

Assessment of *Arundo donax* control on Lady Bird Lake Austin TX

Texas Society for Ecological Restoration

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Lady Bird Lake *Arundo*

- Limits riparian diversity and public use
- Mixed stands and monoculture
- 3.5 acres on 5 mile shore
- Varying slope, canopy
- Along highly used trail



Lady Bird Lake Arundo





Control objectives

1. Control growth and limit spread on lake
2. Develop strategy for other City lands
 - Ø What is most effective treatment for:
 - Areas of high public use?
 - Arundo mixed with desirable plants?
 - Ø Do environmental conditions matter?

2011 Control Plan

- Limit overspray in public areas
 - Cut plants and allow at least 4 ft re-growth
- Limit non-target impacts
 - 2 % imazamox
- Monoculture patches
 - 2 % imazamox + 1 % glyphosate
- Both included 1 % MSO surfactant



2011 Implementation

- Six weeks for cutting/disposal
- Not all patches cut
- Severe drought =
uneven re-growth
- Many patches < 4 ft
- Herbicide application in late October



2012

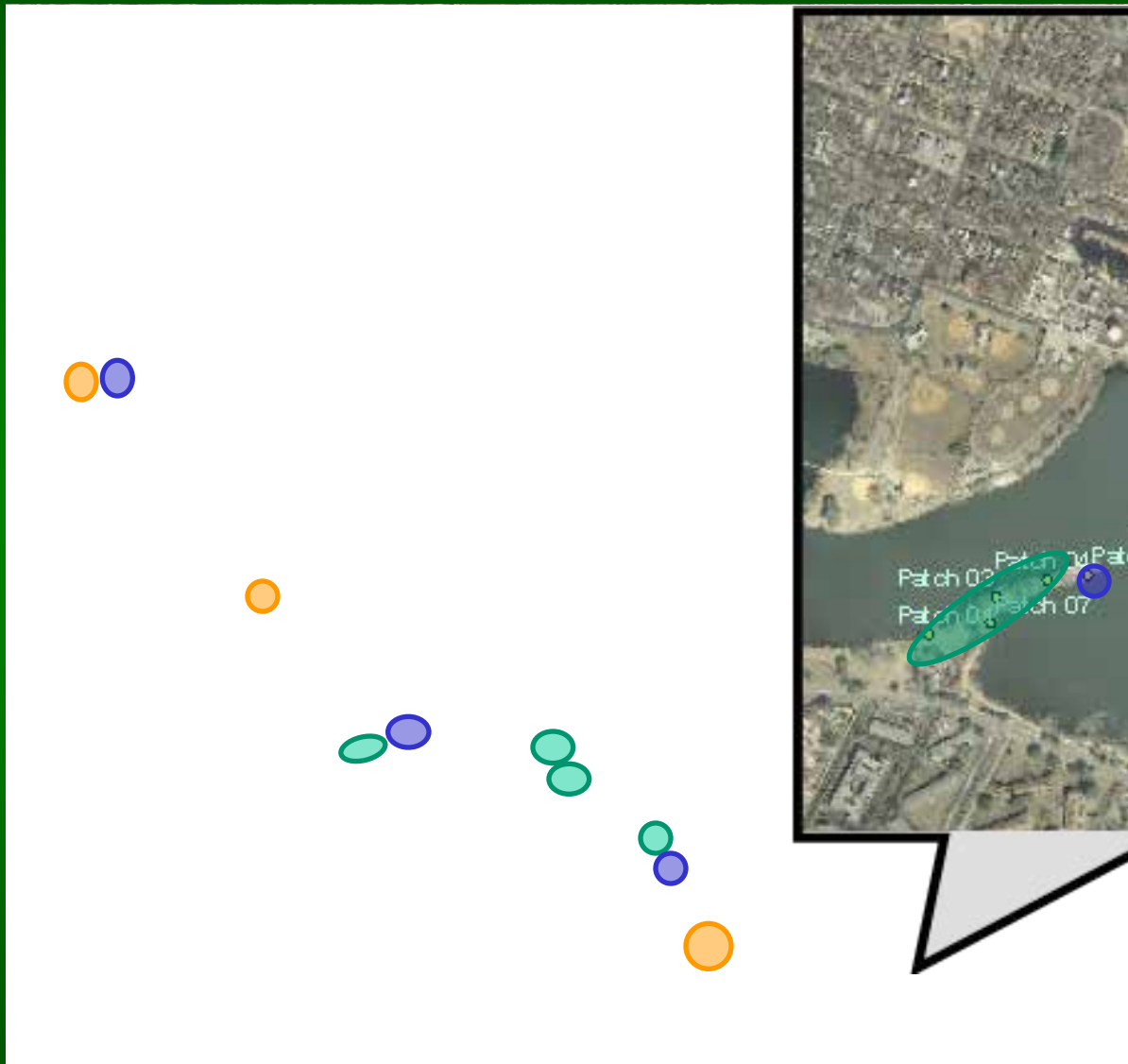
Sampling Design

- Patches fit into four treatment categories
 - Cut vs uncut
 - Stalk height when sprayed
 - Herbicide type

	Treatment 1	Treatment 2	Treatment 3	Treatment 4
Cut/Uncut	Cut	Cut	Uncut	Cut
Stalk Height	< 4ft.	4 – 10ft.	> 10ft.	> 10 ft.
Herbicide	imazamox	imazamox	imazamox	imazamox/ glyphosate

- Environmental: Canopy, Slope, Distance to water

Treatment distribution



- T 1 Cut, < 4', Imaz
- T 2 Cut, 4-10', Imaz
- T 3 Not cut, > 10', Imaz
- T 4 Cut, > 10', I + G



June 2012

Sampling Methodology

- Randomly placed 1 m² quadrat subsamples
- Manual counts of
 - Brown (dead) *Arundo* stems
 - Green (live) *Arundo* stems
- Measured ht of each green stem
- % dead stems = ($\# \text{ brown} / \text{total } \# \text{ stems}$)* 100

Results

Mean % dead Arundo stems, red > 50% dead

	Treatment 1 Cut, < 4 ft, Imazamox		Treatment 2 Cut, 4-10 ft, Imazamox		Treatment 3 Uncut, > 10 ft, Imazamox		Treatment 4 Cut, > 10 ft, I + glyphosate	
Classification	n	% Dead	n	% Dead	n	% Dead	n	% Dead
CGF	1	48.6	2	30.0	3	66.3	1	35.7
CGN	2	35.7	2	0.0	2	72.5	1	97.4
CSF	2	28.0	2	11.5	1	75.9	0	--
CSN	1	48.6	2	28.2	1	58.8	0	--
OGF	3	24.5	2	37.0	2	57.3	2	86.5
OGN	3	21.4	2	50.0	2	71.8	2	100.0
OSF	1	17.9	2	11.9	1	87.0	0	--
OSN	3	57.2	2	18.2	1	76.0	2	100.0



Analysis

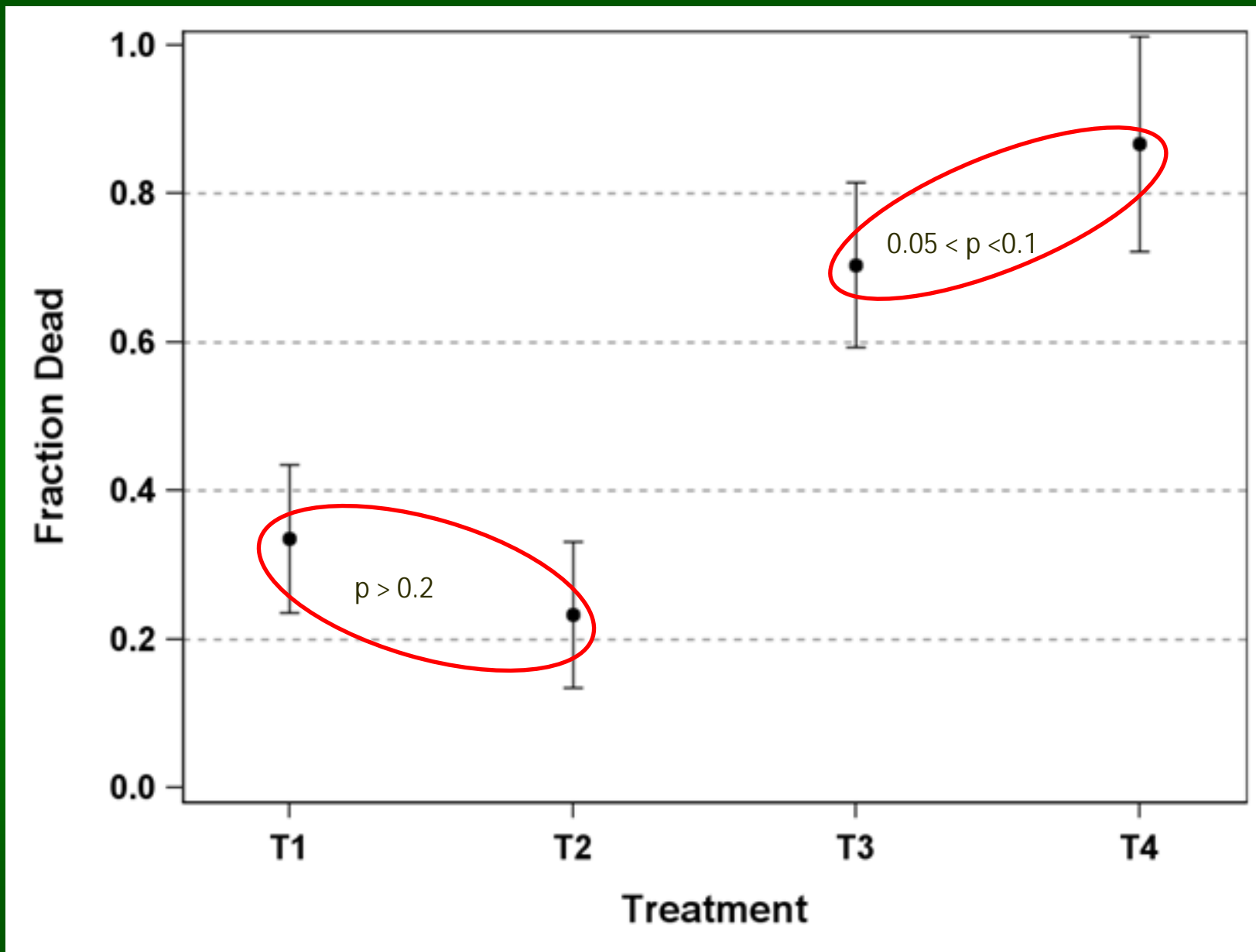
Type III two-way ANOVA:

- Treatment type, canopy, slope, dist from water
 - Treatment type had significant effect on dead Arundo ($p < 0.01$)
 - Env conditions were NOT significant

Tukey-Kramer multiple comparison test

- T1 & T2 sig diff from T 3 & T 4 ($p < 0.005$)
- Not from each other

L-S means for Treatments
with 95% confidence limits



Summary

- Treatments 3 & 4 killed greater % *Arundo* regardless of env conditions
- Avg % dead stalks differed b/w the two:
 - 70% w/ imazamox
 - 88 % w/ imazamox + glyphosate
 - Lack of significance was not definitive
 - Larger sample size may show more difference



Control Recommendations

- Treat full grown plants, no cutting
 - Less leaf surface limits uptake
- Treat June- Sept (before winter dormancy)
 - Less active growth limits uptake
- Adjacent vegetation
 - Imazamox 2 %, up to 5%
- Monoculture Arundo
 - 2% imazamox +
1 % glyphosate



2012 & 2013 treatment

- No Cutting!
- Sprayed full growth plants in August
- Increased use of I + G mix
- Careful application
- 2013- improved plant loss using mix



Future work

- Monitor and re-treat as needed
- Restore monoculture *Arundo* areas
- Provide guidance for other efforts



Initial restoration work

- Sept 2013- emergent vegetation at slope base, submersed in littoral zone
- Dec 2013- seeds and mulch 'blankets' on upper banks
- Allow undercut bank to 'lay back'



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- Aaron Richter, City of Austin
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- Johnson Lake Management





Questions?