

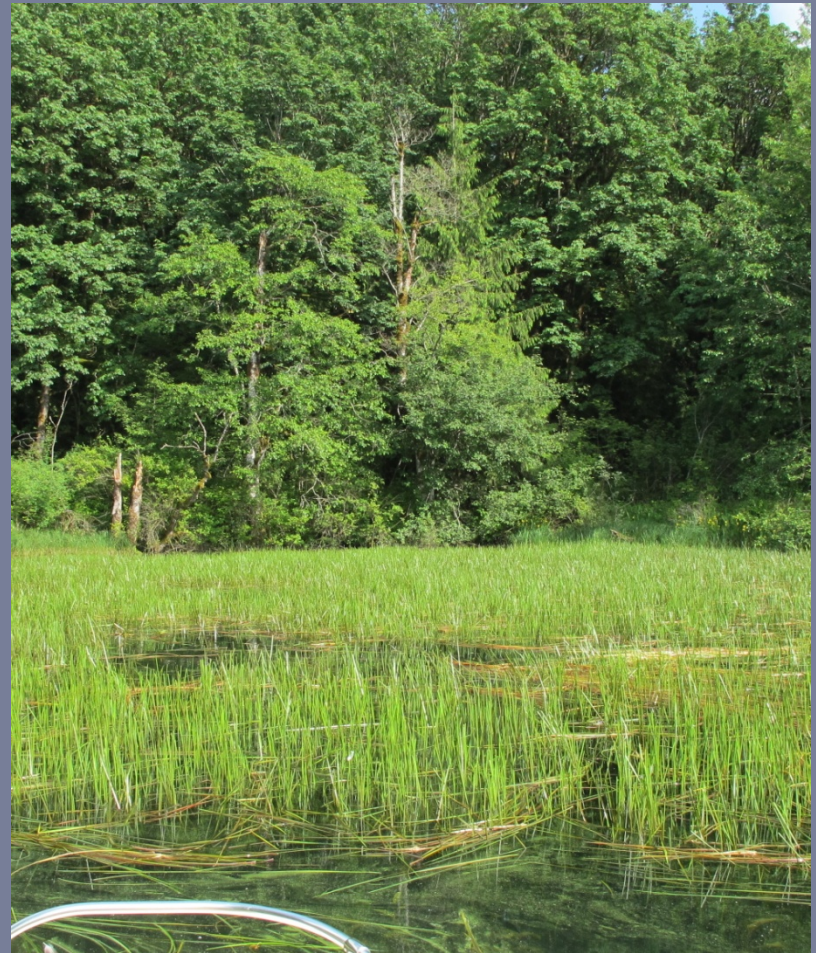
The background of the slide is a photograph of flowering rush plants. The plants are tall, slender, and green, growing out of a body of water. The water is a murky, greenish-brown color. The plants are in sharp focus in the foreground, while the background is slightly blurred.

Flowering Rush in Washington State

Jenifer Parsons, Tim Miller,
Laurel Baldwin

History in Washington

- Found in Silver Lake in 1997
- Specimens from Hatzik Lk, BC 1978
- Yakima River reported in 2008
- 2009 added to Class A noxious weed list



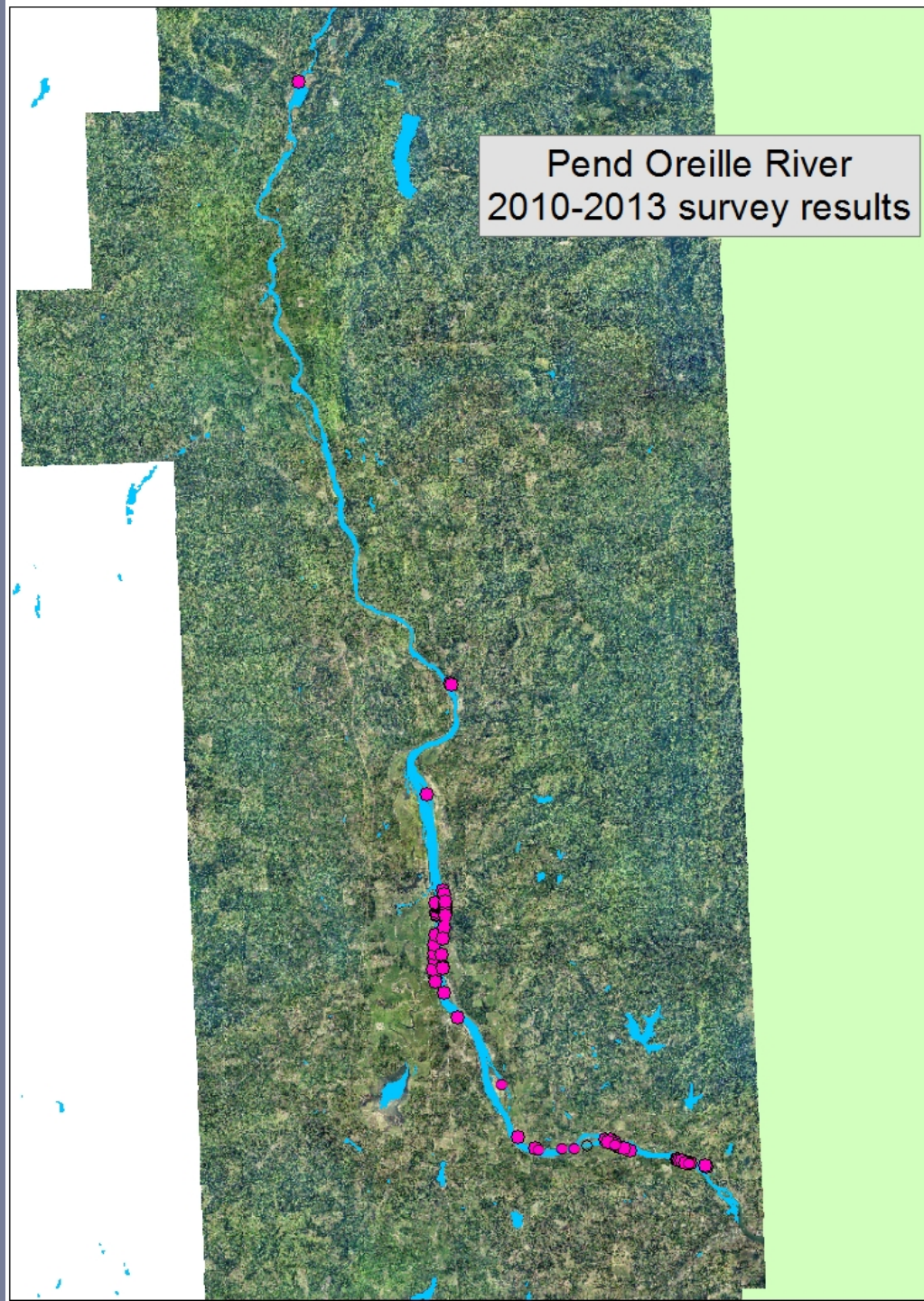
Flowering Rush known locations 2013



All triploid (?)

Spread

- Alarming in river systems
- Example - Pend Oreille River
 - 4 years of survey
- Similar spread apparent on Yakima, Columbia (Tricities) and Spokane Rivers



What Are We Doing?

- Don't have the money or political will to focus on it
- Therefore trying a variety of things, but no true eradication strategy
 - Herbicide trials
 - Spotty Control work
 - biocontrol

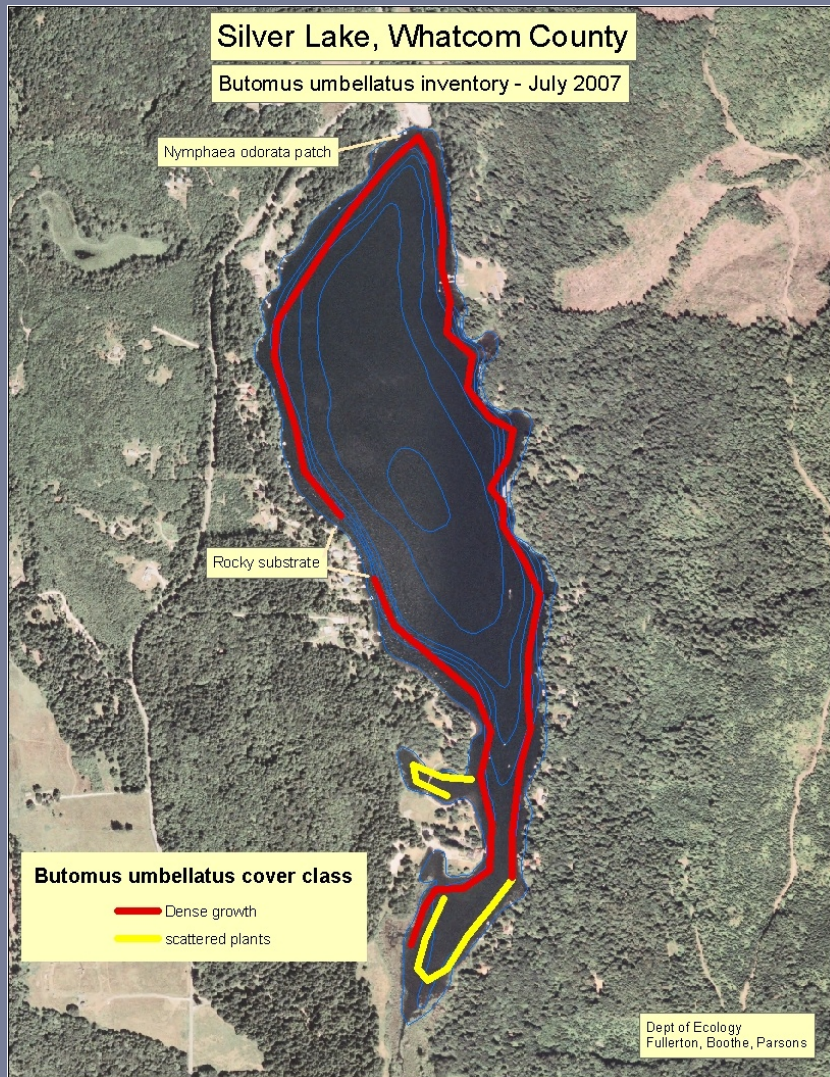


Silver Lake

Flowering rush control
herbicide field trials



Silver Lake



- 180 acres
- 30 ft max depth
- Flowering Rush
 - to 5 m deep (~ 16 ft)
 - Dense in coves on east shore
- Help from local weed coordinator Laurel Baldwin

Emergent growth trials

- Two trials, Aug 2008 and Aug 2010 – Dr. Tim Miller
- Treated plants that were partly submersed
- Used a backpack sprayer from a canoe
- Trial 2 was in submersed growth trial plots, so exposed to emergent herbicides Aug 2010, and triclopyr or triclopyr + 2,4-d in May 2011



Results - Emergent growth

- Trial 1 – about 2 ft of leaf treated, Aug 2008

product	concentration	% control 12 MAT
glyphosate	3%	44
glyphosate	5%	61
imazapyr	1%	74
triclopyr amine	6.70%	56

- Trial 2 – about 1 ft of leaf treated, Aug 2010

product	concentration	% control 12 MAT
Glyphosate + imazapyr	4% + 0.5%	50
Glyphosate + imazapyr	3% + 0.75%	45
imazapyr	1%	40
glyphosate	5%	29

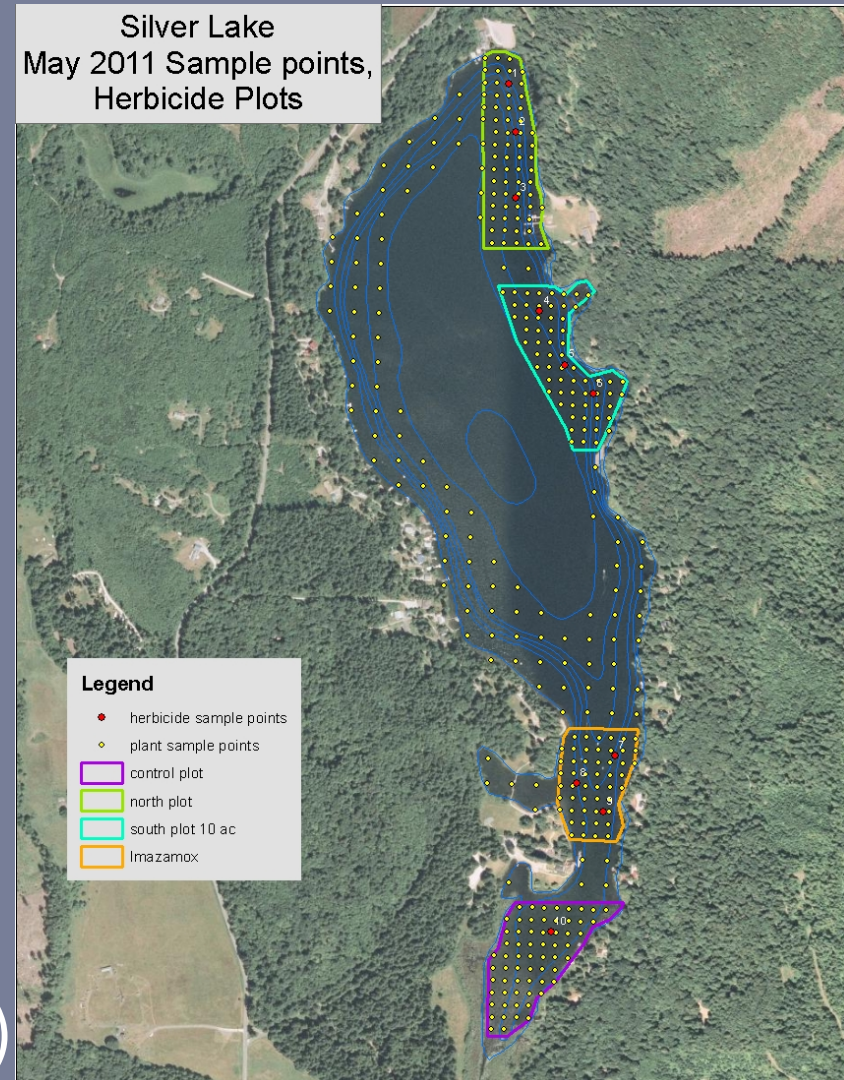
Another Emergent Treatment

- Small wetland area
- Treated when water was off the site, leaves still green, some plants still in flower
- 90% kill with high glyphosate concentration



Submersed growth trial 2011

- Three plots plus control
 - Triclopyr granular, 10 acres
 - Triclopyr + 2,4-d granular, 10 acres
 - Imazamox liquid, 7.5 acres
- Treated late May 2011
- Collected herbicide samples
- Assessed control Aug 2011
 - Frequency points (350)
 - Biomass collected by diver (40)



Results - Submersed growth 2011

- Large release of leaf material by 4 WAT (prison crews helped rake it up)



Baldwin

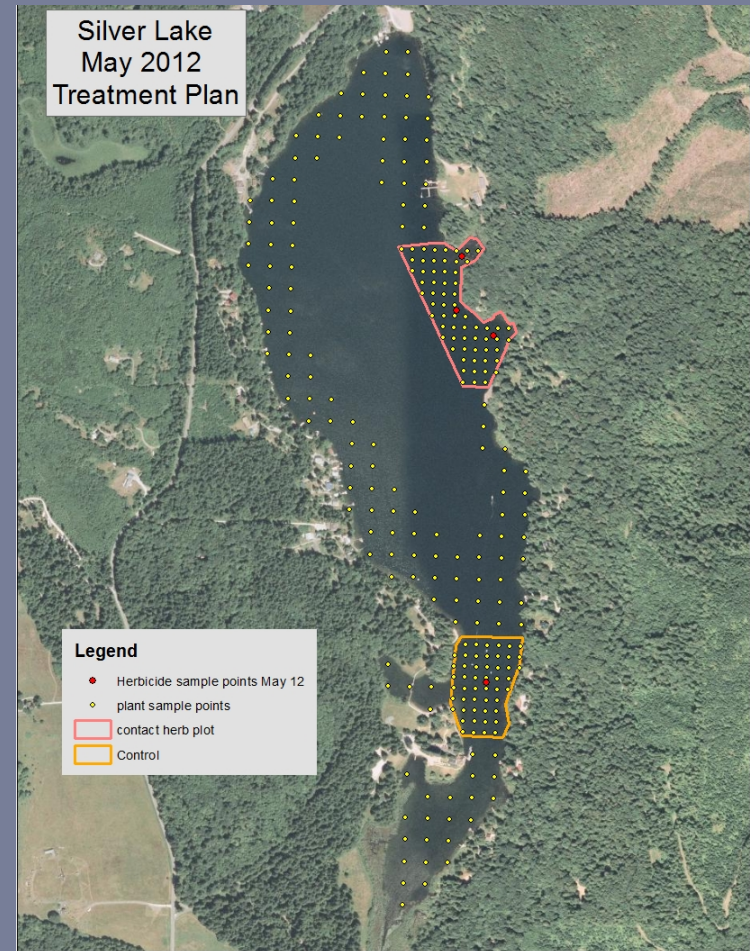
2011 Results Continued

- By 11 WAT plants had recovered, no significant reduction in above ground growth (did not assess rhizomes)
- Had low concentration/exposure times in plots (wind/rain storm 48 hours after treatment)

Product	rate (ppb)	average herbicide conc after tmt (h)						significant reduction 11 WAT
		8		24		48		
		surface	bottom	surface	bottom	surface	bottom	
triclopyr (granular)	2500	79	1369	53	1617	51	57	no
triclopyr + 2,4-d (granular)	1000 + 4000	409 + 183	201 + 673	21 + 31	107 + 239	83 + 97	89 + 697	no
imazamox (liquid)	500	79	385	57	37	NA	NA	no

Submersed Growth Trial 2012 - 2013

- Diquat – recommended from results of other studies (Dr. Madsen)
- Treated 10 acre plot 2 times per year
- Collected herbicide data in 2012
- Collected plant
 - frequency (~ 250 points)
 - Biomass (20 per plot)



Herbicide Data

		Diquat Concentration (ppb)				
May-12		hours after treatment				
		1	6	9	24	48
Treatment	a	73.5	131.2	71.6	42.4	
	b	75	1.8	26.6	16.1	
	c	136	165.6	10.6	16.1	
Control			0.6	nd	nd	
Aug-12						
		1	3	6	24	48
Treatment		72.1		0.5J	3.9	2.2
control			nd	nd	nd	2

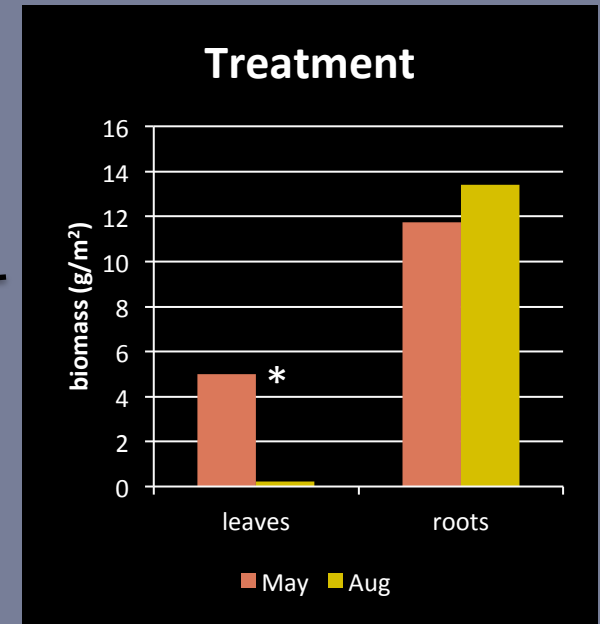
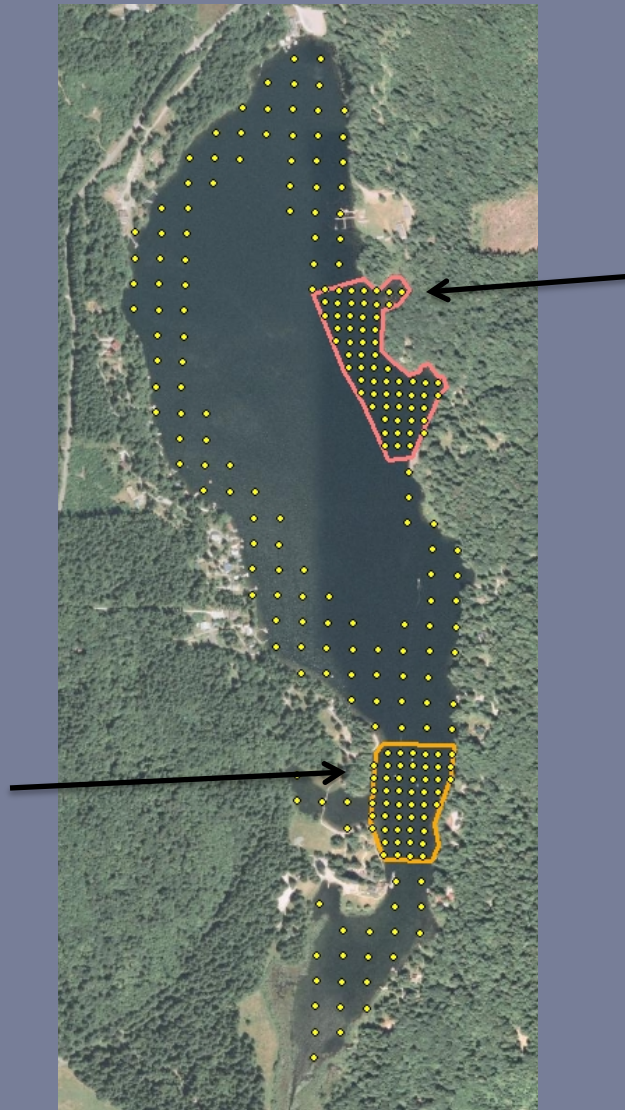
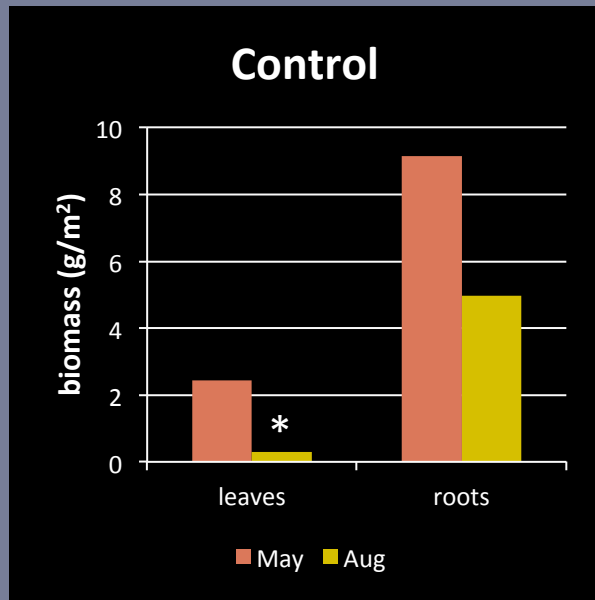
Max label rate 370 ppb

Notes on Diquat and water clarity

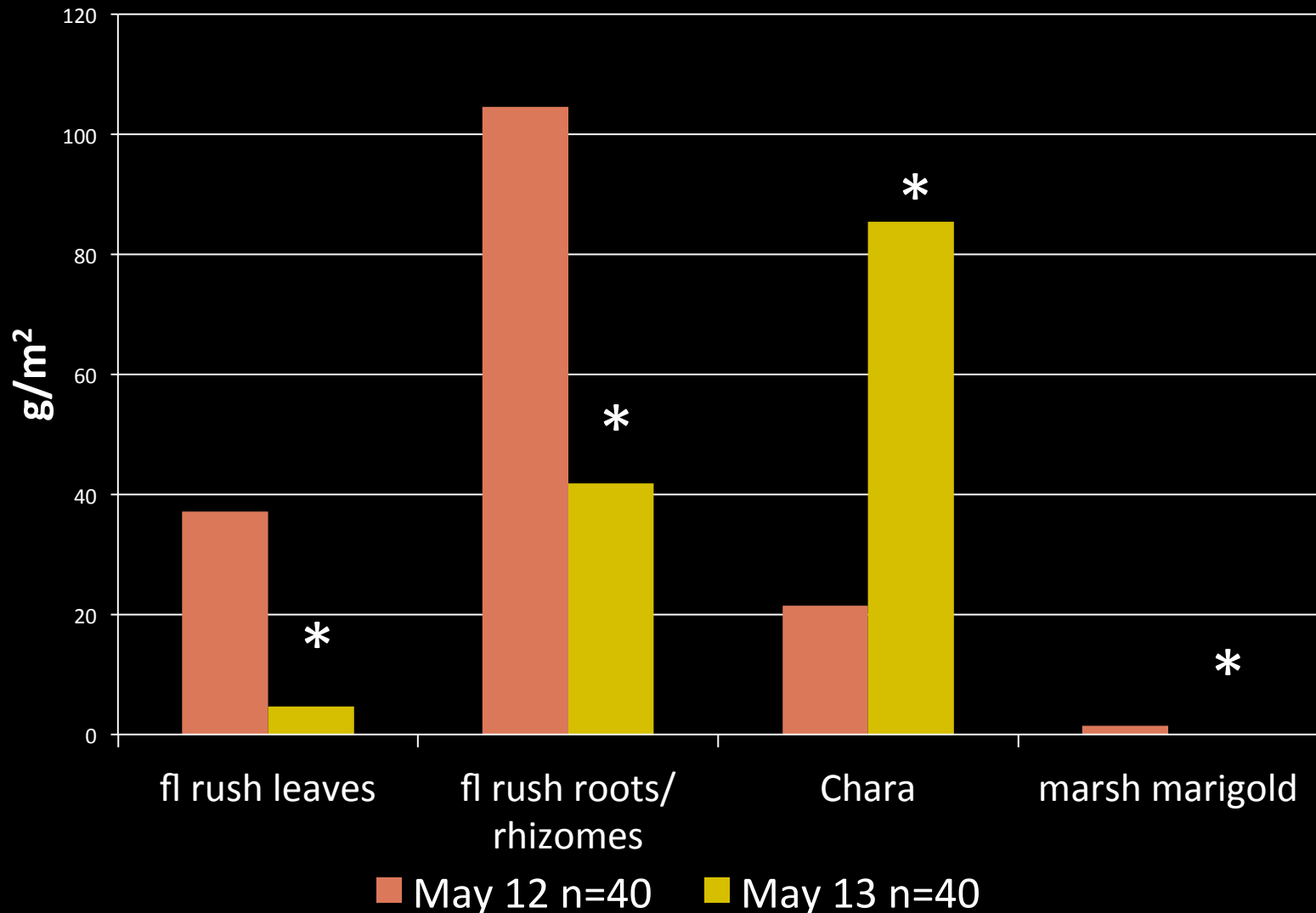
- Diquat binds quickly to suspended particulate matter, especially clays
- Silver Lake visibility (secchi depth)
 - May 5.4 m
 - Aug 7.3 m
- Battleground Lake study –
 - similarly clear, low conductivity,
 - diquat concentrations highest 1-2 days after treatment,
 - 2 weeks after treatment still getting hits of 2 – 10 ppb

Flowering Rush Biomass year of diquat treatment

- N = 20/plot
- No significant difference in other species

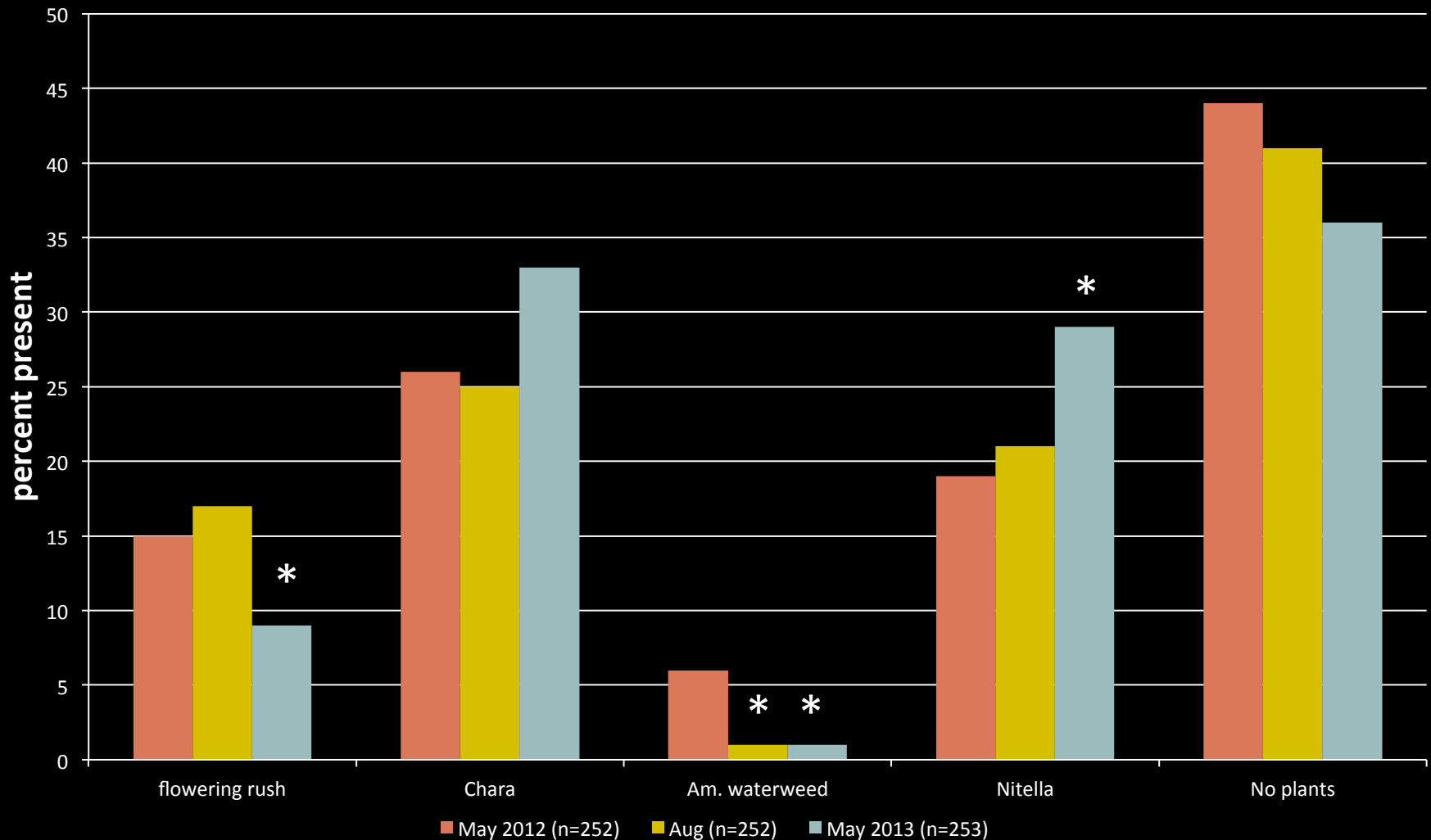


Biomass Results, 2 plots combined



* = significant change (p < .05)

Frequency Results, whole lake



* = significant change from May 2012 (p<.05)

Other treatments

- Lake Spokane hand pulling/covering contracted by AVISTA
- May be holding our own in treatment areas, but improved monitoring would help
- Much of the reservoir is untreated



Other Treatments



- 9-Mile Reservoir – Spokane River
- Hand digging during drawdown Fall 2013
- Dealing with heavy sediment a challenge
- Will see if there is a reduction this summer

Other Treatments

- Yakima/Columbia River
- Benton County and Corps of Engineers
Sprayed emergent plants – discouraging results
- Shade trial – reduced growth a little



Flowering Rush in Washington conclusions

- We may be able to get on top of it in still, clear water or on dry ground, but...
- What about the Reservoirs and Rivers?
 - It is moving fast!
 - Biocontrol?
 - Other methods not tried yet?