Great Lakes PHRAGMITES COLLABORATIVE

WELCOME!

Phragmites Management at Multiple Scales: Treatment Comparisons on the Great Salt Lake

Chad Cranney, Utah Division of Wildlife and Utah State University

Christine Rohal, Utah State University

February 25, 2016

The webinar is listen only. You can listen by phone or through your computer's speakers.
The webinar will be recorded and posted at greatlakesphragmites.net

We will begin shortly!

Phragmites Management at Multiple Scales: Treatment Comparisons on the Great Salt Lake

Christine Rohal & Chad Cranney

Co-authors: Karin Kettenring & Eric Hazelton

UTAH DNR WILDLIFE RESOURCES

Utah State University
DEPARTMENT OF WATERSHED SCIENCES


Great Salt Lake
Salt Lake City, UT
Montana
Oregon
Idaho
Wyoming
Nevada
Utah
Colorado
Kansas
California
Oklahoma
New Mexico
Texas
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
© 2015 Google
Image Landsat
© 2015 INEGI
Google earth
Imagery Date: 4/9/2013 41°07'47.76" N 112°06'40.78" W elev 5746 ft eye alt 1913.30 mi

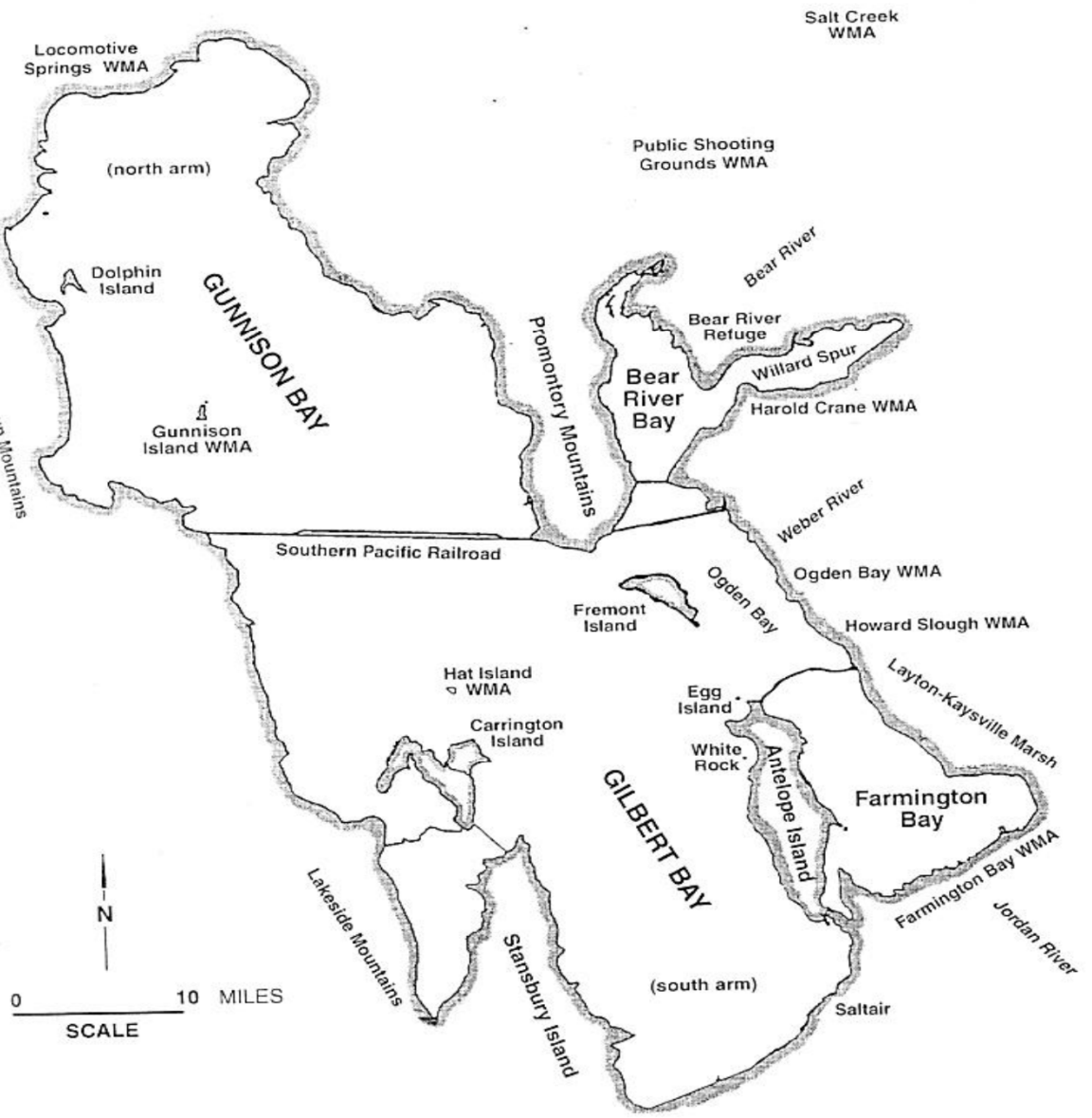
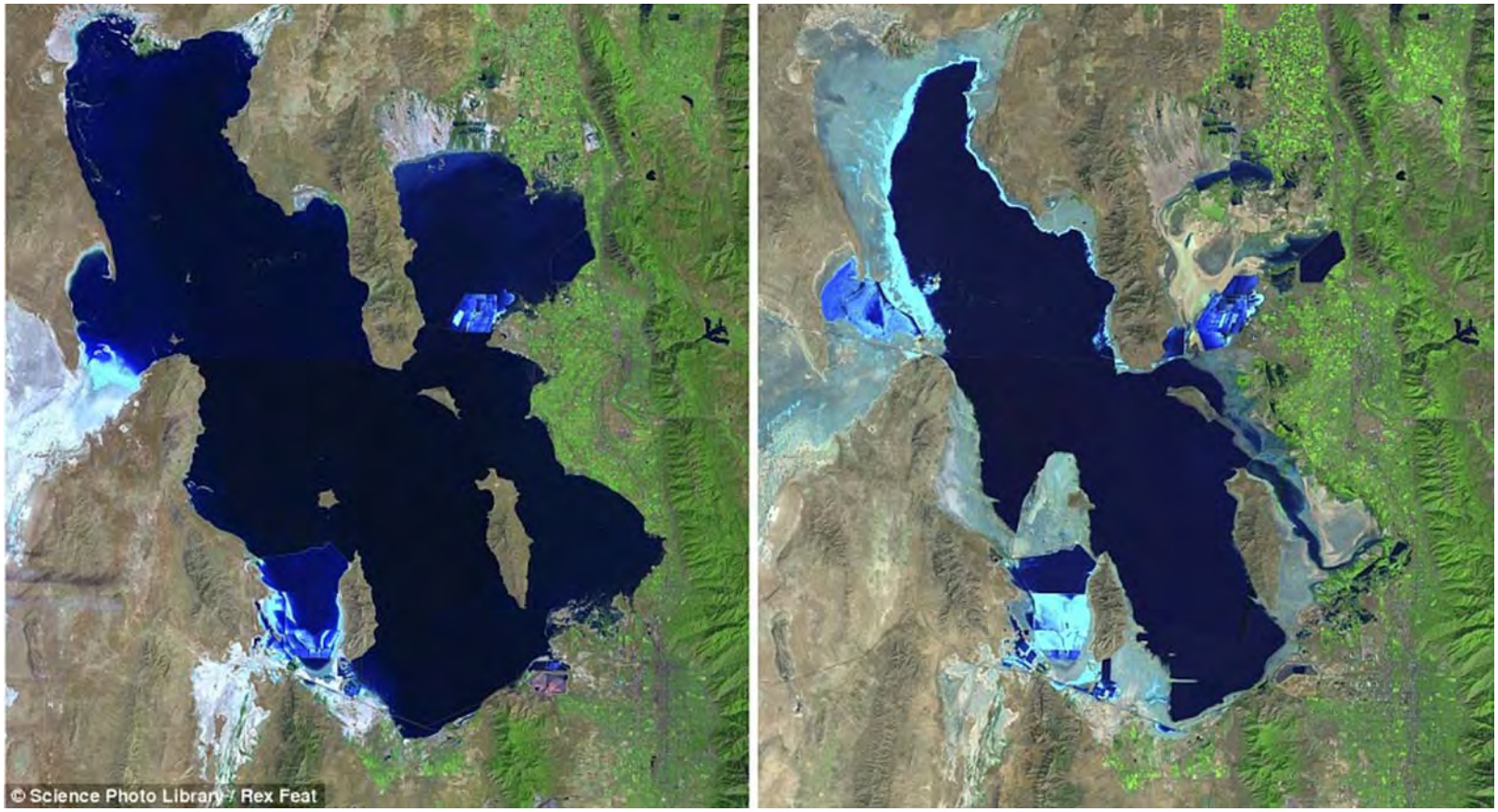


Figure 1. Map of Great Salt Lake and notable features associated with the lake important to water-bird life.

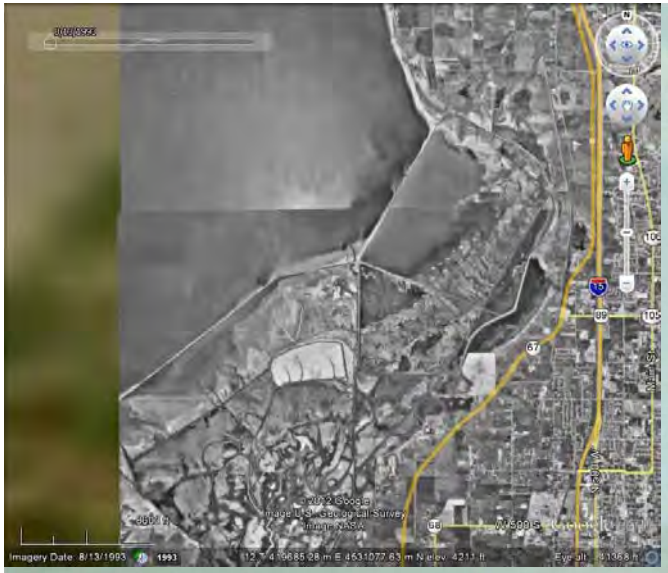
Aldrich & Paul 2001



Avg. depth 4m
Highly dynamic shoreline

Phragmites in Utah

First herbarium record = 1993
Receding flood waters?

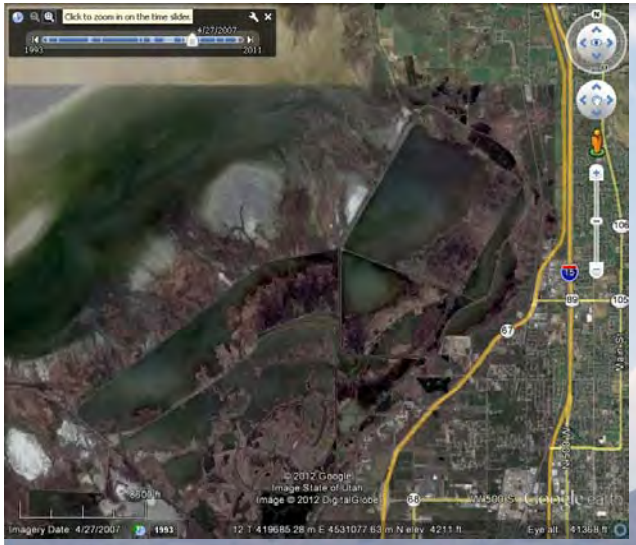


Below the dike at Farmington Bay WMA

2003

Zero acres of Phragmites

Provided by Randy Berger UDWR



Below the dike at Farmington Bay WMA

2008

Estimate from Google Earth photo

1900 acres

2010 estimated at 2600 acres

Provided by Randy Berger UDWR


Great Salt Lake *Phragmites*
Invaded over 26,000 acres
(Long et al. 2012)

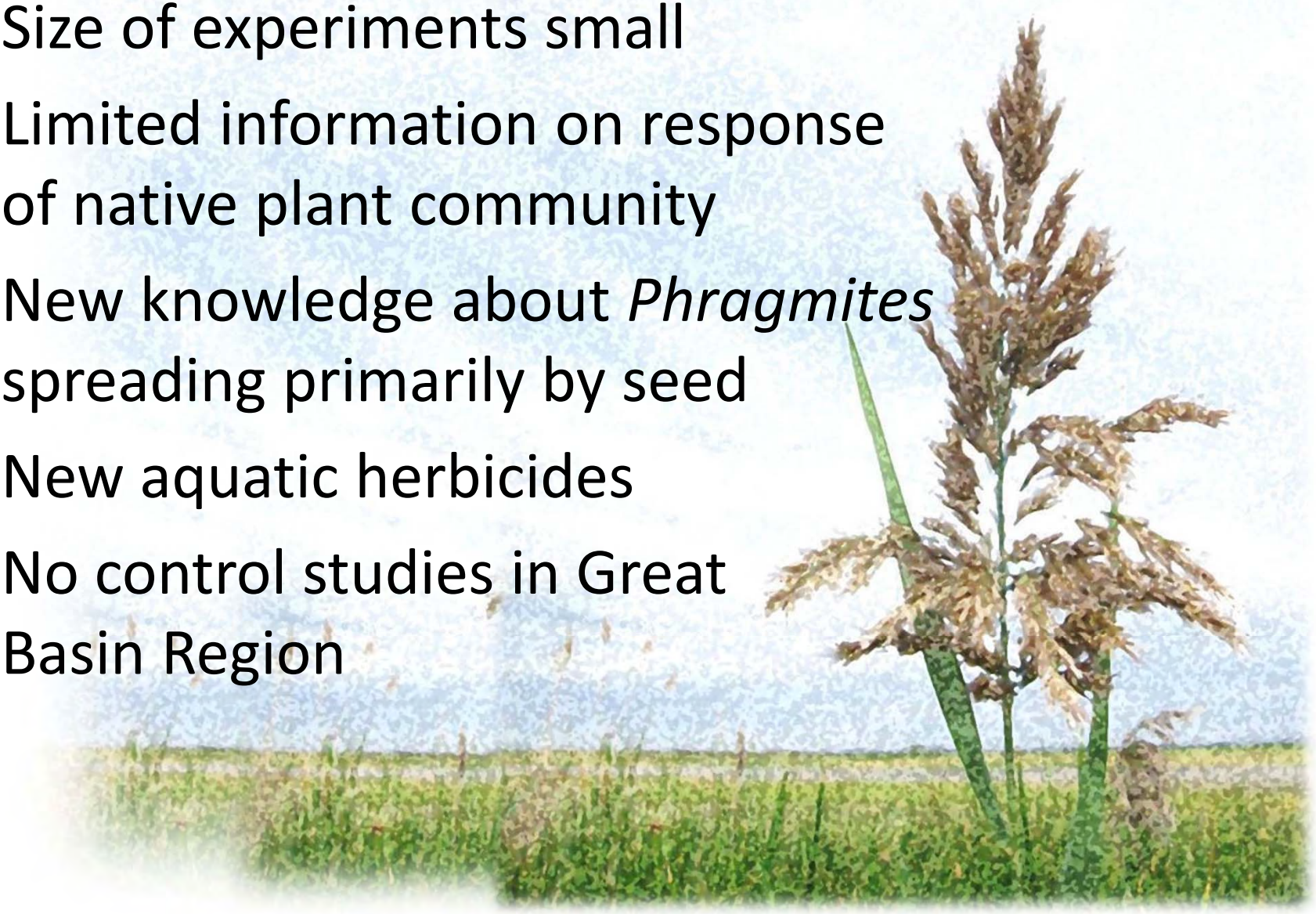
Variety of Techniques

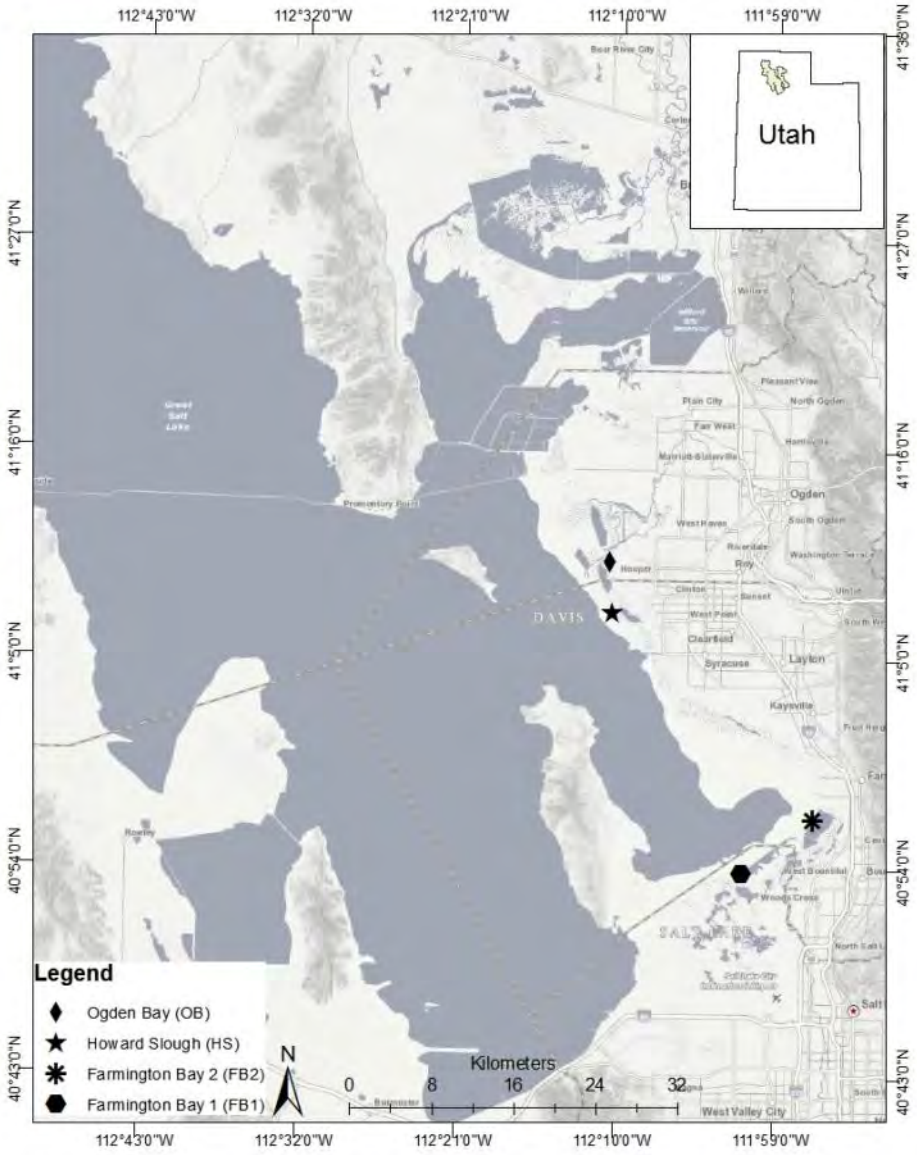
- Mowing
- Fire
- Grazing
- Herbicides
  - 97% of managers in Utah (Kettenring et al 2011)

Phragmites Control Studies

Research limitations & knowledge gaps

1. Size of experiments small
2. Limited information on response of native plant community
3. New knowledge about *Phragmites* spreading primarily by seed
4. New aquatic herbicides
5. No control studies in Great Basin Region




112°43'0"W
112°32'0"W
112°21'0"W
112°10'0"W
111°59'0"W
41°38'0"N
41°27'0"N
41°16'0"N
41°5'0"N
40°54'0"N
40°43'0"N
Utah
Great Salt Lake
Promontory Point
DAVIS
Ogden
Layton
Clearfield
Syracuse
Kaysville
West Bountiful
Woods Cross
SALT LAKE
West Valley City
Legend
Ogden Bay (OB)
Howard Slough (HS)
Farmington Bay 2 (FB2)
Farmington Bay 1 (FB1)
N
Kilometers
0
8
16
24
32

Phragmites treatments

Large stand study

(3 acre plots)

- Fall imazapyr, winter mow
- Summer glyphosate, winter mow
- Summer imazapyr, winter mow
- Fall glyphosate, winter mow
- Untreated control

Sequence of treatments

2012

January 2013

2013

Summer = Late June/Early July

Fall = Late August/Early September

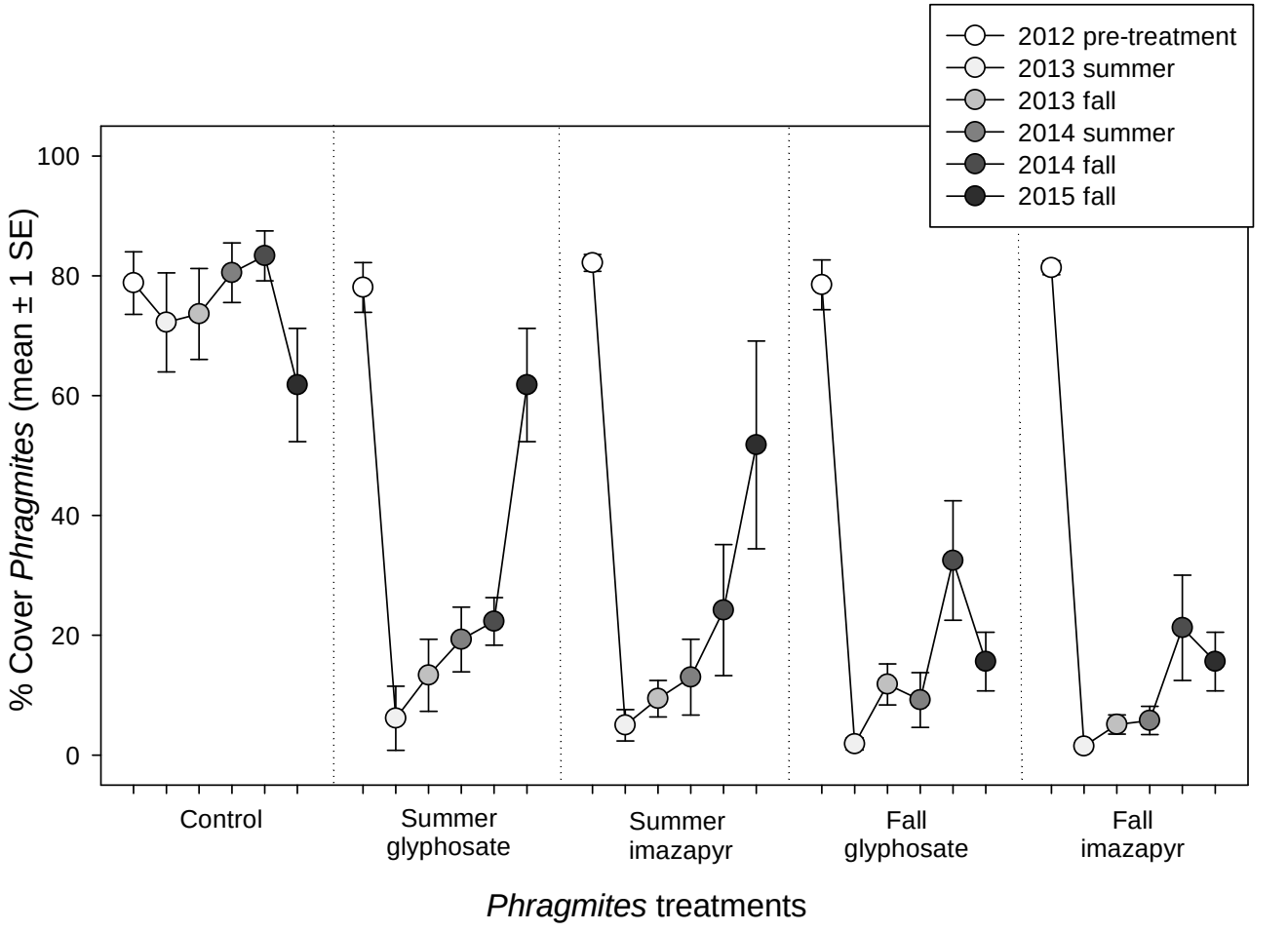
2014

January 2014

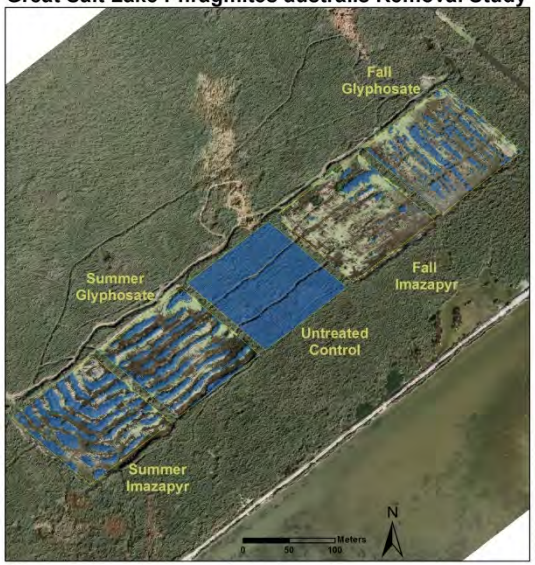

ASV


POSI-TRACK™
PT-80

How do these treatment affect *Phragmites* cover?



Great Salt Lake Phragmites australis Removal Study

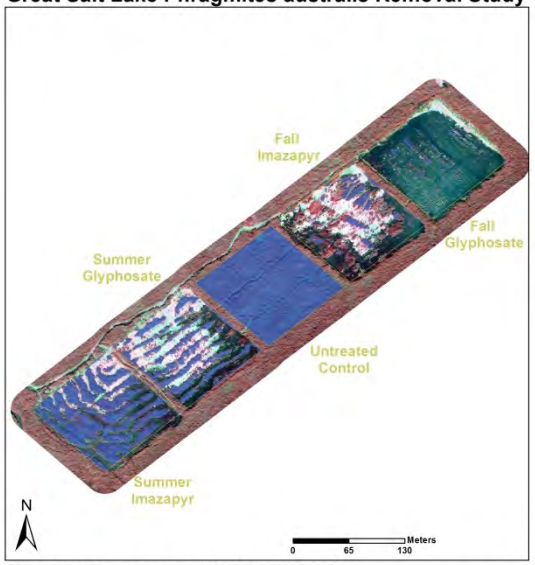


Phragmites Cover by Treatment

Site: Farmington Bay 1
Year: 2013

Map prepared by:
Eric Hazelton
Map date: December, 2015

Great Salt Lake Phragmites australis Removal Study

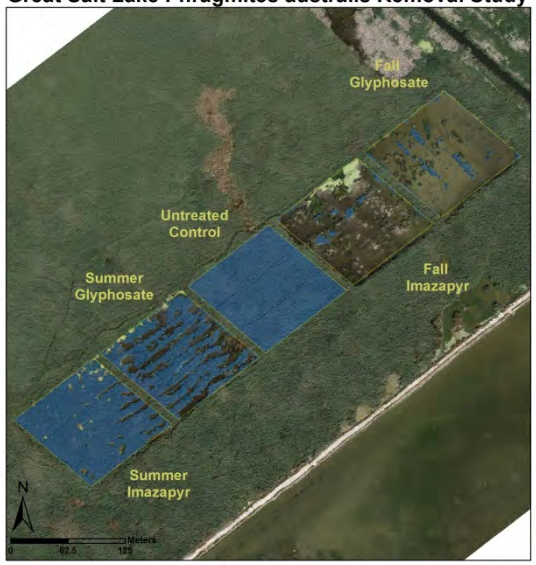


Phragmites Cover by Treatment

Site: Farmington Bay 1
Year: 2014

Map prepared by:
Eric Hazelton
Map date: December, 2015

Great Salt Lake Phragmites australis Removal Study

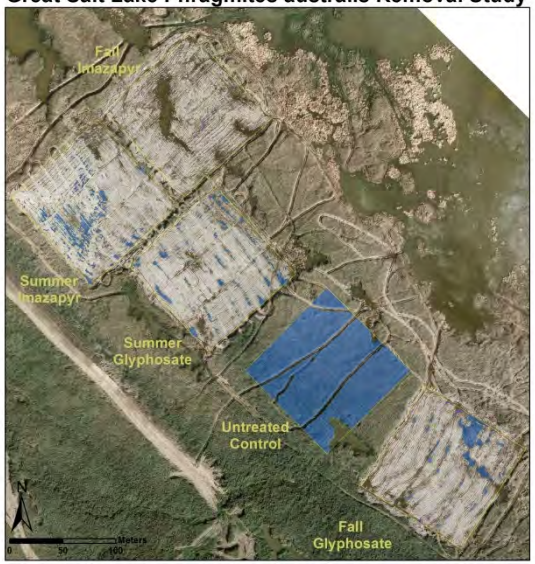


Phragmites Cover by Treatment

Site: Farmington Bay 1
Year: 2015

Map prepared by:
Eric Hazelton
Map date: December, 2015

Great Salt Lake Phragmites australis Removal Study

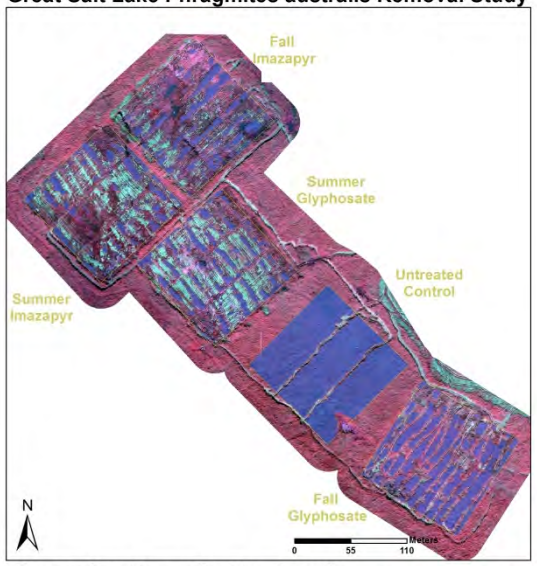


Phragmites Cover by Treatment

Site: Farmington Bay 2
Year: 2013

Map prepared by:
Eric Hazelton
Map date: December, 2015

Great Salt Lake Phragmites australis Removal Study



Phragmites Cover by Treatment

Site: Farmington Bay 2
Year: 2014

Map prepared by:
Eric Hazelton
Map date: December, 2015

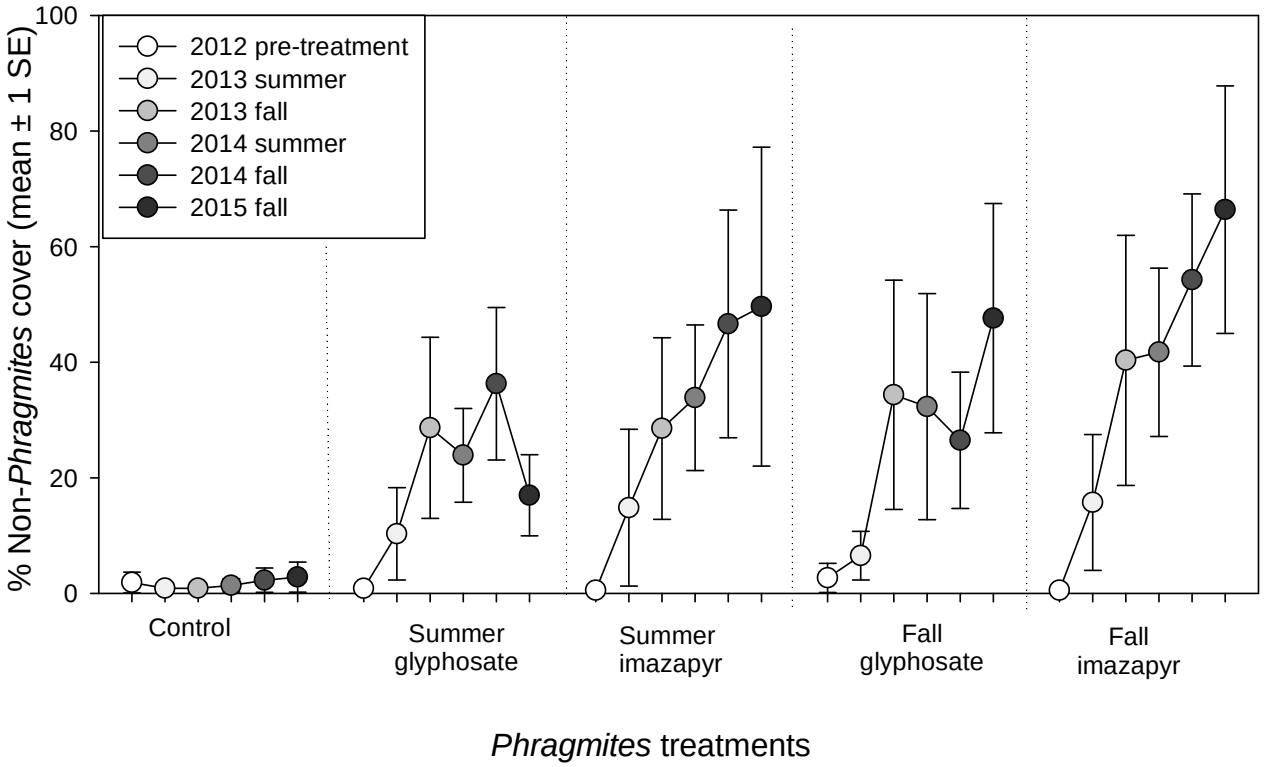
Great Salt Lake Phragmites australis Removal Study

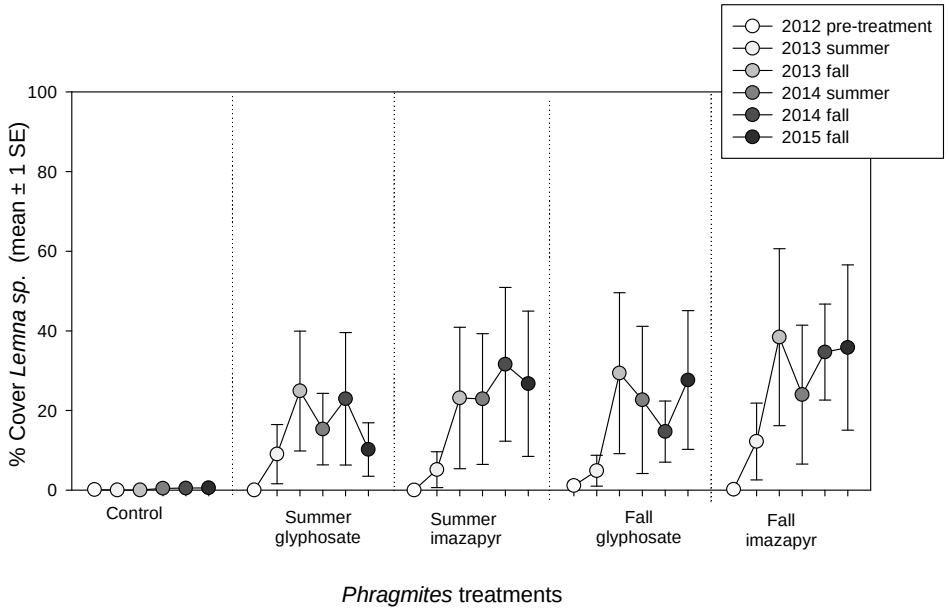
Phragmites Cover by Treatment

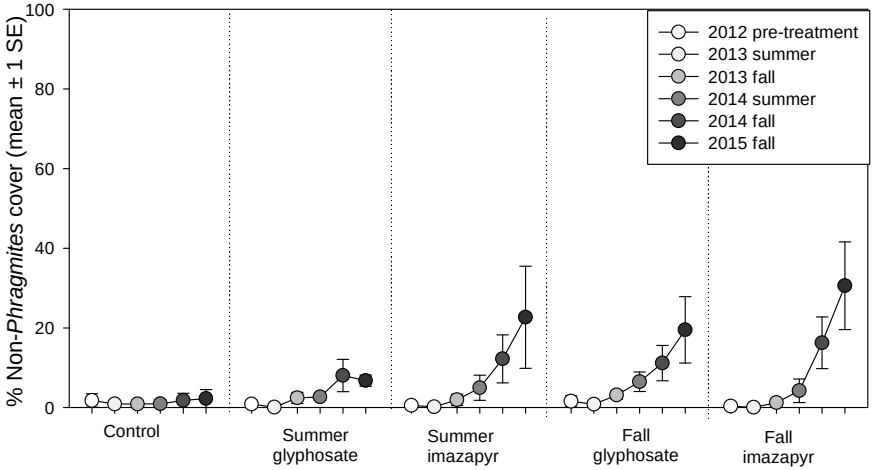
Site: Farmington Bay2
Year: 2015

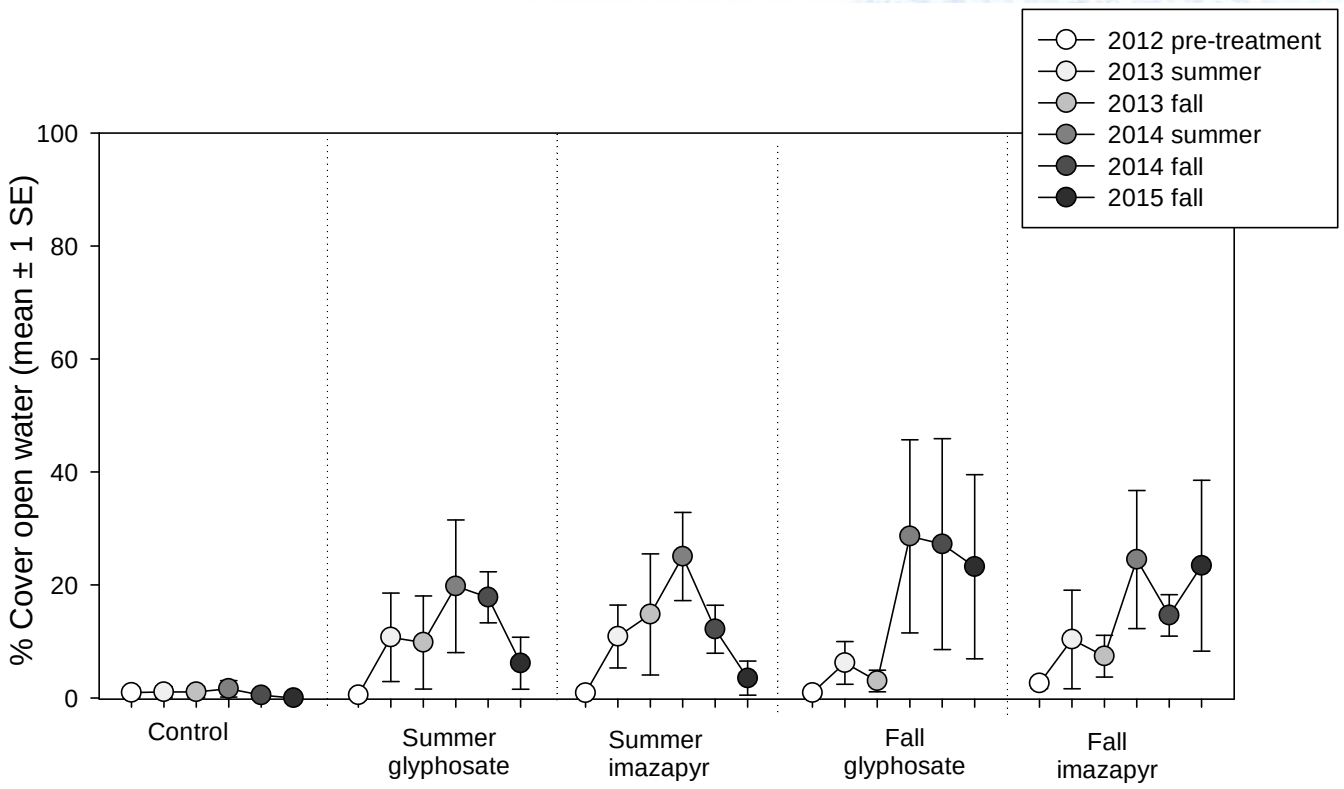
Map prepared by:
Eric Hazelton
Map date: December, 2015

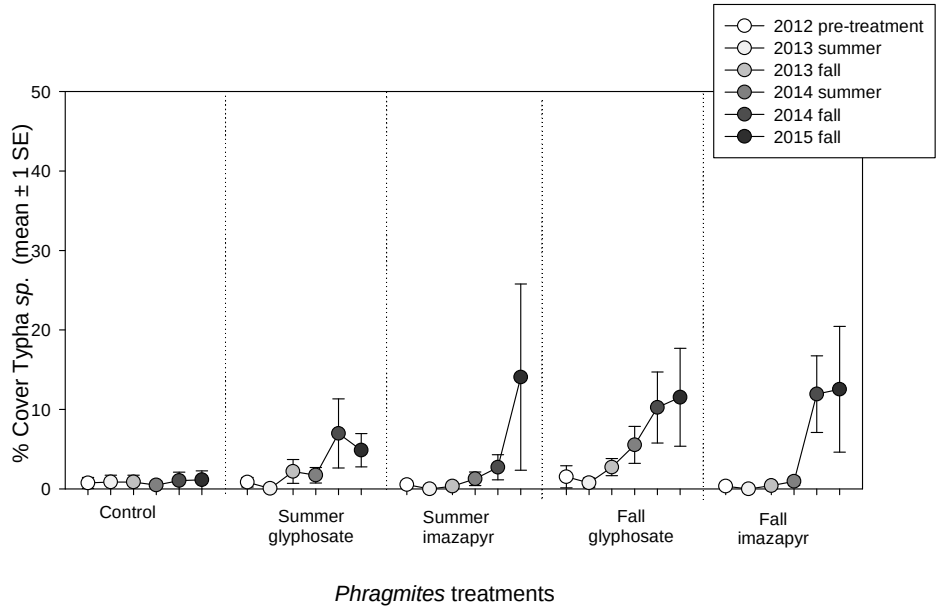
How do these treatment affect non-*Phragmites* cover?

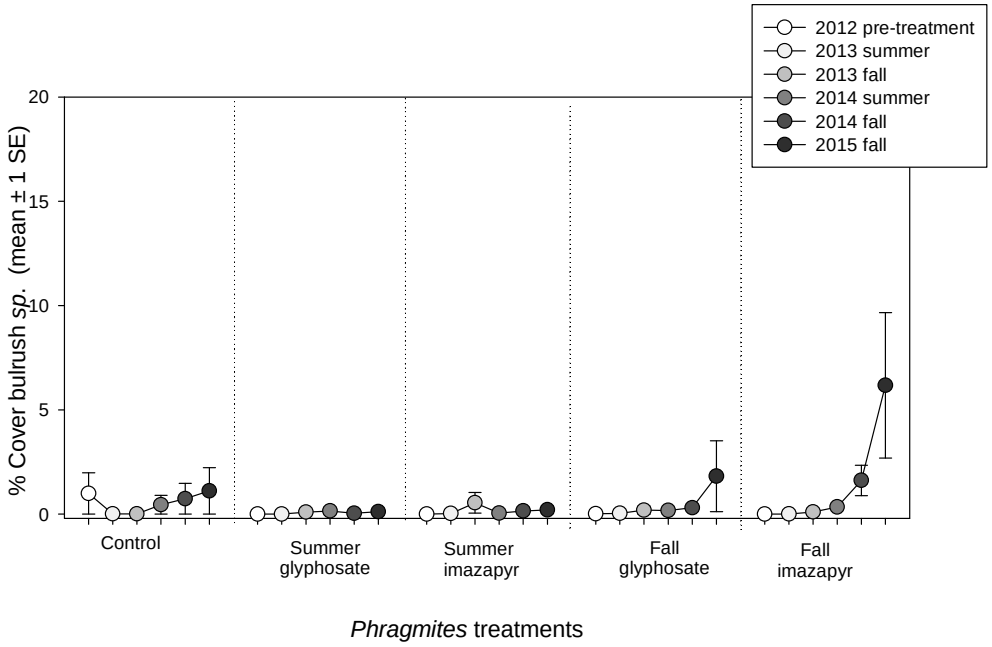



2012 pre-treatment
2013 summer
2013 fall
2014 summer
2014 fall
2015 fall
% Cover *Lemna sp.* (mean ± 1 SE)
100
80
60
40
20
0
Control
Summer glyphosate
Summer imazapyr
Fall glyphosate
Fall imazapyr
Phragmites treatments

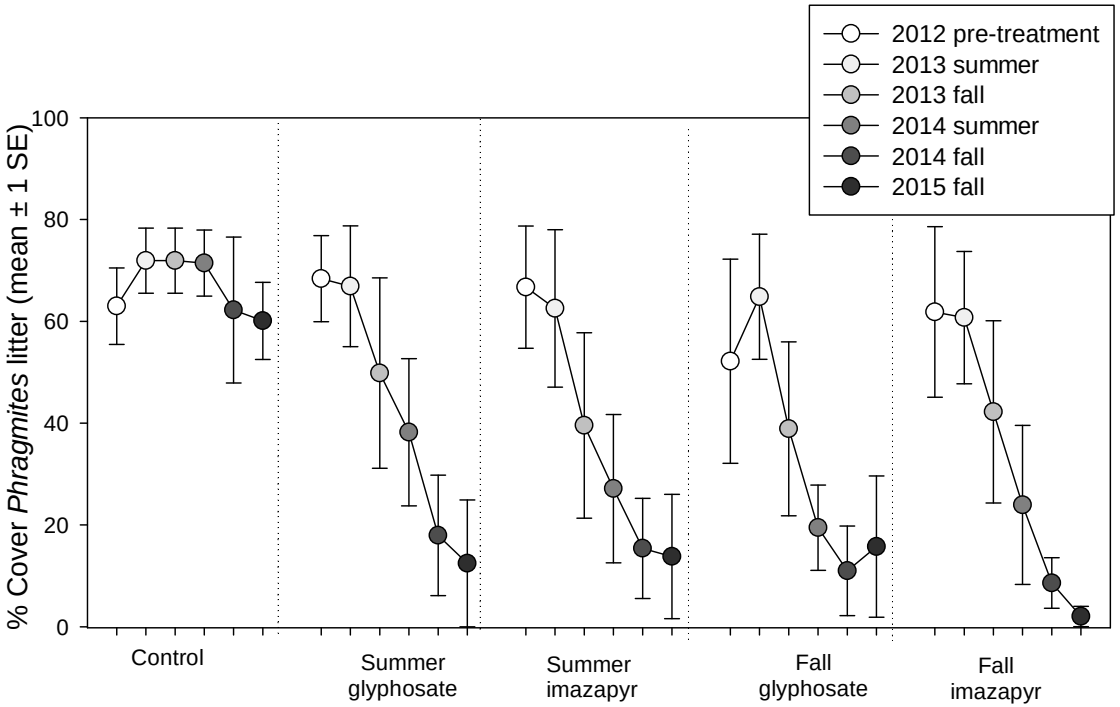

2012 pre-treatment
2013 summer
2013 fall
2014 summer
2014 fall
2015 fall
% Non-*Phragmites* cover (mean ± 1 SE)
100
80
60
40
20
0
Control
Summer glyphosate
Summer imazapyr
Fall glyphosate
Fall imazapyr
Phragmites treatments


2012 pre-treatment
2013 summer
2013 fall
2014 summer
2014 fall
2015 fall
% Cover open water (mean ± 1 SE)
100
80
60
40
20
0
Control
Summer glyphosate
Summer imazapyr
Fall glyphosate
Fall imazapyr
Phragmites treatments


2012 pre-treatment
2013 summer
2013 fall
2014 summer
2014 fall
2015 fall
% Cover Typha sp. (mean ± 1 SE)
50
40
30
20
10
0
Control
Summer glyphosate
Summer imazapyr
Fall glyphosate
Fall imazapyr
Phragmites treatments

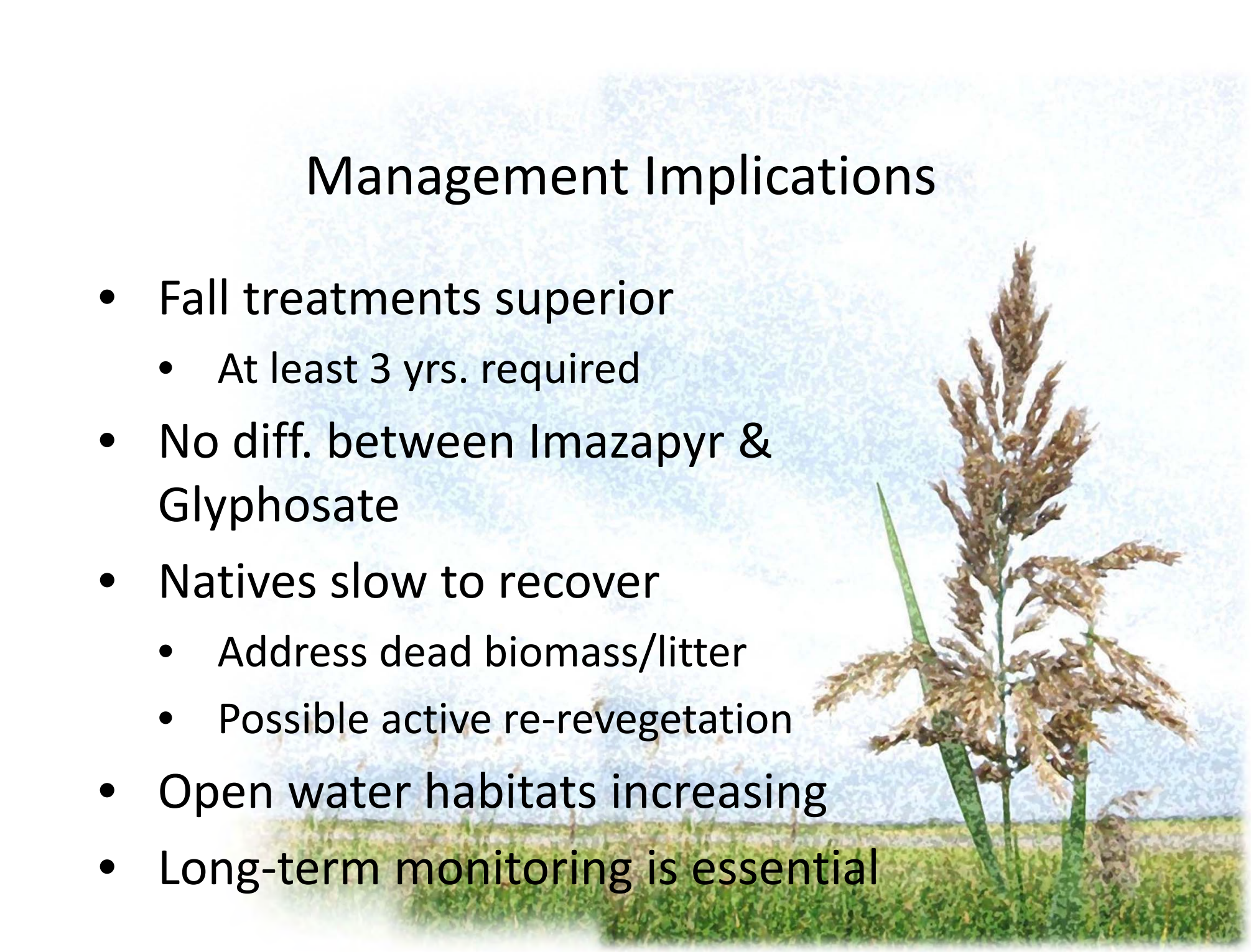

2012 pre-treatment
2013 summer
2013 fall
2014 summer
2014 fall
2015 fall
% Cover bulrush sp. (mean ± 1 SE)
20
15
10
5
0
Control
Summer glyphosate
Summer imazapyr
Fall glyphosate
Fall imazapyr
Phragmites treatments

Phragmites litter



Management Implications

- Fall treatments superior
  - At least 3 yrs. required
- No diff. between Imazapyr & Glyphosate
- Natives slow to recover
  - Address dead biomass/litter
  - Possible active re-revegetation
- Open water habitats increasing
- Long-term monitoring is essential



Small Patch Study

Why do two studies?

- Different treatments more feasible at small scales

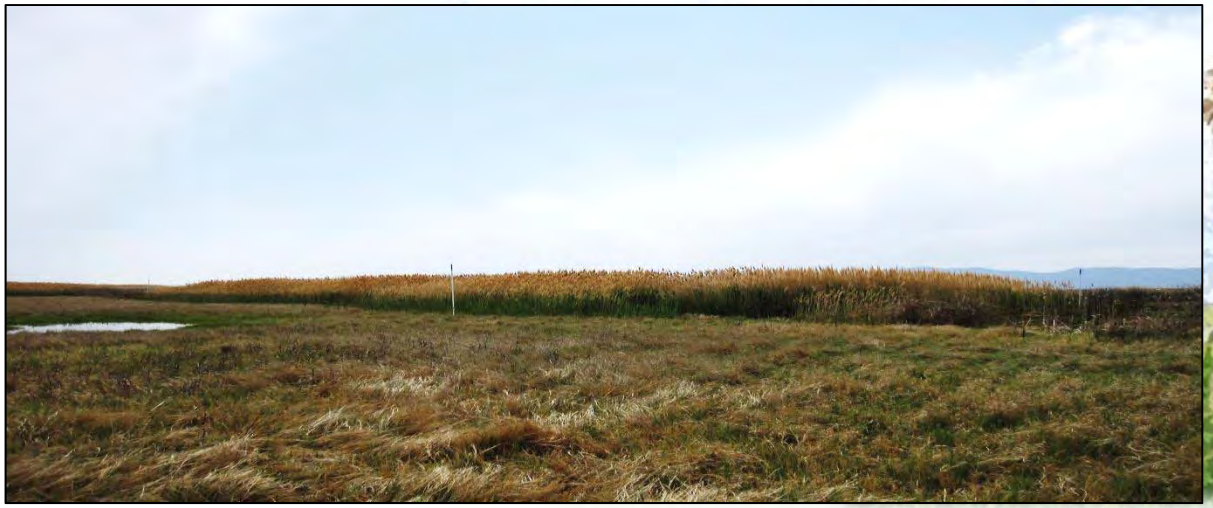
- Same treatments may work differently at smaller scales

Small Patch Study - Research Questions

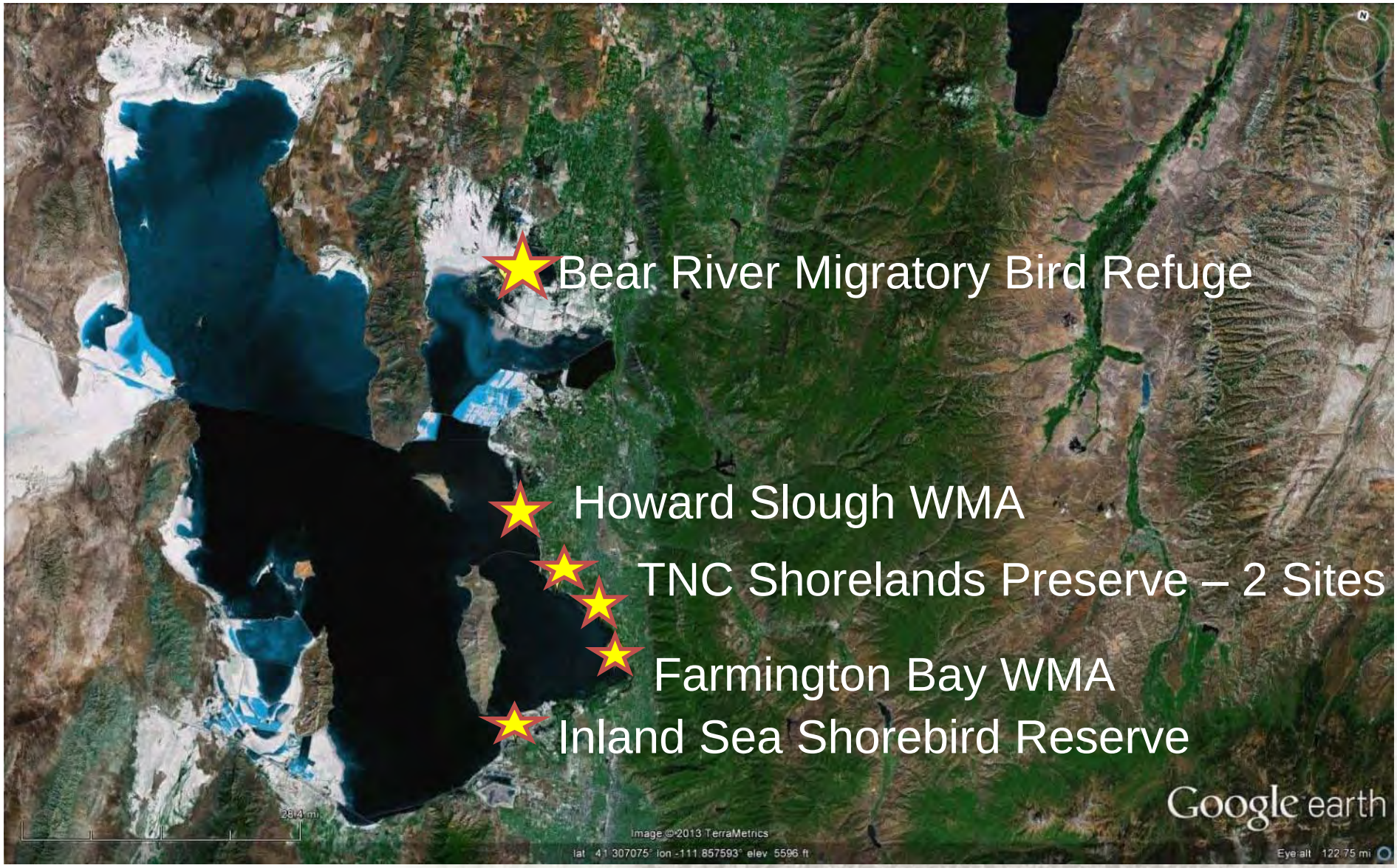
1. What are effective treatments for controlling small patches of *Phragmites*?

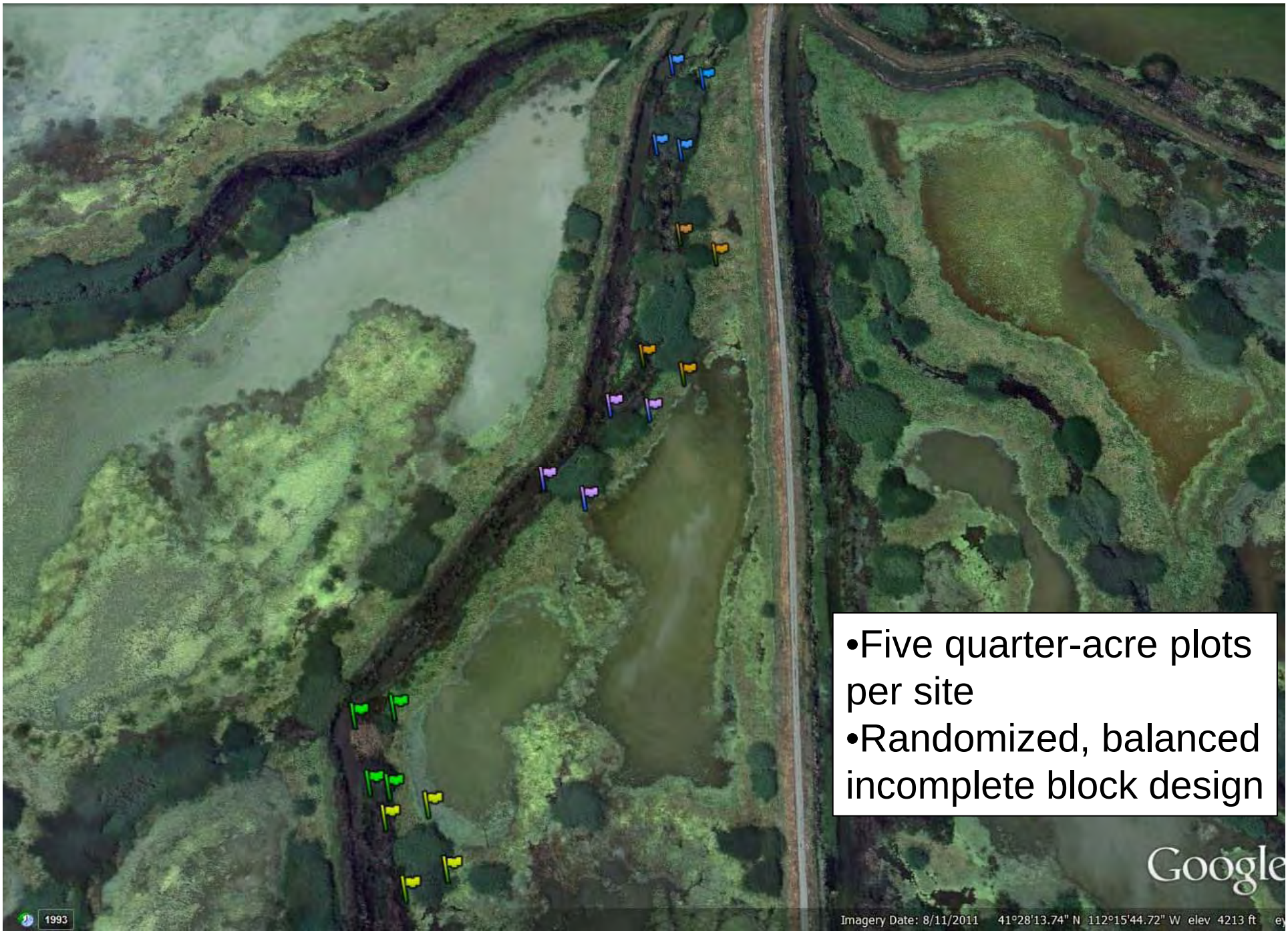
2. Which control treatments have the greatest benefit for native plant communities?

3. Which treatments are able to limit *Phragmites* seed production?



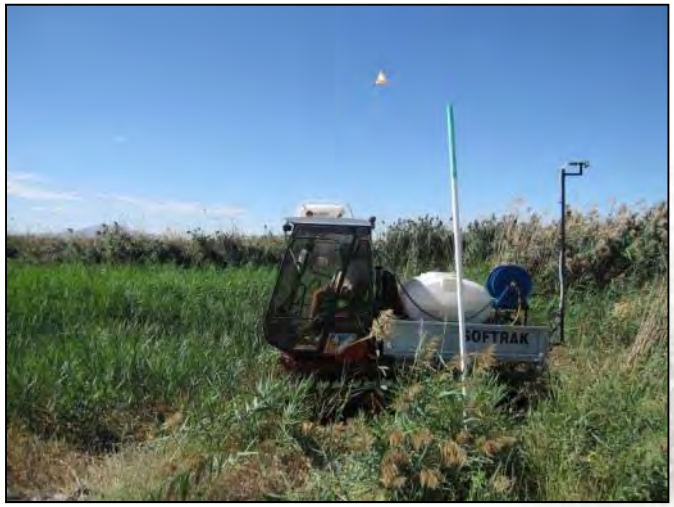
Study Area


Bear River Migratory Bird Refuge
Howard Slough WMA
TNC Shorelands Preserve – 2 Sites
Farmington Bay WMA
Inland Sea Shorebird Reserve
Google earth
28.4 mi
Image © 2013 TerraMetrics
lat 41.307075° lon -111.857593° elev 5596 ft
Eye alt 122.75 mi

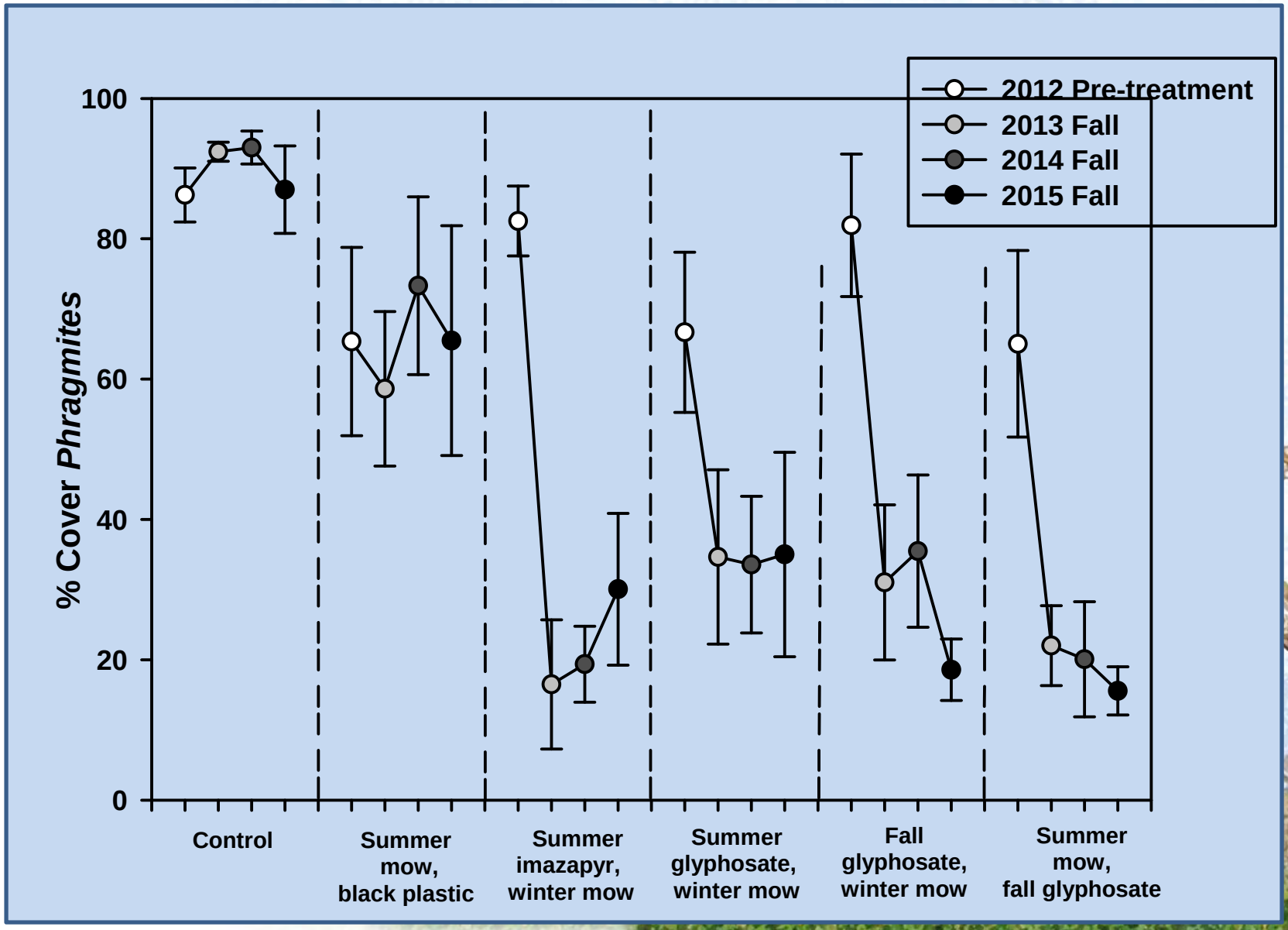

•Five quarter-acre plots per site
•Randomized, balanced incomplete block design
Google
1993
Imagery Date: 8/11/2011 41°28'13.74" N 112°15'44.72" W elev 4213 ft

Treatments

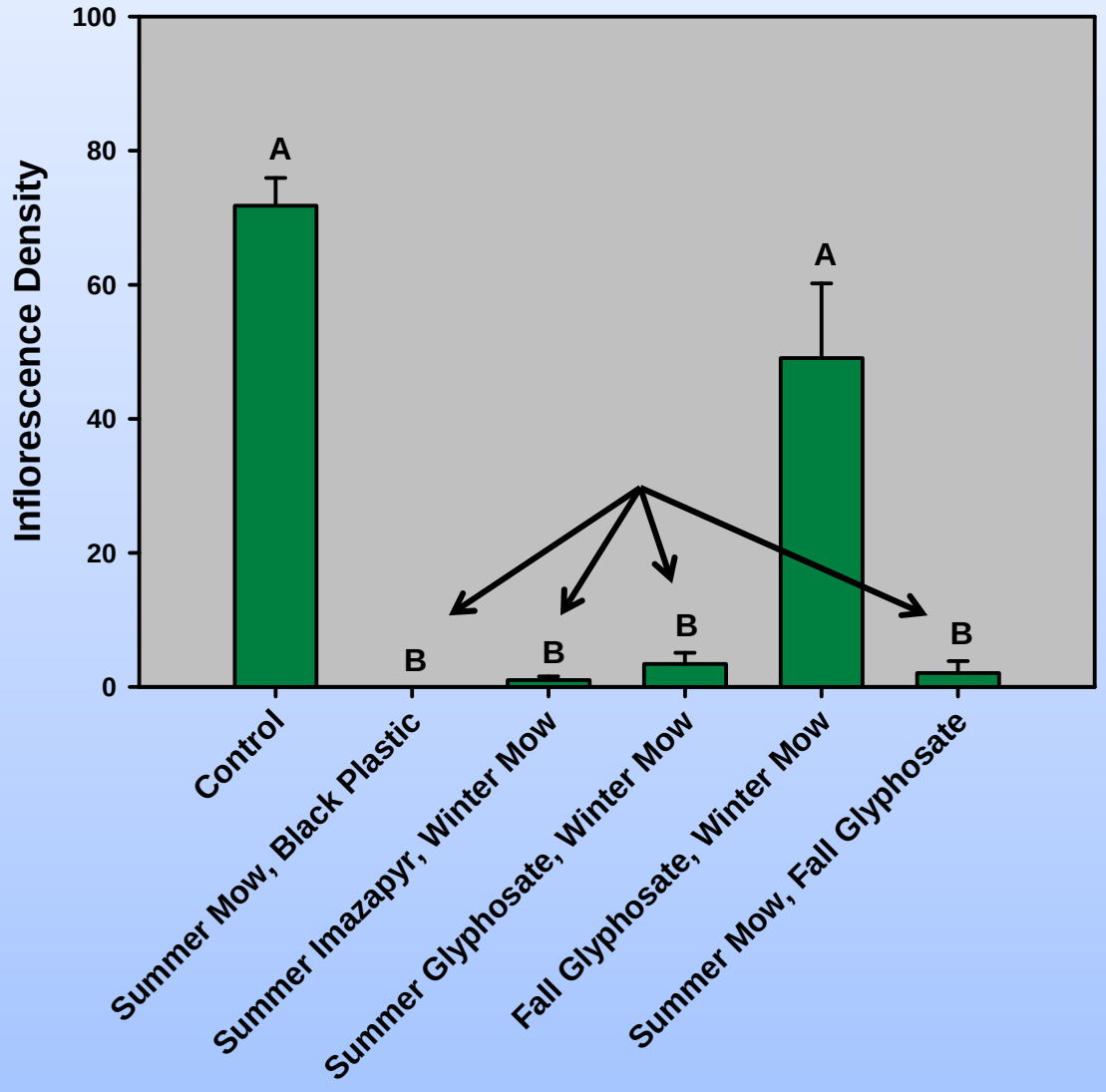
1.) Fall glyphosate spray, winter mow
2.) Summer imazapyr spray, winter mow
3.) Summer glyphosate spray, winter mow
4.) Summer mow, fall glyphosate spray
5.) Summer mow, then cover with black plastic
6.) Untreated control



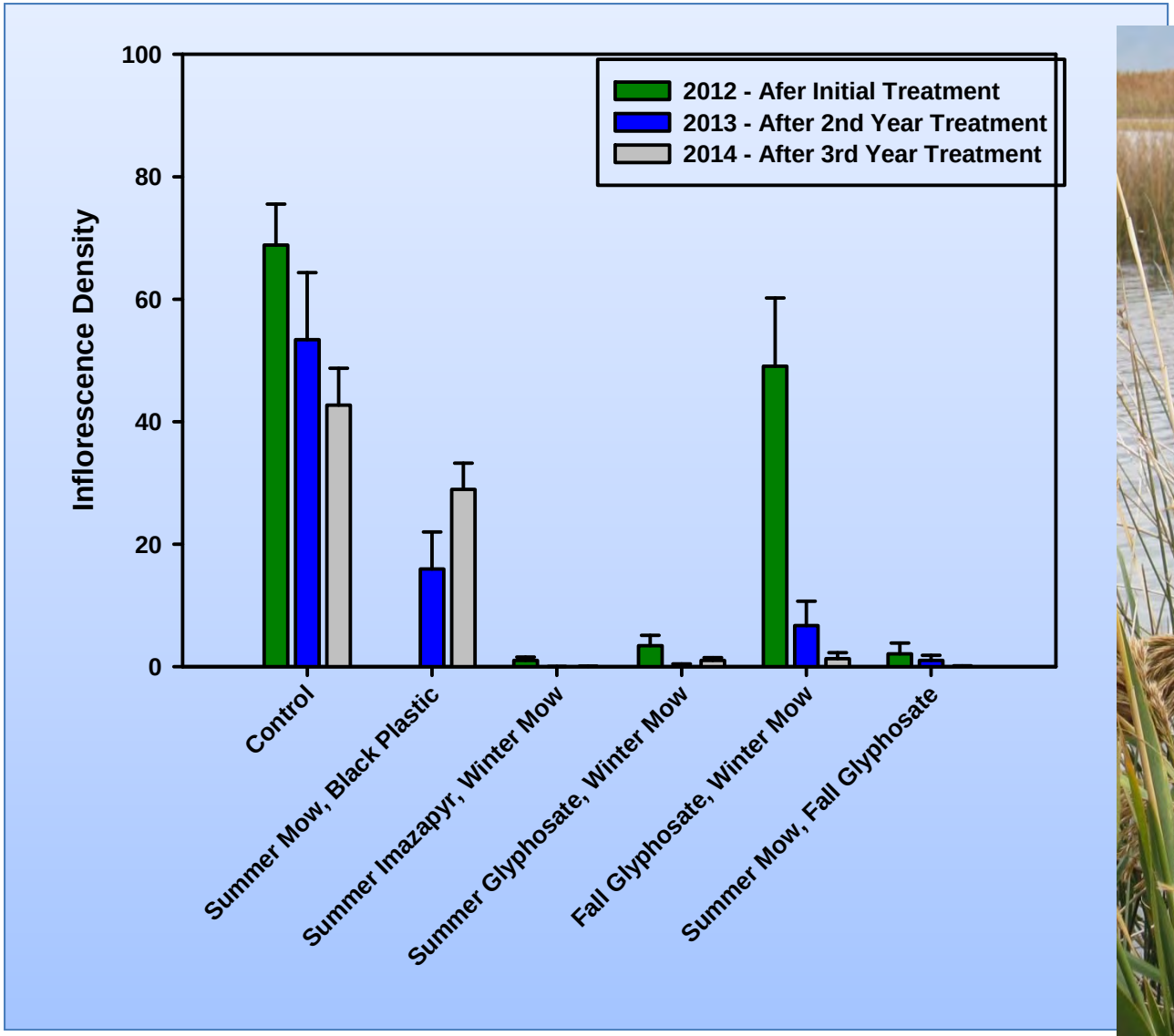
How do these treatments affect *Phragmites* cover?



Results: Summer treatments reduce *Phragmites* seeds

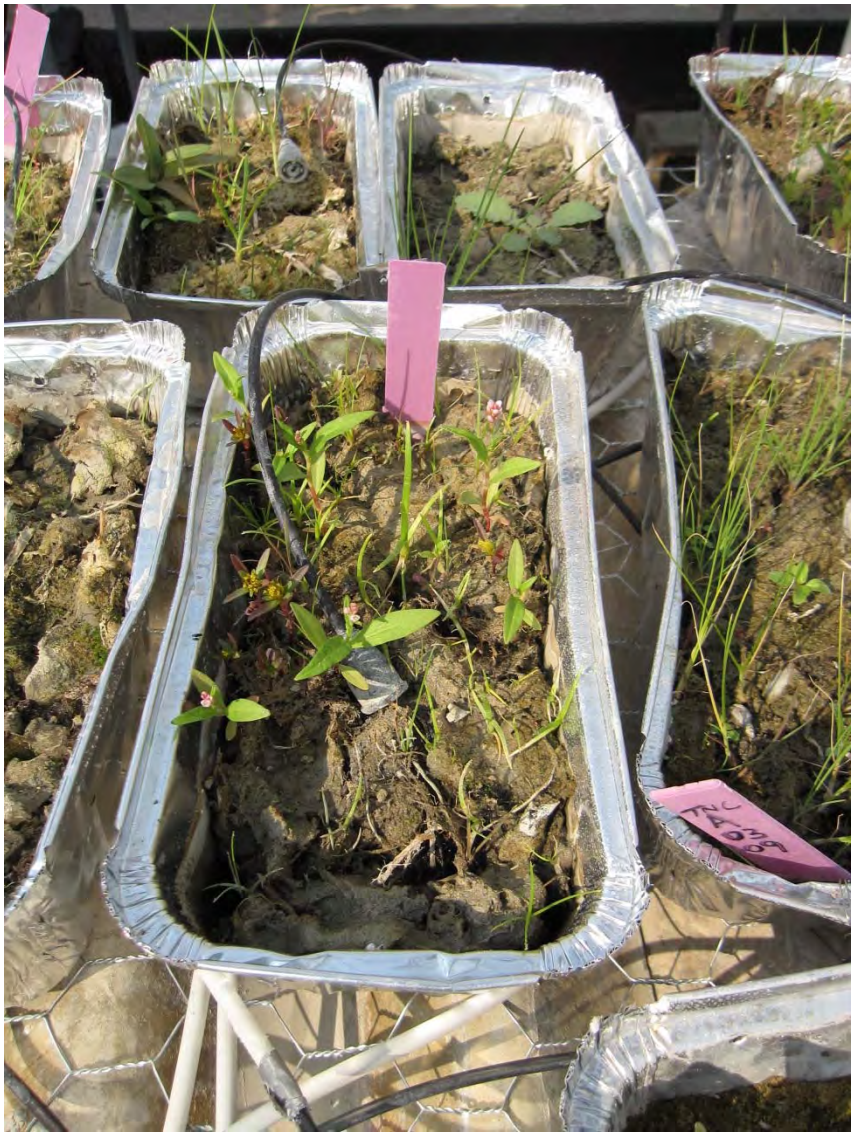


Inflorescence production minimal across **all** herbicide treatments in follow-up years

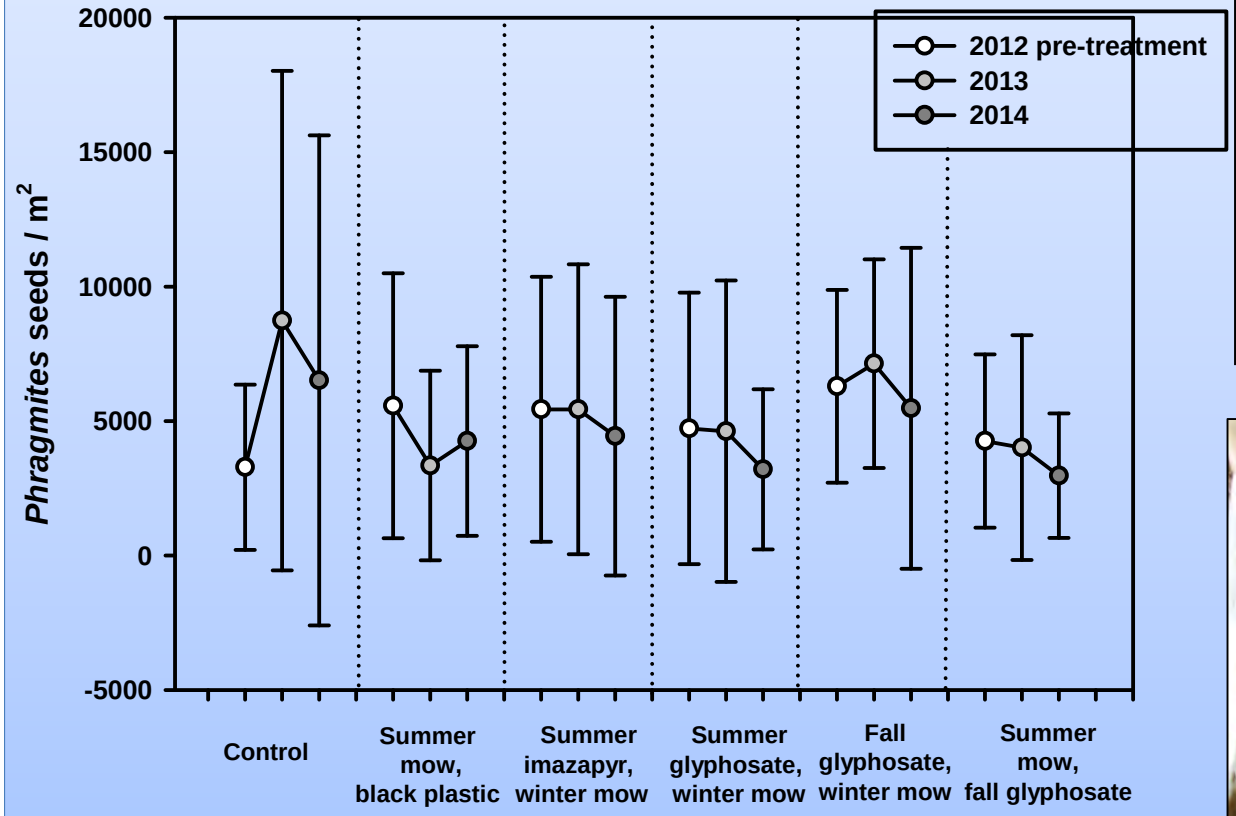


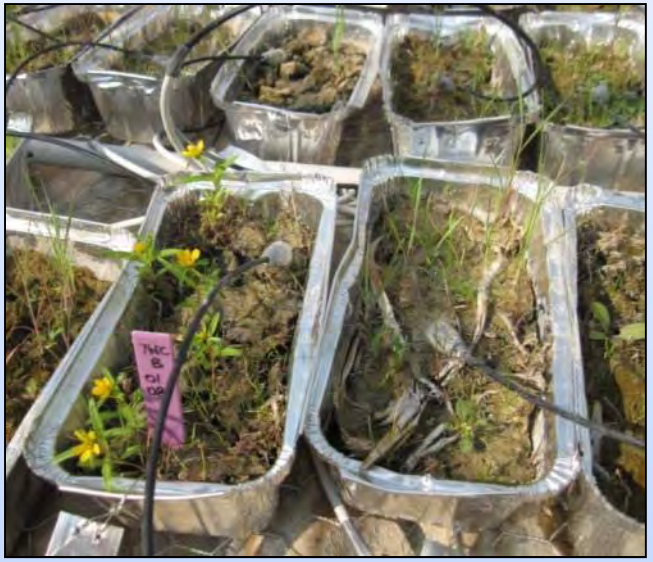
Seedbank Study

- Collect subsamples of the top 5cm of soil
- Grow out in greenhouse
- Learn changing Phragmites presence in the soil & potential for native recruitment



Phragmites in the seedbank

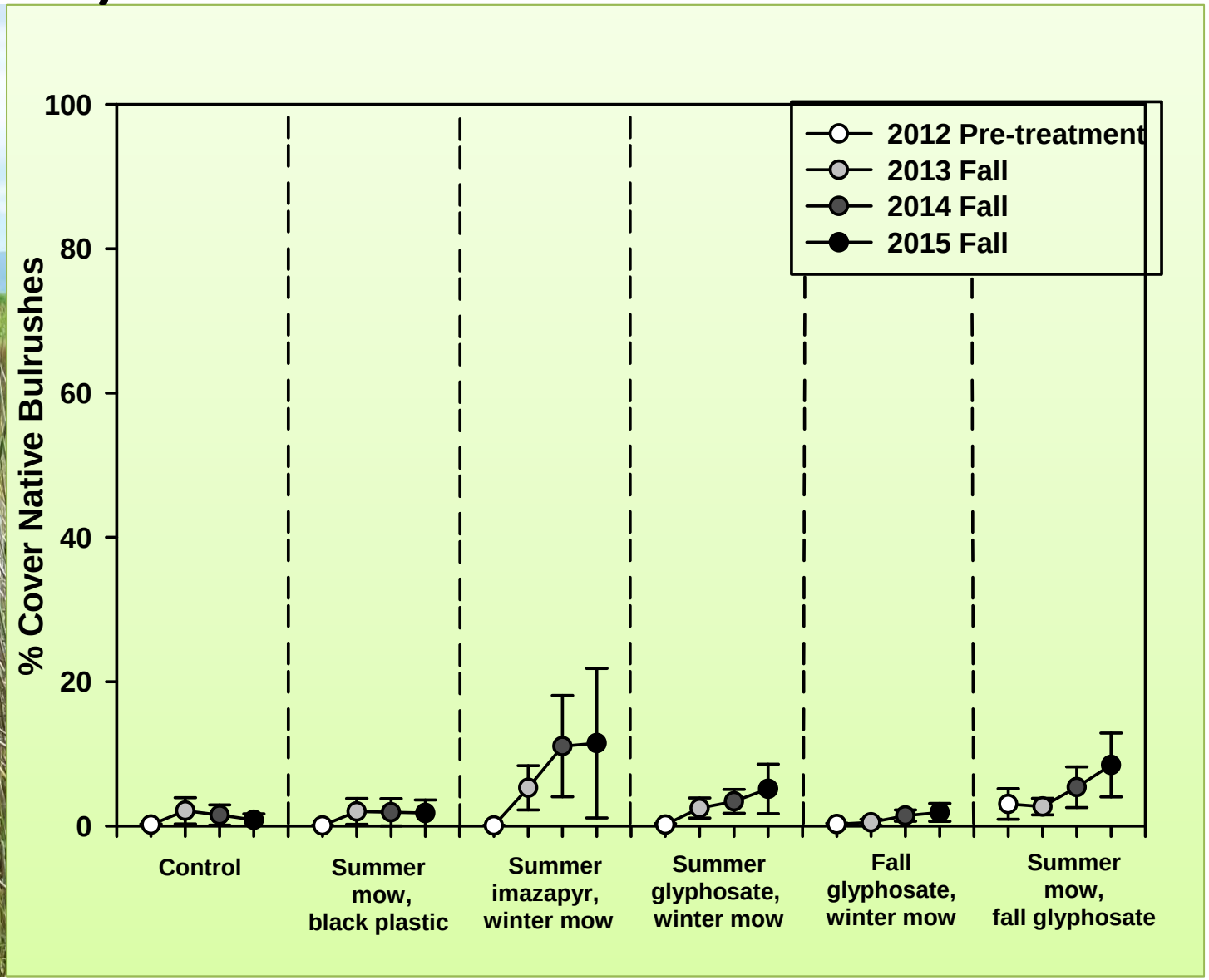




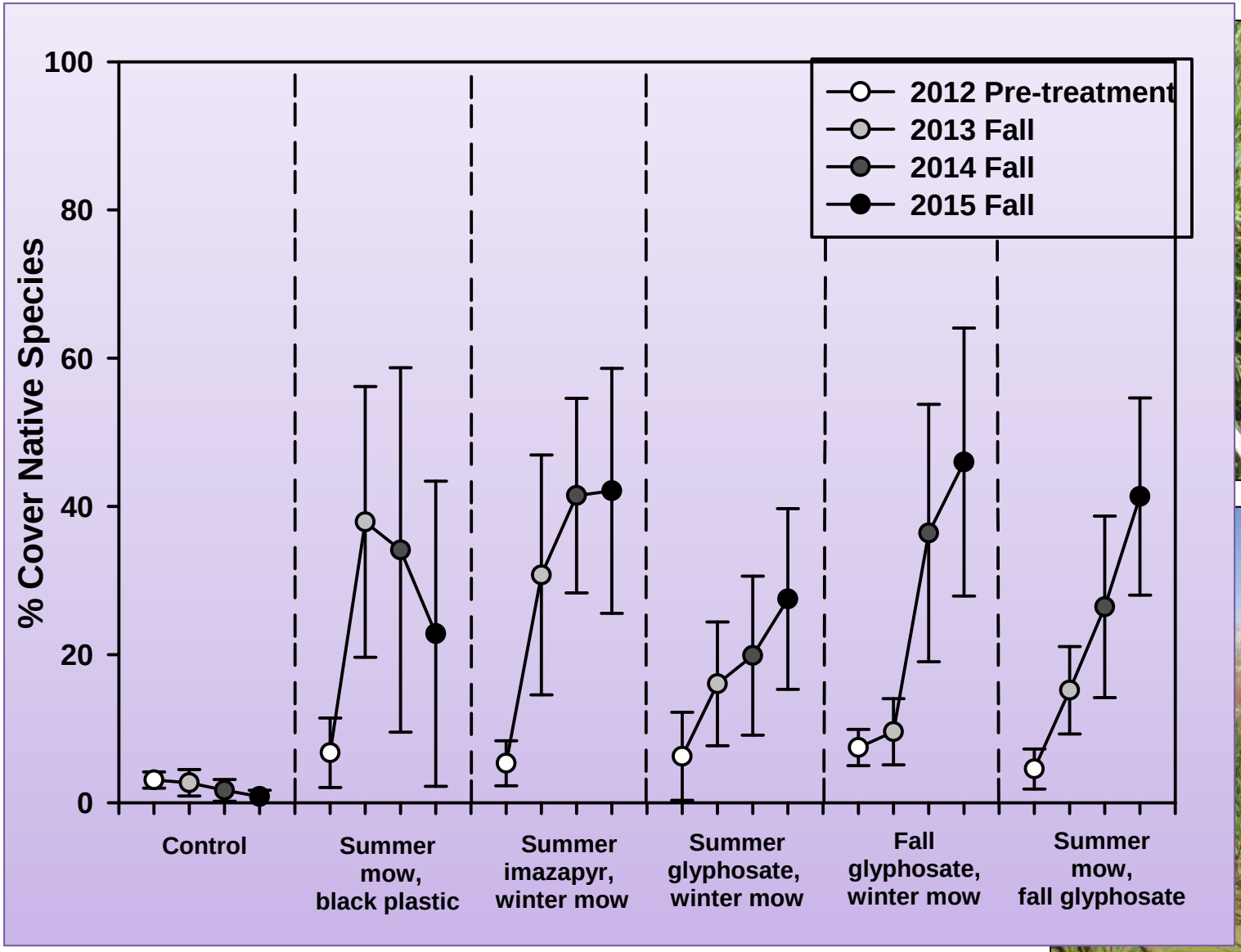
Native Species Natural Return?

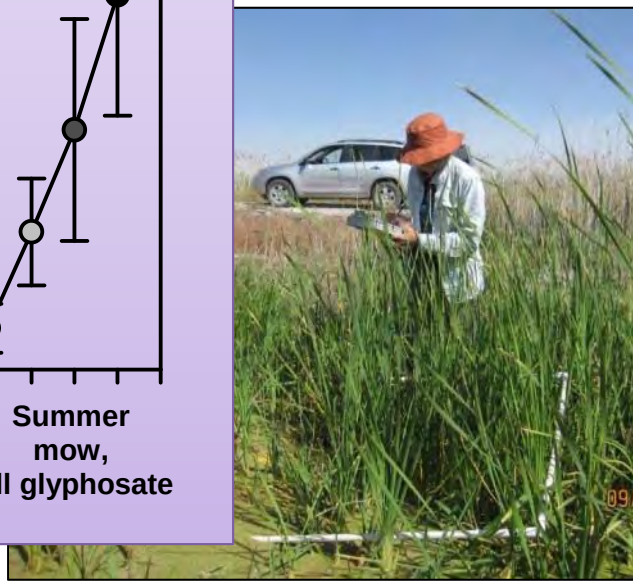
The Ideal - Bulrushes

Low recovery of “ideals” across treatments

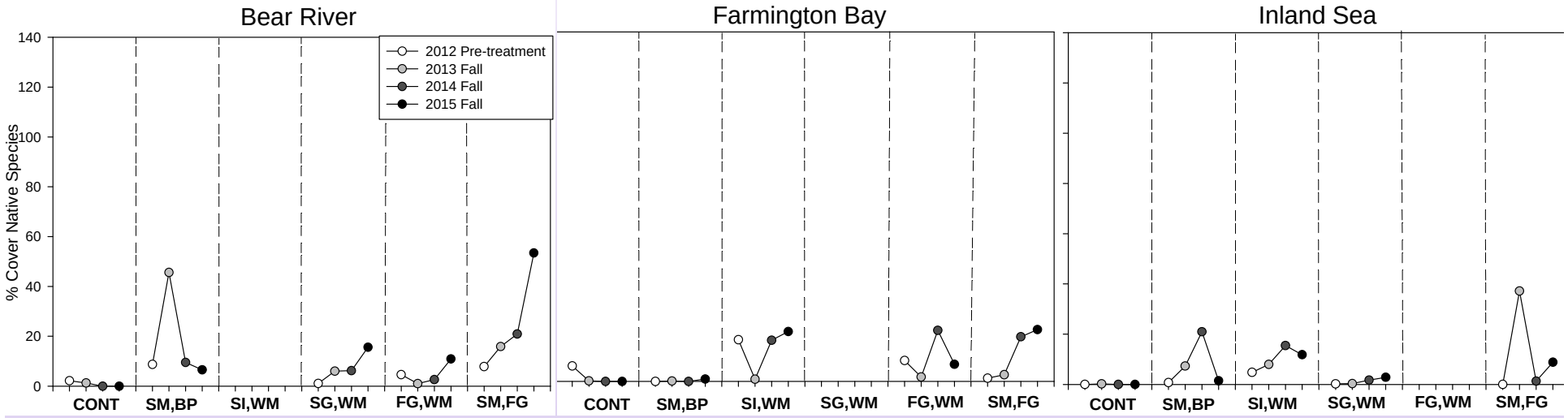


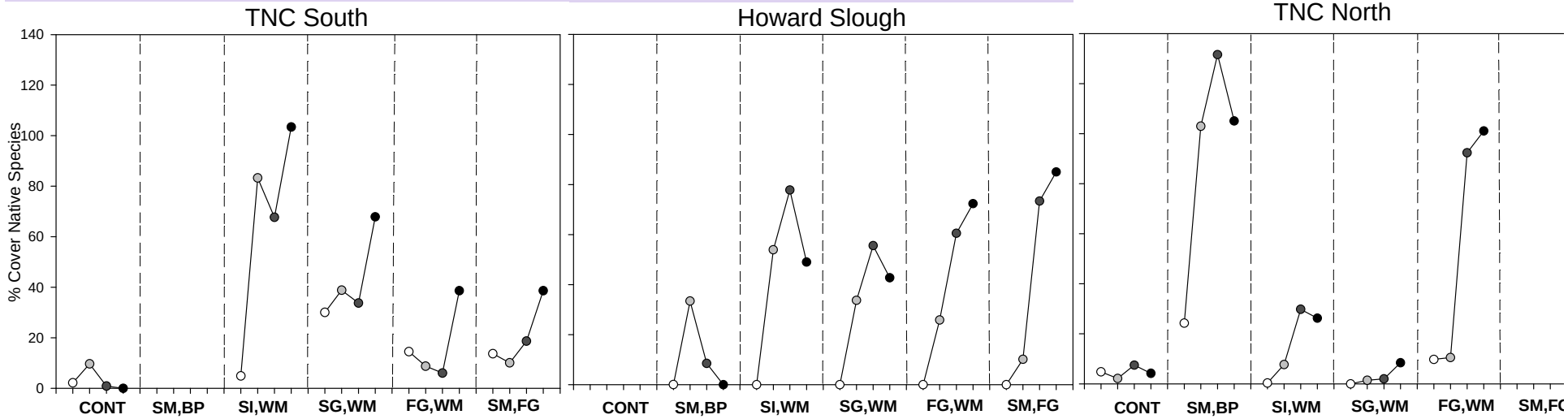
Native cover does not differ by treatment



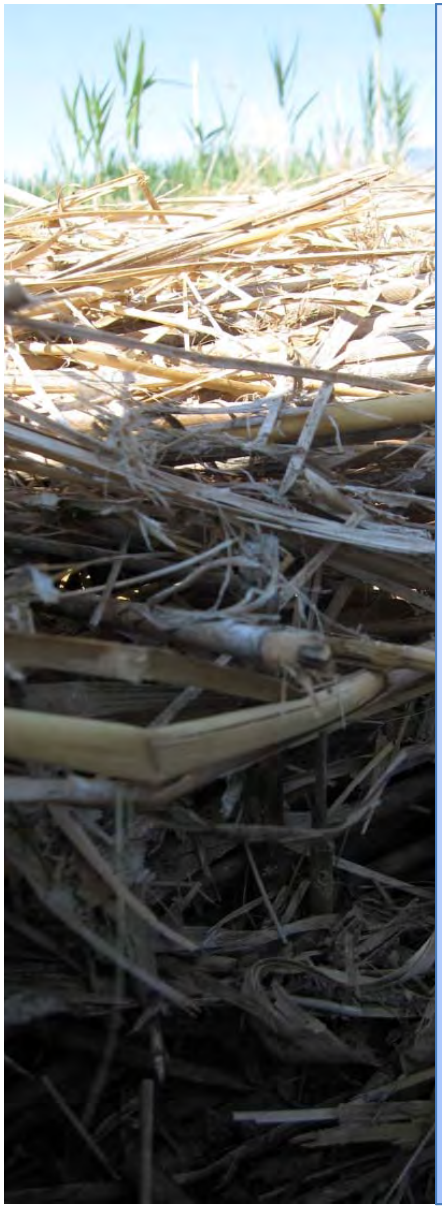


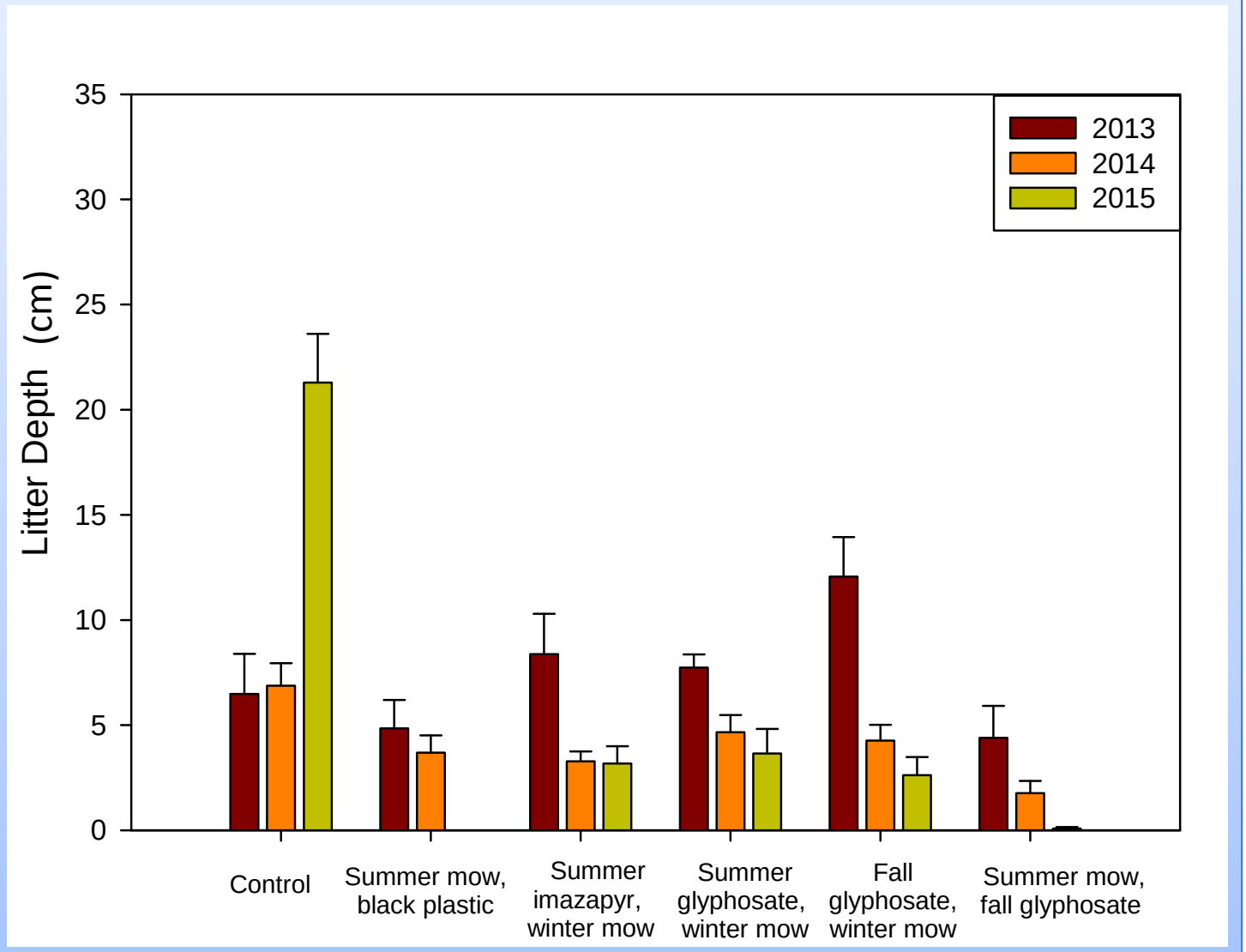
Native plant cover differs by site



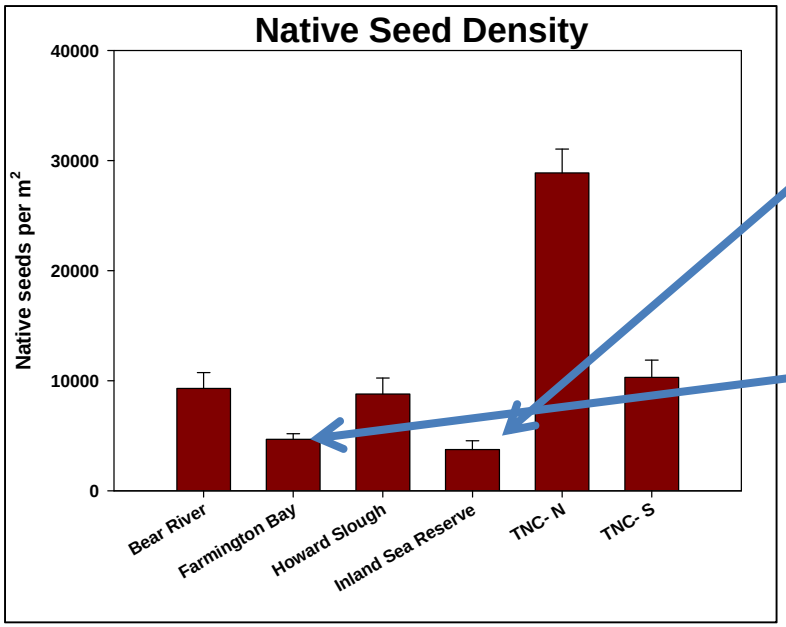


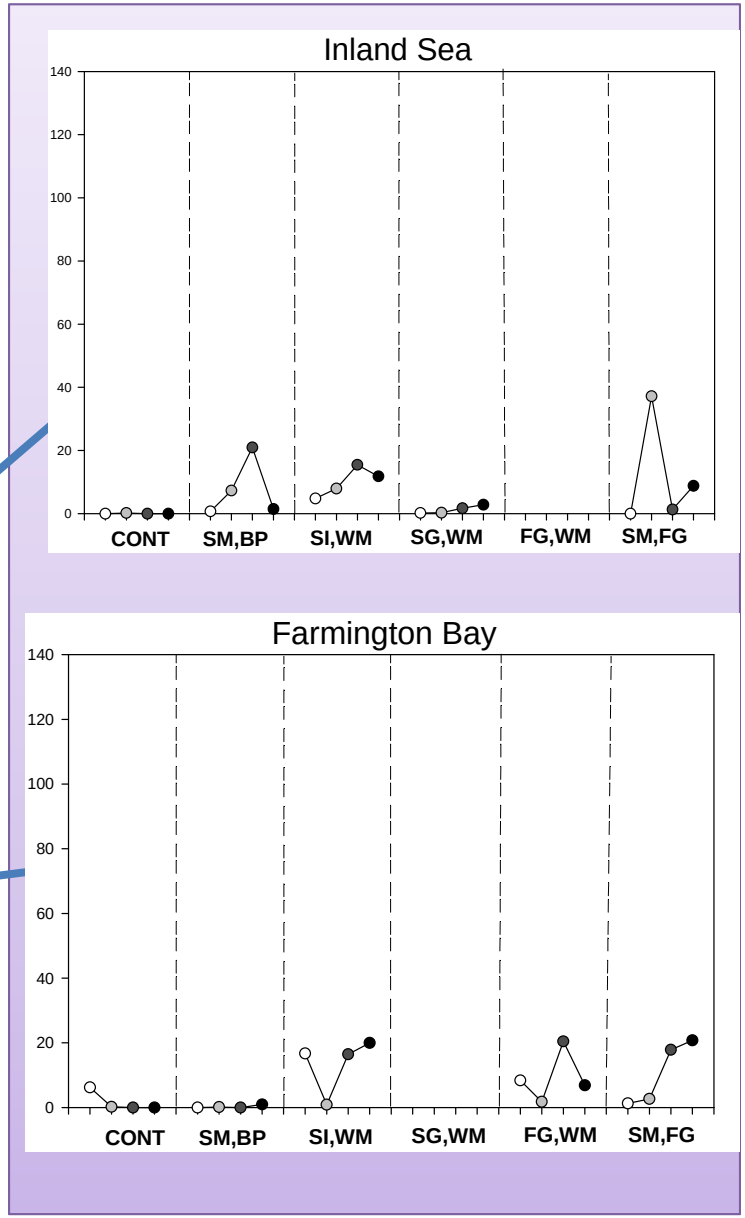
Depth of litter limits quick recruitment





Low native density in seedbank → low recovery



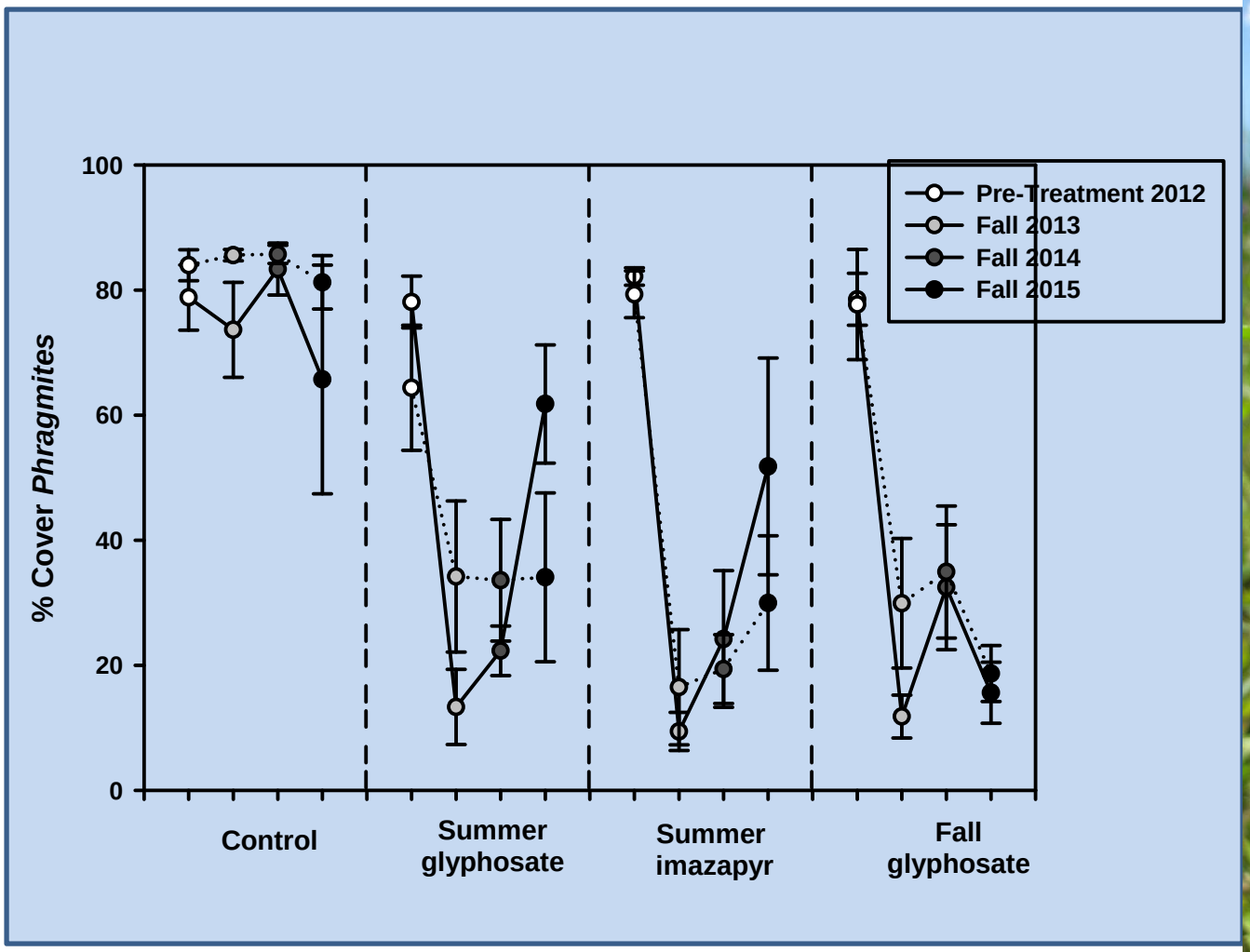


Hydrology major driver of native recovery

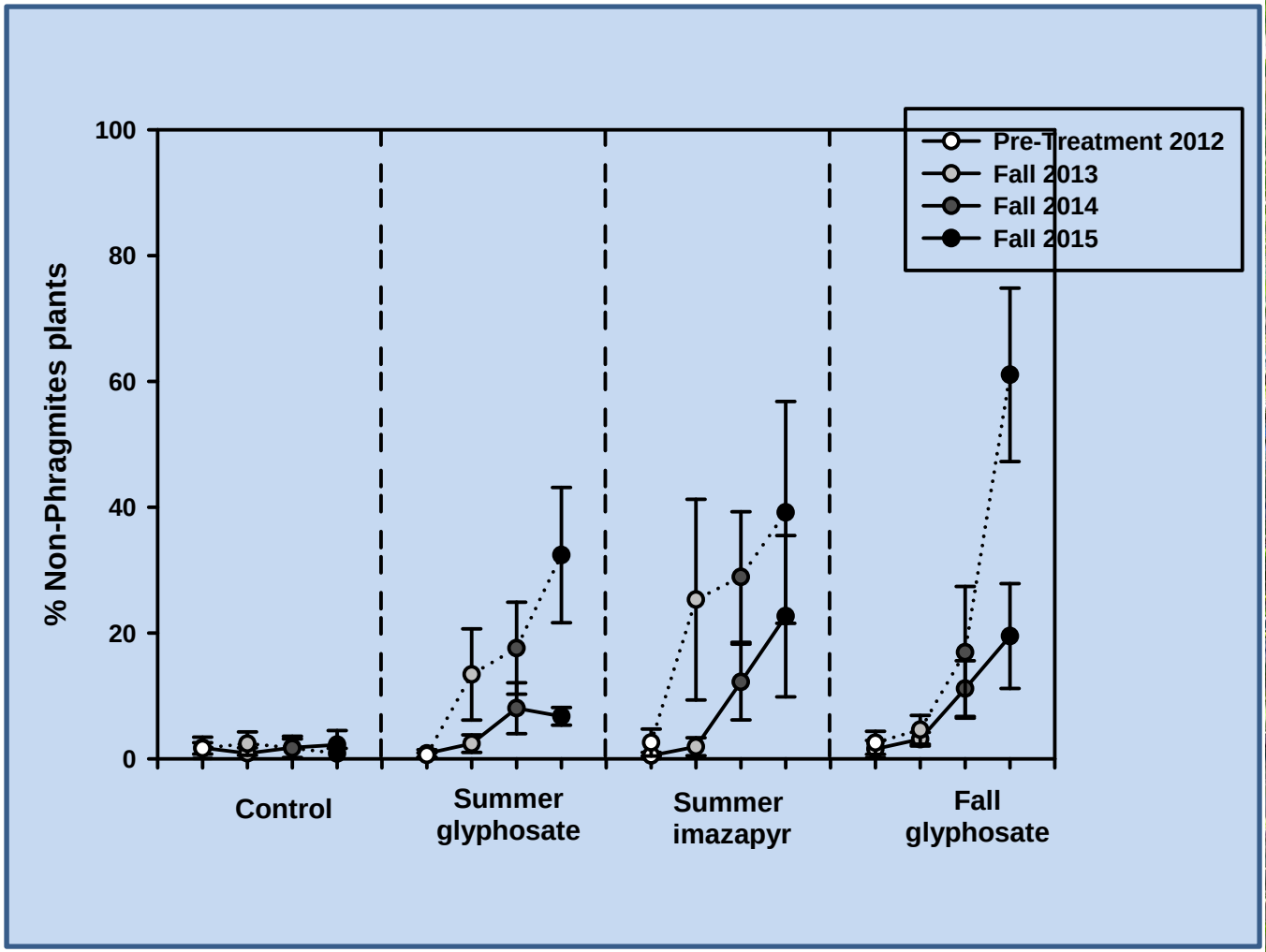
Management Implications – Small Patch

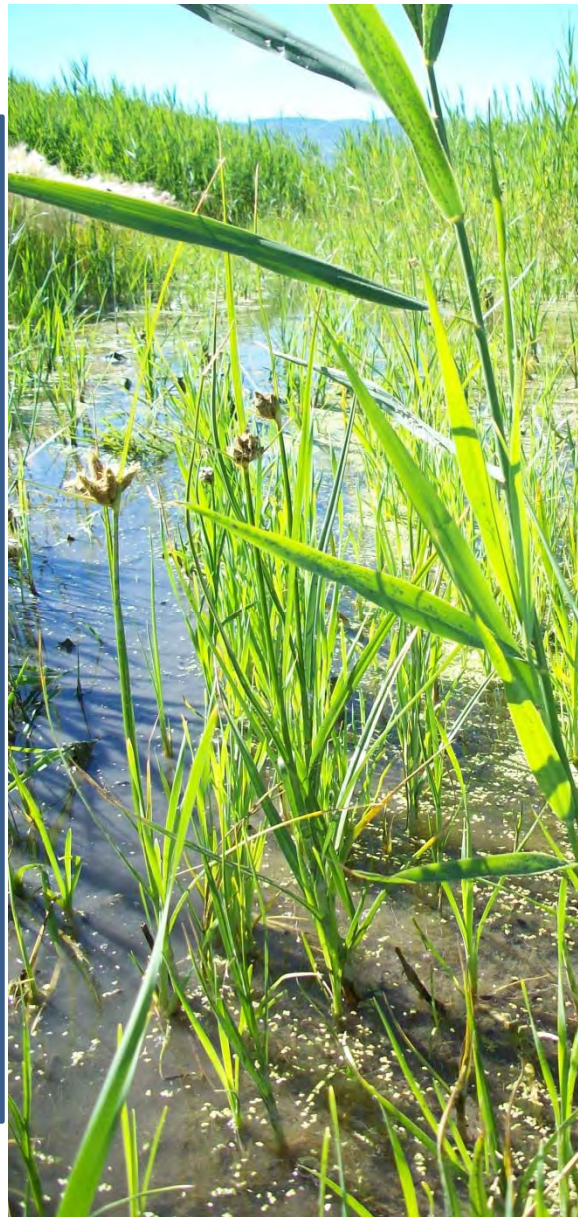
- Fall herbicide treatments show best trend
- Summer herbicide and mow treatments limit seed production in the initial treatment year
- Summer mow, fall glyphosate best?
- Native species revegetation is slow across all treatments
  - Low recruitment of native bulrushes
- Soil moisture/ water level impacts success

Small Patch vs. Large Patch *Phragmites* control



Small Patch vs. Large Patch
Plant recruitment





Results inform future research

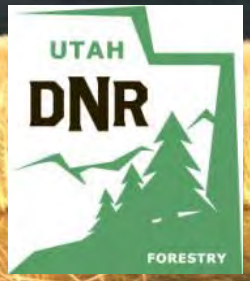
- Revegetation studies
  - Jimmy Marty: Germination of native bulrushes
  - David England: Revegetation method comparison

Results inform future research

- Phragmites grazing
  - Brittany Duncan: Cattle grazing impacts on *Phragmites* cover and nutrient dynamics


UTAH
DNR
WILDLIFE RESOURCES
U.S.
FISH & WILDLIFE
SERVICE
DEPARTMENT OF THE INTERIOR
The Nature
Conservancy
Protecting nature. Preserving life.™
Kennecott
Utah Copper

Thanks for all the help and support



The Wetland Foundation®

Q & A

Christine Rohal

Graduate Student
Wetland Ecology Lab
Utah State University

christine.rohal@gmail.com

Chad Cranney

Assistant Wetland Manager
Utah Division of Wildlife

Masters Student
Wetland Ecology Lab
Utah State University

chadcranney@utah.gov

THANK YOU!

www.greatlakesphragmites.net

phragmites@glc.org

@GLPhrag

Great Lakes Phragmites Collaborative