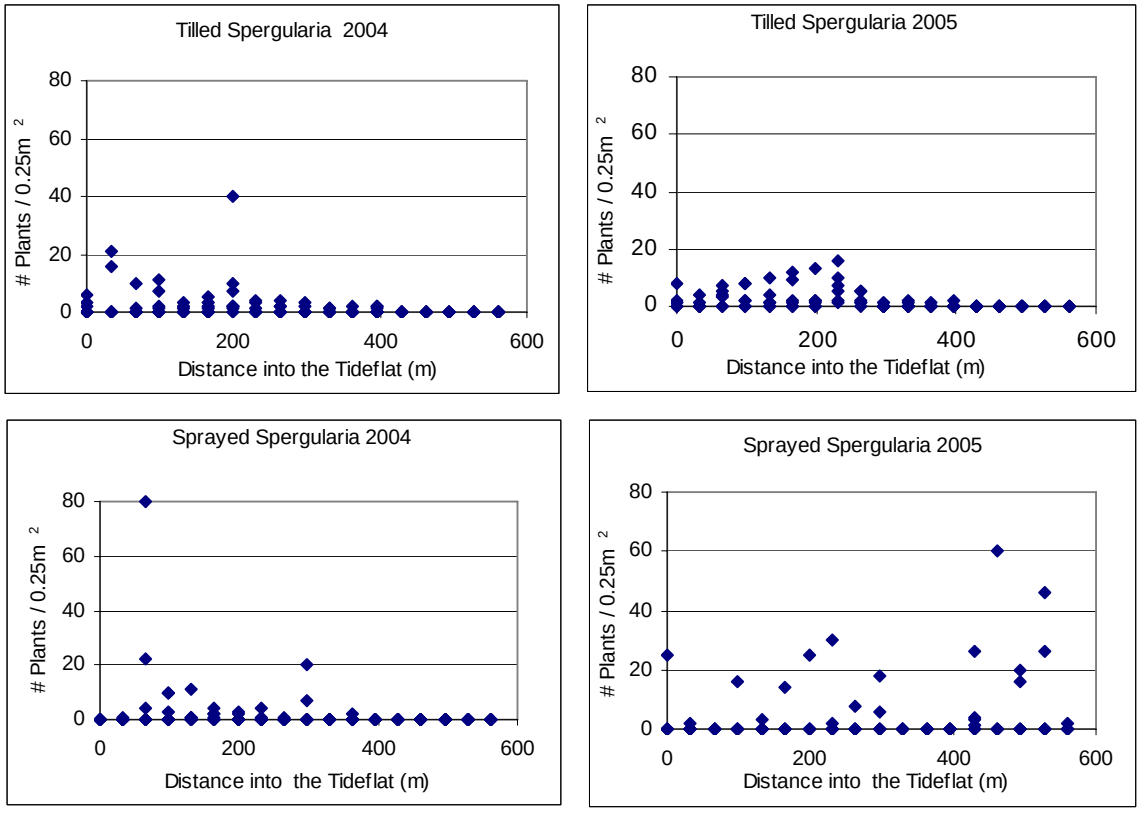

Figure 4. Distribution density of Sand-spurry (*Spergularia Canadensis*) across the Porter Point mudlfats as a function Spartina control method and time.

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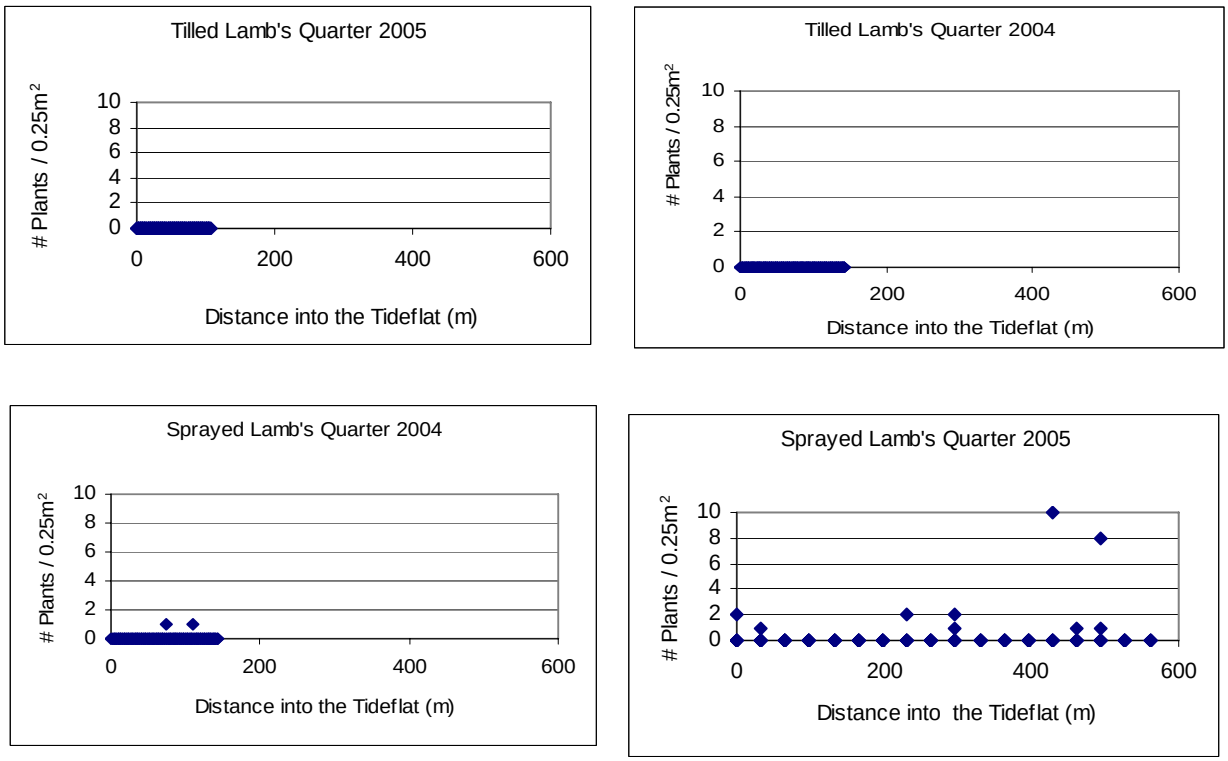

Figure 5. Distribution density of Lamb's Quarters (*Chenopodium rubrum*) across the Porter Point mudlfats as a function Spartina control method and time.

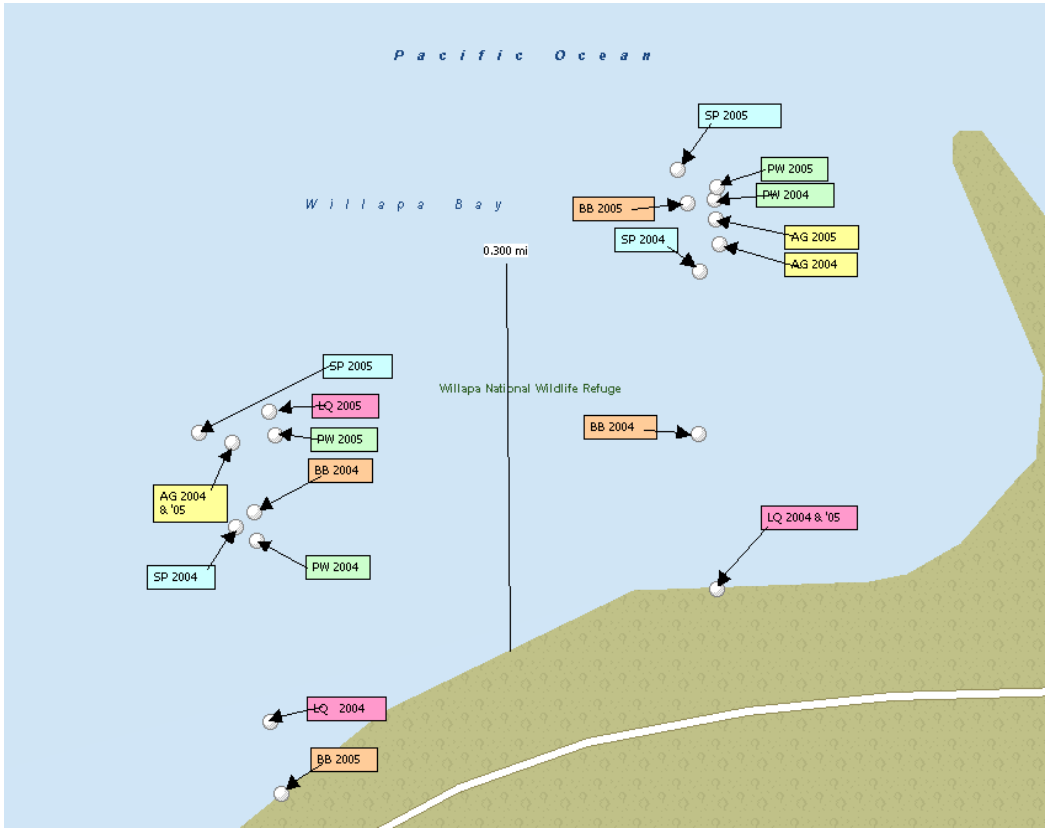

Figure 6. Farthest reach of marsh plants along transect line

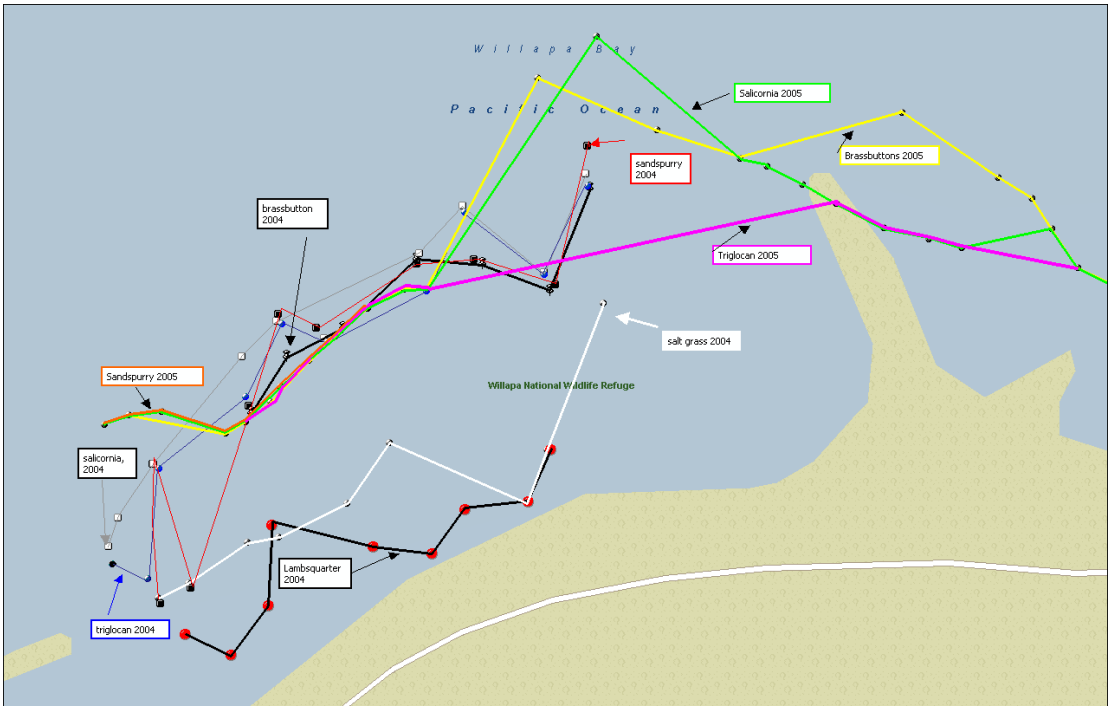

Figure 7. 2004 and 2005 outermost range of native plants from survey and transect data.

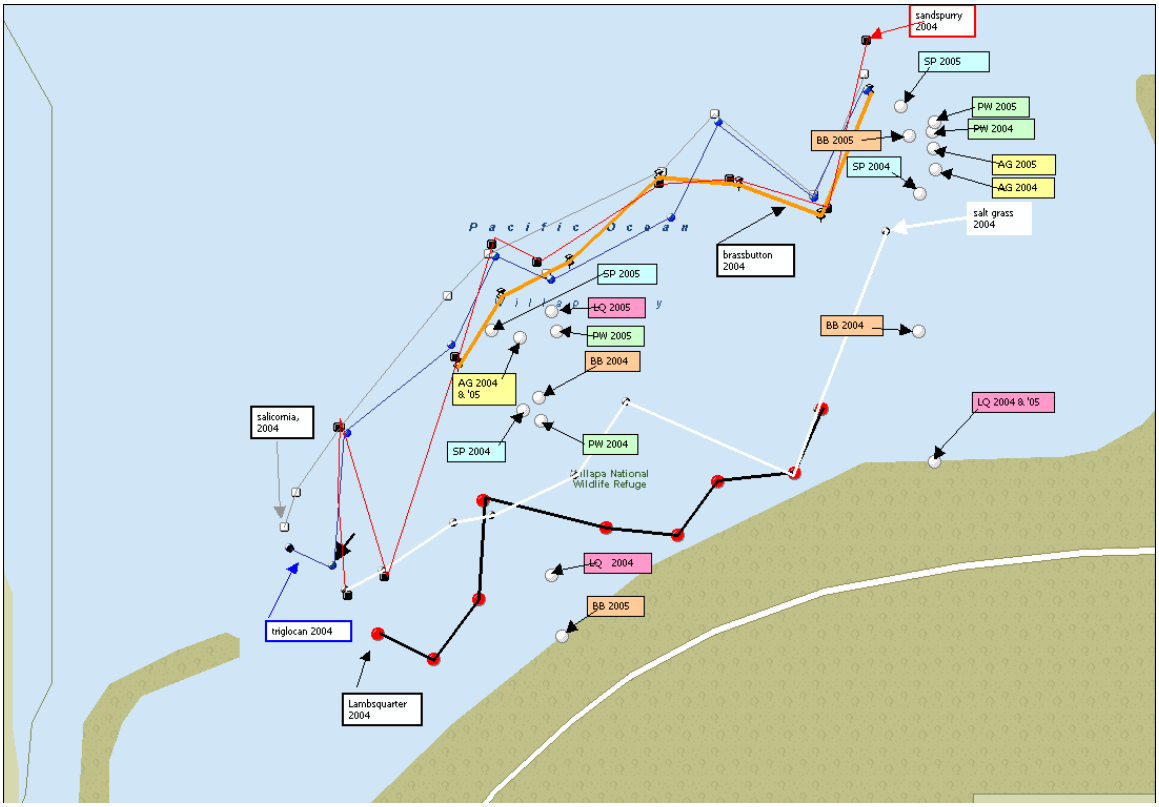

Figure 8. 2004 and 2005 survey data of outermost location of native plants

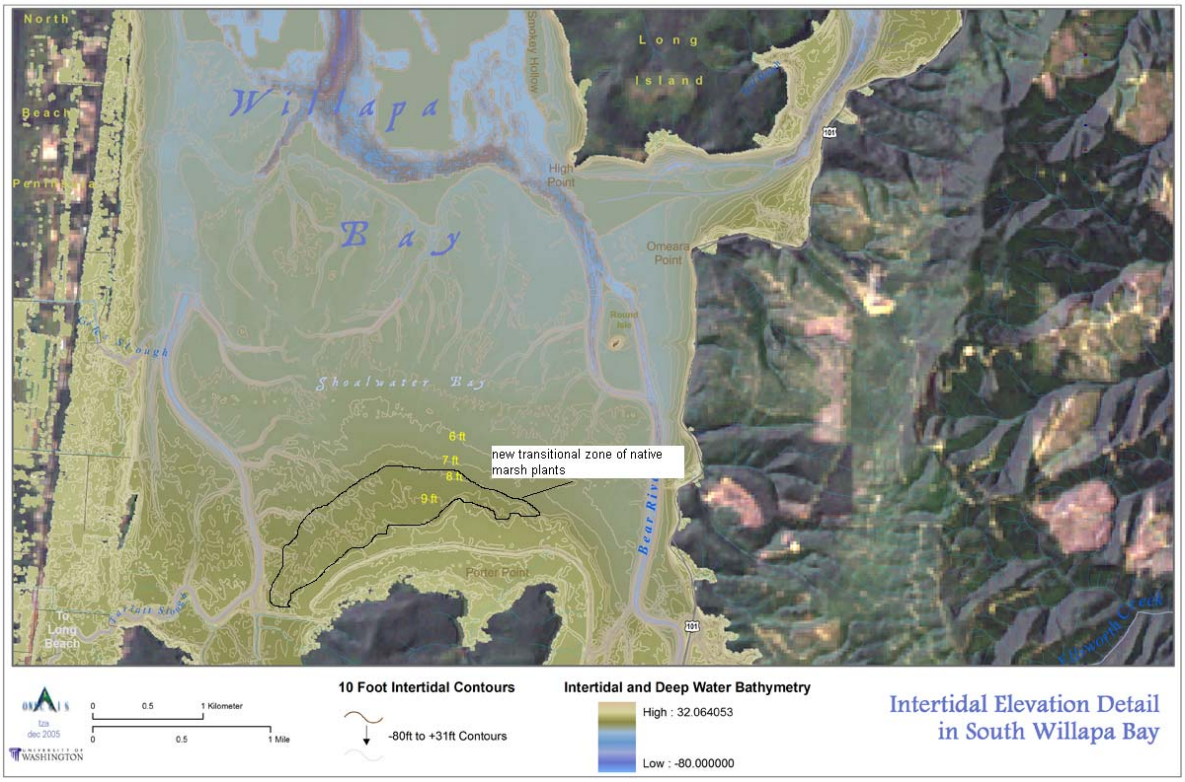

Figure 9. Border lines of the salt marsh succession of the Porter Point unit mudlflats.

Table 1. Ranges of salt marsh plants relative to mean lower low water based on Jefferson, 1973. Some aspects of plant succession in Oregon estuarine salt marshes. Ph.D. Thesis, OSU.

Plant	**Elevation range reported in literature (ft)**	**Tide range reported***
Salicornia (*Salicornia*)	5.5 - 10	MLHW-EHW
Triglochin (Arrowgrass)	6 -- 9	MHHW
Cotula (Brass Buttons)	6 -- 9	MHHW
Spergularia (Sand-spurry)	4.8 - 10	MT-EHW

*MLHW- mean low high water; EHW – extreme high water; MHHW – mean higher high water; MT- mean tide.