

Chautauqua Lake

Third-Party Monitoring for Chautauqua Lake Macrophyte
Management: Herbicide Program



Michael Hartshorne

Project Manager – Aquatics; Aquatic
Ecologist

mhartshorne@princetonhydro.com

610-524-4220

Fred Lubnow, PhD

Director of Aquatics

flubnow@princetonhydro.com

610-524-4220

Objectives of Presentation

- ✓ Review of 2020 Herbicide Program and Monitoring Objectives
- ✓ Project Methodology
- ✓ Submerged Aquatic Vegetation (SAV) & Water Quality (WQ) Data
- ✓ Evaluation of Objectives & Conclusions

2020 Herbicide Treatment & Third – Party Monitoring

Goals, Objective, and Methods

3rd Party Monitoring Objectives

- ✓ Evaluate apparent effectiveness of herbicide treatment
- ✓ Evaluate potential impacts of the herbicide treatment on non-target plants
- ✓ Evaluate potential effects of herbicide treatments on water quality via *in-situ* monitoring

Third-Party Tasks

Chautauqua Lake – Third Party Monitoring Tasks	
Task	Description
1.1	Third Party Sampling and Observation Plan
1.2	Collect Pre-Treatment Samples and Observations
2.1	Collect Post-Treatment Samples and Observations
2.2	Prepare Draft and Final Report
2.3	Attend Virtual Public Meeting

Sampling Plan & Methods

- ✓ Iterative process to identify
 - Sampling stations
 - Data collection methods
 - Data analysis techniques
 - Field Schedule

Sampling Stations

Pre-Treatment – June 23, 2020

Herbicide Application – June 29, 2020

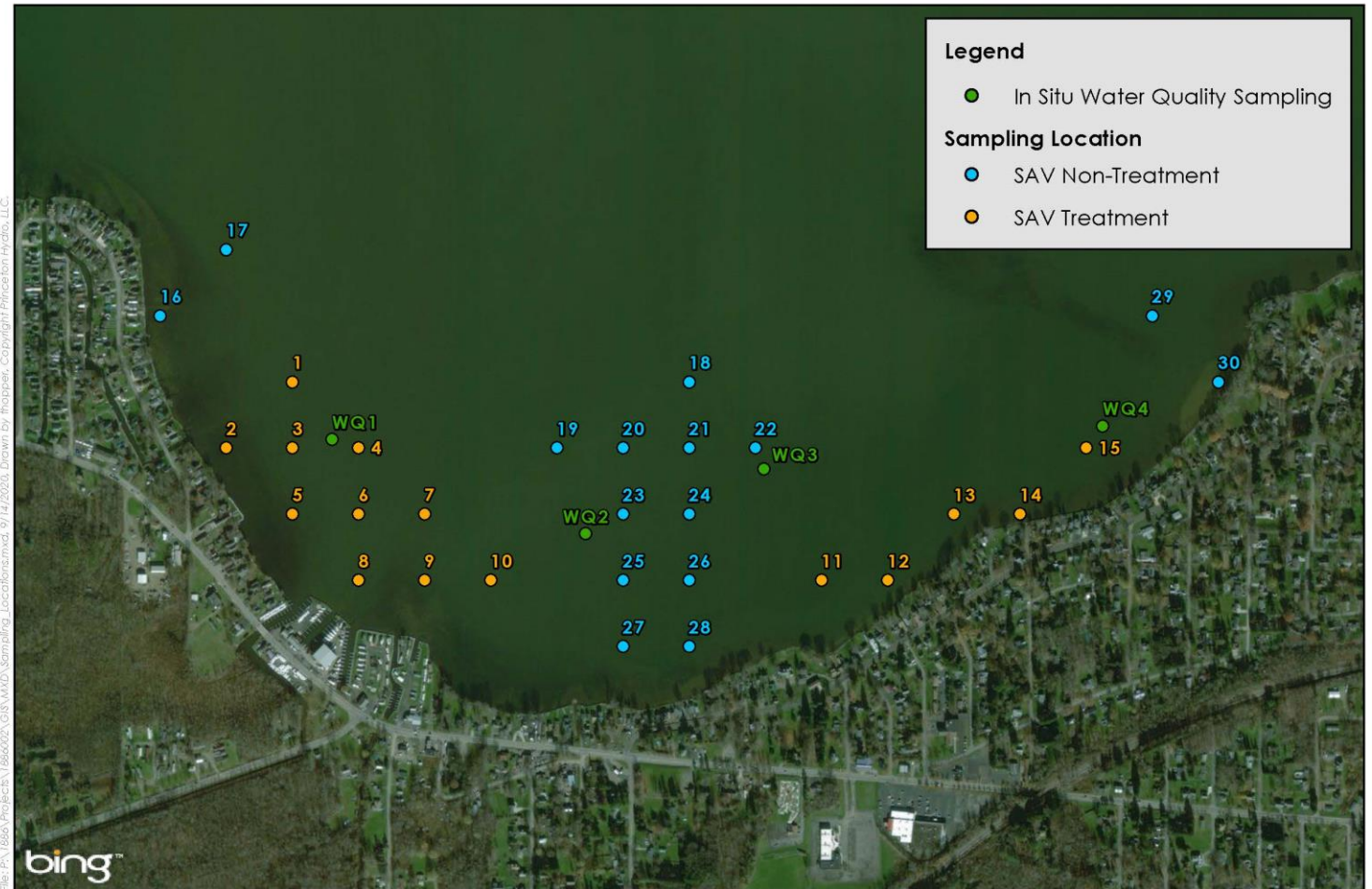
Post-Treatment – August 11 & 12, 2020

30 Stations

15 'Treatment'

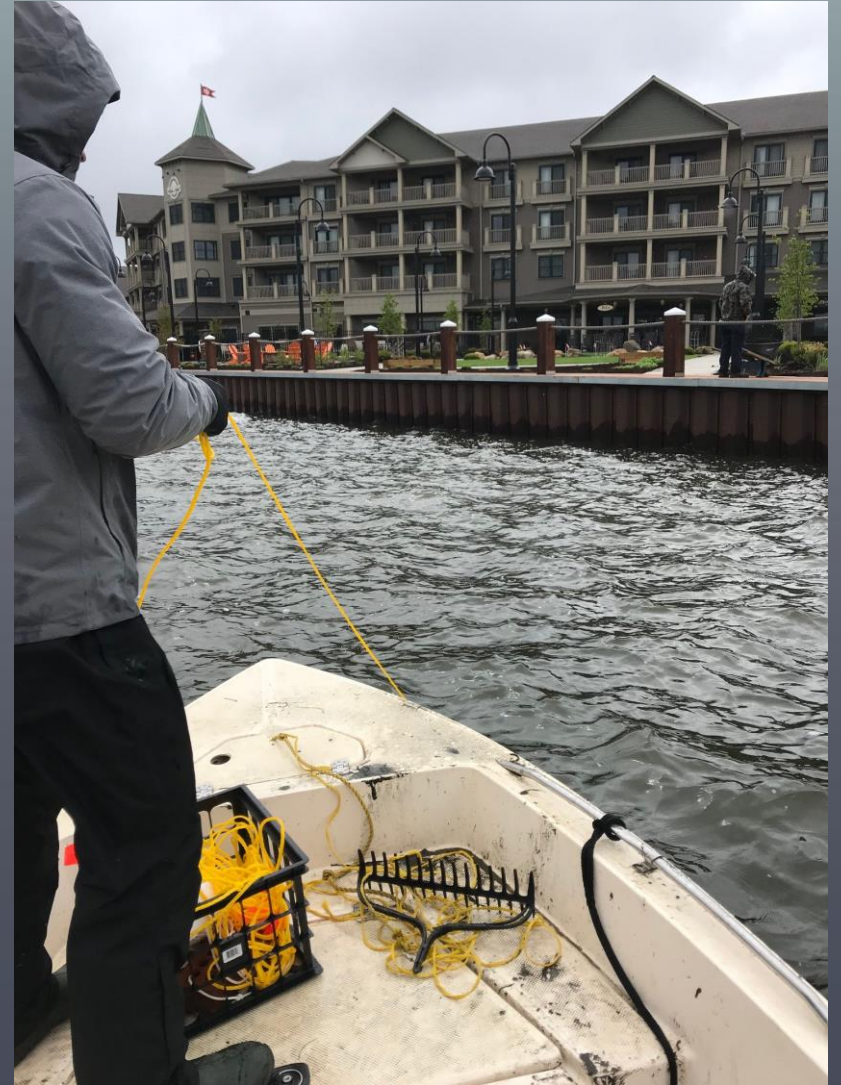
15 'Non-Treatment'

4 *In-situ* Stations



SAV Data Methods

- ✓ Established 30 rake toss points in the Shermans Bay (Busti & Lakewood Portions)
- ✓ Each point received 2 rake tosses
- ✓ Plants identified to species level and abundance described according to protocol established by Racine-Johnson (Racine-Johnson, 2019)



SAV Data Methods (Continued)

Abundance Category	Rake-Toss Abundance Number	Dry Weight (g/m ²) Ranges Associated with Total Plants Abundance	Mean Dry Biomass (g/m ²)	Dry Weight (g/m ²) Ranges Associated with Single Species Abundance
'0' = no plants	0	0.0	0.0	Same
'T' = trace plants	1	~0.0001 – 0.9999	0.5	Same
'S' = sparse plants	2	~1.0000 – 24.9999	13.0	Same
'M' = medium plants	3	~25.0000 – 99.9999	62.5	Same
'D' = dense plants	4	~100.0000 – 400.0000+	250.0	Same

In-situ

- ✓ Temperature
- ✓ Dissolved oxygen (DO)
- ✓ pH
- ✓ Specific Conductance
- ✓ Secchi Transparency



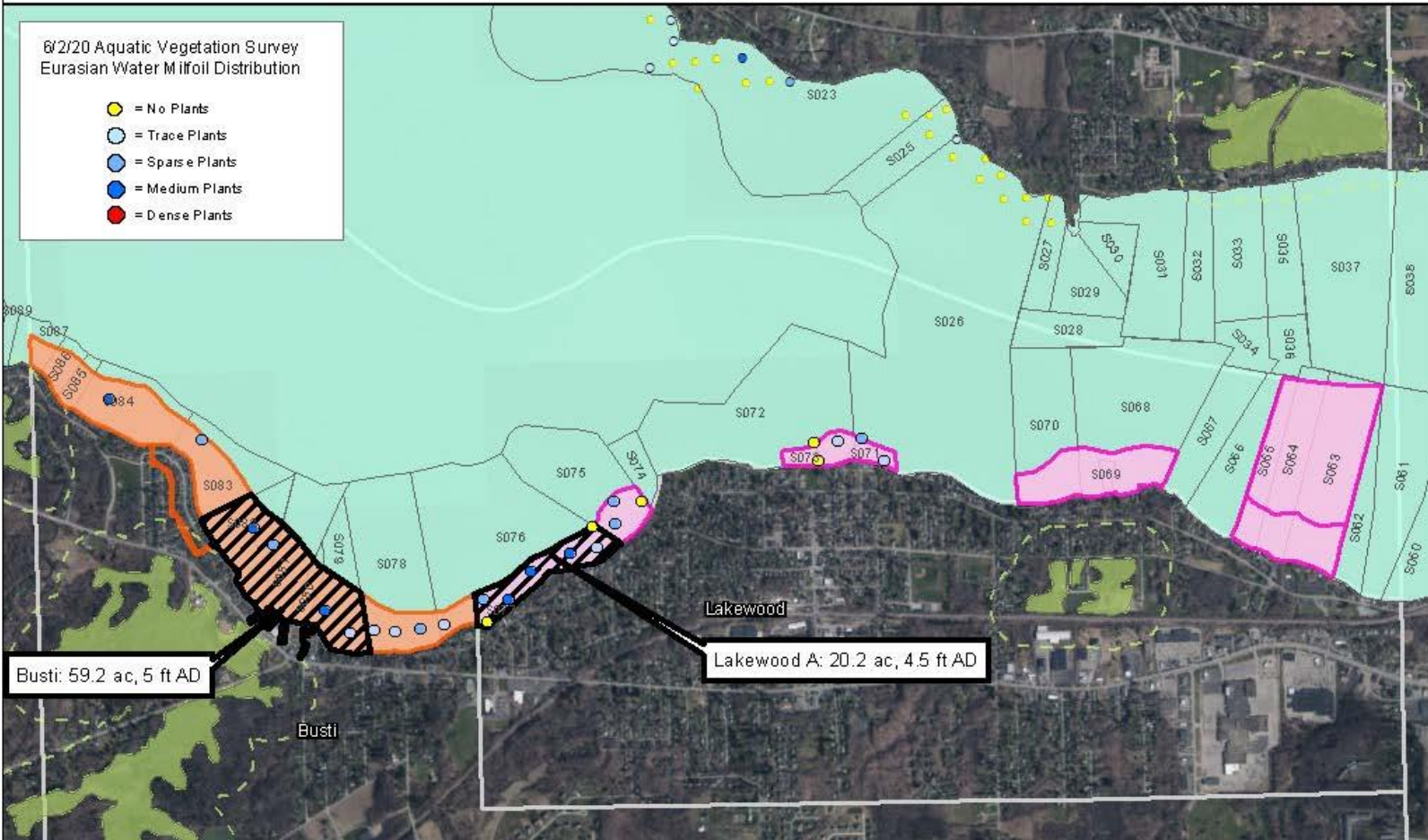
2020 Herbicide Treatment

Scope and Target Species

2020 Treatment

- ✓ Treatment permit issued on June 17, 2020
- ✓ Permit authorized application of Procellacor EC for treatment of Eurasian watermilfoil (*Myriophyllum spicatum*)
- ✓ Authorized zones:
 - Busti/Lakewood Area 79.4 acres
 - Ellery 7.0 Acres
- ✓ Treatment conducted on June 29, 2020 (Via CLWMA)

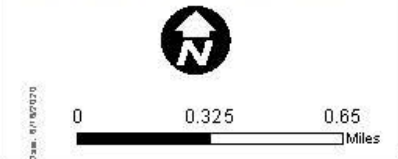
2020 HERBICIDE APPLICATION PLAN EURASIAN WATER MILFOIL CONTROL



BUSTI and LAKEWOOD CHAUTAUQUA LAKE

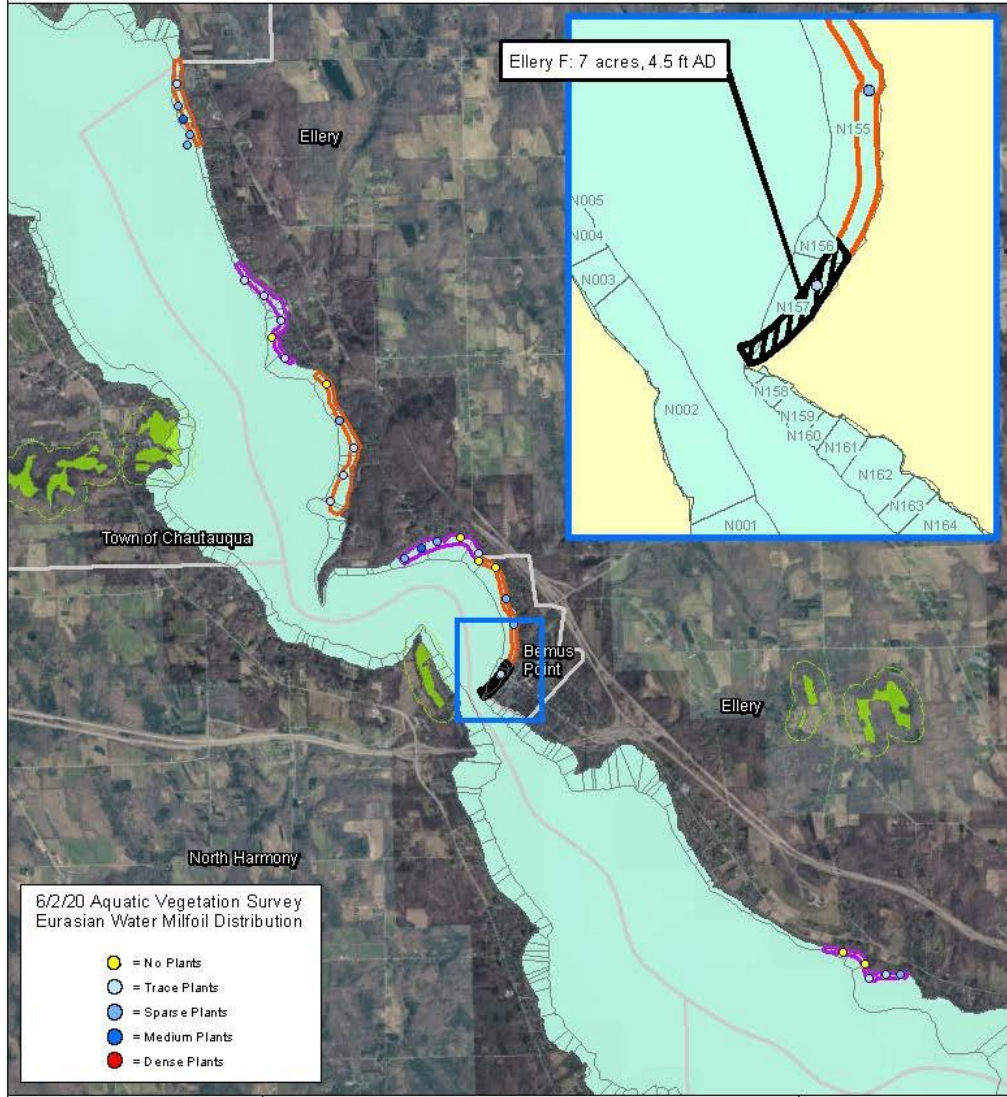
- Reduced Treatment Area by NYSDEC 6/15/20
- Busti Proposed Treatment Area: 130.5 acres
- Lakewood Proposed Treatment Area: 138.2 acres

NOTE: Treatment areas extend 200 feet from shore or to approximate 6 ft water depth whichever is greater.



Prepared by: K.M. Wadlington, NJ
Mapping Source: Esri, DigitalGlobe, GeoEye, Earthstar, Orangebird, CNES/Airbus, USDA, USGS, AeroGRID, IGN, and the GIS User Community

2020 HERBICIDE APPLICATION PLAN
EURASIAN WATER MILFOIL CONTROL

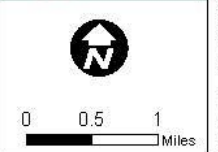


6/2/20 Aquatic Vegetation Survey
Eurasian Water Milfoil Distribution

- = No Plants
- = Trace Plants
- = Sparse Plants
- = Medium Plants
- = Dense Plants

ELLERY
CHAUTAUQUA LAKE

Reduced Treatment Area by NYSDEC 6/15/20
 Proposed Ellery Treatment Area: 178 acres
 Note: Treatment areas extend to estimated 6 ft water depth.
 NYSDEC FWW Chautauqu_Bnd_NAD1927
 FWW Checkzone



Date: 6/10/2020 Prepared by: AEL, Washington, NJ Imagery Source: Esri, DigitalGlobe, GeoEye, Earthstar Open Imagery, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

2020 WQ and SAV Data

In-situ Data

- ✓ Evaluate water quality parameters for indications of impairment that may be derived from herbicide application
- ✓ Chautauqua Lake – NYSDEC Class A Waterbody
 - Thresholds established for Dissolved Oxygen and pH under 6 NYCRR Part 703
 - DO > 5 mg/L
 - pH 6.5 – 8.5

In-situ Results

Pre-Treatment

- ✓ WQ 1 (2m) – DO 2.25 mg/L
- ✓ Numerous stations/depths with pH > 8.5
- ✓ Mean Secchi
 - ✓ Treatment – 1.75 m
 - ✓ Non-Treatment – 2.0 m

Post-Treatment

- ✓ WQ 3 (2.5 m) – DO 4.90 mg/L
- ✓ All stations/depths with pH > 8.5
- ✓ Mean Secchi
 - ✓ Treatment – 0.95 m
 - ✓ Non-Treatment – 0.95 m

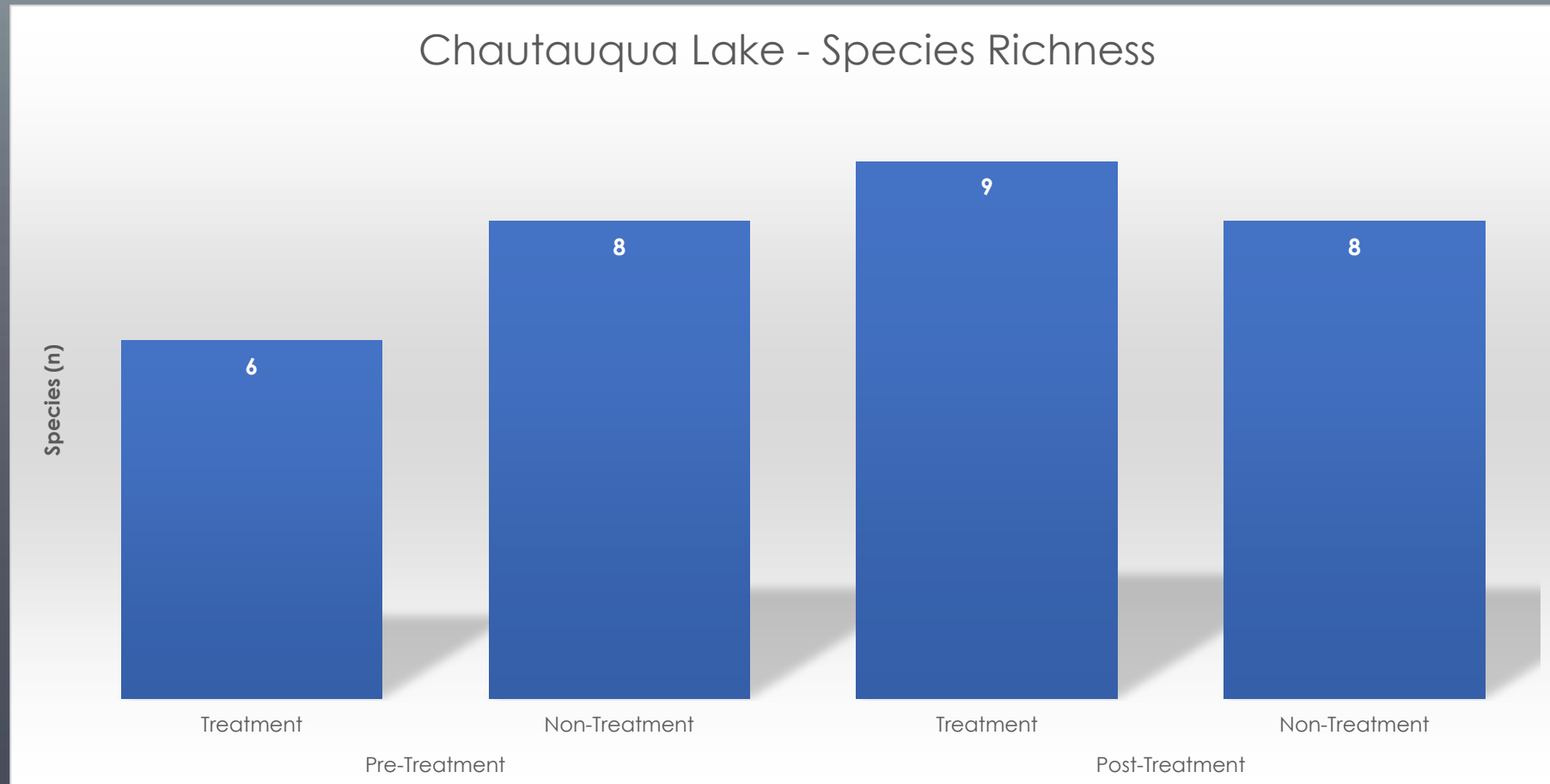
SAV Data

- ✓ Evaluate Species Richness
- ✓ Biomass of target species, non-native, and native species
- ✓ Describe abundance of the macrophyte species
- ✓ Provide statistical analysis of biomass data
- ✓ Compute Floristic Quality Index
- ✓ General notes and observations on plant health

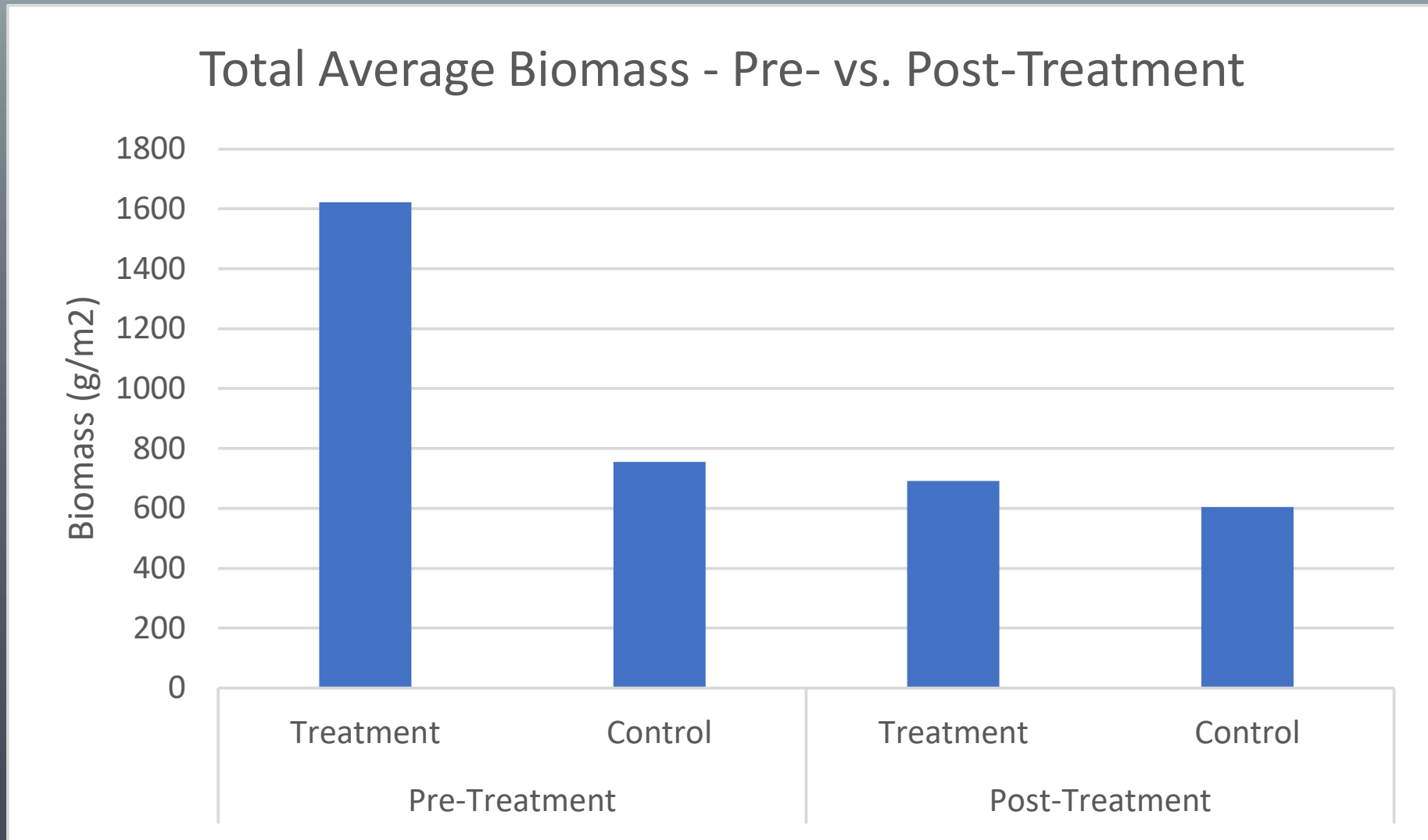
SAV Results

Chautauqua Lake - Macrophyte Species List	
Common Name	Scientific Name
Curly-Leaf Pondweed	<i>Potamogeton crispus</i>
Eurasian Watermilfoil	<i>Myriophyllum spicatum</i>
Coontail	<i>Ceratophyllum demersum</i>
Elodea	<i>Elodea canadensis</i>
Small Pondweed	<i>Potamogeton berchtoldii</i>
Water Stargrass	<i>Heteranthera dubia</i>
Sago Pondweed	<i>Stuckenia pectinata</i>
Tape Grass	<i>Vallisneria americana</i>
Star Duckweed	<i>Lemna trisulca</i>
Slender Naiad	<i>Najas flexilis</i>
Chara	<i>Chara sp.</i>

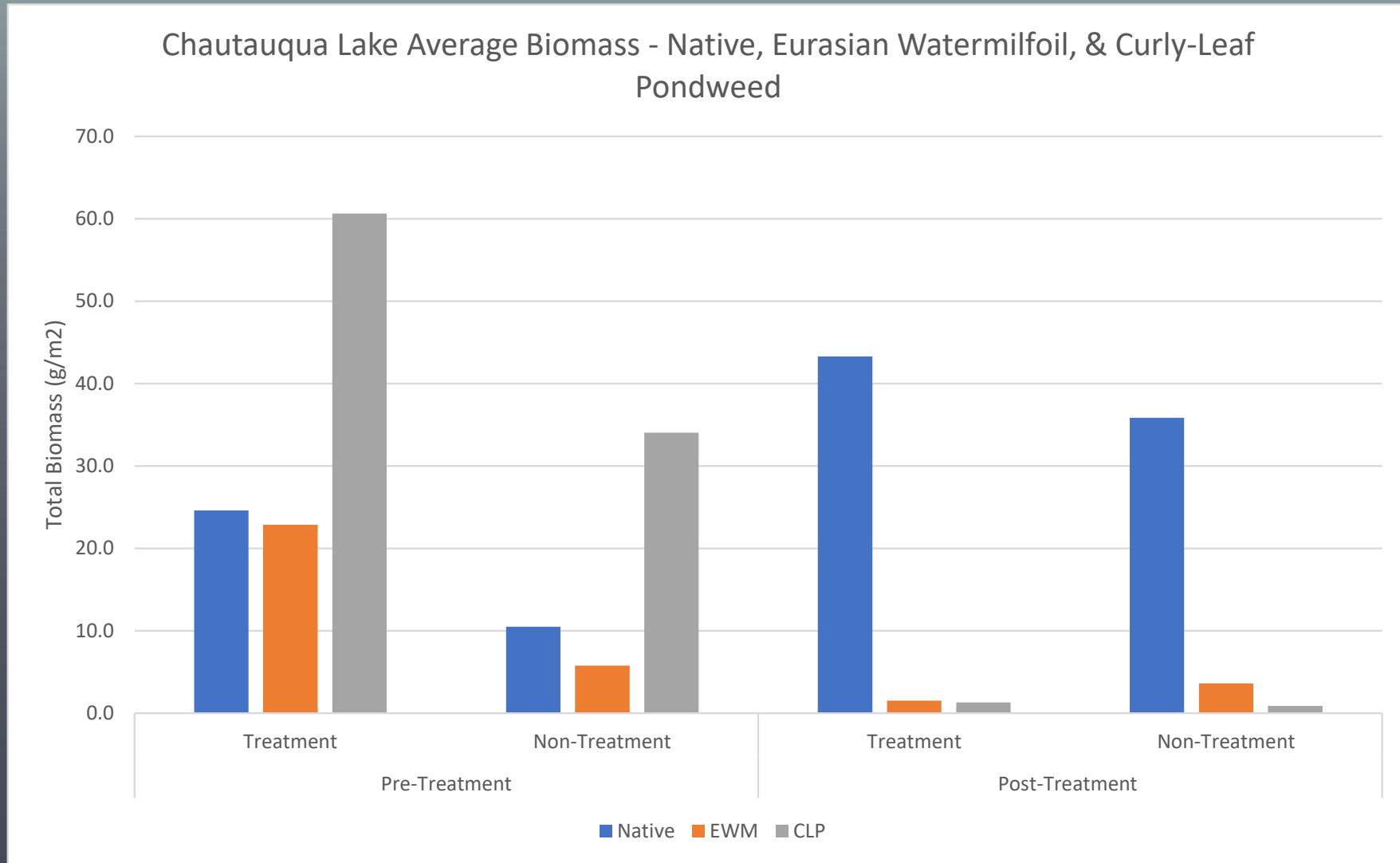
SAV Data – Species Richness



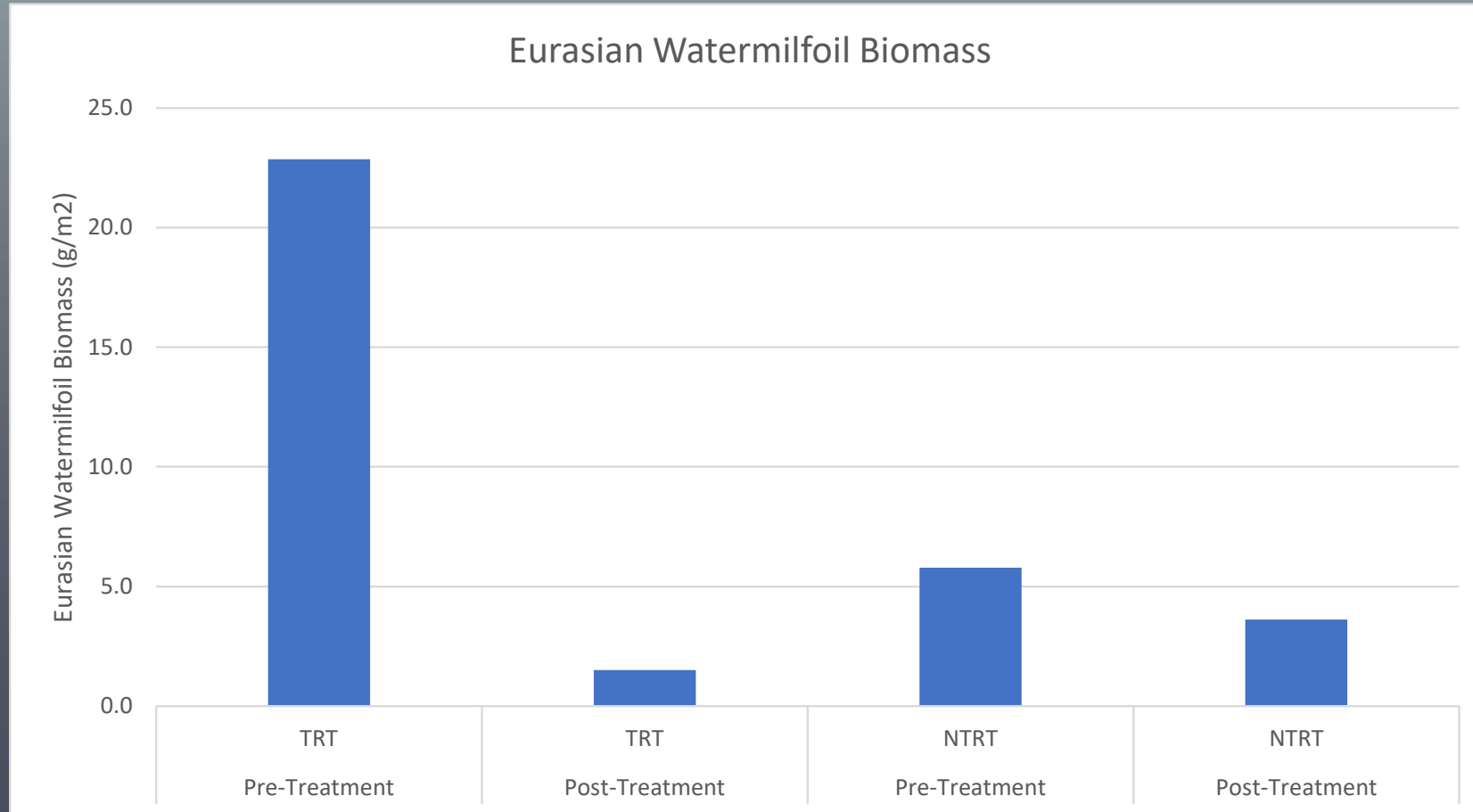
Changes in Total Biomass



Changes in SAV Biomass



Changes in Eurasian Watermilfoil Biomass



Mean Rake Toss Abundance Per Species

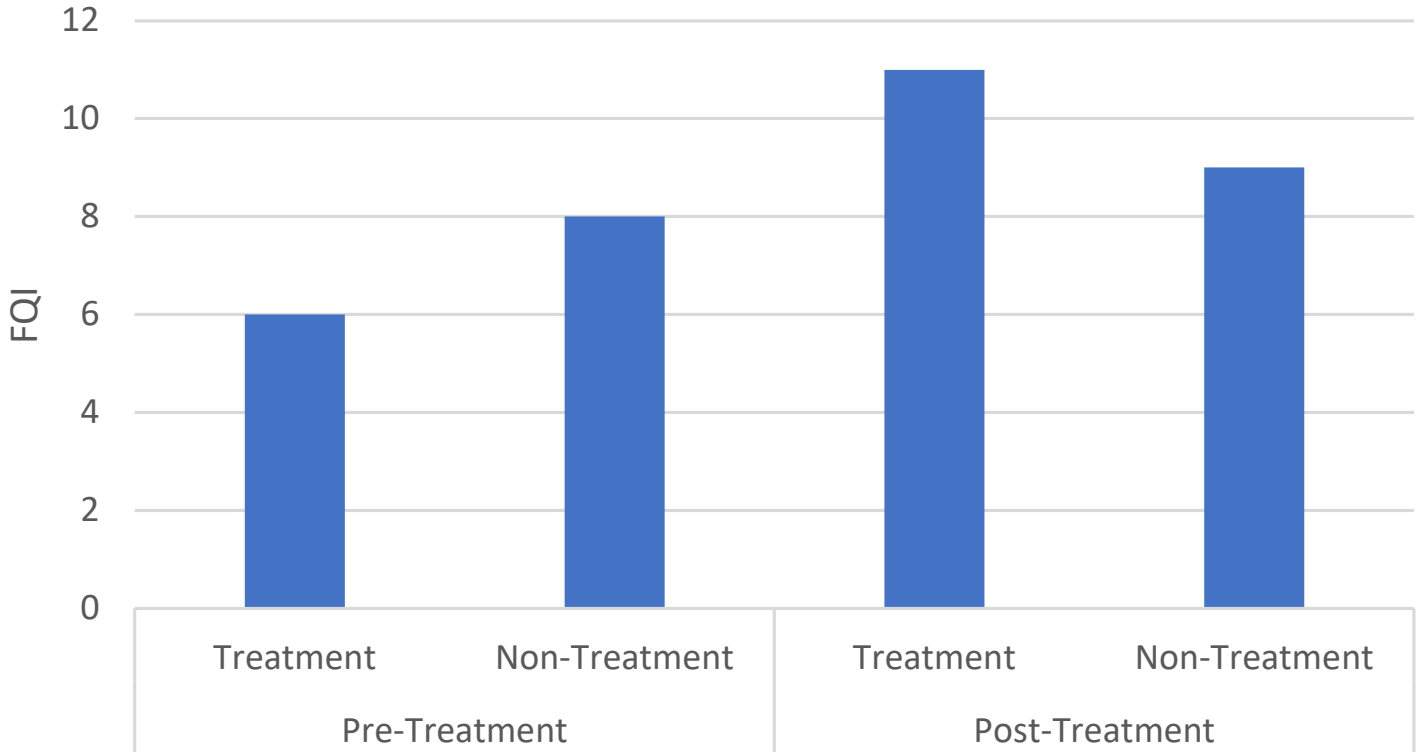
Mean Rake Toss Abundance Per Species

Event	Type	Species									
		P_crispus	M_spicatum	C_demersum	E_canadensis	P_berchtoldii	H_dubia	S_pectinata	V_americana	L_trisulca	N_flexilis
Pre-Treatment	TRT	M	S	S	S	S	T	0	0	0	0
	NTRT	M	S	S	S	T	T	T	T	0	0
Post-Treatment	TRT	S	S	S	S	T	S	0	S	T	S
	NTRT	T	S	S	S	S	T	0	T	0	T

Floristic Quality Assessment

- Standardized assessment method that calculates a numerical index reflecting the quality of a native plant community in a given area (Conservationtools.org)
- Computed utilizing a species list and an applied Coefficient of Conservation (C) for each species
- C-values selected for this project were derived from the database associated with the Mid-Atlantic Allegheny Plateau (glaciated) (2012) as accessed via universalfqa.org.

Chautauqua Lake - Floristic Quality Index



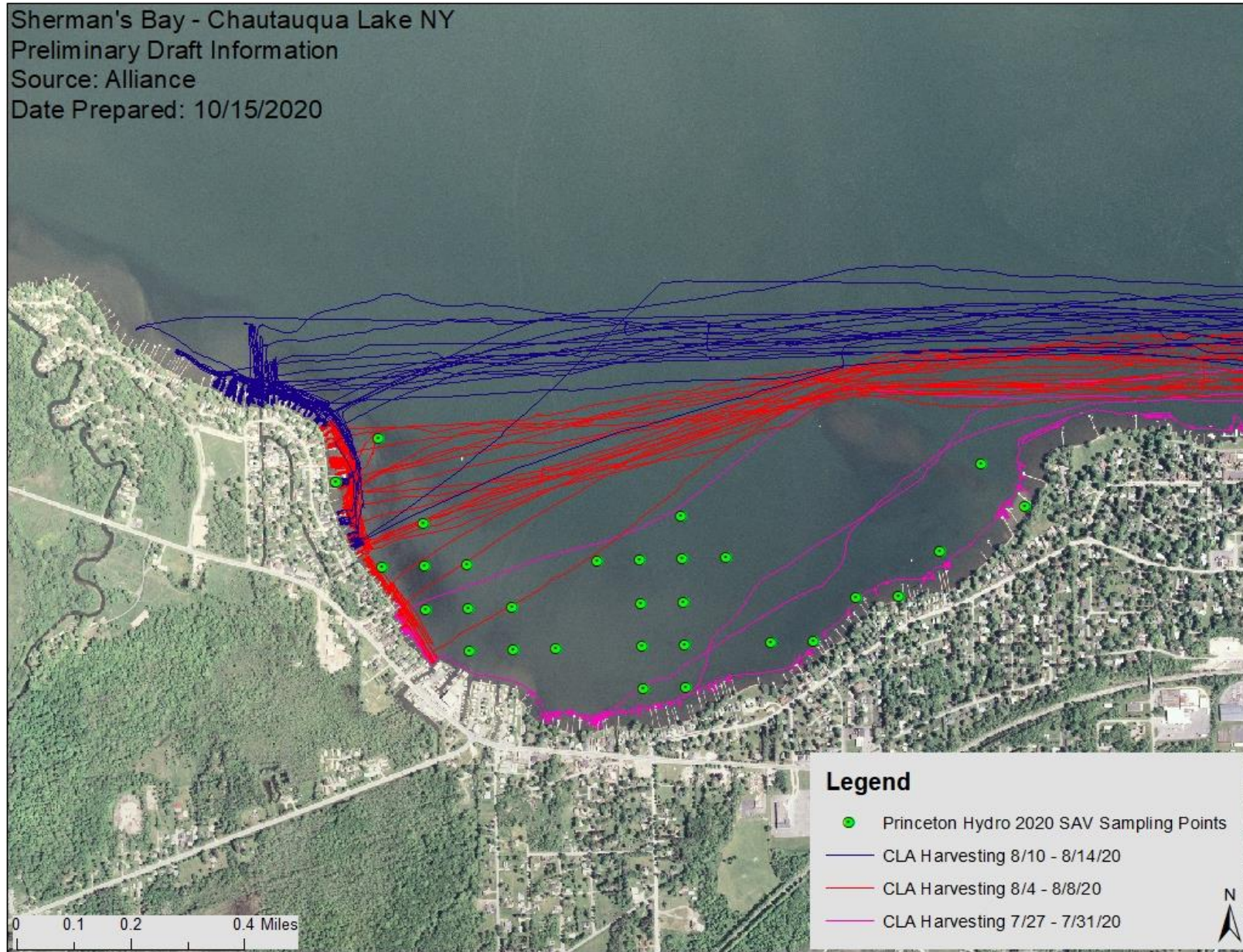
Potential Effects of Other Macrophyte Management Techniques

Macrophyte Harvesting

SAV Harvesting

- ✓ Active SAV harvesting did occur in Shermans Bay between the Pre-Treatment and Post-Treatment surveys
- ✓ The maps provided to Princeton Hydro show that the harvesting was primarily near-shore but may have crossed several of the rake toss points.
- ✓ Harvesting is typically non-selective in targeting rooted macrophytes.

Sherman's Bay - Chautauqua Lake NY
Preliminary Draft Information
Source: Alliance
Date Prepared: 10/15/2020



Conclusions

Conclusions

- ✓ Water quality data showed limited reductions in dissolved oxygen at one site Pre- and Post-Treatment
- ✓ pH values were routinely greater than the 8.5 upper threshold due, likely, to elevated plant and algal productivity
- ✓ Secchi transparency decreased between Pre-Treatment and Post-Treatment monitoring at all stations

Conclusions

- ✓ SAV Species Richness increased at the Treatment site following herbicide application. Species richness at the Non-Treatment site remained equal Pre-Treatment vs. Post-Treatment
- ✓ Total SAV biomass decreased 57% in the Treatment zone and 20% in the Non-Treatment zone. Neither total decrease was statistically significant (Kruskal-Wallis test)

Conclusions

- ✓ Eurasian Watermilfoil biomass decreased 93% in the Treatment zone and 38% in the Non-Treatment zone
- ✓ Native biomass in the Treatment zone increased 76% following treatment and 242% in the Non-Treatment zone
- ✓ Curly-Leaf Pondweed biomass decreased 98% in the Treatment zone and 97% in the Non-Treatment zone. Reduction likely attributable to life-cycle of this plant due to natural early senescence.

Conclusions

- ✓ The herbicide treatment was successful at reducing Eurasian watermilfoil biomass while native species biomass and species richness increased following treatment
- ✓ Reductions in Curly-Leaf Pondweed biomass are likely attributable to natural senescence as opposed to in-lake herbicide movement. Recommendation for herbicide sampling in future events to detect potential movement outside of the treatment area.
- ✓ Water quality data showed the majority of pH values outside of the prescribed range during Pre- and Post-Treatment. Exceedances Post-Treatment are likely related to increased algal densities. Chlorophyll *a* / Plankton sampling is recommended for future events.

Questions?

Thank You



QUESTIONS?



Michael Hartshorne

Project Manager – Aquatics; Aquatic Ecologist

Princeton Hydro, LLC

mhartshorne@princetonhydro.com

610-524-4220

**THANK
YOU!**

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