Occurrence and Distribution of Eurasian, Northern and Hybrid Watermilfoil in Lake Minnetonka and Christmas Lake;

A Genetic Analysis

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Collaborators

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Eric Fieldseth, Minnehaha Creek Watershed District

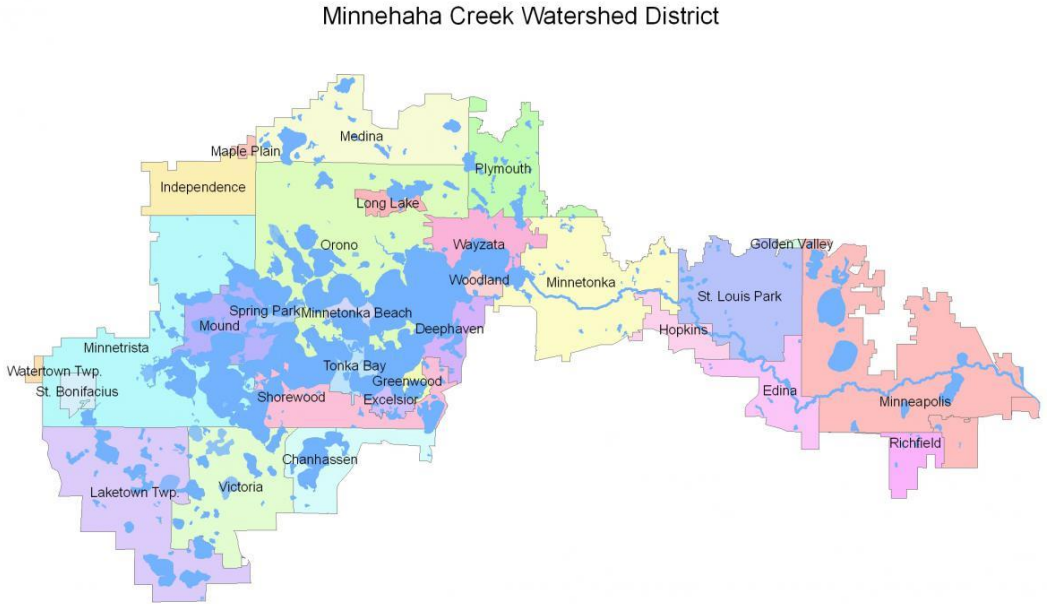
Minnehaha Creek Watershed District

181 square miles

8 major creeks

129 lakes

thousands of wetlands




Lake Minnetonka
North Arm
Smiths Bay
Grays Bay
Veterans Bay
St. Albans Bay
Christmas Lake
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

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Background

Eurasian Watermilfoil first discovered in Lake Minnetonka in 1987

(1st occurrence in state)

- Christmas Lake in late 1990's

<u>Lake Minnetonka EWM Management</u>

- Mechanical Harvesting
- Whole bay herbicide treatments in some bays

<u>Christmas Lake EWM Management</u>

- Occasional harvesting, hand removal and herbicide treatments in Christmas Lake at individual homes (not wide-scale)
- Experimental trials with milfoil weevils

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Objectives

1) What is the taxonomic composition of watermilfoils (Eurasian, northern, and hybrid) in Minnetonka Bays and Christmas Lake & does it differ in herbicide-treated versus untreated bays or lakes?

2) Are hybrid watermilfoil populations genetically distinct in different water bodies, and is there any relationship between genetic composition and management history?

3) Are there any relationships between weevil occurrence and density and distinct watermilfoil taxa?

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Methods

3 herbicide treated bays

- Pre- and post-treatment point-intercept surveys (June and August)

3 non-treated bays/lakes

- Early and late season point-intercept surveys (June and August)
- Milfoil weevil transect surveys

Genetic Analysis

- Milfoil plants collected from each sample point where present
- Samples genetically analyzed at Montana State University – Dr. Thum's Lab

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Preliminary Results

Objective 1) What is the taxonomic composition of watermilfoils (Eurasian, northern, and hybrid) in Minnetonka Bays and Christmas Lake & does it differ in herbicide-treated versus untreated lakes?

		EARLY/PRE			LATE/POST		
		EWM	NWM	HWM	EWM	NWM	HWM
Treated	**Grays**	1		42	1		2
	St. Albans	20		8			3
	North Arm	2		25			17
Untreated	**Smiths**	59	3	28			
	Veterans	19	2	4			
	Christmas	25	19				

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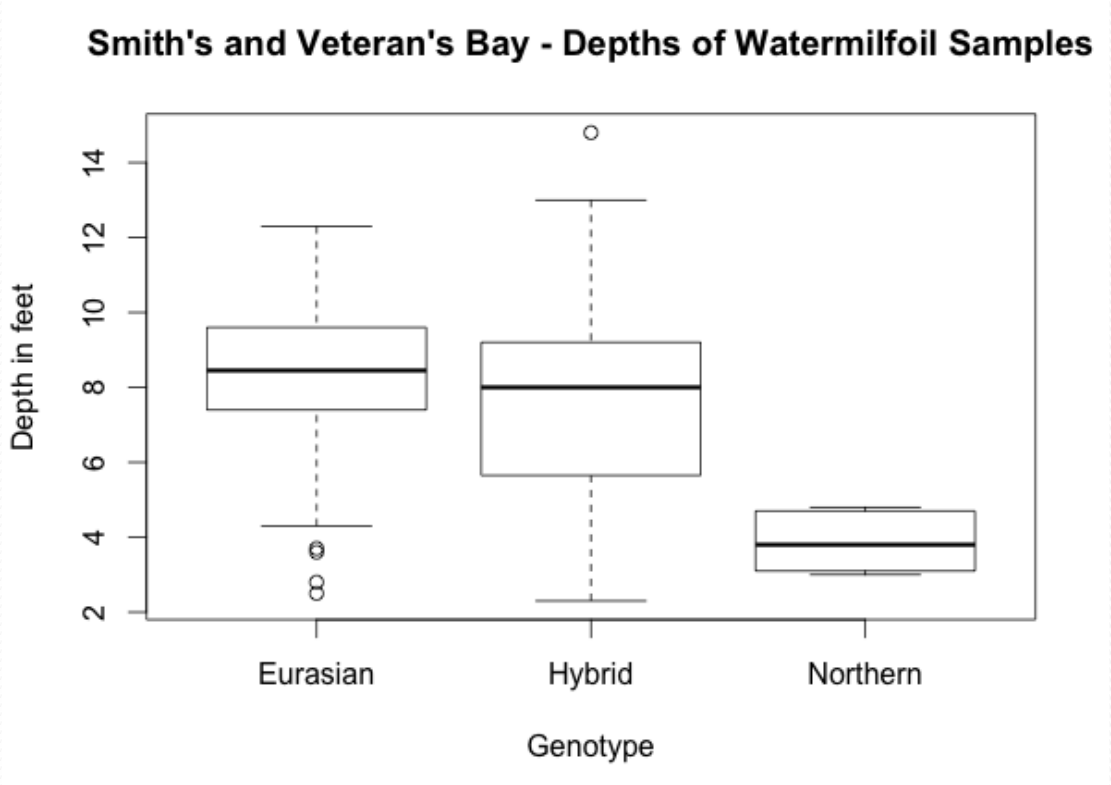
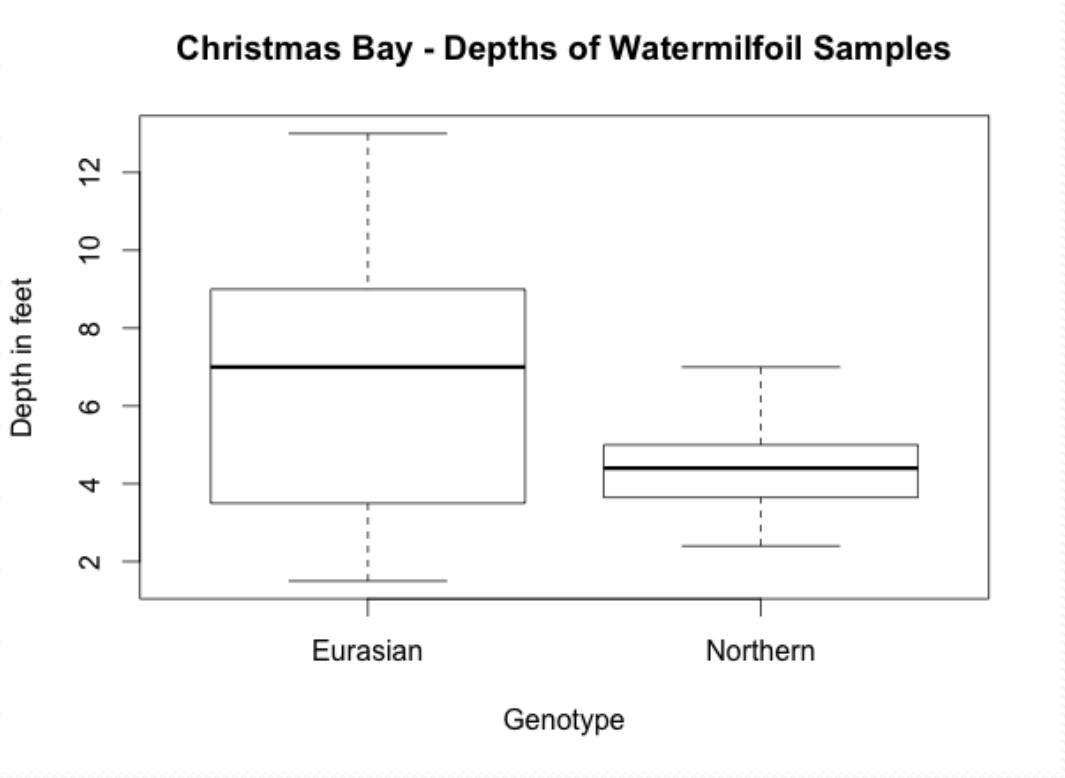
Depth Analysis



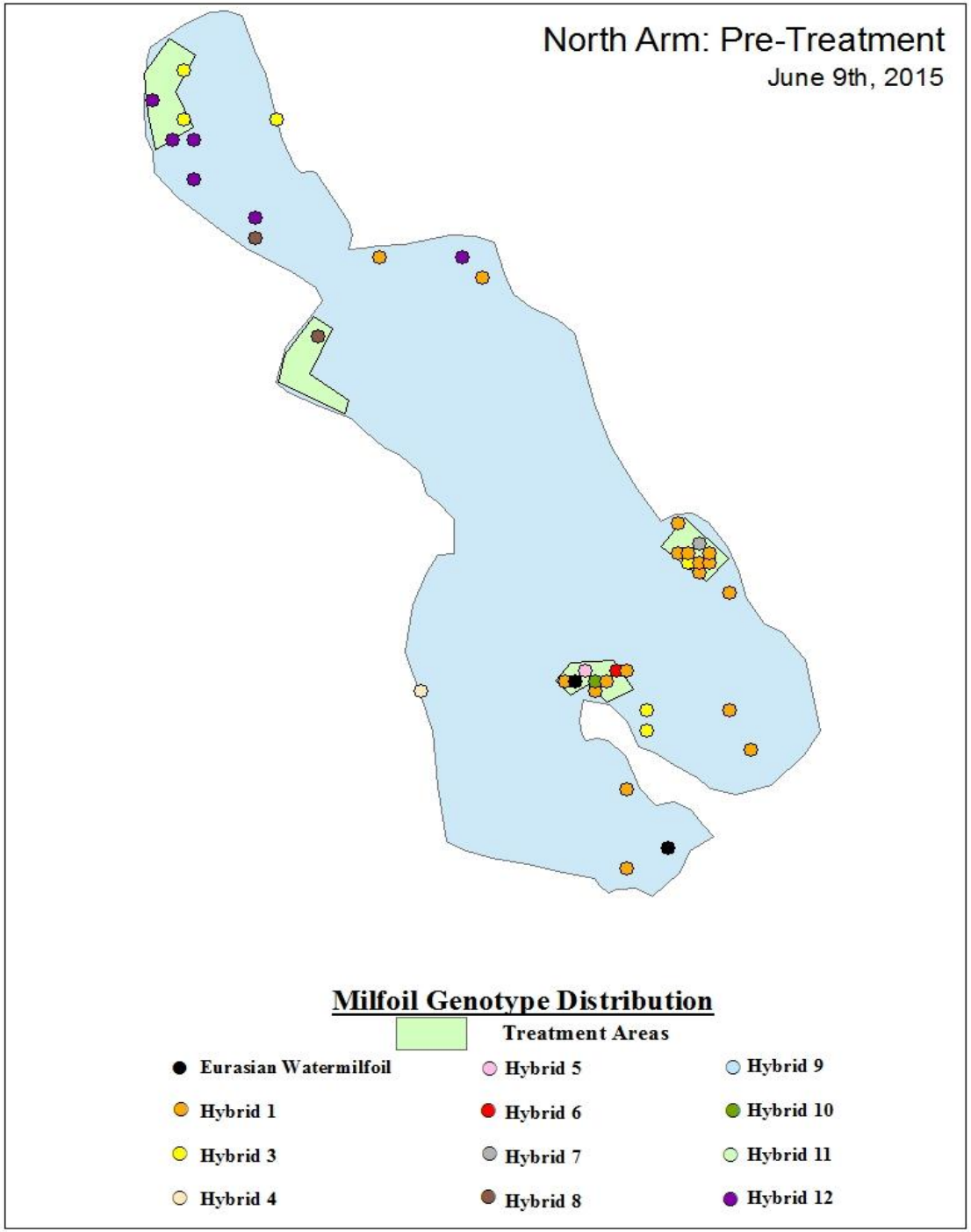


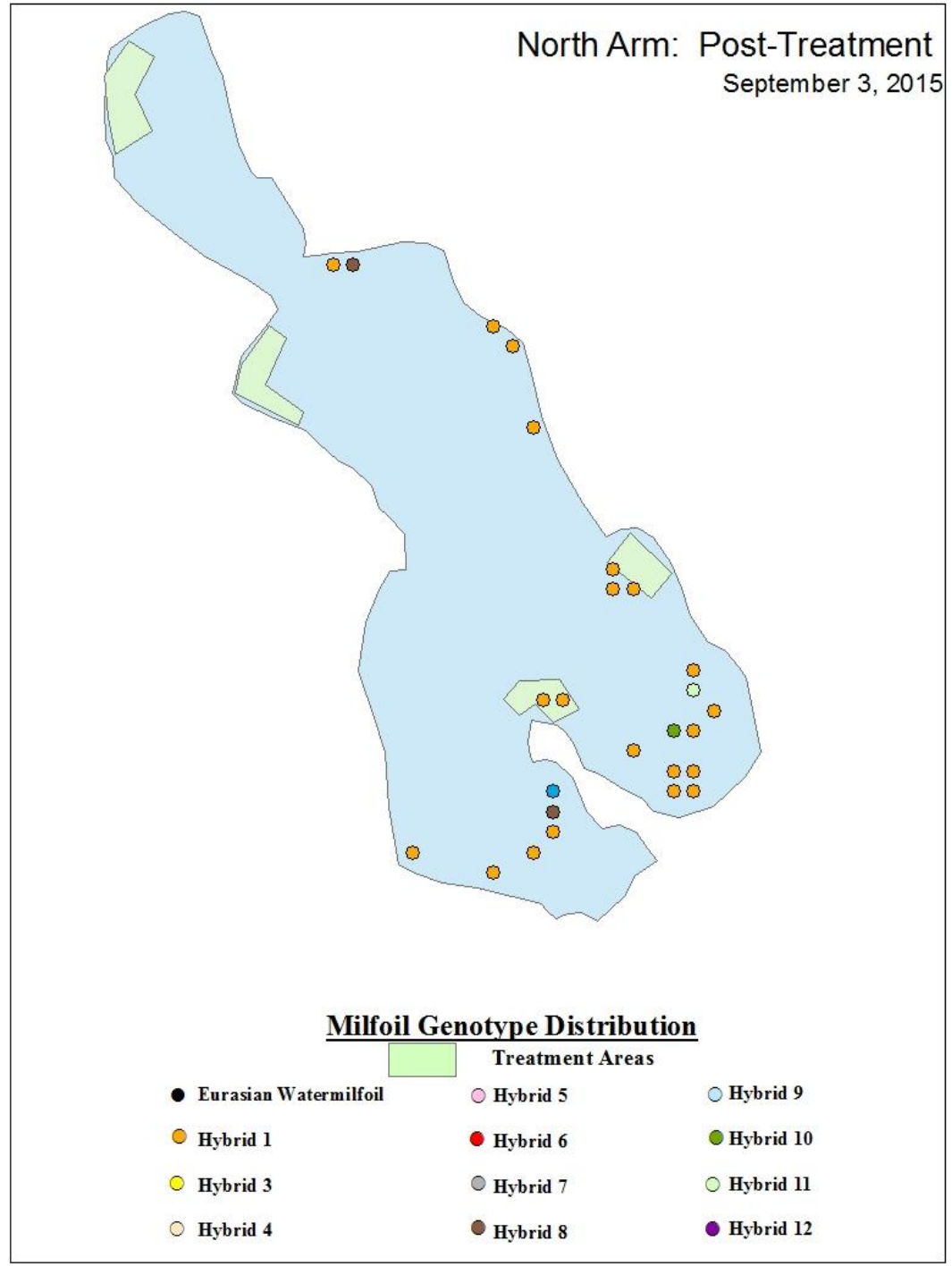
Preliminary Results

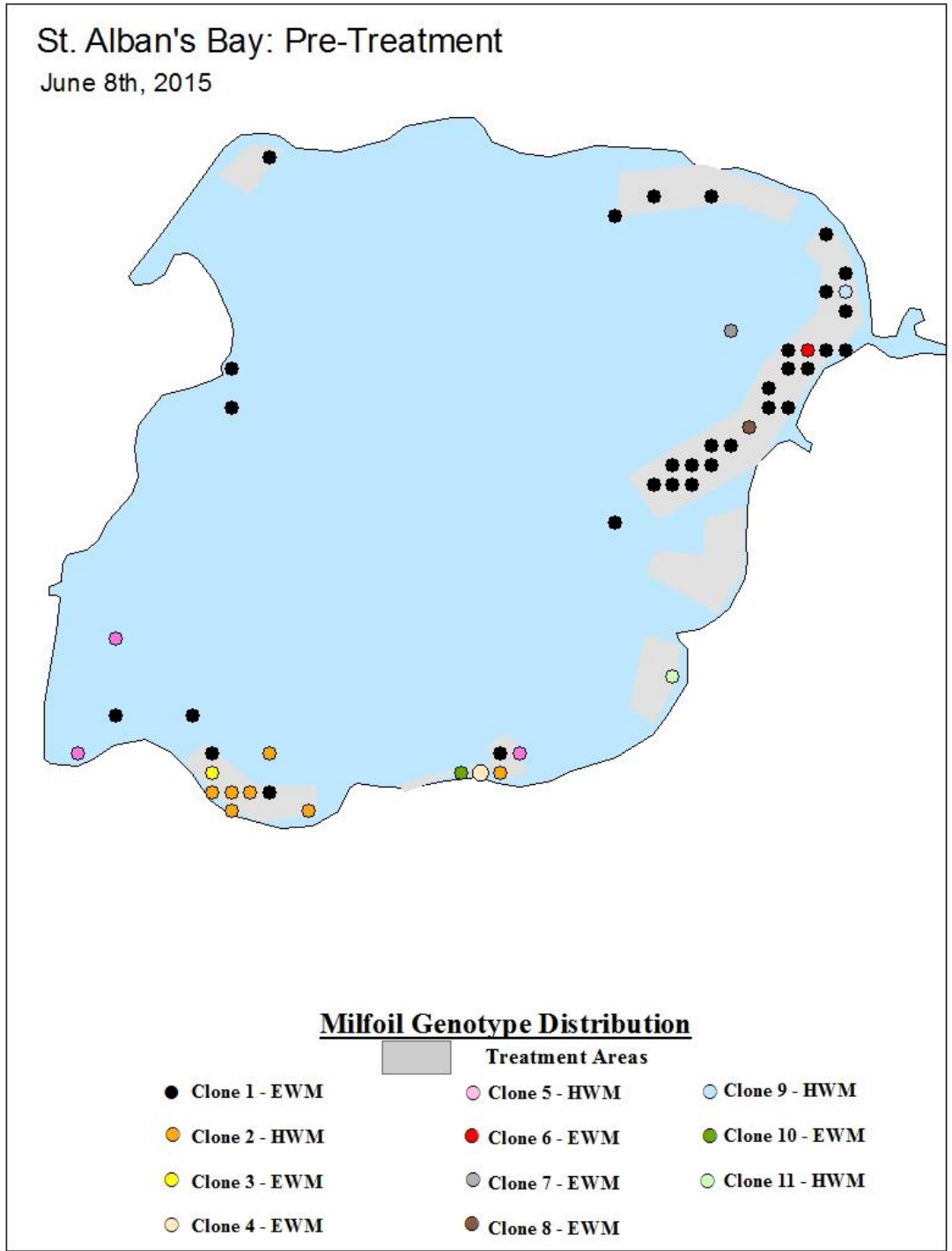
2) Are hybrid watermilfoil populations genetically distinct in different water bodies, and is there any relationship between genetic composition and management history?

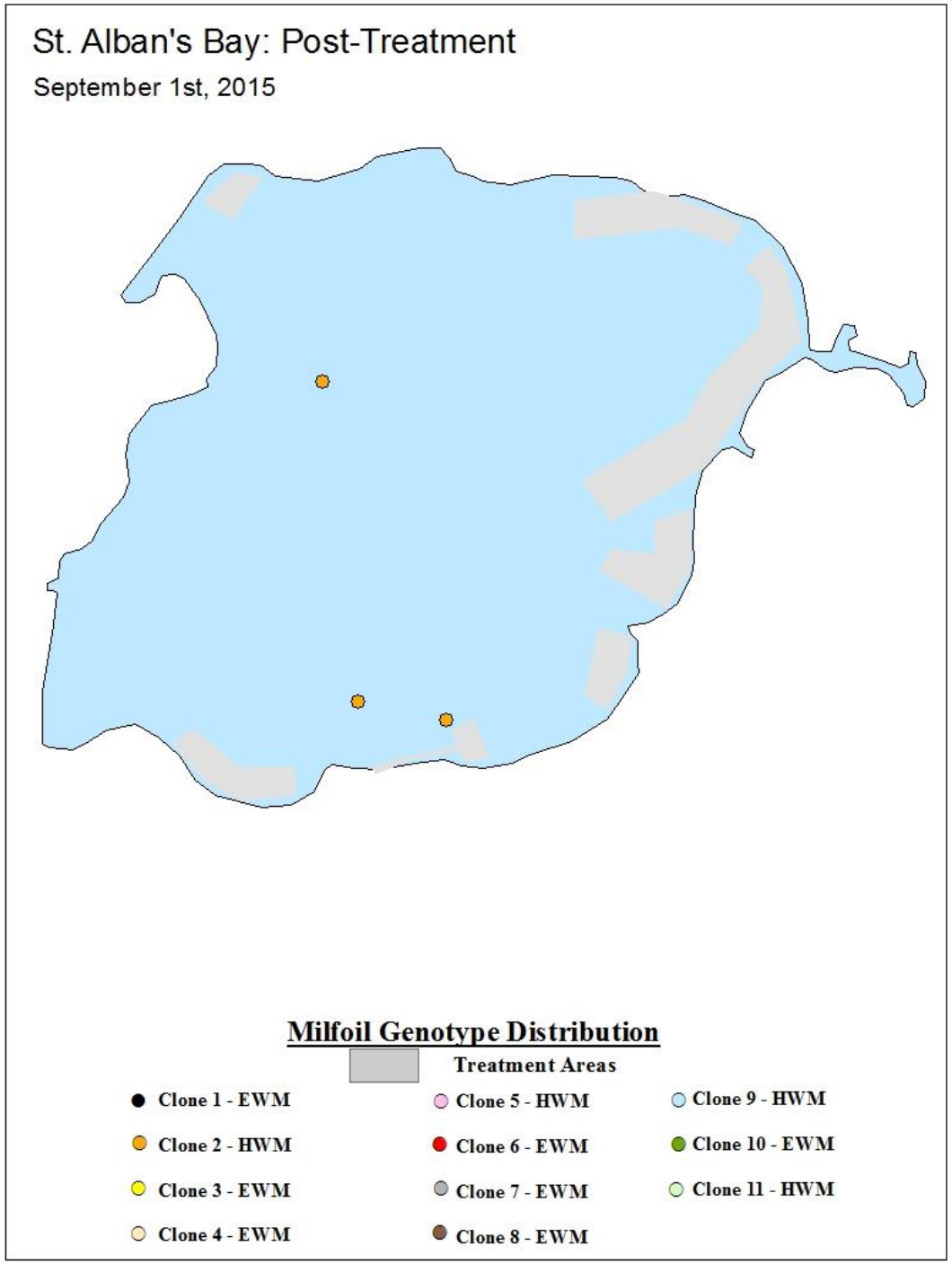
In progress

- Has been change in composition over time though


North Arm: Pre-Treatment
June 9th, 2015
Milfoil Genotype Distribution
Treatment Areas
Eurasian Watermilfoil
Hybrid 1
Hybrid 3
Hybrid 4
Hybrid 5
Hybrid 6
Hybrid 7
Hybrid 8
Hybrid 9
Hybrid 10
Hybrid 11
Hybrid 12


North Arm: Post-Treatment
September 3, 2015
Milfoil Genotype Distribution
Treatment Areas
Eurasian Watermilfoil
Hybrid 1
Hybrid 3
Hybrid 4
Hybrid 5
Hybrid 6
Hybrid 7
Hybrid 8
Hybrid 9
Hybrid 10
Hybrid 11
Hybrid 12





Same clone as North Arm remains post-treatment

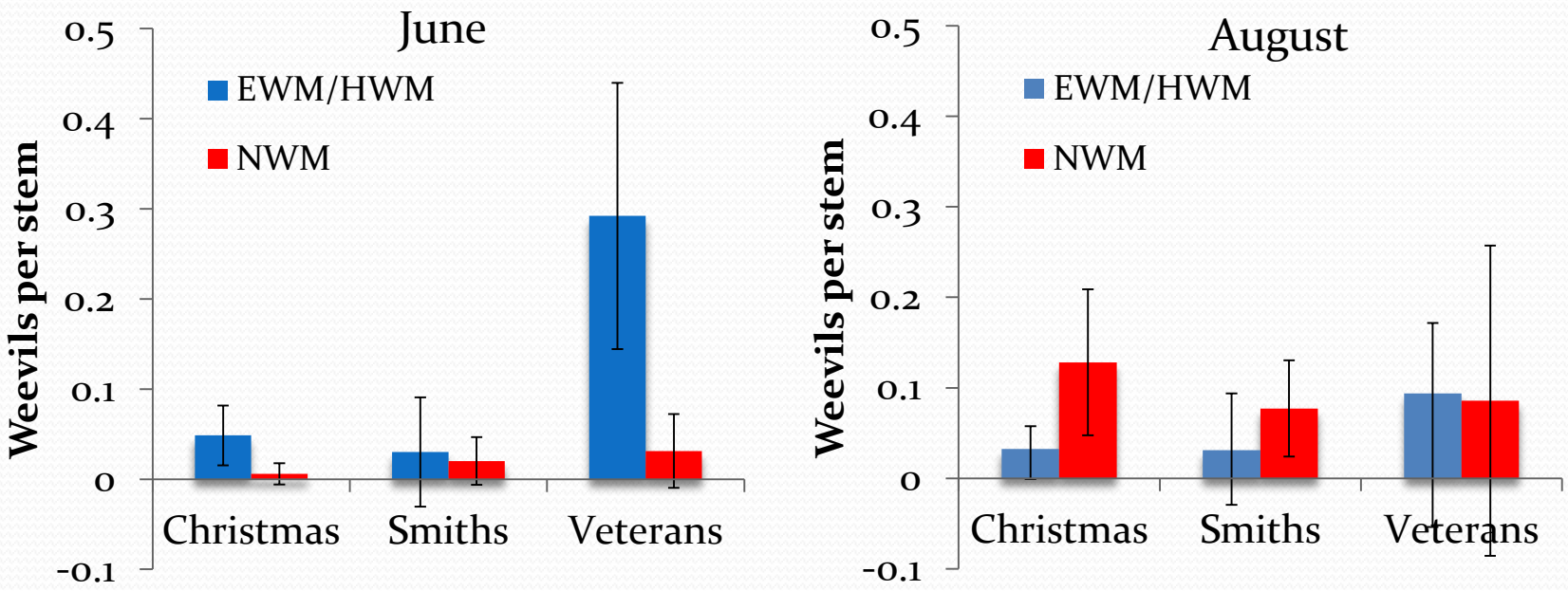
- Is this clone more resistant to herbicides?
- Is it a more aggressive spreader?
- Or was it just more common, so its more likely to remain?

➢Candidate for herbicide screening

Preliminary Results

3) Are there any relationships between weevil occurrence and density and distinct watermilfoil taxa?

Number of weevils/stem (all stages) ± 2SE



Preliminary Results

3) Are there any relationships between weevil occurrence and density and distinct watermilfoil taxa?

- Milfoil weevils were found on all three taxa in the three bays/lakes sampled.
- Because hybrid was not distinguished from Eurasian in the weevil survey samples, densities are for combined EWM/HWM. However, HWM was very rare at Christmas but composed 20 to 30% of EWM/HWM plants at Veterans Bay.
- Densities in June were higher on Eurasian/Hybrid than on northern but in August, milfoil weevil densities were higher on northern watermilfoil in Christmas Lake and Smiths Bay.
- Northern tends to be in shallower water and may provide good habitat and refuge for milfoil weevils.

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Next Steps

- Continued analysis
- Possible future years of sampling
- Herbicide screening on select clones?

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Any Questions

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