An Analysis of Shoreline Stabilization with Coir Logs for Austin, Texas

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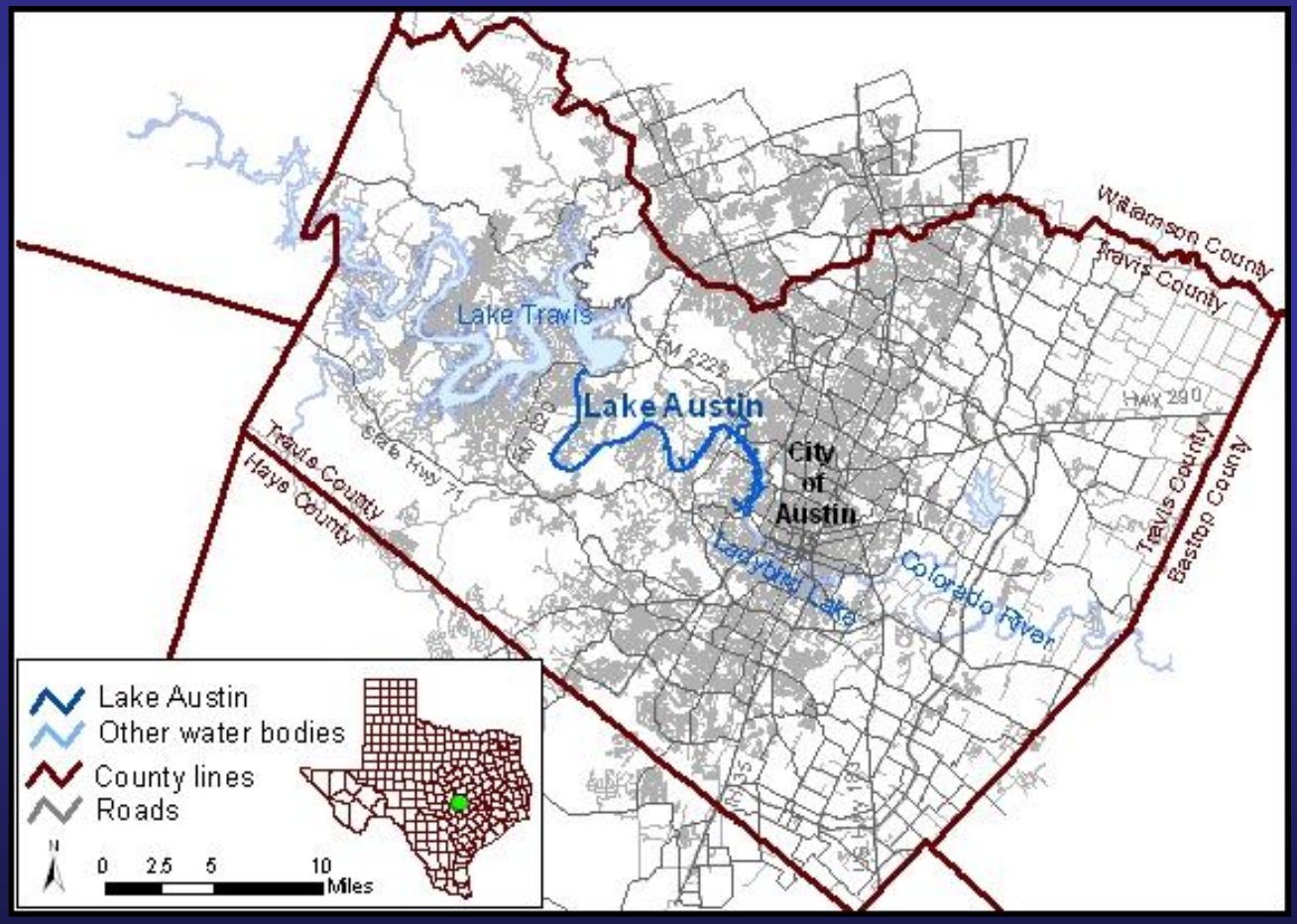
City of Austin – Watershed Protection Department,
Environmental Resource Management

Project Location

- Lake Austin, Travis County
- 20.6 mile impoundment of the Colorado River



- Municipal water storage and hydroelectric power
- Land use is largely residential
- “Constant Level”

Background

Historic recreational use ….

…generally low impact

Background

Current recreational use…

…XTREME

Background

accelerated erosion

Background

Traditional bank stabilization method is a bulkhead

Minimal vegetation
Minimal wave abatement

Poor habitat
Eroding substrate

Disconnects riparian
Low water quality benefits

Test a bioengineering approach using biodegradable coir logs and wetland plants to stabilize and restore

Methods

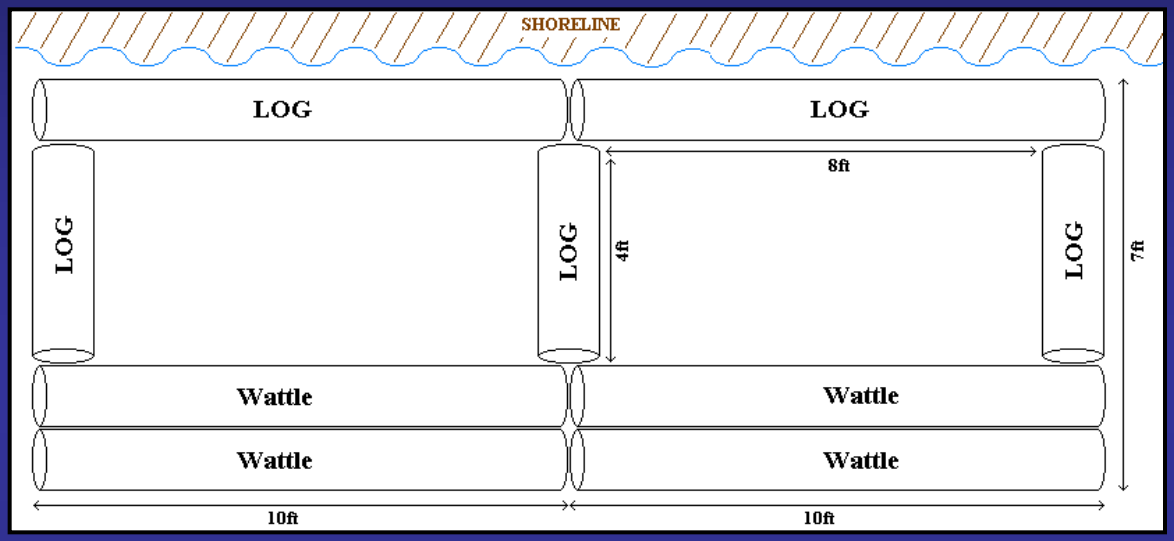
Duckbill anchors

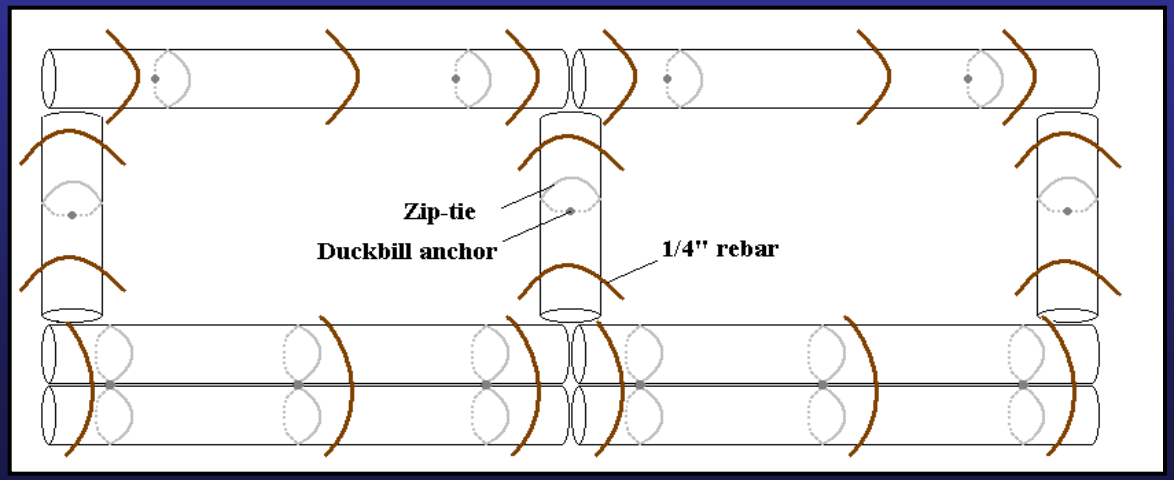
UV resistant zip ties

4ft rebar “staples”

Methods

Coir log arrangement





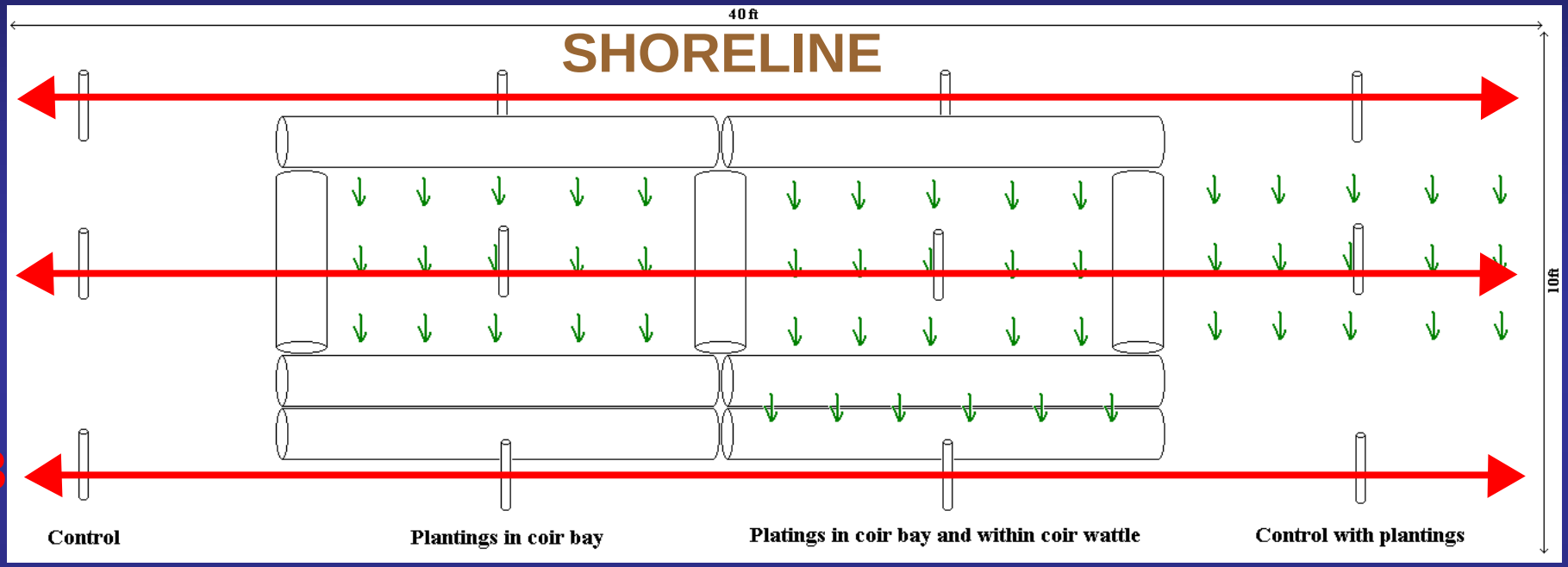
Methods

American water-willow
(***Justicia americana***)

American bulrush
(***Scirpus americanus***)

Pickerelweed
(***Pontederia cordata***)

Methods


40 ft
SHORELINE
T1
T2
T3
10ft
Control
Plantings in coir bay
Platings in coir bay and within coir wattle
Control with plantings

Methods

Installation Sept 2, 2009

Control w/ plants

Coir bay w/ plants

Coir bay w/ plants and plants in logs

Control w/o plants

Methods

Monthly data collection:

- Measure exposed PVC gauge
- Plant Survival (presence/absence)
- Coir log integrity observations
- Photographs

Coir Bay with plantings

Sep 2009

4 yrs

Oct 2013

Coir Bay with plantings + plantings in logs

Controls

without plantings

with plantings

Sep 2009

4 yrs

Oct 2013

Results

Analysis

- Repeated measures two-way ANOVA (treatment and transects as factors)

➡ Difference between sediment levels between treatments and time and interaction between treatments and transects

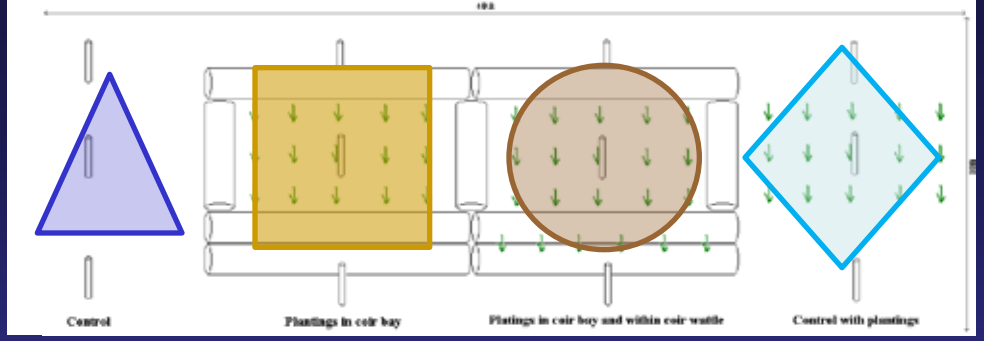
- Tukey multiple comparisons test

➡ No statistical difference between coir bay treatments
No statistical difference between controls
Statistical difference between coir bay treatments and controls

- Regression analysis

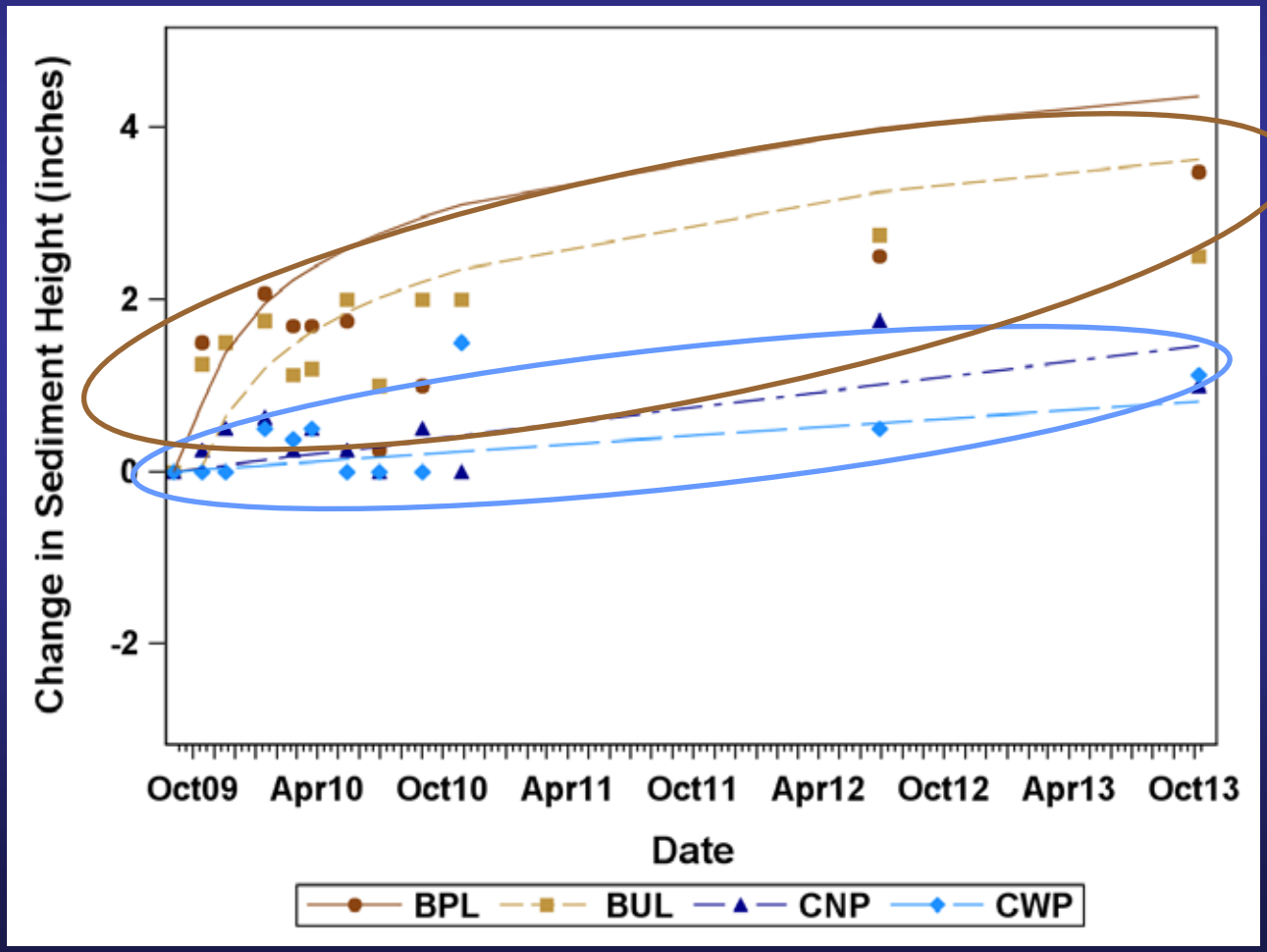
Results

Regression by Treatment



Coir
Logarithmic, and significant

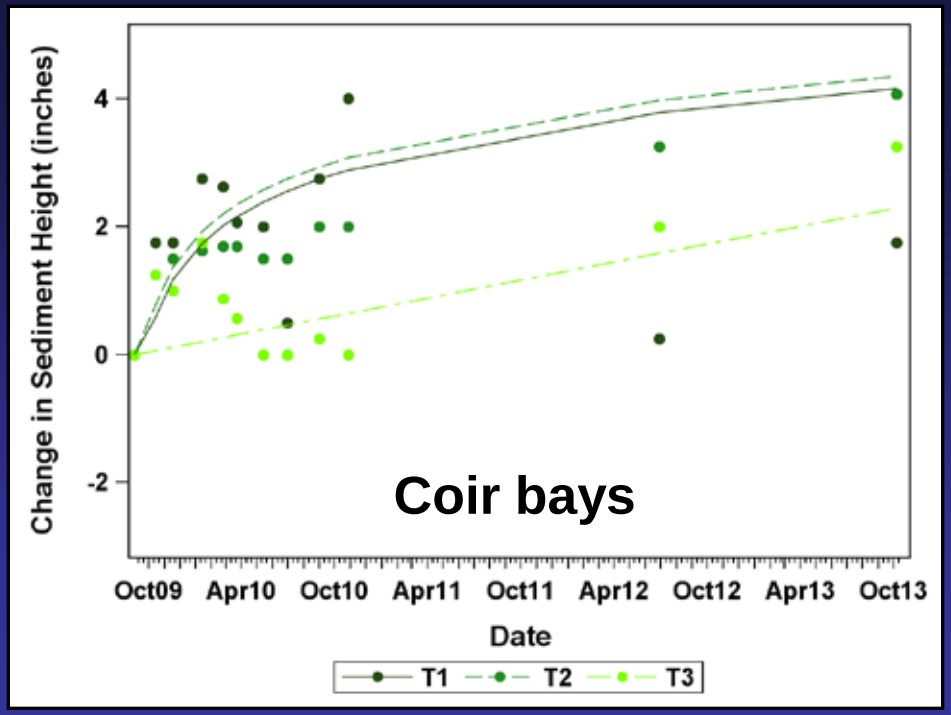
Control
Linear, but not significant



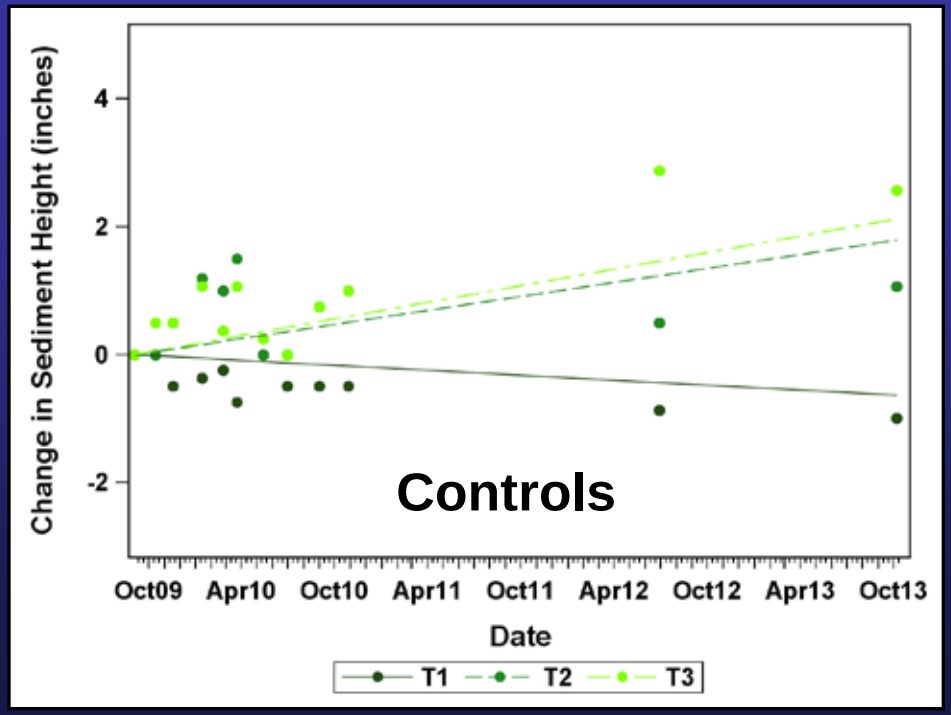
Results

Regression by transect

T1, T2 Logarithmic, significant
T3 Linear, significant (subtle)

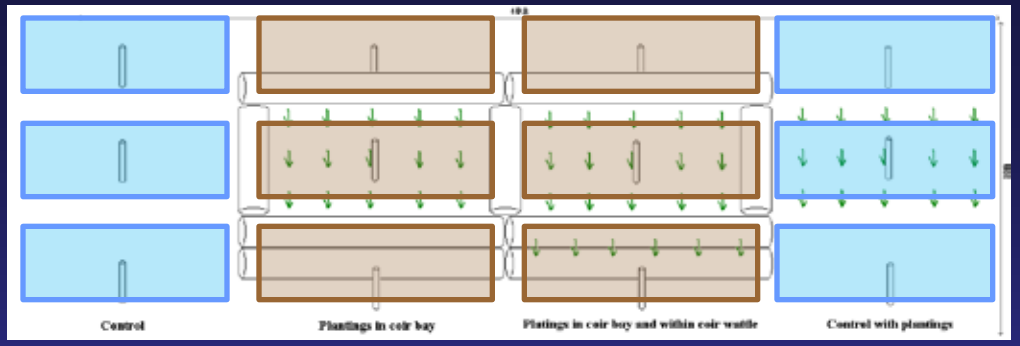


T2, T3 Linear, significant (subtle)
T1 Linear, not significant



Results

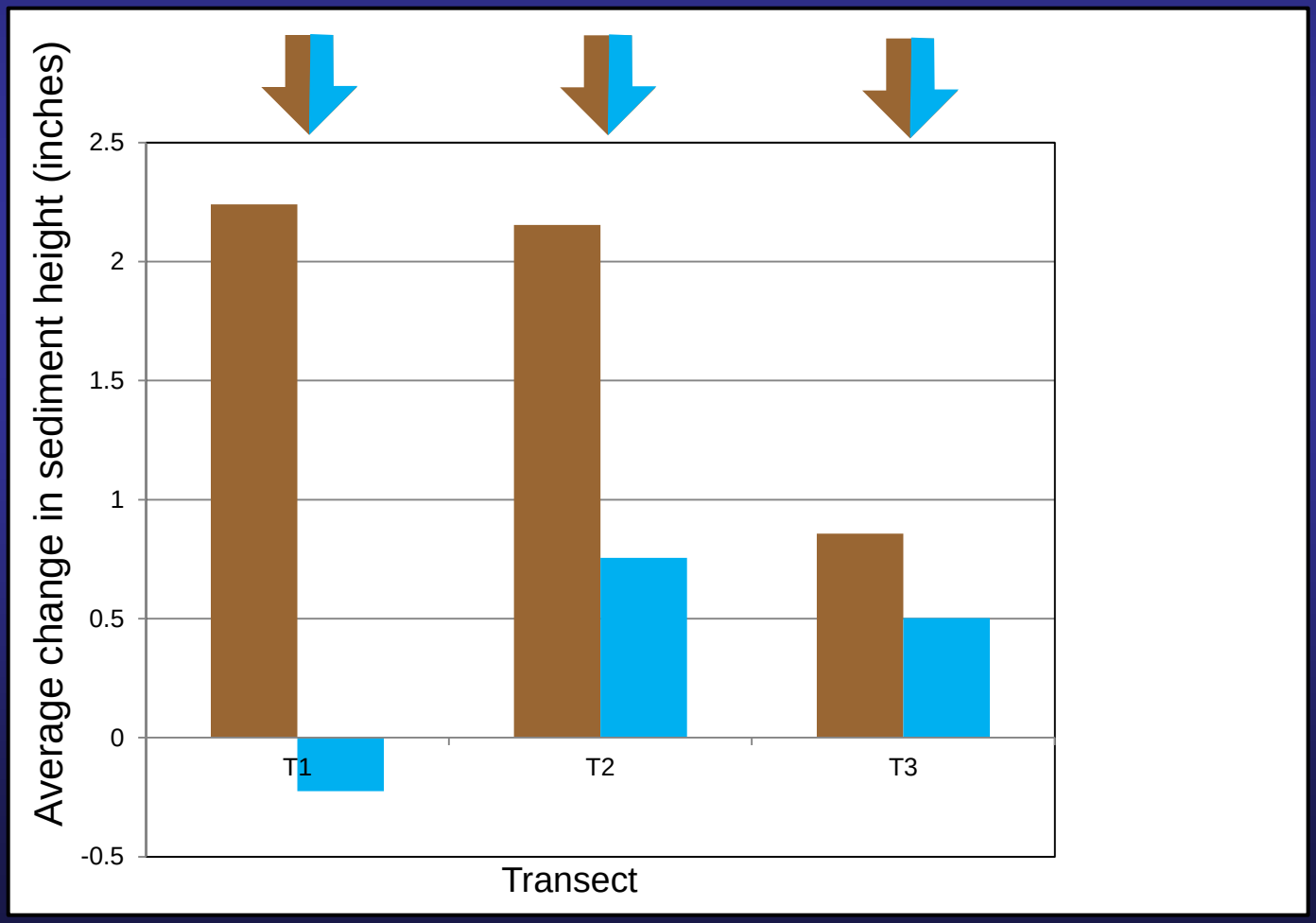
by transect and treatment



Transect 1

Transect 2

Transect 3



Results
plantings

remaining after 4 yrs

Pickerelweed

in control = none
in coir bay = none

American bulrush

in control = none
in coir bay = none

American water-willow

in control = avg 50 stems/bay !!!
in coir bays = avg 247 stems/bay !!!

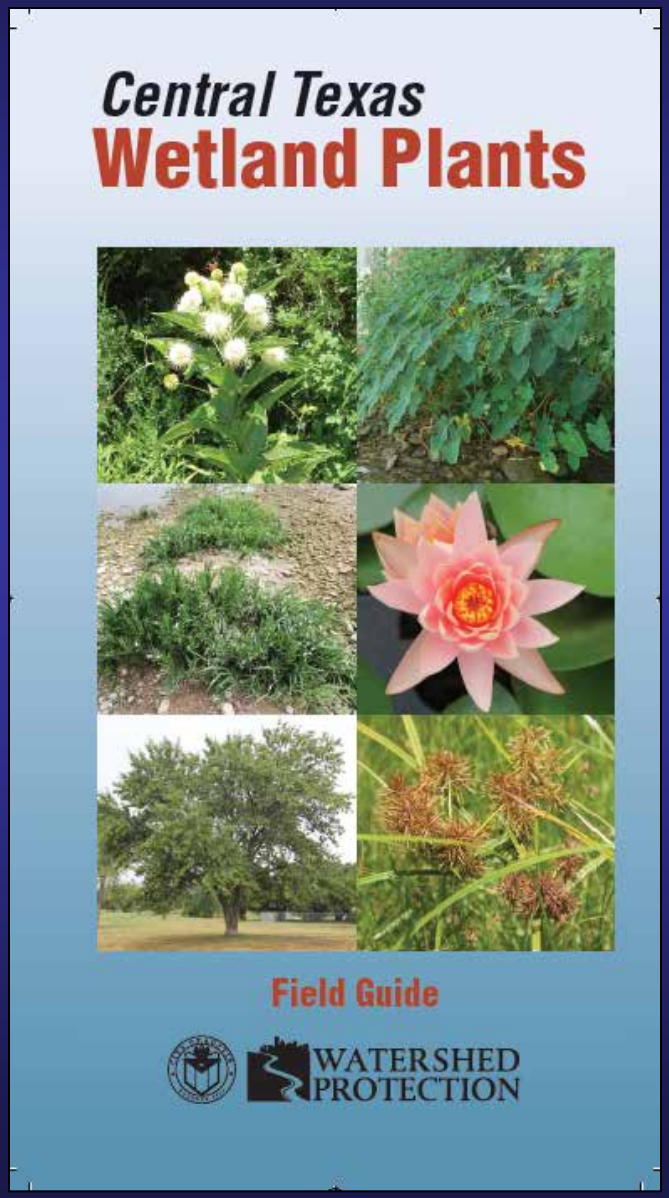
Take away

In Lake Austin…

- Coir logs with plantings can retain sediment and provide stability for shoreline, plants and colonization by other plants
- American water-willow is an appropriate plant for remediation
- After 4 yrs coir logs remain even in a high wave-action zone

Stable shoreline, high plant diversity and density

Field Guide for Central Texas Wetland Plants



For download (high resolution)
ftp://ftp.ci.austin.tx.us/wre/Wetland_Guide_Print/FinalWetlandGuide_Print_v2.pdf

Web friendly (low resolution) version:
http://draft.austintexas.gov/sites/default/files/files/Watershed/riparian/WetlandGuide.pdf

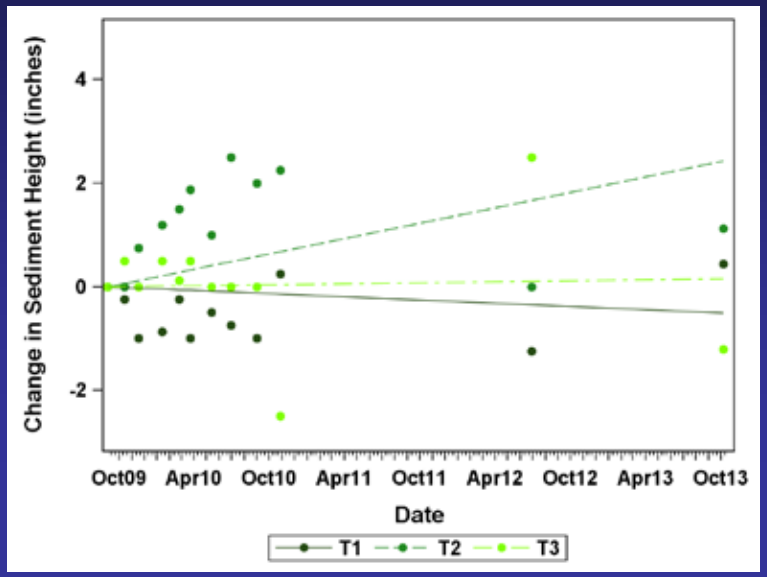
Questions?

Future Work

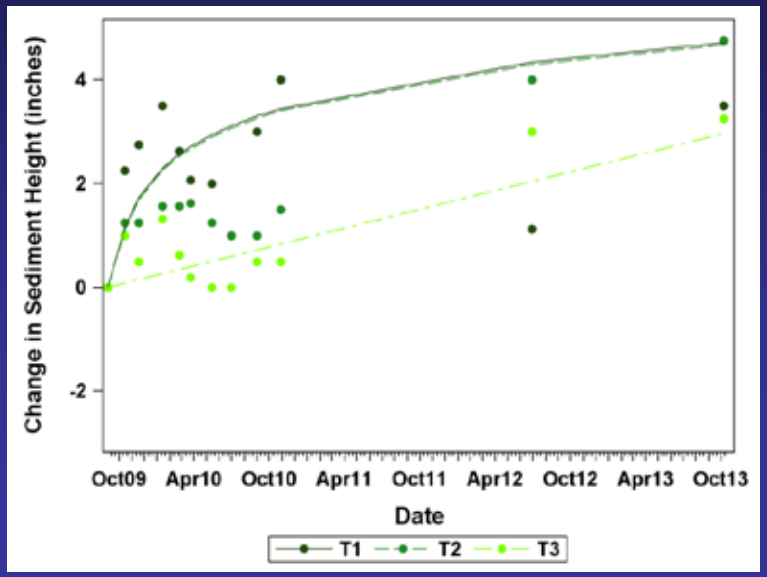
- Continue monitoring of existing sites
- Coir logs without plantings
- Coir logs with additional species
- Coir logs in difference arrangements
- Anchoring using only re-bar (i.e. no duck bills, no zip ties)

Results by Transect by Treatment

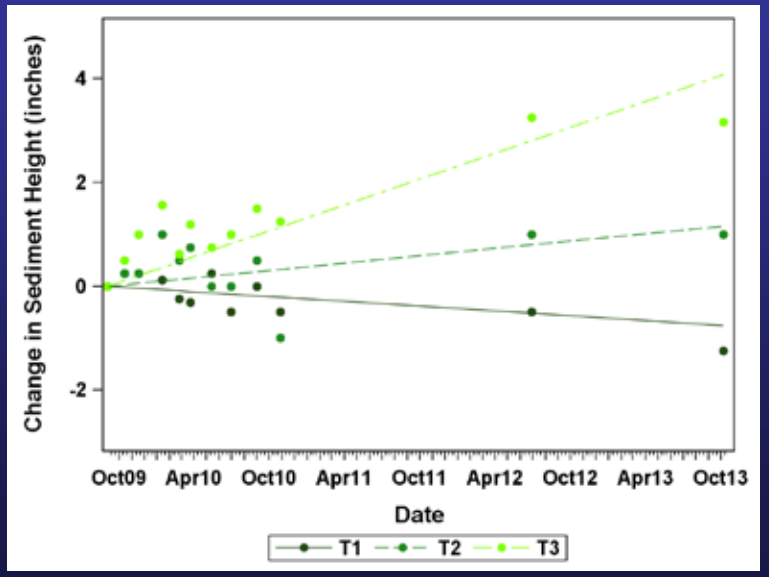
Transects: Control with plantings



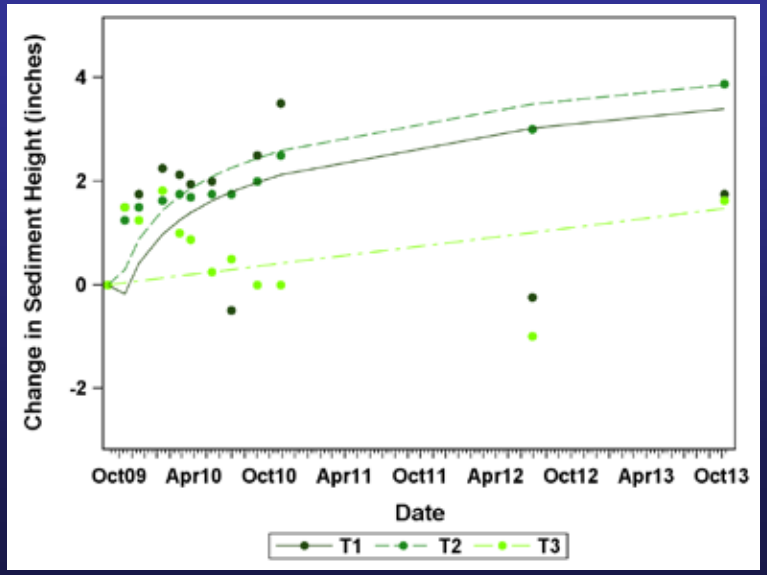
Transects: Coir with plantings

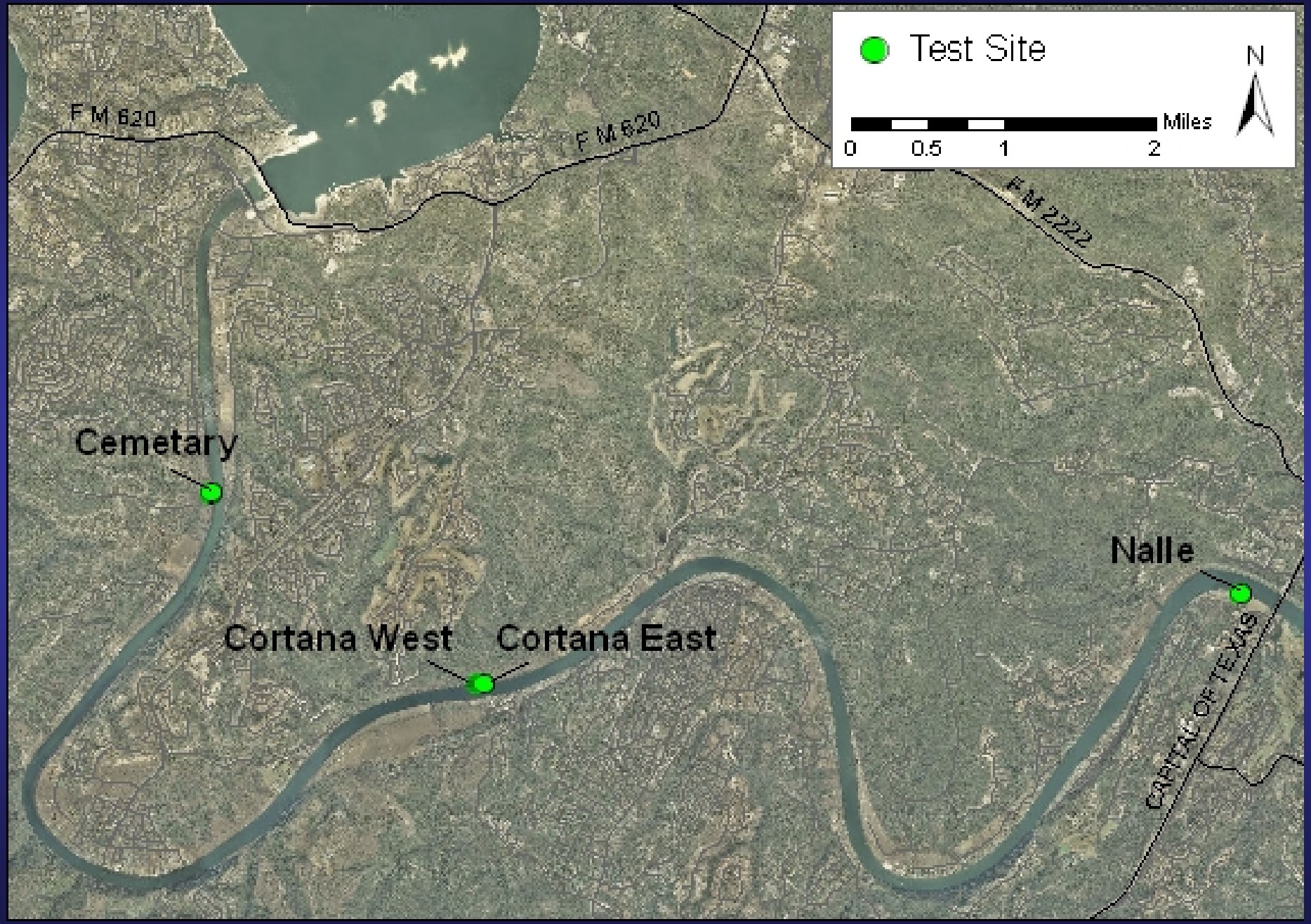


Transects: Control no plantings



Transects: Coir with plantings + log plants




Test Site
N
Miles
0
0.5
1
2
FM 620
FM 620
FM 2222
Cemetary
Cortana West
Cortana East
Nalle
CAPITAL OF TEXAS