Application of Coir Logs and Emergent Vegetation for Urban Lake Shoreline Stabilization:

Results of a 5 year study and discussion of a large scale implementation

Andrew Clamann

City of Austin – Watershed Protection Department,
Environmental Resource Management

Lake recreation ….

…has changed…

Intense wave action can destabilize shorelines

Traditional bank stabilization method is a bulkhead

Minimal vegetation
Minimal wave abatement

Poor habitat
Eroding substrate

Disconnects riparian
Low water quality benefits

Clearly, a better alternative is needed.

2009 pilot project: Test a bioengineering approach using biodegradable coir logs and wetland plants to stabilize and restore the shoreline

10ft long 12”Coir logs

4ft rebar “staples”

UV resistant zip ties

duckbill anchors

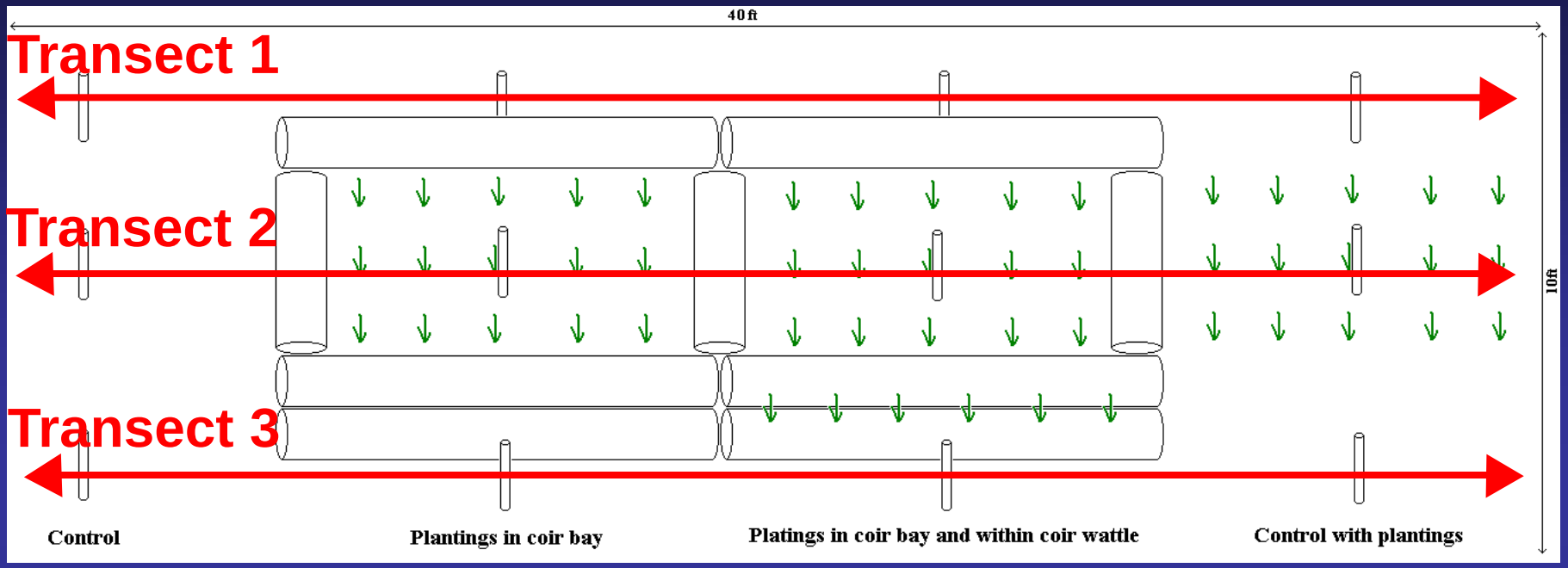
Coir log arrangement

Plantings

American water-willow
(*Justicia americana*)

American bulrush
(*Schoenoplectus americanus*)

Pickerelweed
(*Pontederia cordata*)


40 ft
Transect 1
Transect 2
Transect 3
10ft
Control
Plantings in coir bay
Platings in coir bay and within coir wattle
Control with plantings

Parameters:

- Measure depth to substrate of exposed PVC gauges
- Plant Survival (presence/absence)
- Coir log integrity observations
- Photographs

Coir bay with plantings

Sep
2009

4 yrs

Oct
2013

Controls

without plantings

with plantings

Sep
2009

4 yrs

Oct
2013

Statistical Analysis*

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

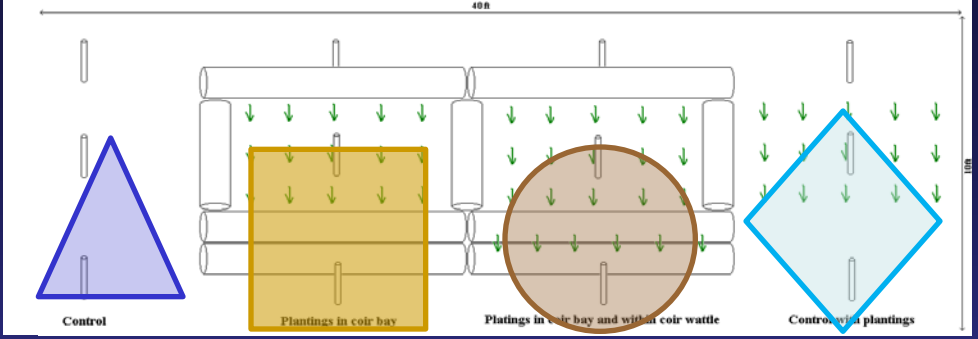
  ✓ Difference between sediment levels between treatments and time and interaction between treatments and transects

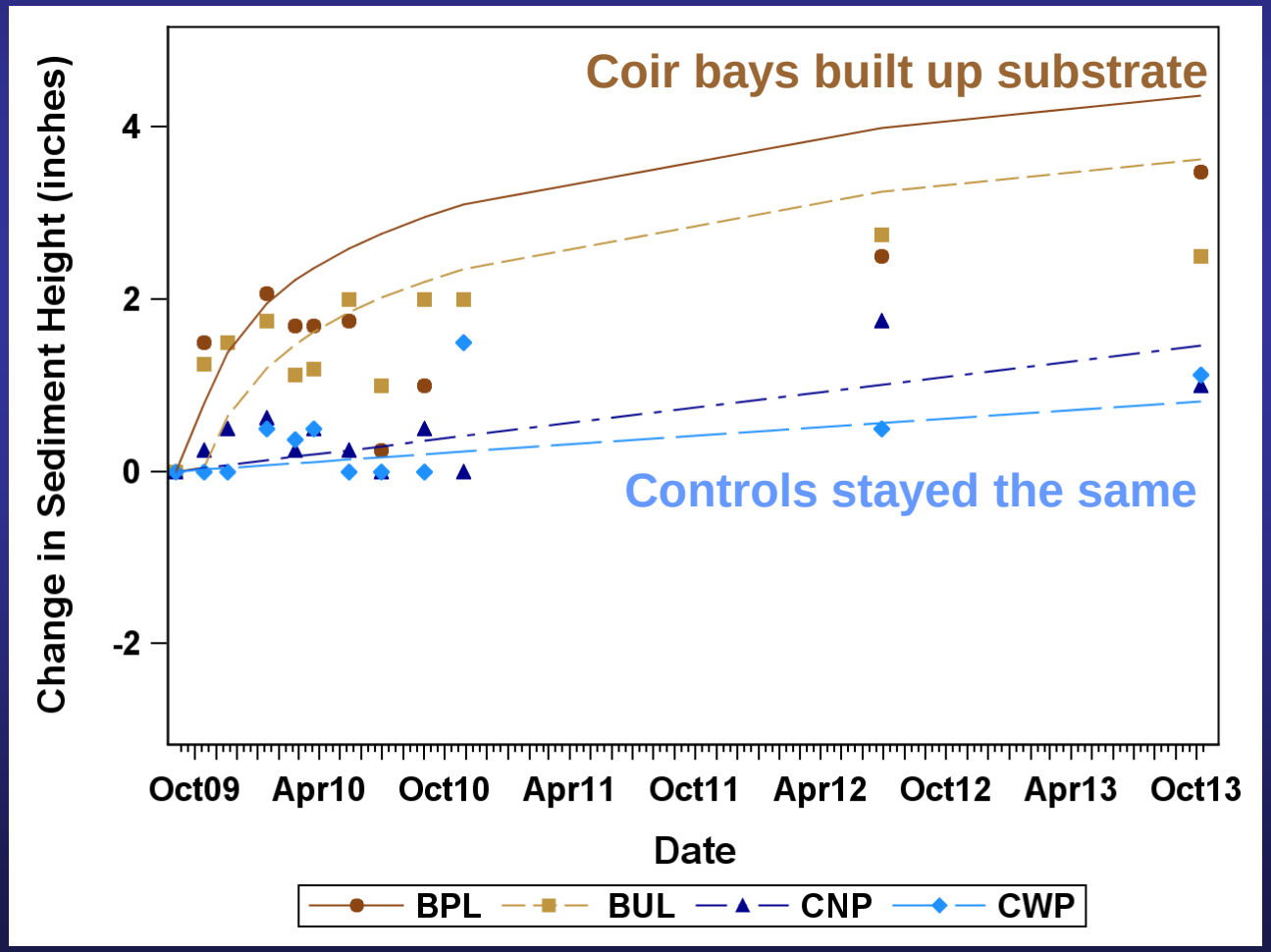
- Tukey multiple comparisons test

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

- Regression analysis

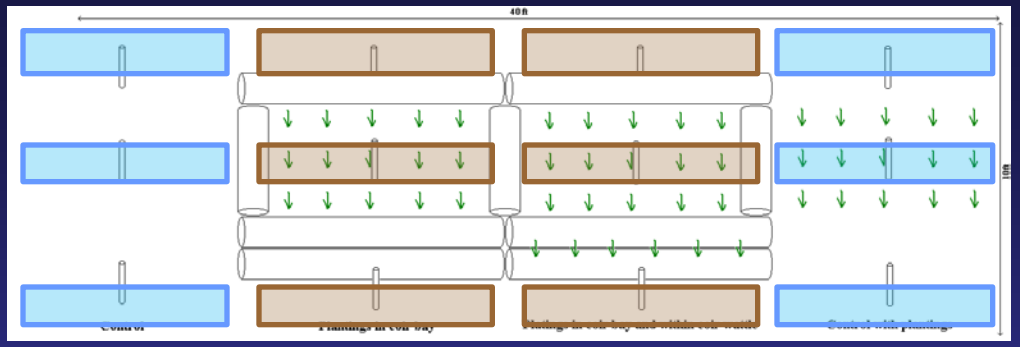
Regression analysis
(by treatment)





Results

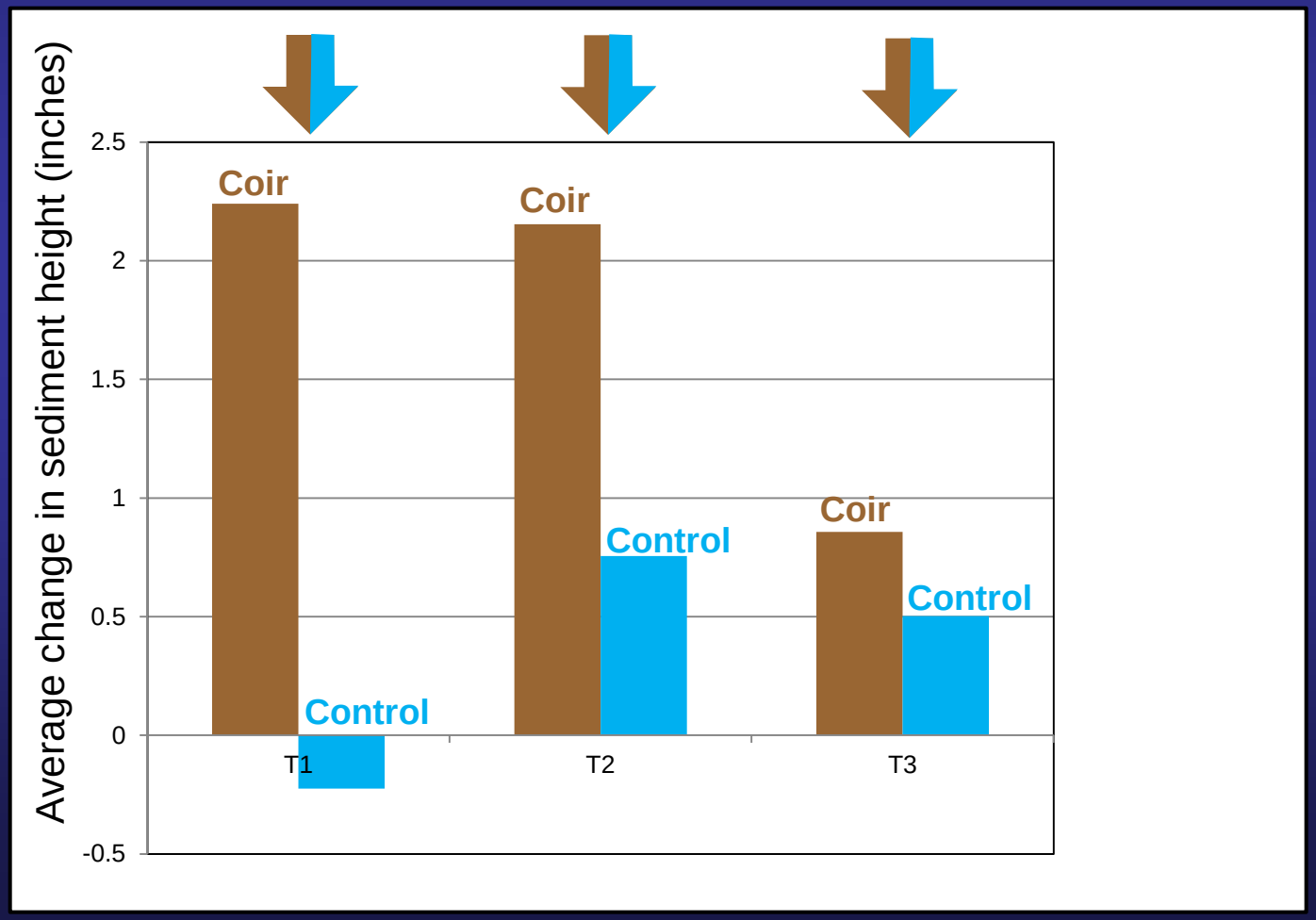
by transect and treatment



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 !!!

Before:

Eroding shoreline
Few plant species
Exposed shoreline

After:

Shoreline stabilized (and increased!)
Diverse plant community
Vigorous plants covering shoreline

Pilot Findings

In Lake Austin:

- Method can **retain sediment** and **provide stability**
- **American water-willow** is an appropriate plant
- After 5+yrs **coir logs partially remain** (even in a high wave-action zone)

Sep 2009

Oct 2014

Fall 2014
Large Scale Implementation

- 2,100 feet of shoreline
- 600 coir logs
- Seven new plant species
- New coir arrangements
- Installation with 30% less materials:

  anchoring using only re-bar (i.e. no duck bills, no zip ties)

  less logs per bay

Tip 1: Never unload a truck in late summer

280 logs per shipping container

Tip 2: Either get someone else to unload or get pre-wrapped logs

…better yet, do both

Tip 3: Harness aggression

…feel the hate flow through you

Tip 4: Be careful

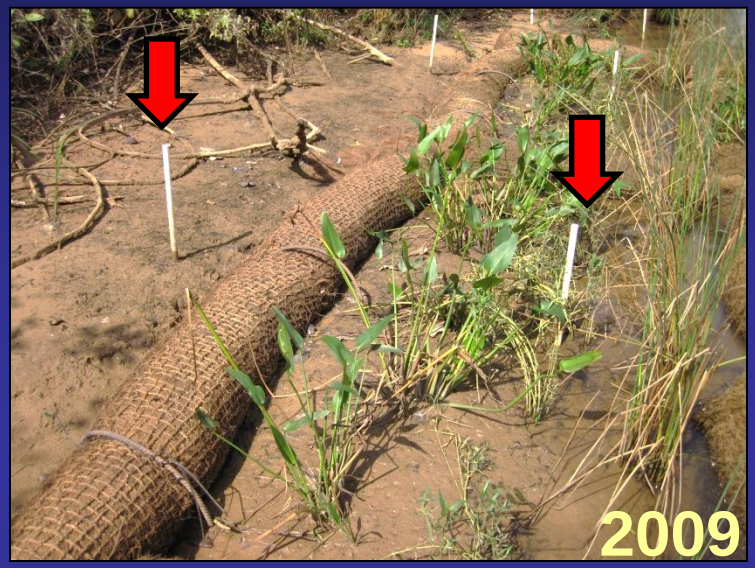
Tip 5:

Delegate anything that might result in carpal tunnel syndrome

Tip 6: logs >6inches above normal pool

Tip 7: bend terminals ends to stop flanking

Tip 8: Ensure that your measuring gauges will stand the test of time



Tip 9: Install AFTER the recreation season

Tip 10: Rebar spanning single logs only (no doubles)

Tip 11: Don’t use rebar unless you have an exit strategy

Cost

Fall 2009 (80ft)

10ft, 12” coir log*	$ 65.00 each
Duckbill anchors	$ 8.00 each
Zip ties	$ 0.50 each
#4 Rebar**	$ 1.85 per stick

$ 29.13 per linear foot

$ 19.44 per linear foot

Fall 2014 (2,100ft)

10ft, 12” coir log*	$ 60.00 each
#3 Rebar**	$ 1.60 per stick

$ 12.80 per linear foot

Tip 12: Get a good crew as good as mine

Questions?