

Impact of *Spartina* and its Control in Willapa Bay, WA on Migratory Shorebird Foraging and Native Marsh Succession



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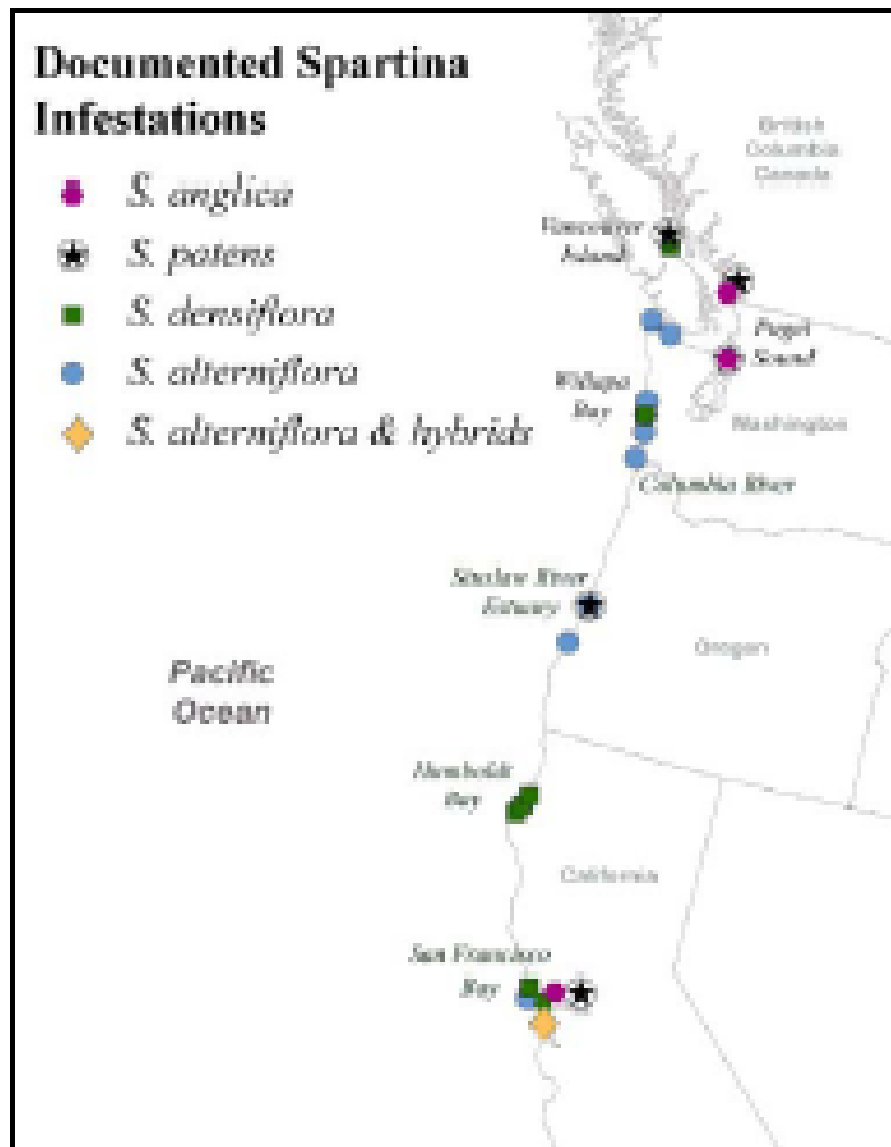


EXTENSION

World Class. Face to Face.

Spartina – a native East Coast grass, is among the world's top 100 worst weeds. It invades shallow estuaries – turning productive mudflats into meadows.





West Coast Governors' Agreement on Ocean Health
Spartina Eradication Action Coordination Team
 Work Plan

Released May 2010

Figure 1: Distribution of non-native *Spartina* species on the Pacific Coast of North America (courtesy of Portland State University, 2009)

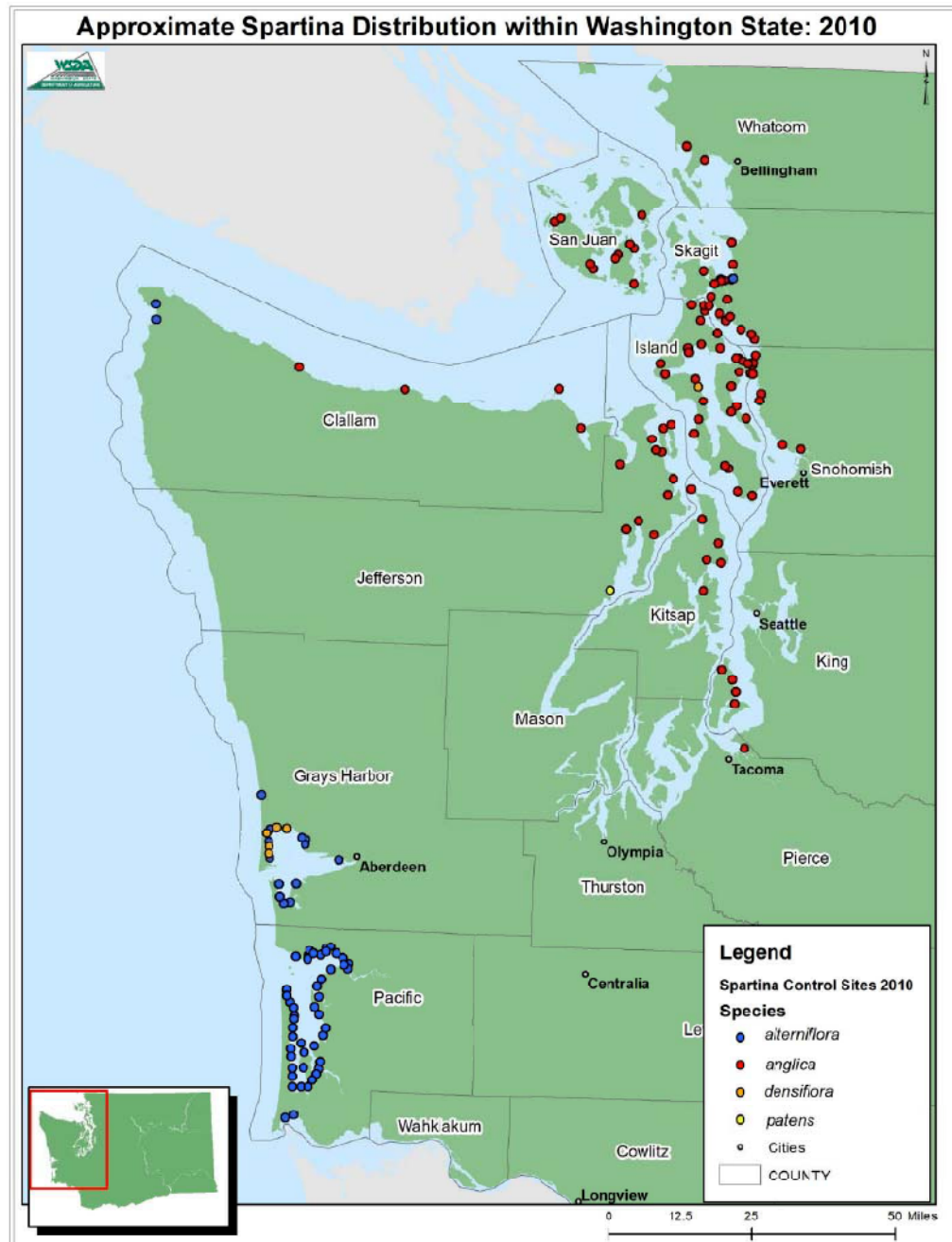


Figure 2: Distribution of invasive *Spartina* sites in Washington State 2010.



One Year-old Seedling



Two Year-old Seedlings



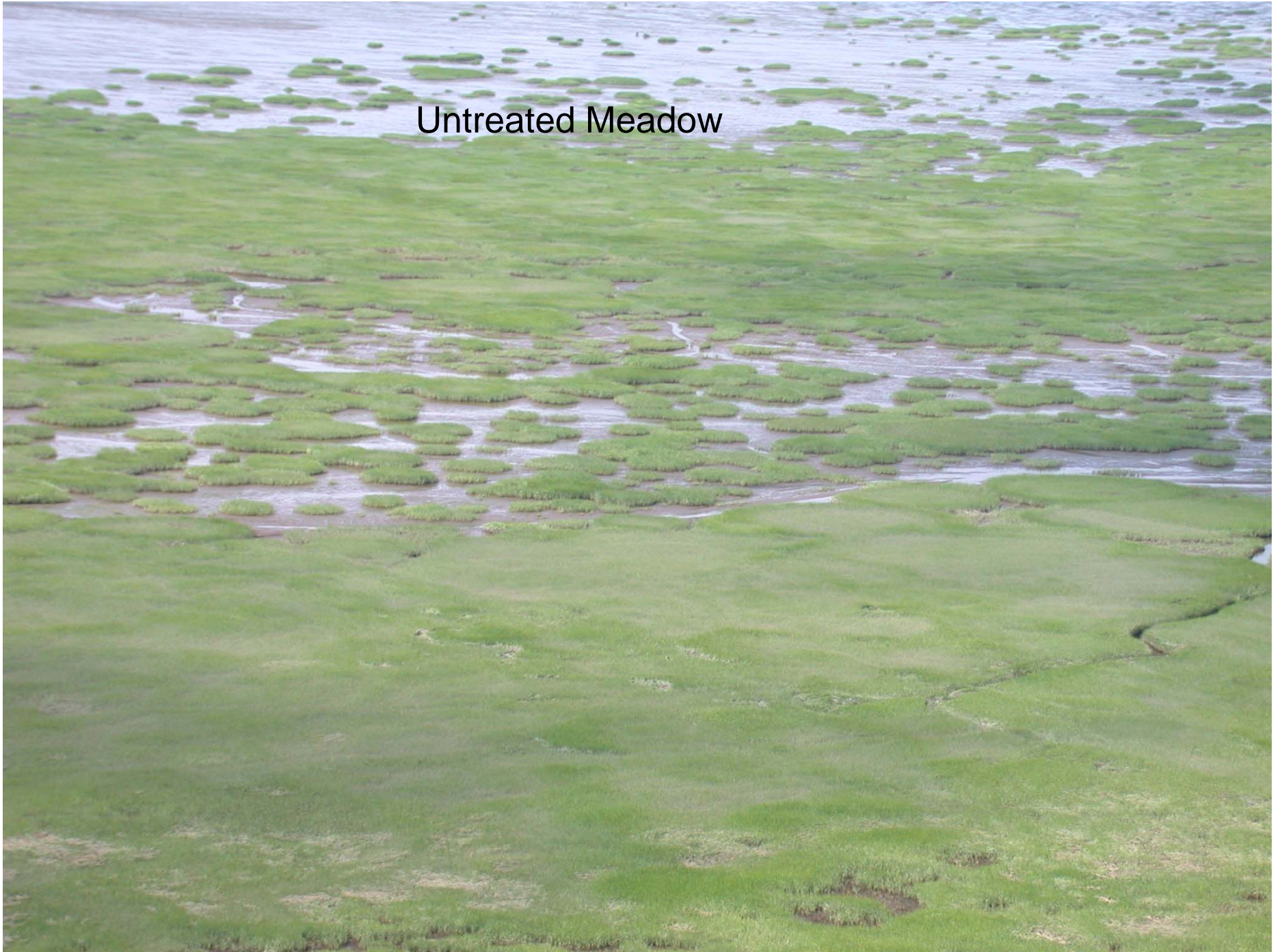
Three to Four Year-old Clone



Ten Year-old Meadow

Growth rate (m²) of clones = 30% increase per year

Untreated Meadow





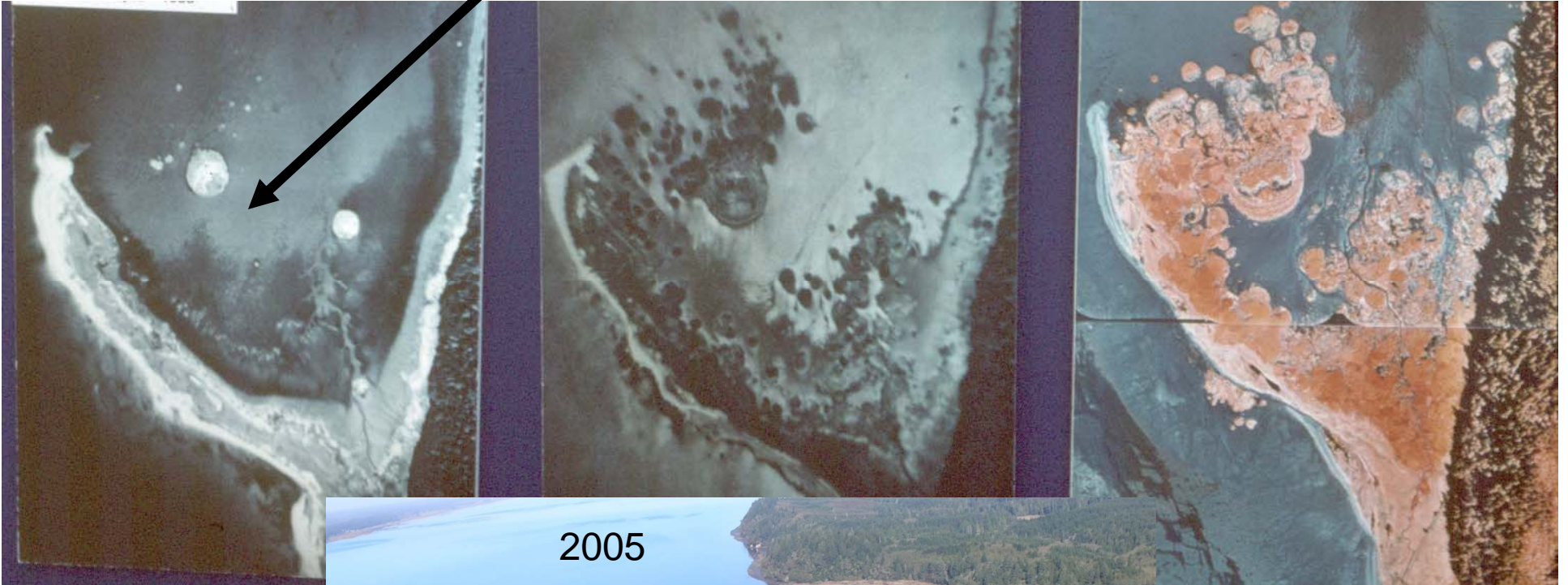


Jensen Spit – a founding *Spartina* clone

1955

1978

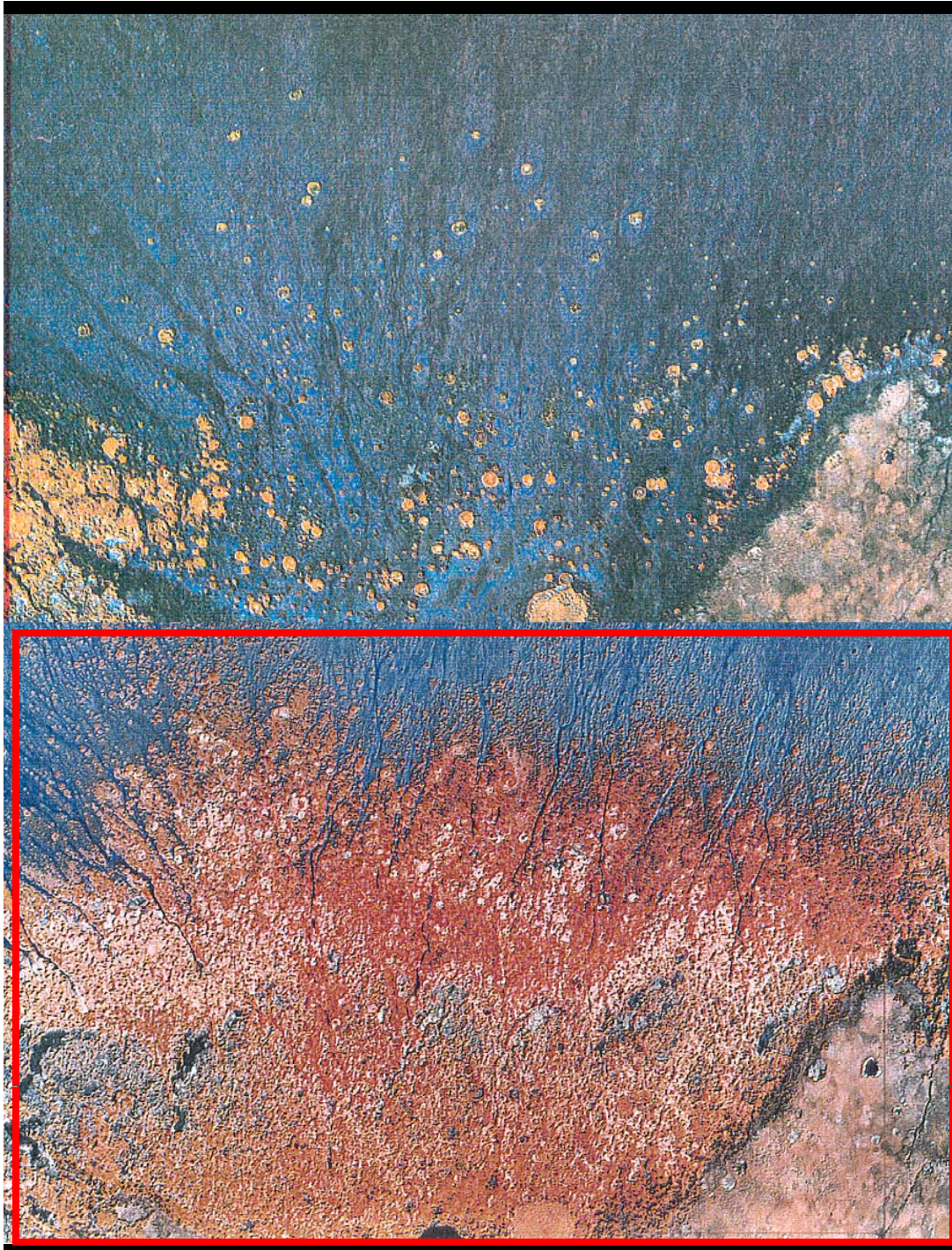
1997




2005



Spartina expansion
1993 to 1997
South par of
Willapa Bay



Aerial photos courtesy of Washington State DNR



Outer reach of clones 2004 = 2 miles

Outer reach of solid meadow in 2004 = 1 miles

Image © 2010 DigitalGlobe

©20

10 T 424612.37 m E 5138447.63 m N elev 0 ft

Willapa Bay- A national treasure

**Most pristine and productive estuary in
North America**

**Produces 25% of the nation's oysters
(~\$50-100M/yr in shellfish)**

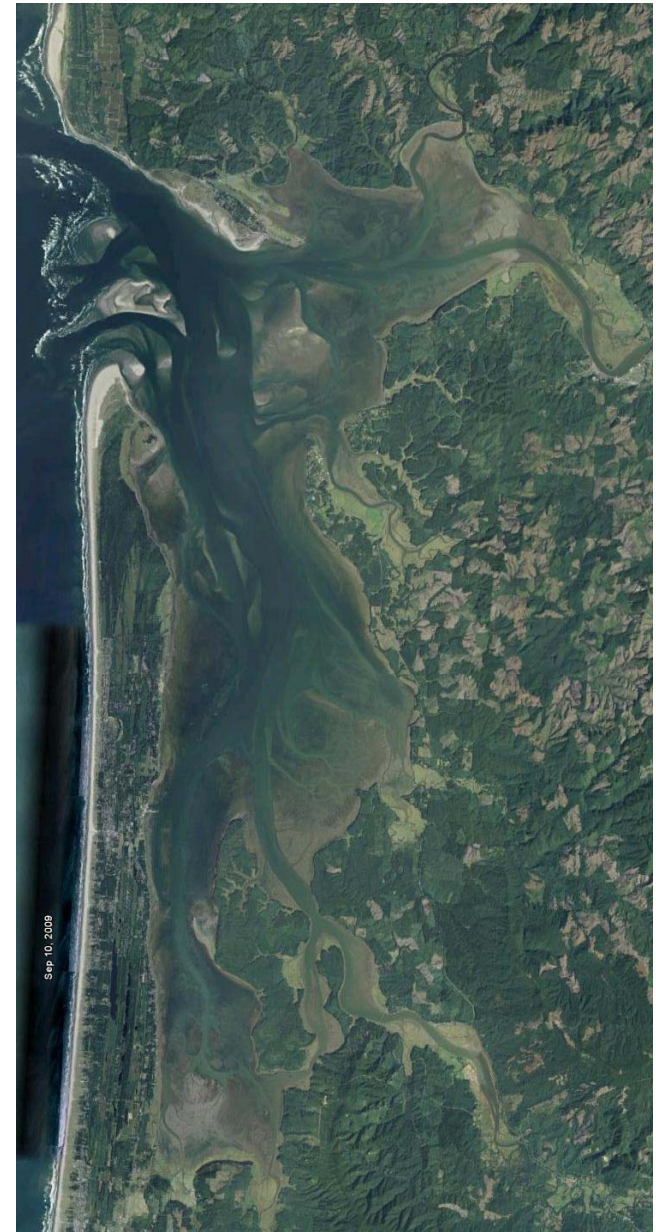
**Shorebird resource of international
significance**

2nd Largest Spartina infestation in the world



**“Willapa Bay is the second most
important endangered shorebird
habitat in the US”**

Audubon Society 2003









**Despite >> \$10,000,000 in control effort between 1990 to 2003,
Spartina increase from 500 acres to >10,000 ac**

Those control efforts included:

- Mowing
- Covering
- Digging
- Crushing
- Disking
- Tilling
- Biocontrol
- Spraying – glyphosate
- Crushing + spraying w/ glyphosate











Disking



Roller Crushing







Crushing / pulverizing





Tilling



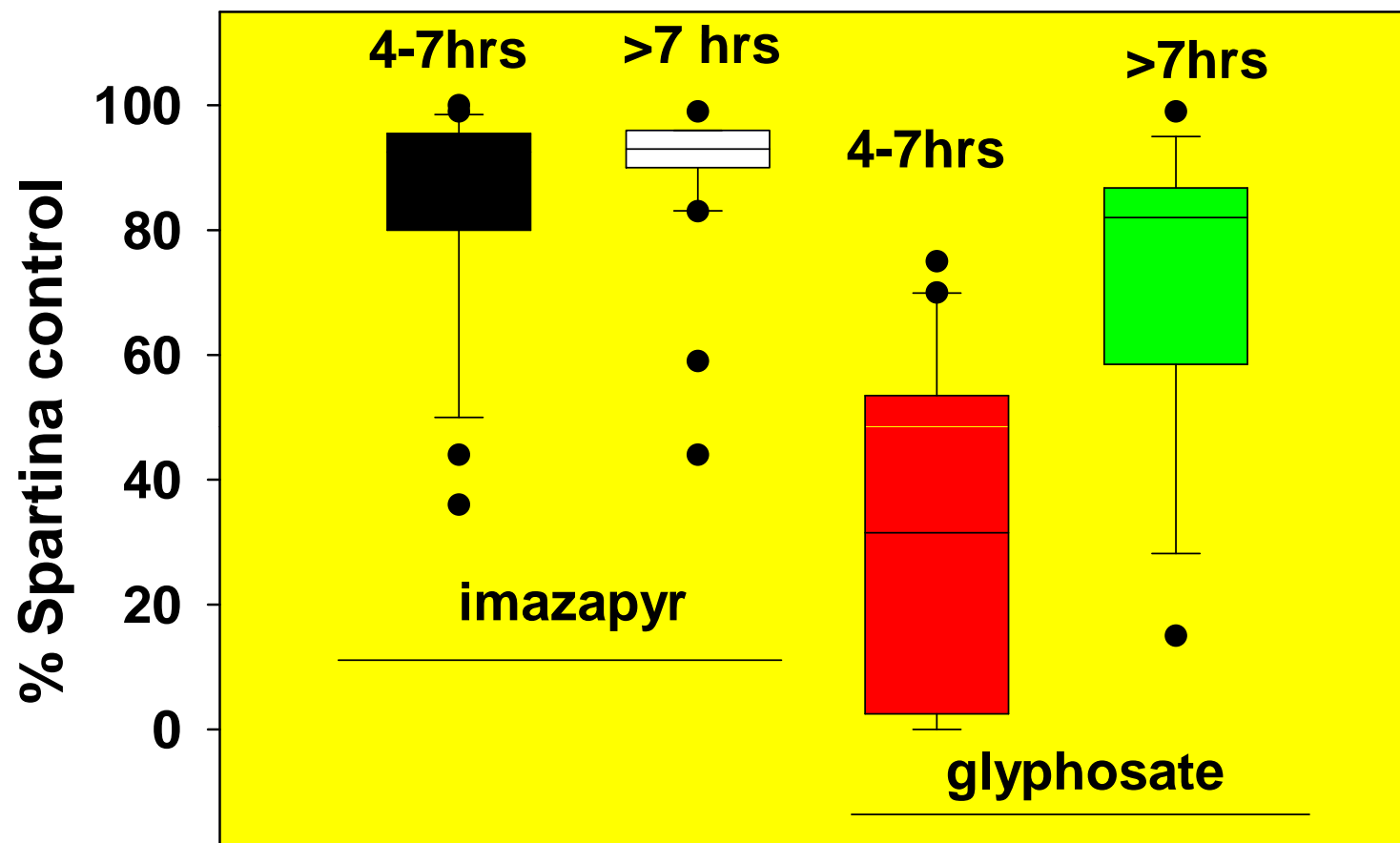




Herbicides
Glyphosate 1995 to 2004

It was just a matter of time before Spartina covered every inch of available mudflat (40,000 acres).





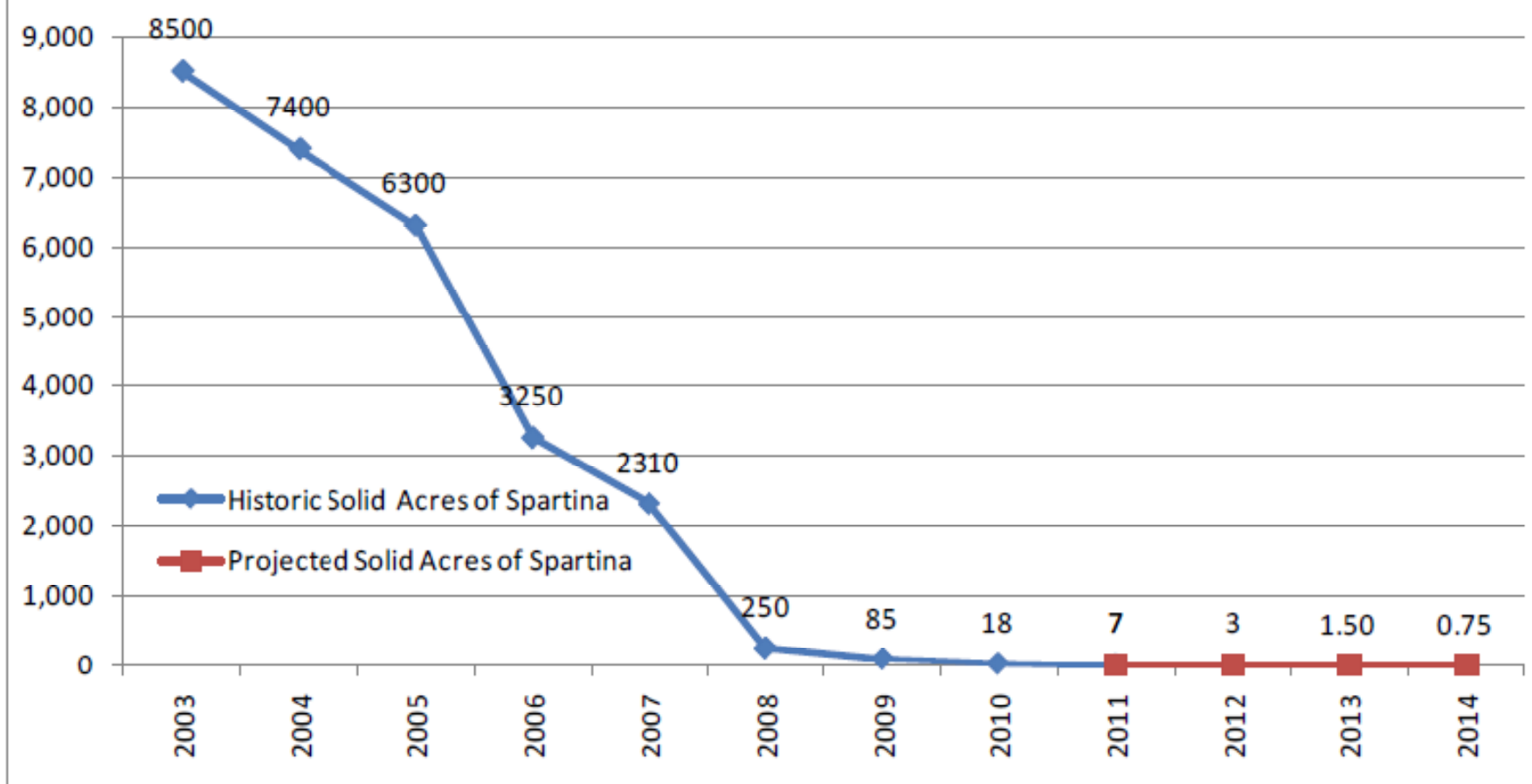
Efficacy comparison for 1.68 kg/ha imazapyr and 8.4 kg/ha glyphosate as a function of dry times*



Imazapyr 2003 to 2010



2010 Willapa Bay Historic and Projected *Spartina* Infestation



Naselle River tide flats

2006



2000





2003

Palix River Meadow

2005

2004



2009



Pre and Post-Spartina control monitoring

- Shorebird, waterfowl & birds of prey
- Native marsh plants

Porter Point

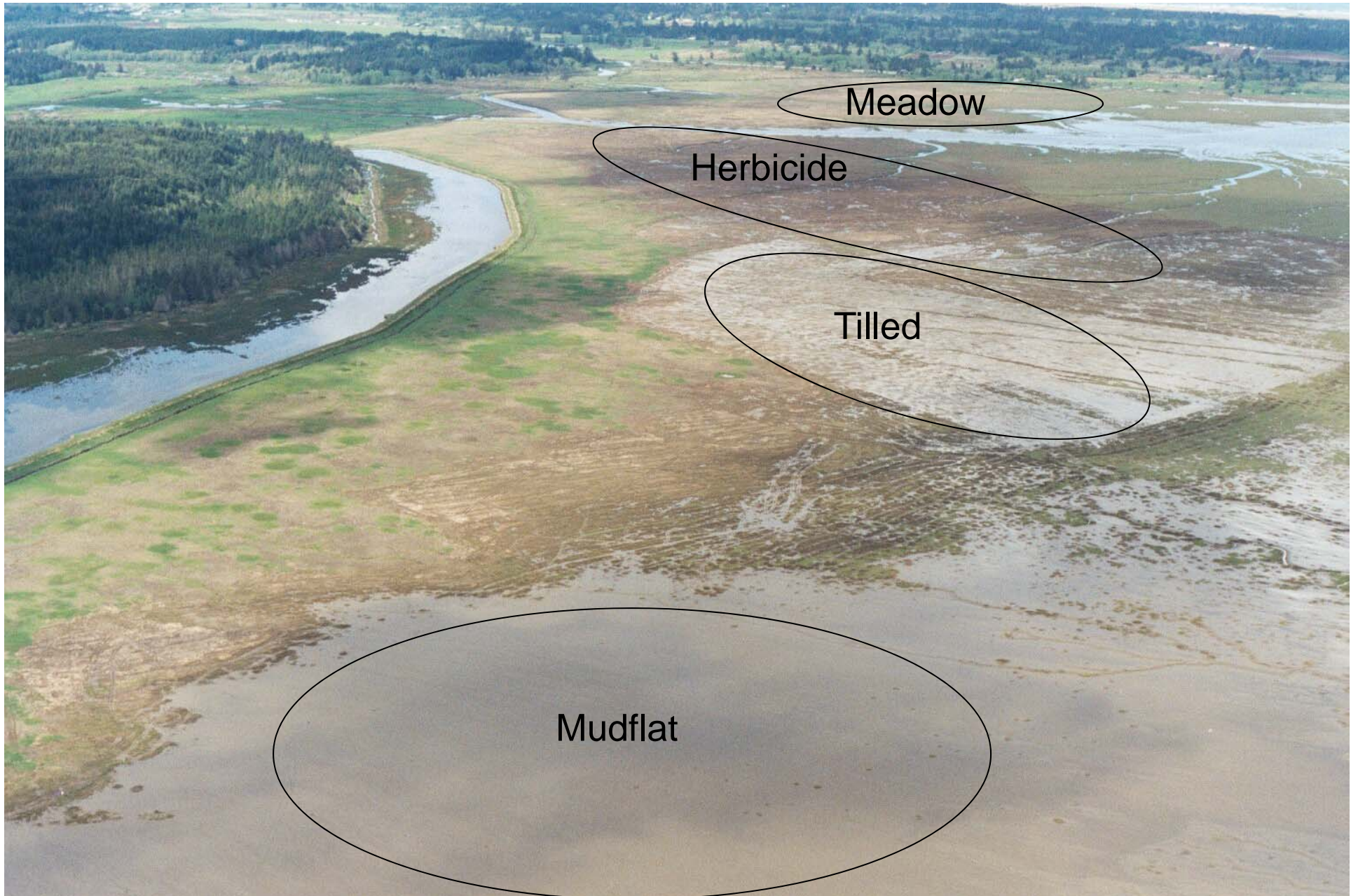
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10 T 424612.37 m E 5138447.63 m N elev 0 ft

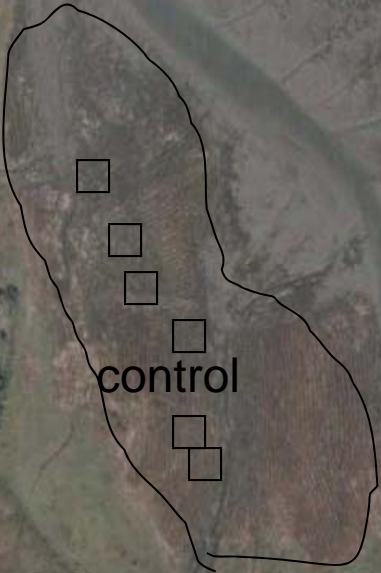


Large (~100+ha) comparative treatment block monitored from 2003 to 2010



Sep 6, 2004

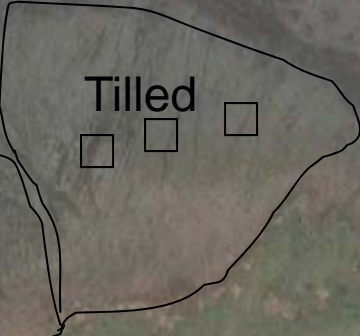
Round Island



control



Sprayed



Tilled



Bare Sediment



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Image © 2010 DigitalGlobe

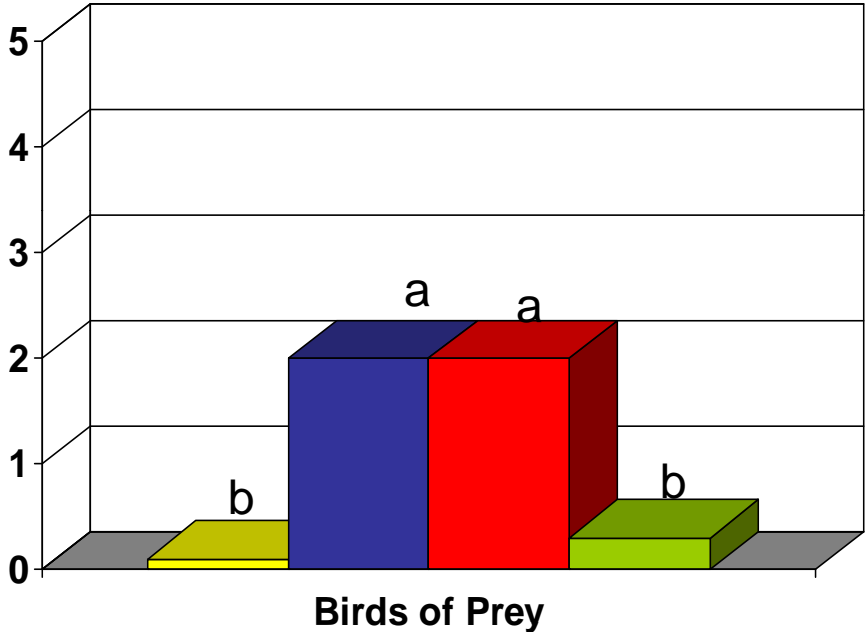
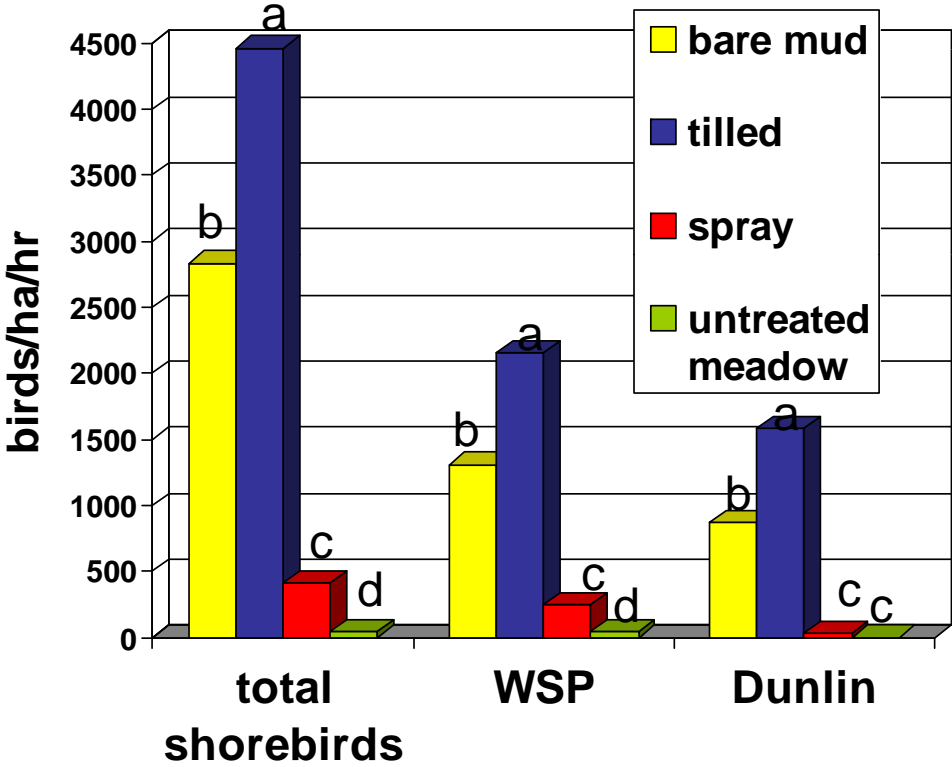
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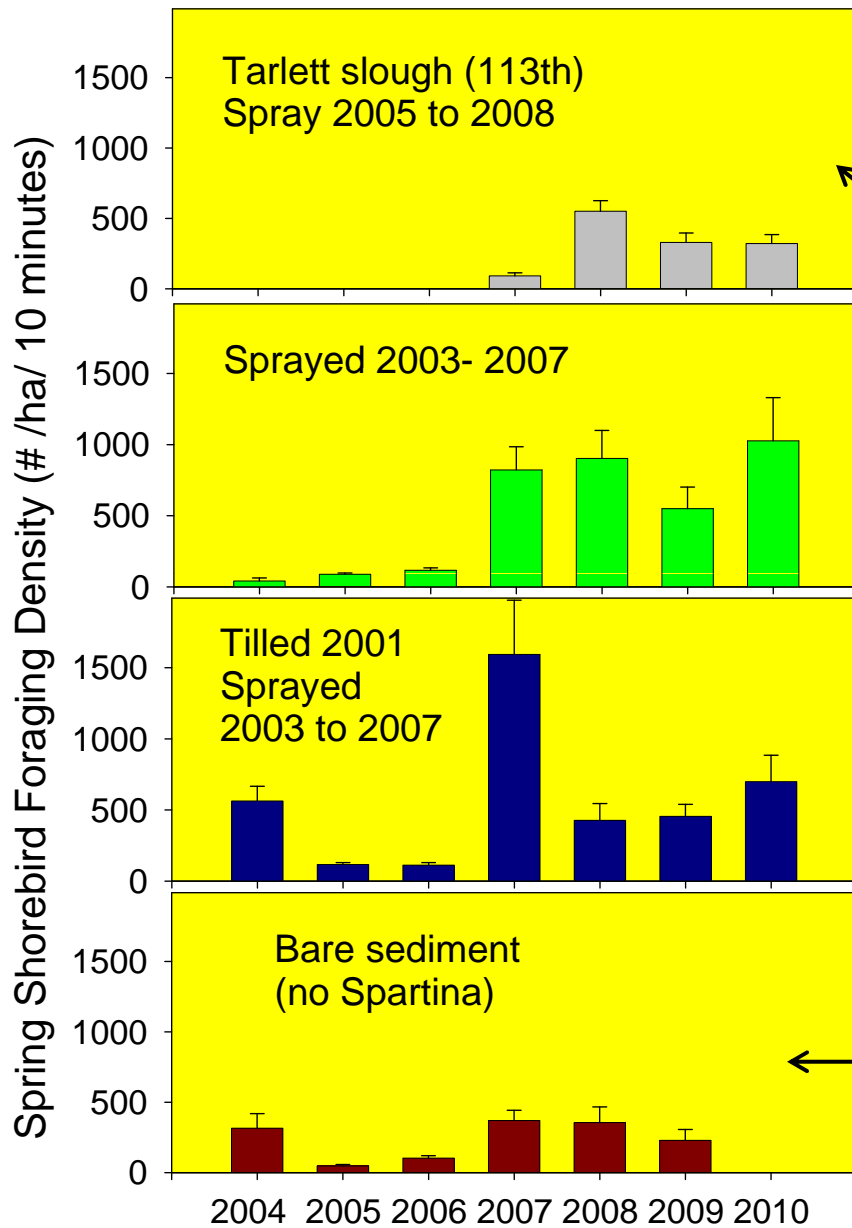
Imagery Date: Sep 7, 2004

10 T 424095.39 m E 5136820.67 m N elev 0 ft

Eye alt 14079 ft

Mean bird flux density – at the early part of the management program (2004)





Untreated control site

Spring shorebird migration recovery following Spartina control
@ Willapa National National Wildlife Refuge



Sep 6, 2004

1990

2010

2004 – treatment starts

1 Ha bird observation sites



2180 ft

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Image © 2010 DigitalGlobe

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Imagery Date: Sep 7, 2004

10 T 428558.97 m E 5163471.88 m N elev 0 ft

Eye alt 7612 ft

Sep 10, 2009

2009

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Image USDA Farm Service Agency
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2180 ft

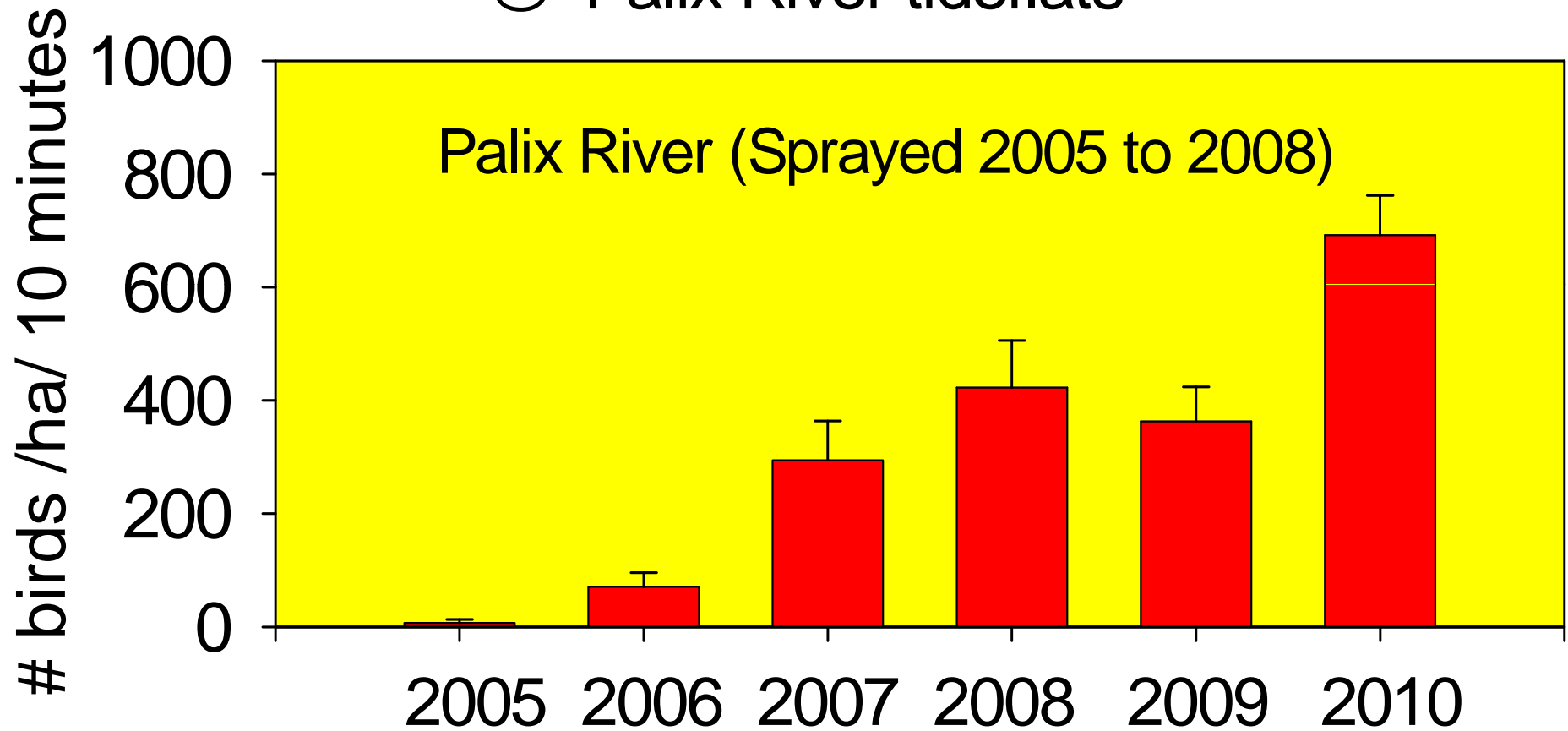
Imagery Date: Jun 26, 2009

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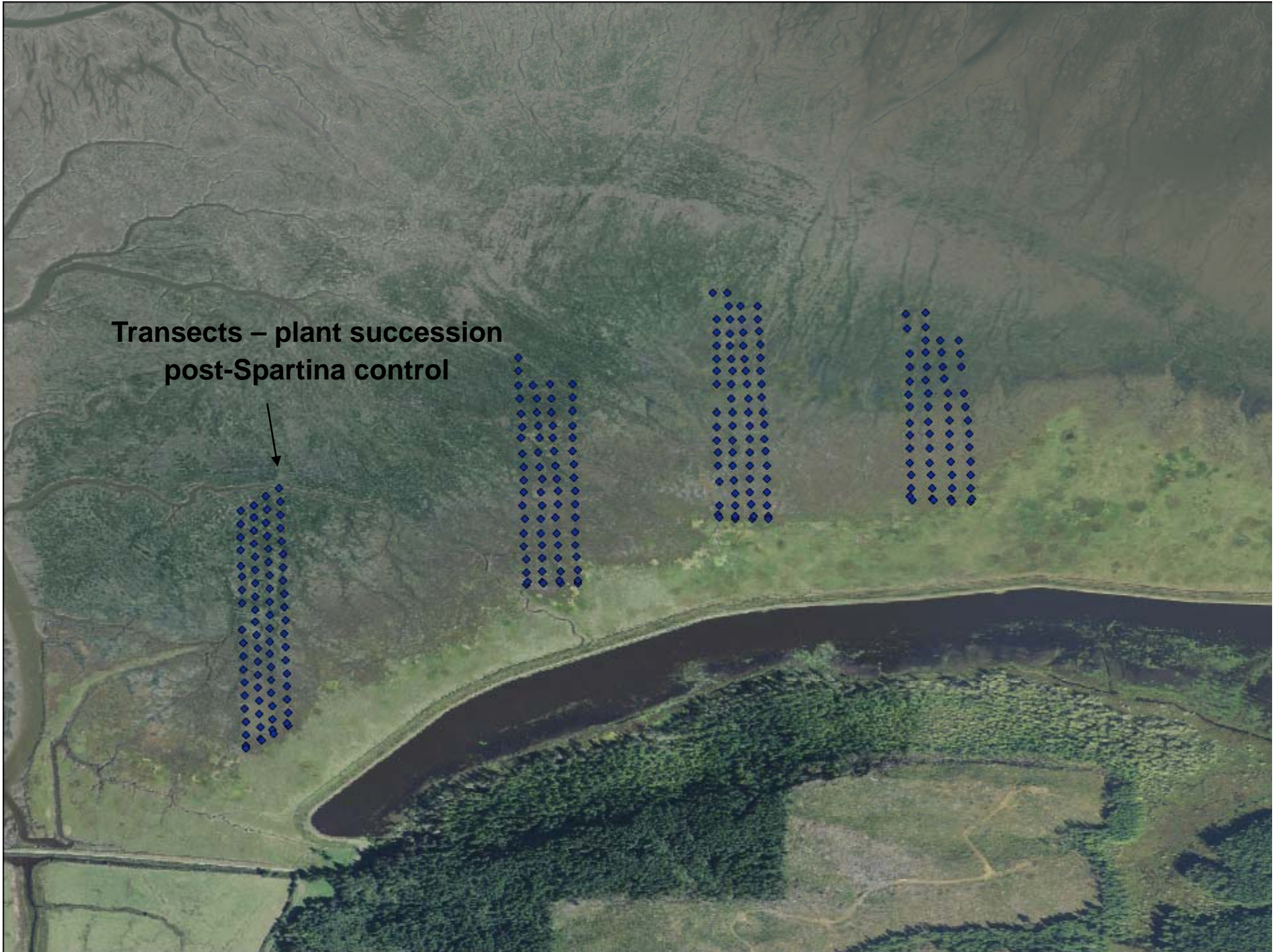
Eye alt 7612 ft



Spring shorebird migration recovery
following *Spartina* control
@ Palix River tideflats



**Transects – plant succession
post-Spartina control**



Spartina – 8 years of growth – Porter Pt.



What about native flora moving into the
tidflats once *Spartina* is removed.

What will be the species transition over time?
How far out will these species go?





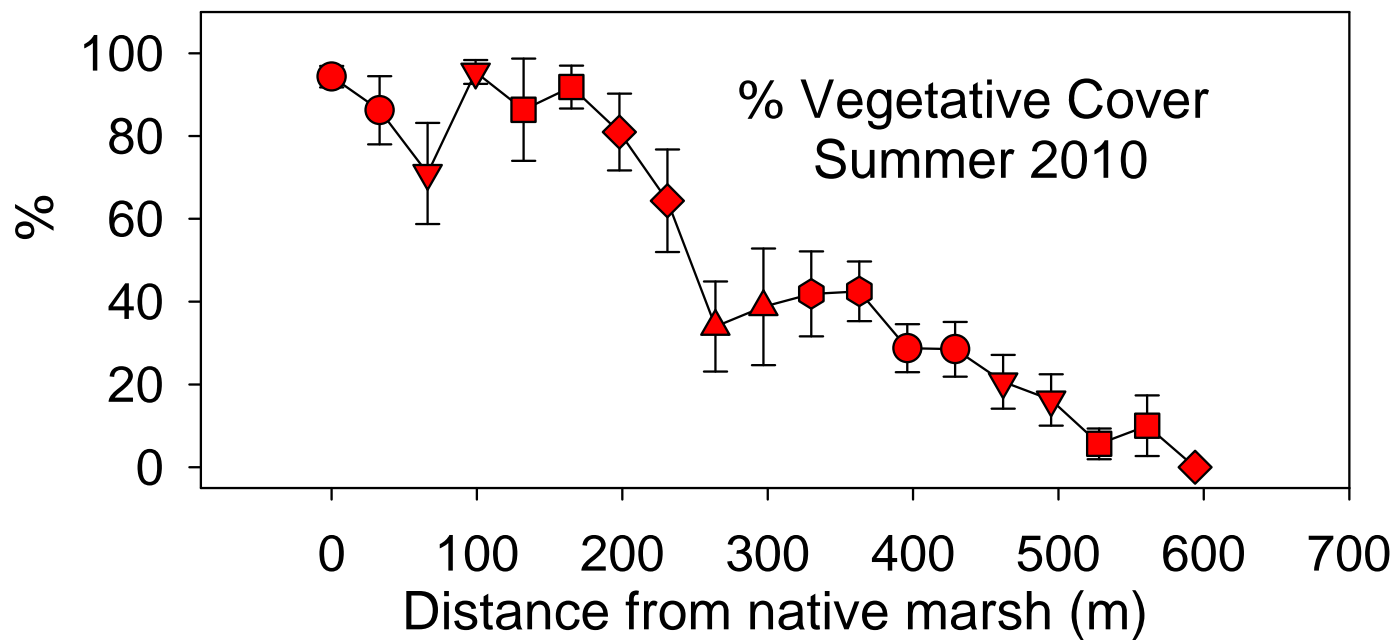
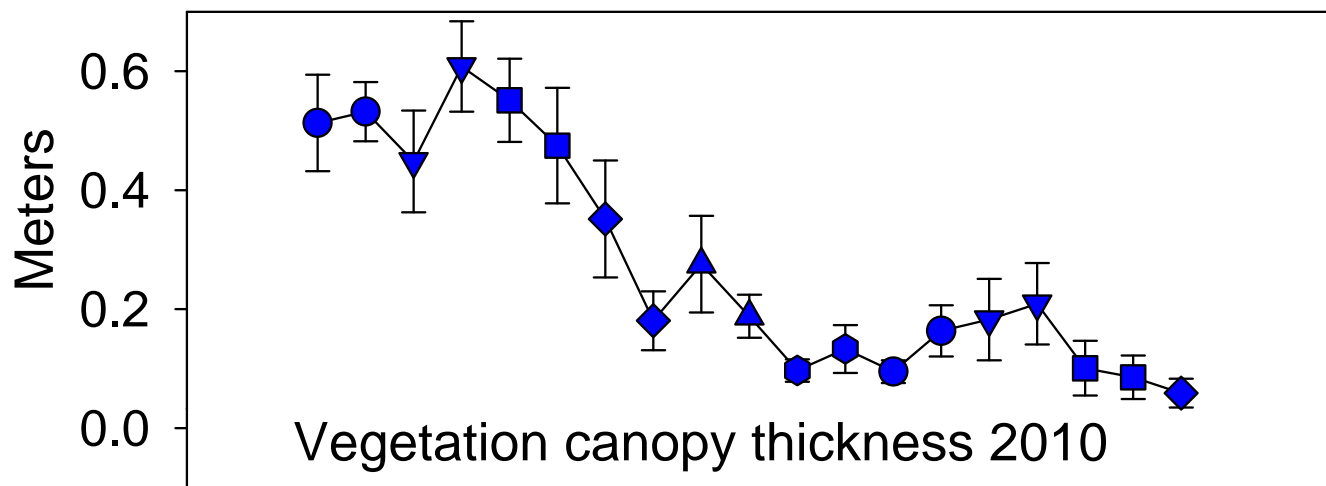
2003

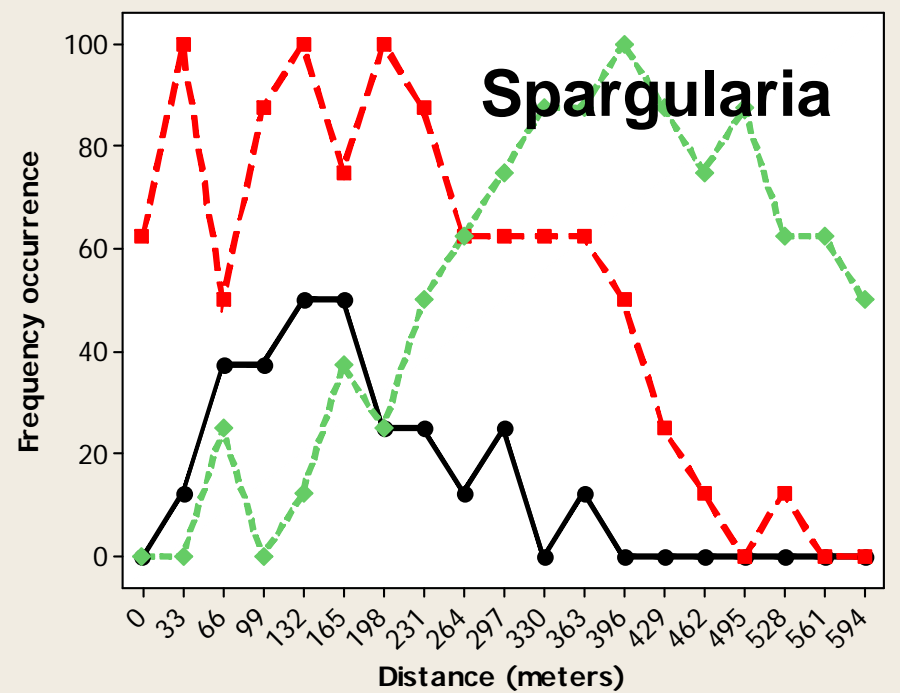
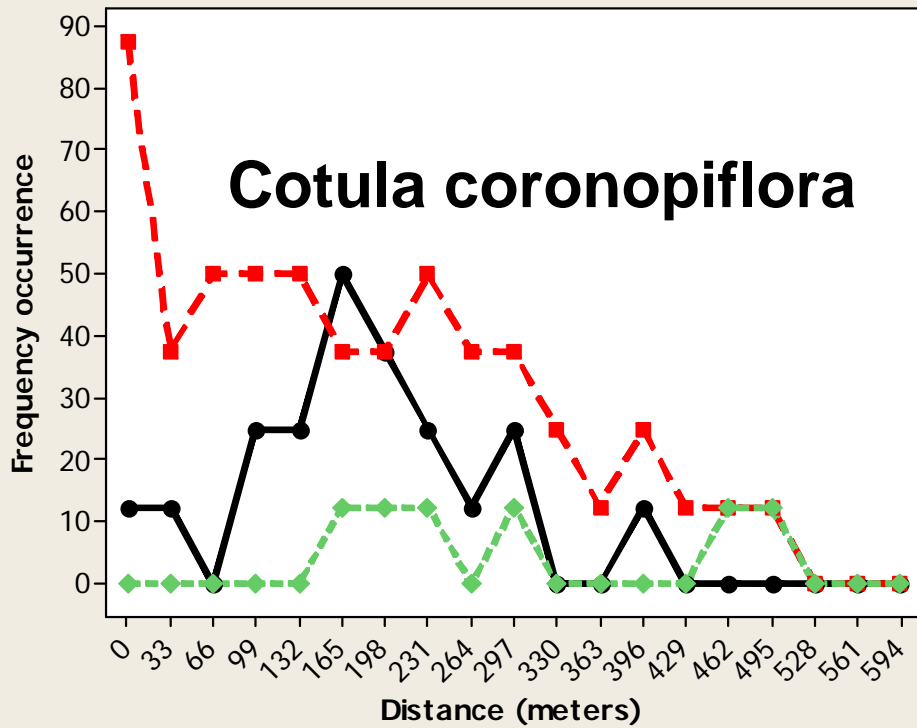
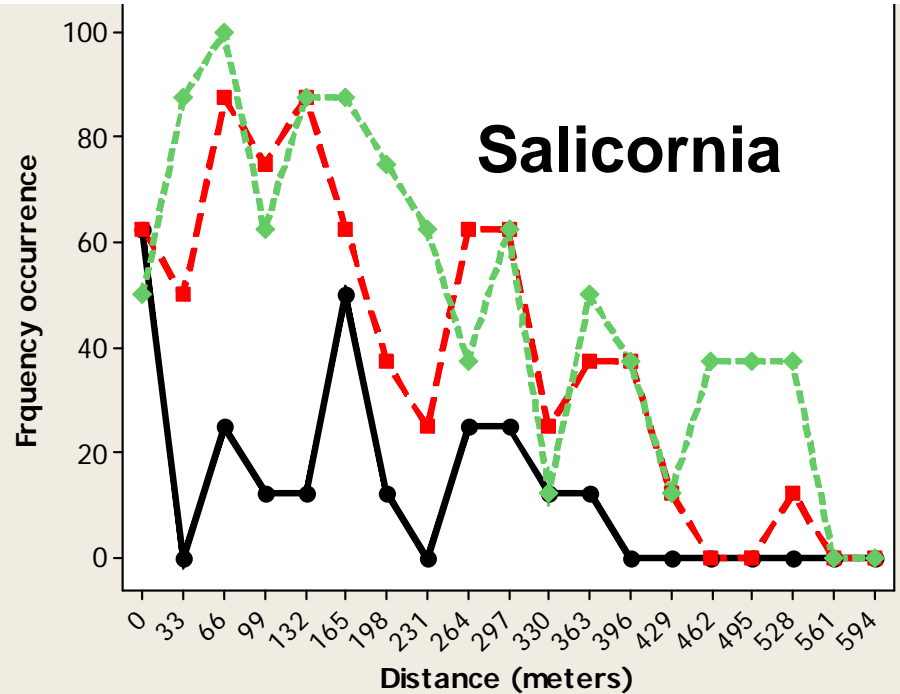
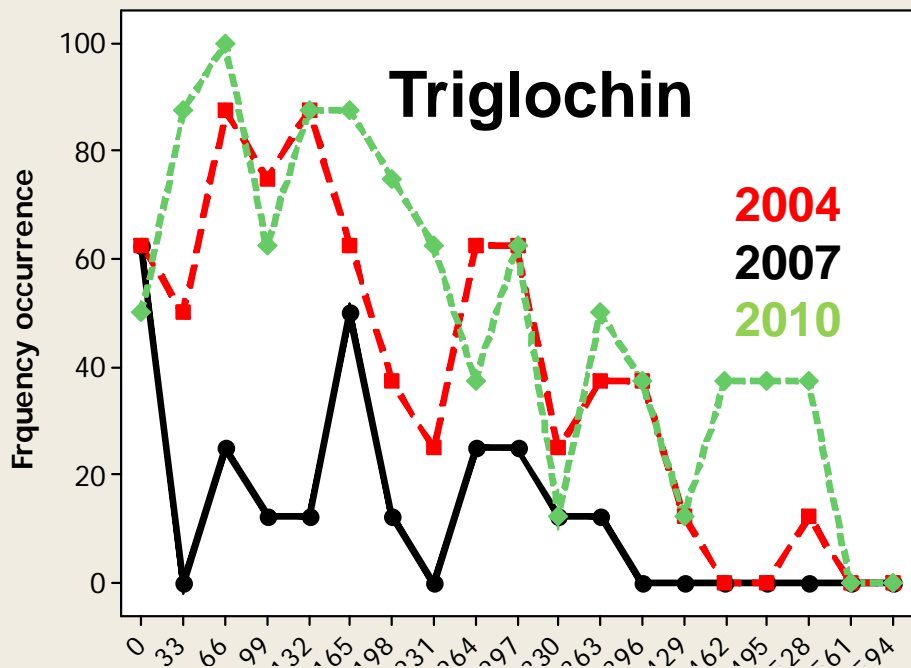
2008

1980's

2005

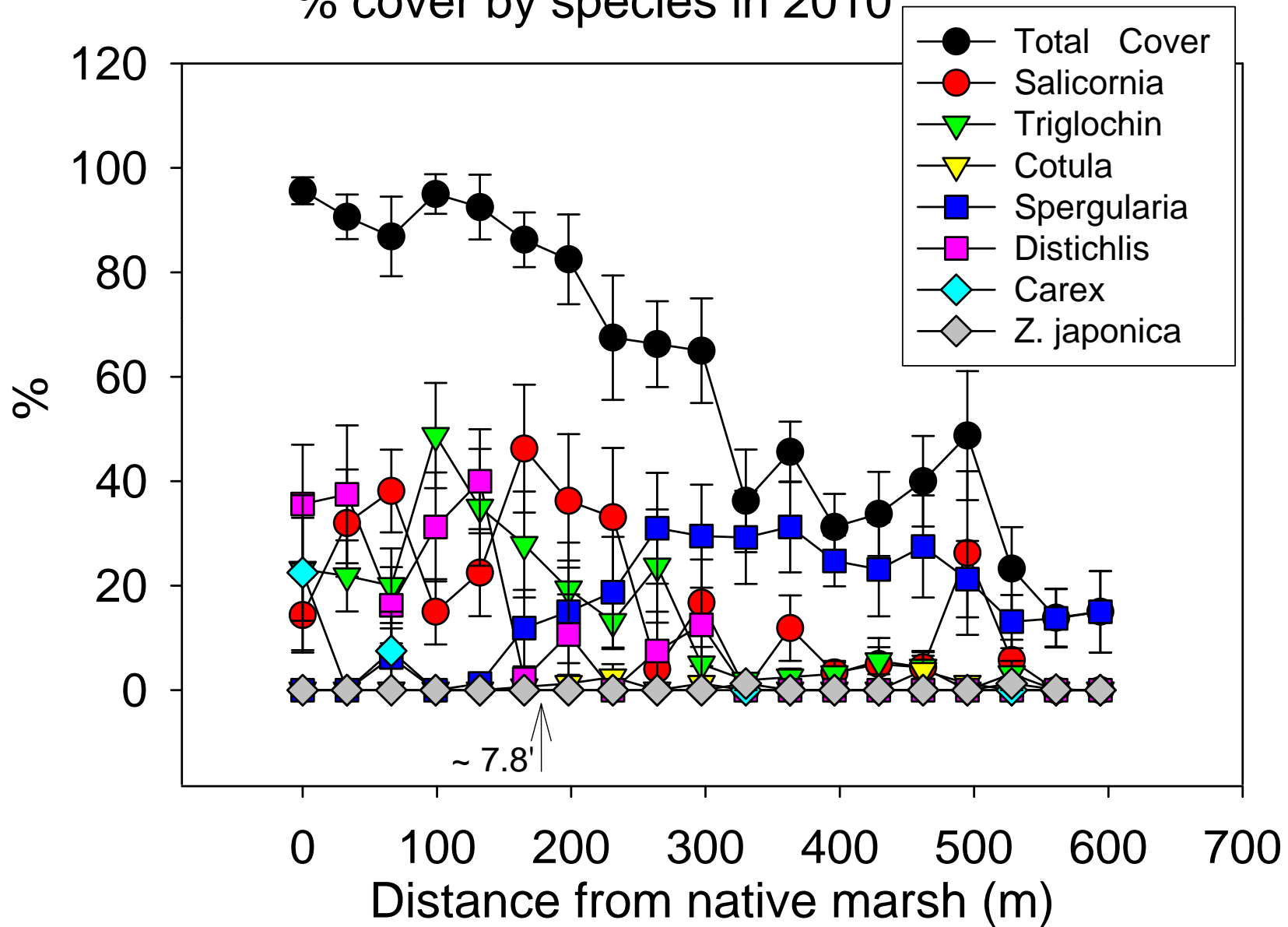
Herbicide 2003 to 2006





Herbicide sites - treatments started 2003

% cover by species in 2010



Aug 17, 2006

1900' – outer range
Spergularia and

1600' – outer range
Spergularia

1000' – outer range
pickleweed

Arrowhead grass 600'

Image USDA Farm Service Agency

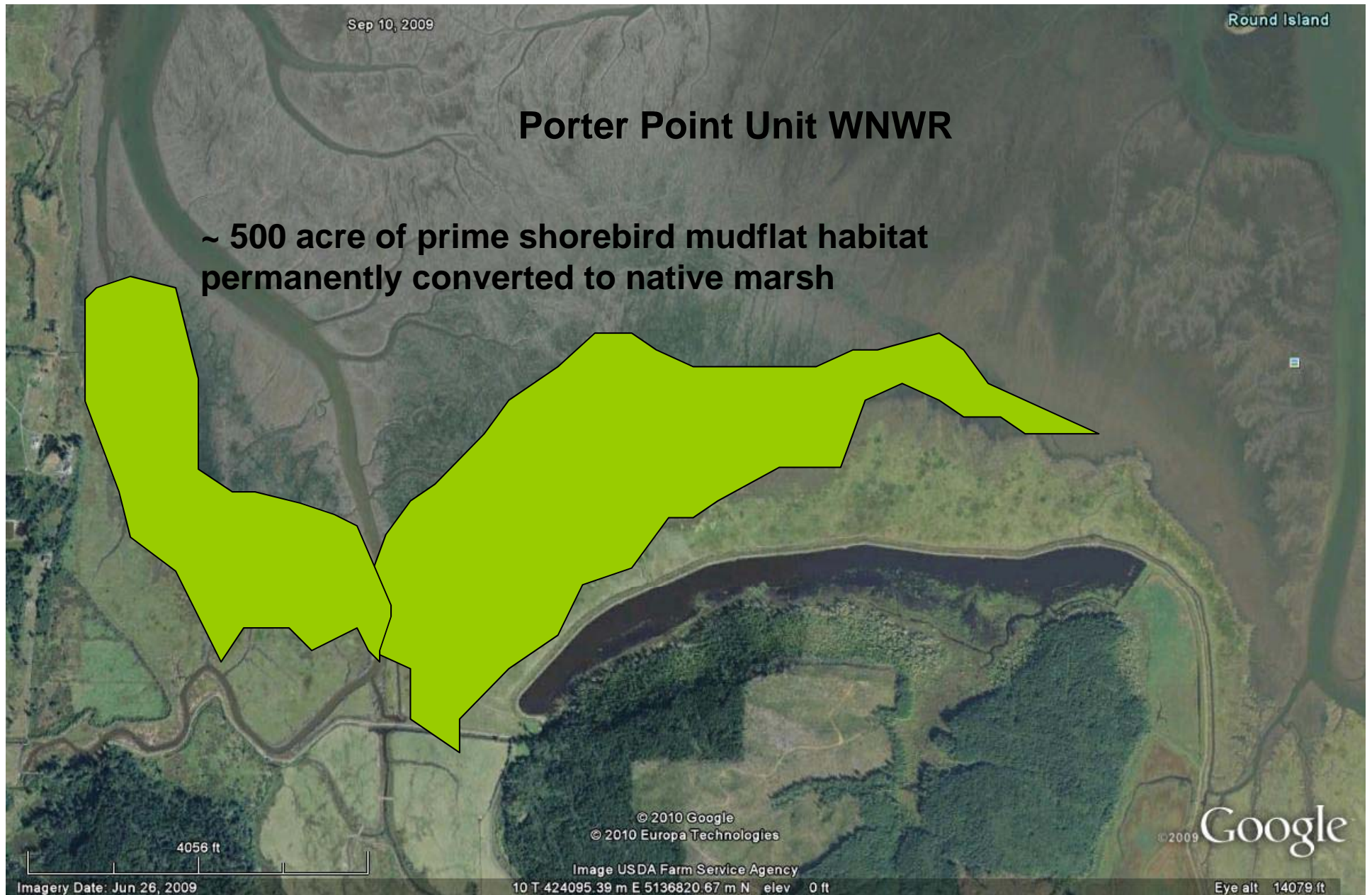
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10 T 423912.07 m E 5136852.83 m N elev 0 ft

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Google

Eye alt 7882 ft



Mudflats (up to ~ 1995) to Spartina (1995 to 2004) to Salt Marsh (2008 to ?) Succession

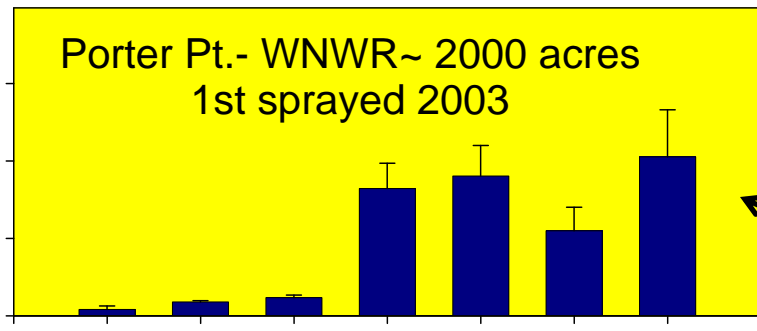
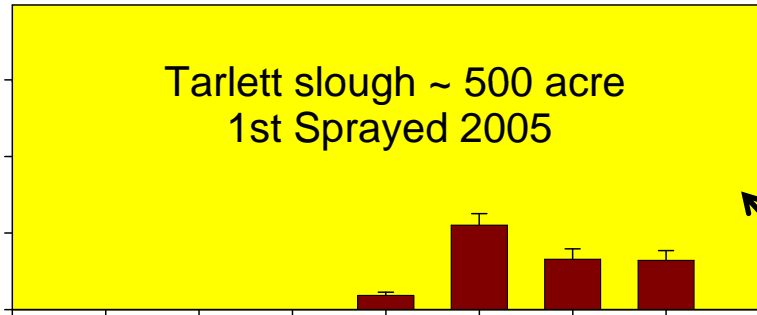
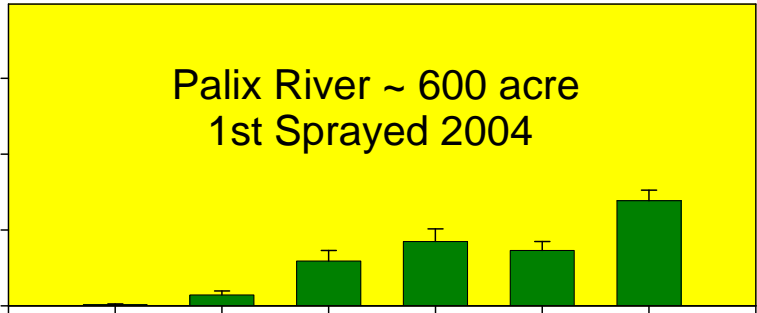
An aerial photograph of a wetland restoration project. The image shows a large body of water on the left, with a small boat in the center. The surrounding land is covered in dense, green vegetation, likely marshland or wetland plants. The text is overlaid on the image.

Summary

- Create the habitat and they will come
- Largest most successful shorebird habitat restoration project in US history
- Similar success stories from other Puget Sound, Grays Harbor, San Francisco Bay

Thanks to hard work by many thousands of hands over 20 years:
Willapa National Wildlife Refuge, Washington Department of Agriculture,
Washington Dept. of Fish & Wildlife, Washington Dept. Natural Resources,
Pacific County Weed Board, Shoalwater Indian Tribe, The Nature Conservancy,
Willapa Bay Oyster growers, Univ. of Washington and Washington State Univ.
& >\$25 million in funding from Federal, State and private resources.

Spring Shorebird Foraging Density (# /ha/ 10 minutes)



2004 2005 2006 2007 2008 2009 2010

Spring shorebird migration recovery following Spartina control
@ Willapa National National Wildlife Refuge



Questions?

