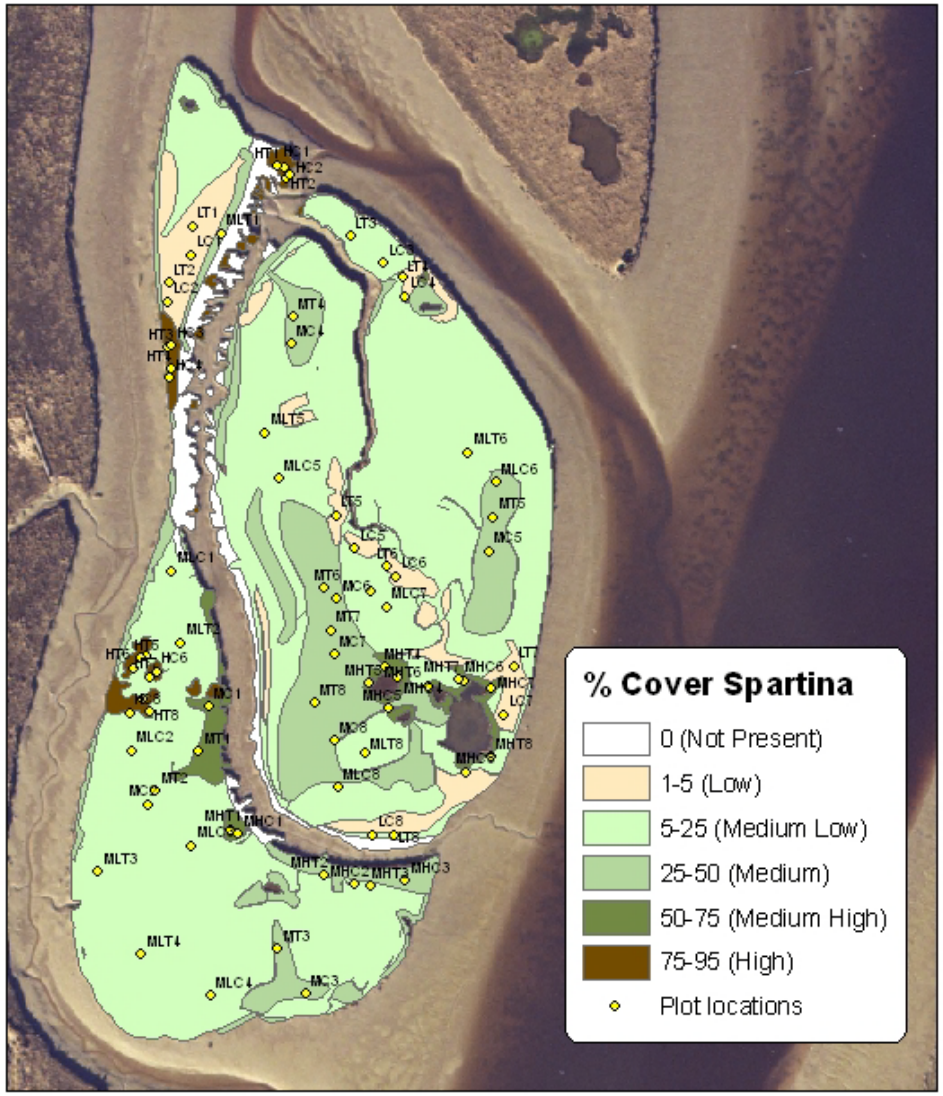
Developing methods for restoring salt marshes invaded by *Spartina densiflora*

Andrea Pickart, U.S. Fish and Wildlife Service

Humboldt Bay National Wildlife Refuge

EXPERIMENTAL TREATMENTS 2004-2006



Coastal Conservancy

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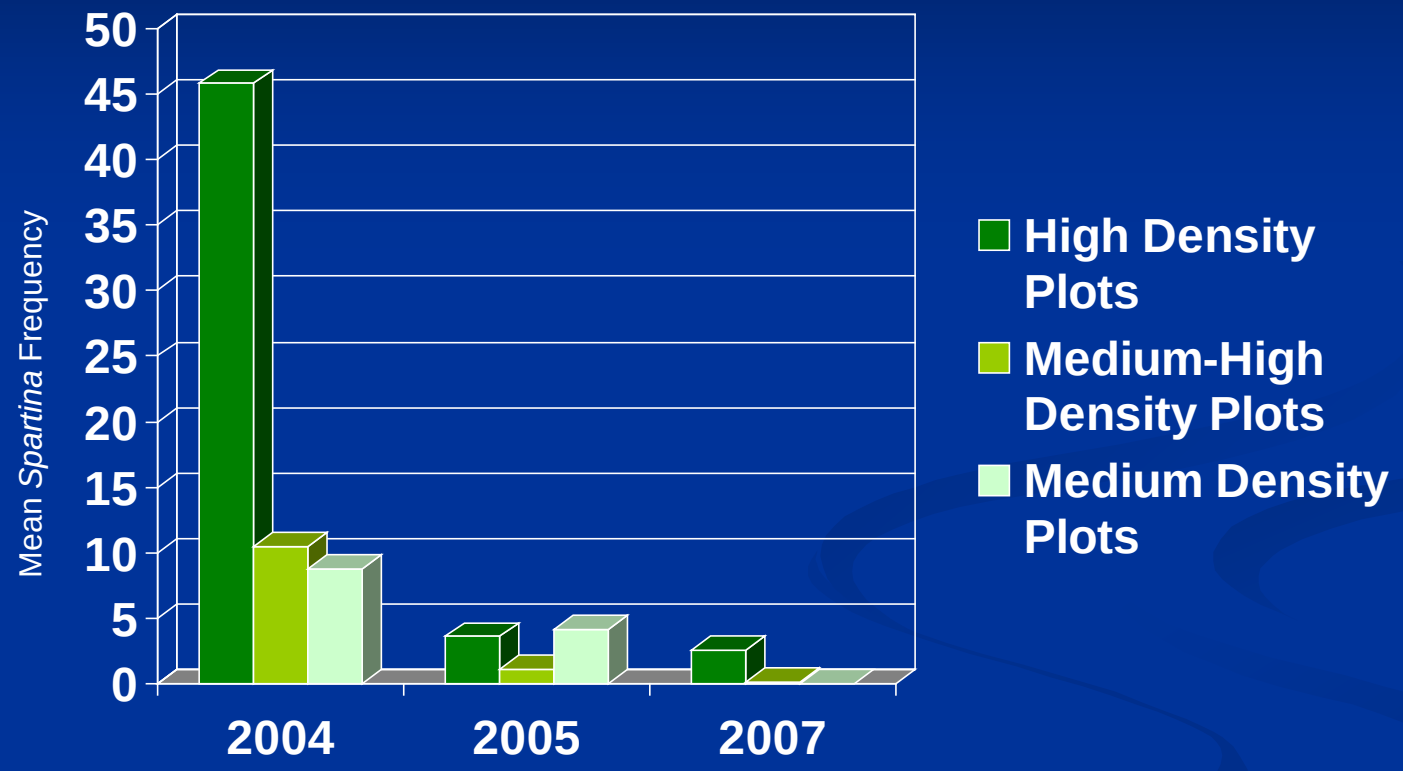
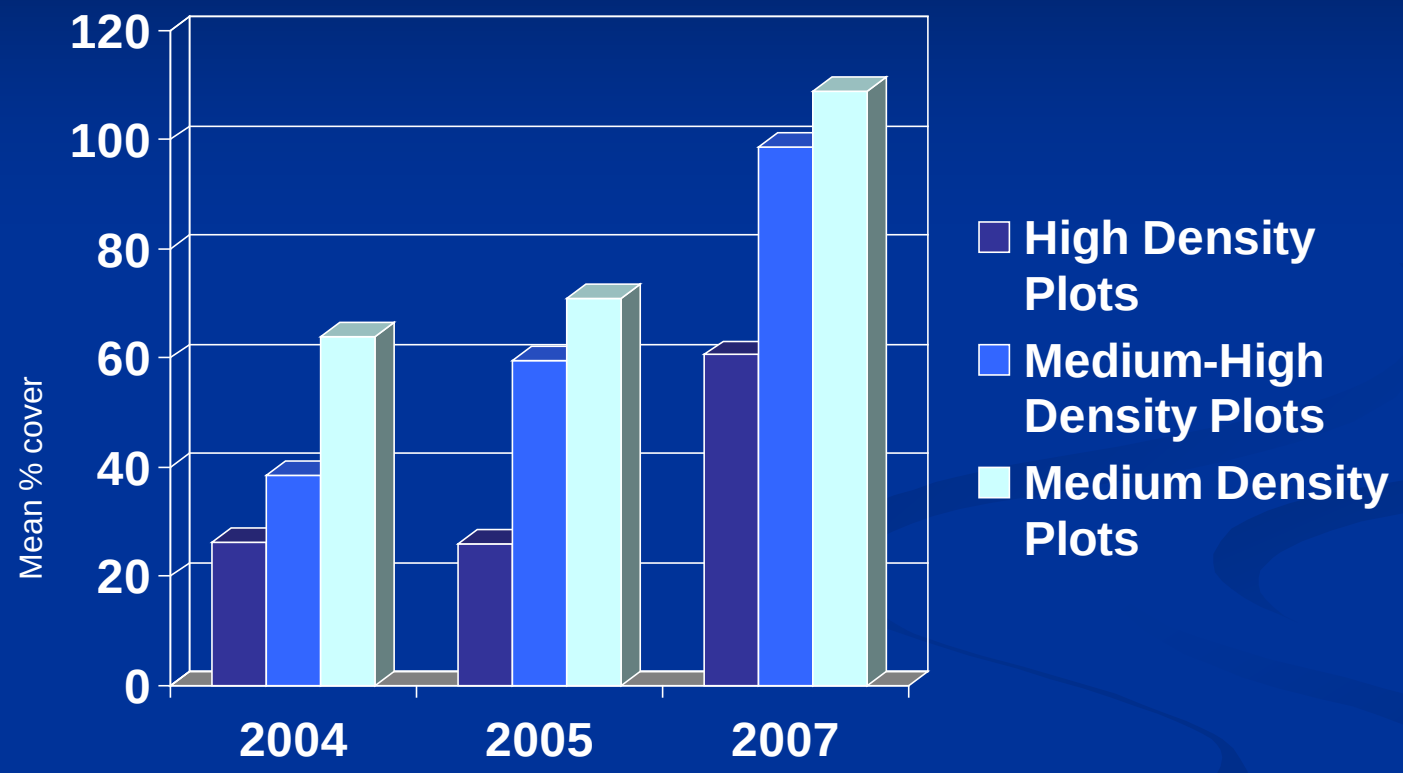
Changes in frequency of *Spartina* in mowed plots



Changes in % cover of native species in mowed plots



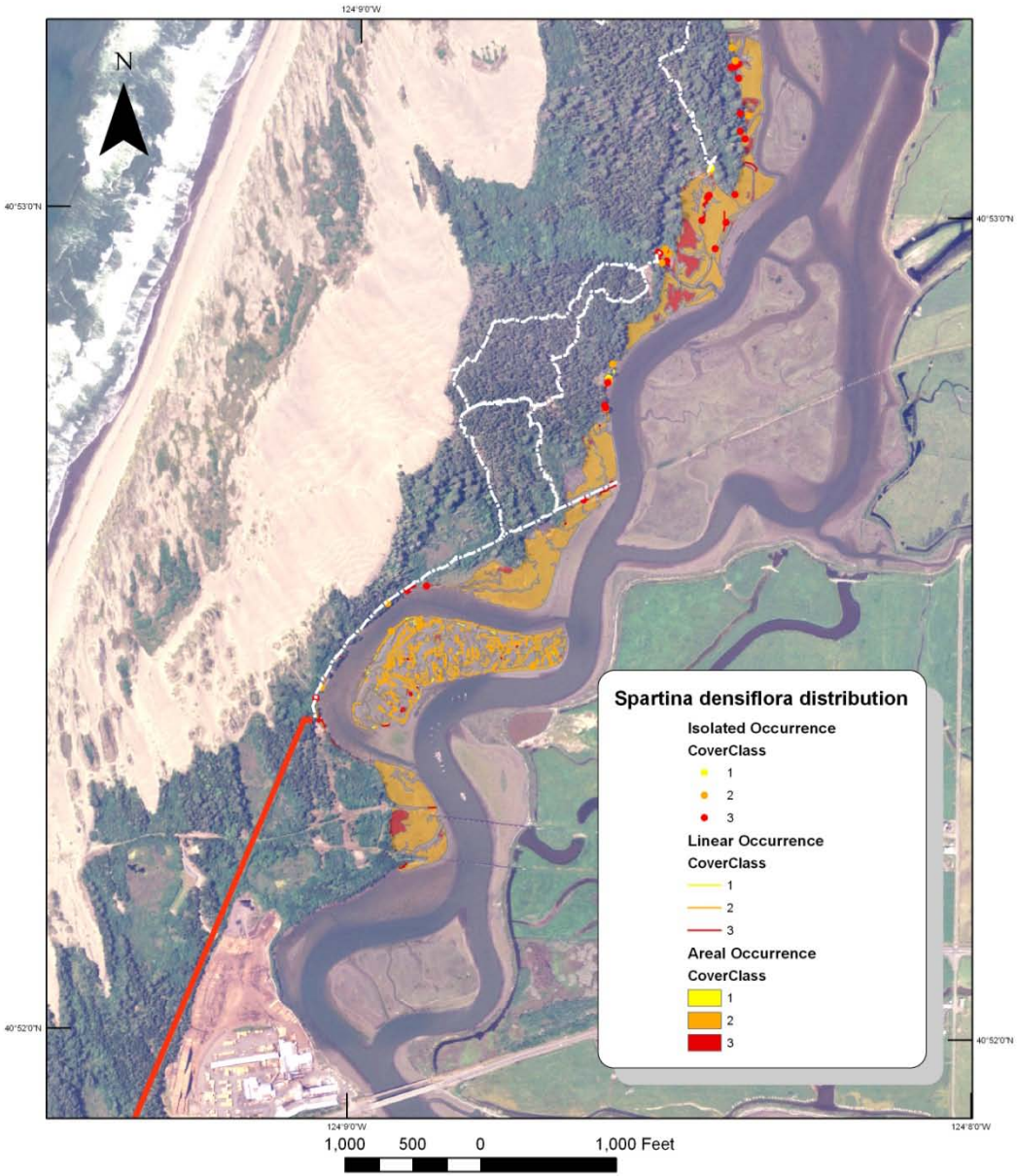
High Density Plot Before
July 2004

October 2007

PILOT RESTORATION 2006-2008 (8 ha)

MAPPING

Spartina Control Map



Initial treatment: Mow to base of plant with corded weedeater

Modified treatment 1: Mow below surface with metal-blade brushcutter (progressive cut method)

Modified treatment 2: Reverse direction of metal-blade, apply in one place for grinding to below surface (grind method)

CDC
PRISONER
CDC

Raking

Summer Disposal, Burn Haystacks

Winter disposal, off-site

310D
JOHN DEERE

JOHN DEERE
310D

Post restoration succession – *algal mat stage*

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Post restoration succession – brackish areas……*Triglochin maritima*

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Post restoration succession – *Sarcocornia pacifica* seedlings

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Spring *Spartina* Seedling Flush

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Flaming seedlings

August 2006

April 2007

October 2008

June 2009

August 2006

April 2007

October 2008

October 2008

Pearson Correlation coefficient SPRING 2007 (first seedling flush)

n = 315

	Spartina seedling density	% Cover Algae	% Cover Wrack	% Cover Mud	Total native cover
***Spartina* seedling density**		**0.37**	-0.10	**0.17**	**-0.37**

Significant negative correlation (p<.05)

Significant positive correlation (p<.05)

REVEGETATION

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Photo points

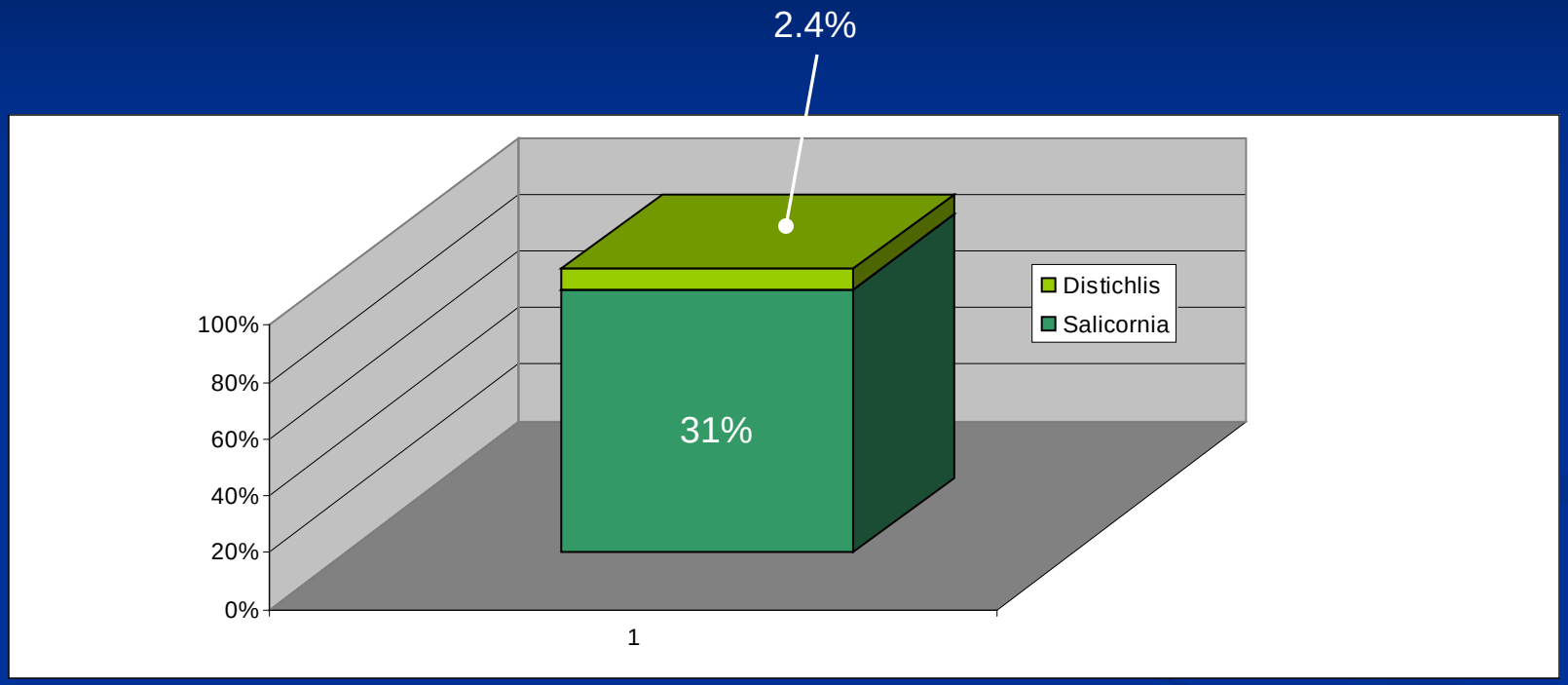
Jan 2008

July 2008

July 2009

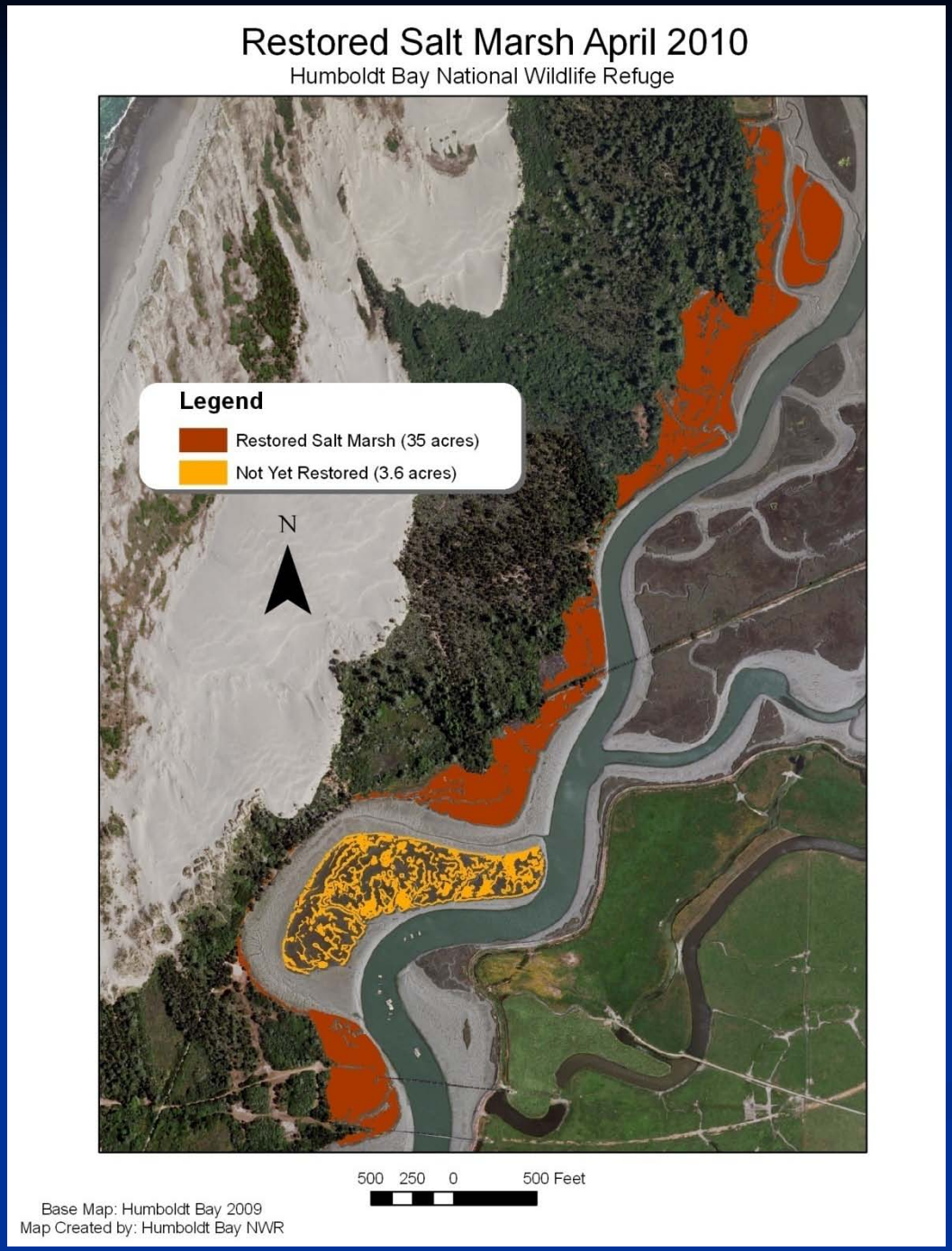
Survivorship of Plugs through August 2008

Plot	%Survival	Plant Date
1	100	1/19/08
2	97	3/15/08
3	97	4/13/08
4	98	4/26/08



Species composition by end of first summer

Initial planting 1:1 *Sarcocornia:Distichlis*



Total Restored As of April 2010 :

35 acres

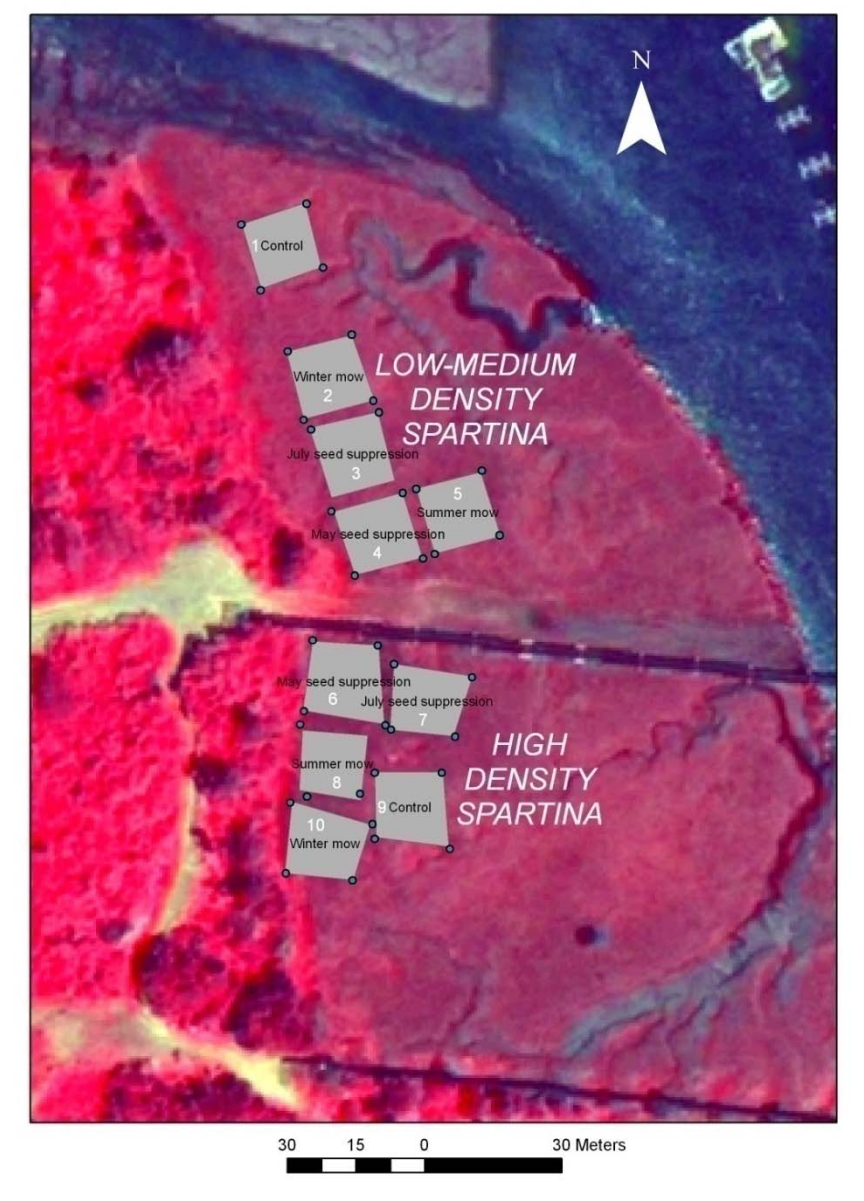
(14 ha)

Research Phase for Regional Eradication 2008-2010

Objectives

- Refine mowing treatments
- Measure seed production
- Mapping of entire infestation
- Seed bank ecology
- Impacts on rare plants
- Impacts on invertebrates

Mowing efficiency



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Summer Mow July
2008 (before)

Mowing Treatment
Aug 2008

Summer Mow Dec
2008

Summer Mow
August 2009

Winter Mow
Dec. 2008 (before)

Treatment Jan 2009

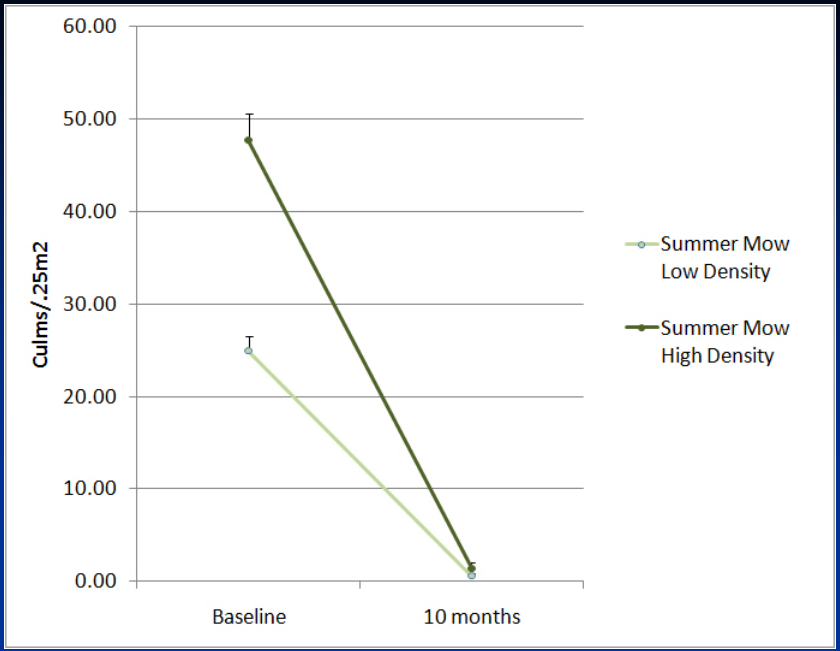
Winter Mow March
2009

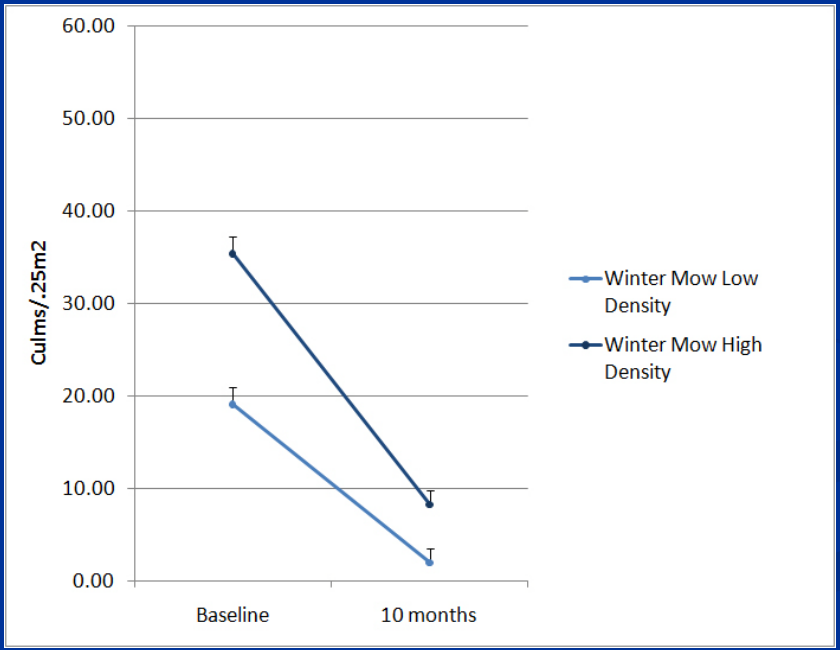
Winter Mow August
2009

Seed
Supression
April 2009

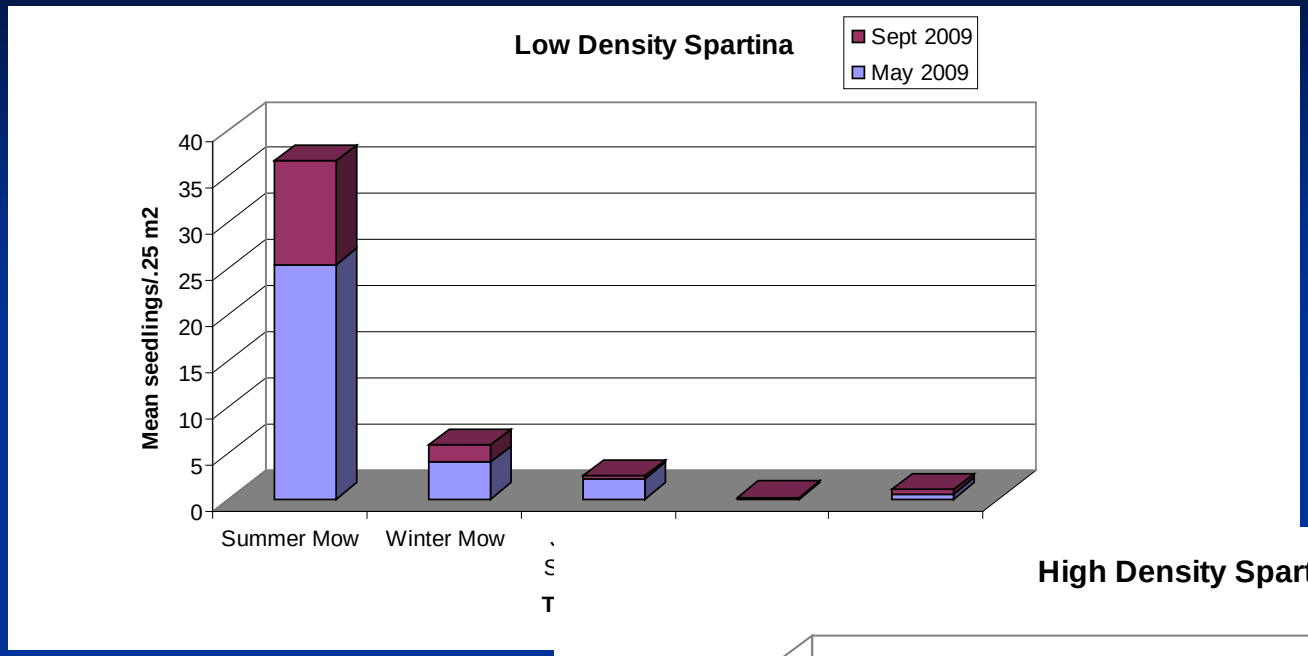
Results

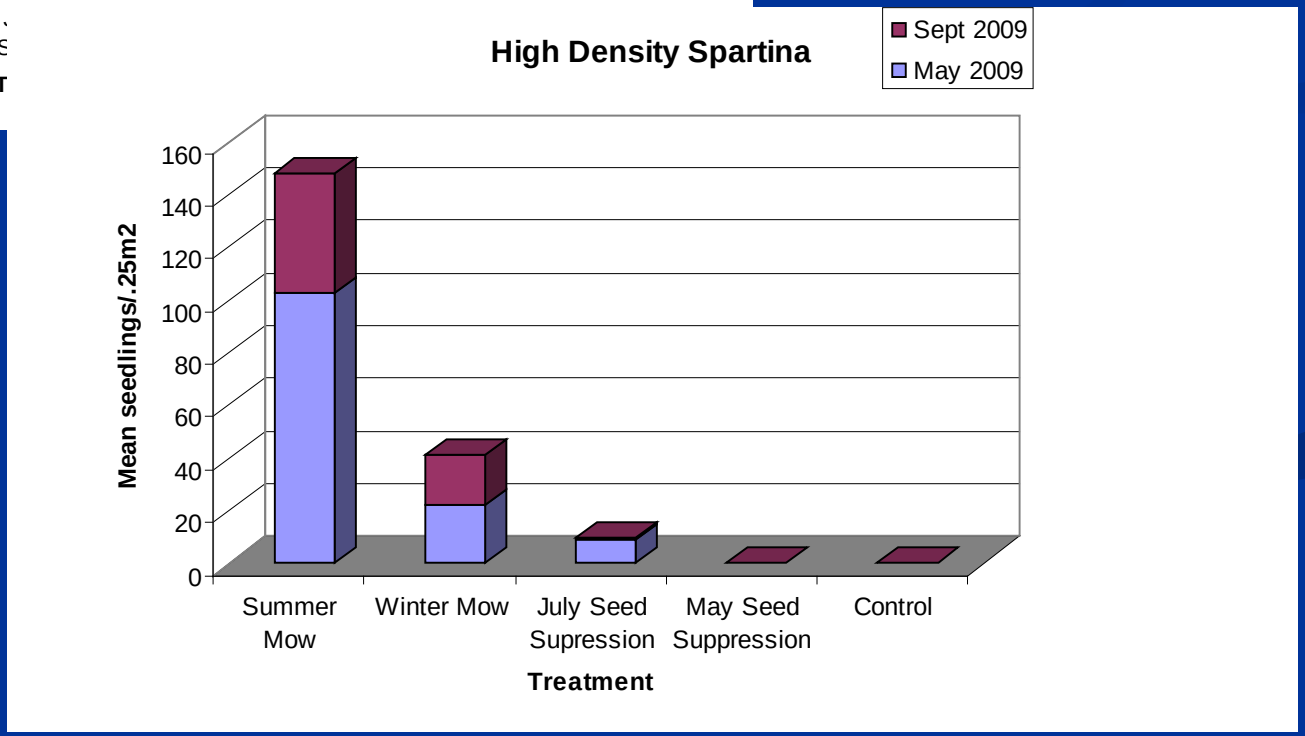
Mortality





Results Seedling emergence



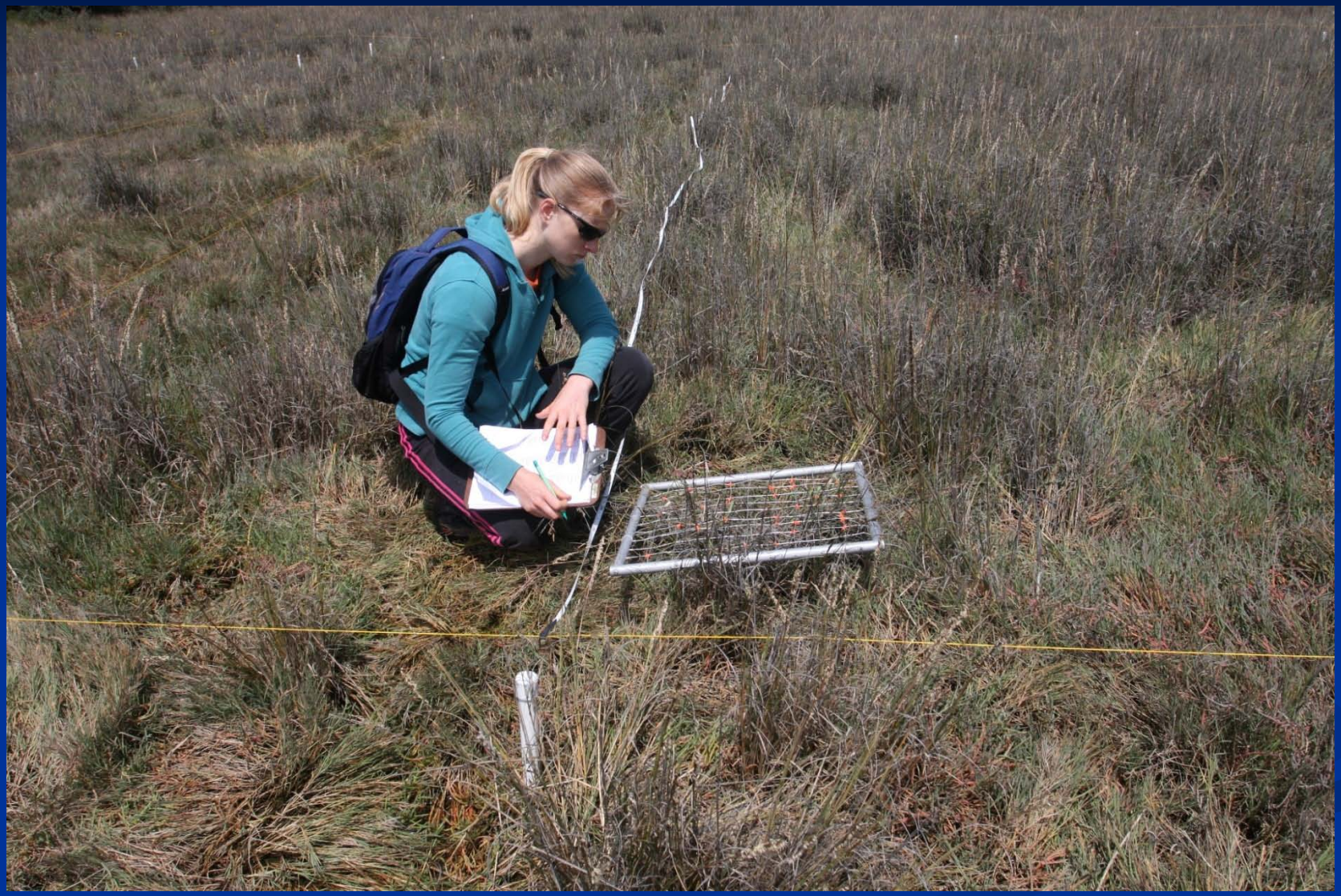


Results

Seed suppression top mow

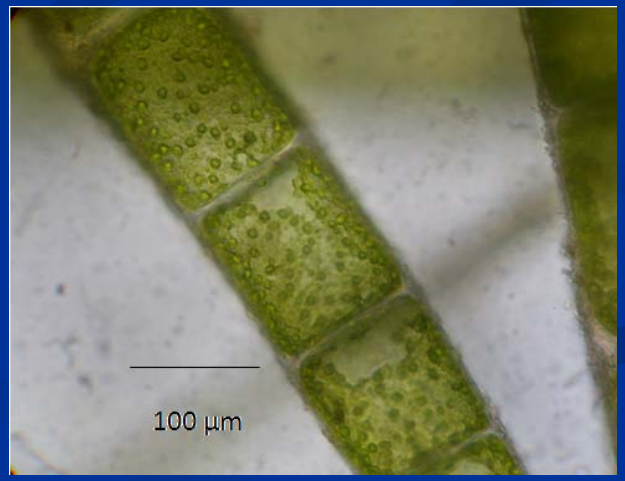
- 100% prevention (May) and mortality (July)
- Inflorescence length predicts number of seeds (R^2=.62)
- Seed set 49,367,712 seeds per acre

Algal Monitoring



Rhizoclonium riparium

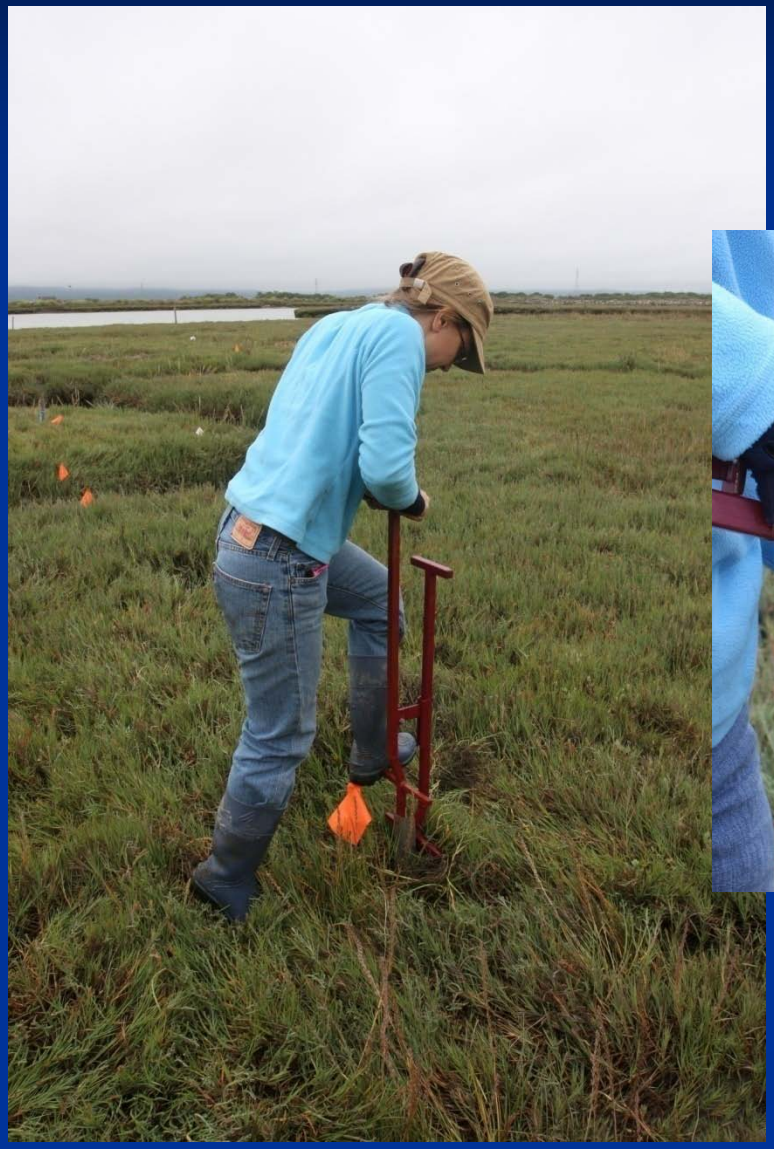
Chaetomorpha linum



Photographs: Simona Augyte

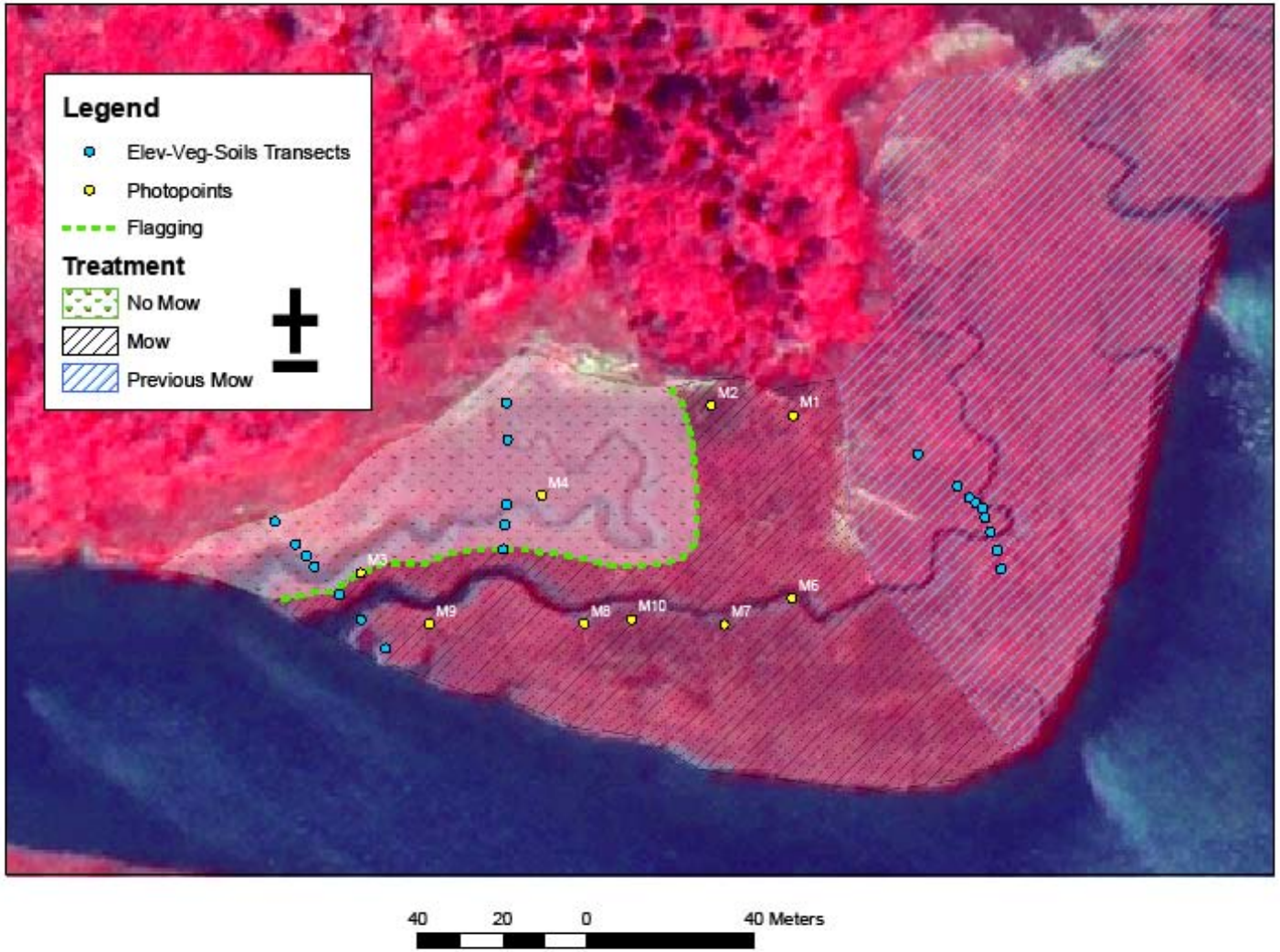
Continuing Studies

Abiotic impacts of *Spartina* removal



Soil Tests: Compaction,
Organic matter, pH, salinity

TIDAL CREEK STUDY DESIGN MA-LE'L



Continuing Studies

Brushcutter model efficiency, use of top mulch to avoid disposal

Echo

Tanaka

Husqvana

Grind vs. Cut Method (Efficiency and regeneration from ejected material)

Continuing Studies

Wheeled or tracked equipment efficiency

6-2-10

6-24-10
(3 wks)

5-17-10

4-10 (5 wks)

Acknowledgements

Adam Wagschal
Alejandro Bortolus
Andrea Craig
Annie Eicher
Armando Aispuro
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CA Dept of Forestry & Fire Protection
California Conservation Corps
Carol Vander Meer
Conor Shea
David Garza
Derek Weatherbee
Desiree Davenport
Emily Walter
Eric Nelson
Erik Jules
Frank Shaughnessy
Gillian Levy
Heather Block
Heather Rickard
Jason Zito
Jessi Graff
Joel Gerwein
Julie Neander
Kristina Prosser
Laurel Goldsmith
Luc Lagarde
Mike Swank
Patti Clifford
Paula Golightly
Rebecca Langhans
Rose Patenaude
Sara March
Scott Owen
Sean Craig
Steve Lewis
Trevor Goodman
Zack Grazul

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