

SAV Survey Methodologies for Monitoring Monoecious Hydrilla

Combining Survey Methodologies for a More Complete Assessment

Linking Plant Biology with Management Strategies to Improve Control of Monoecious Hydrilla



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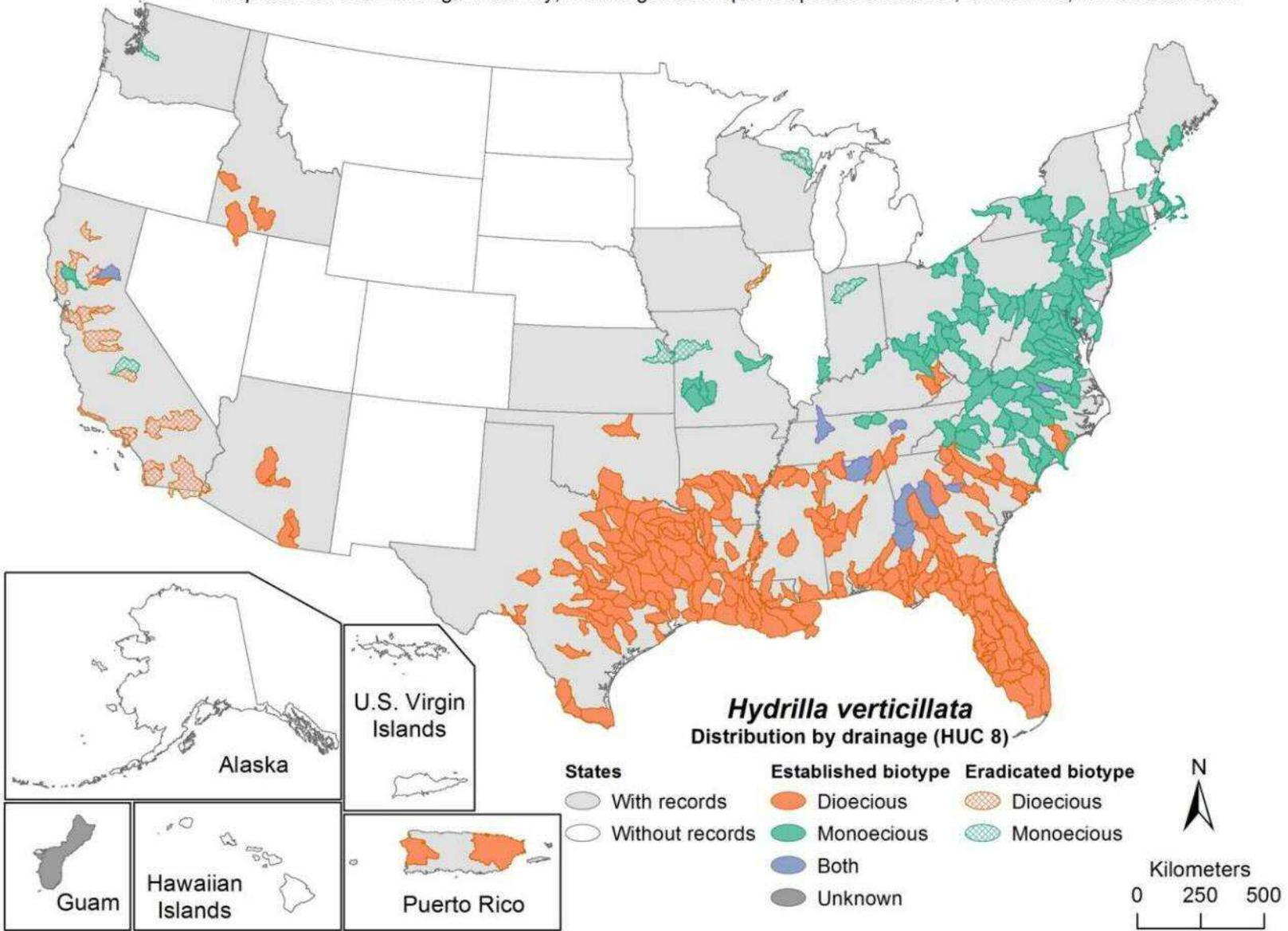
UF

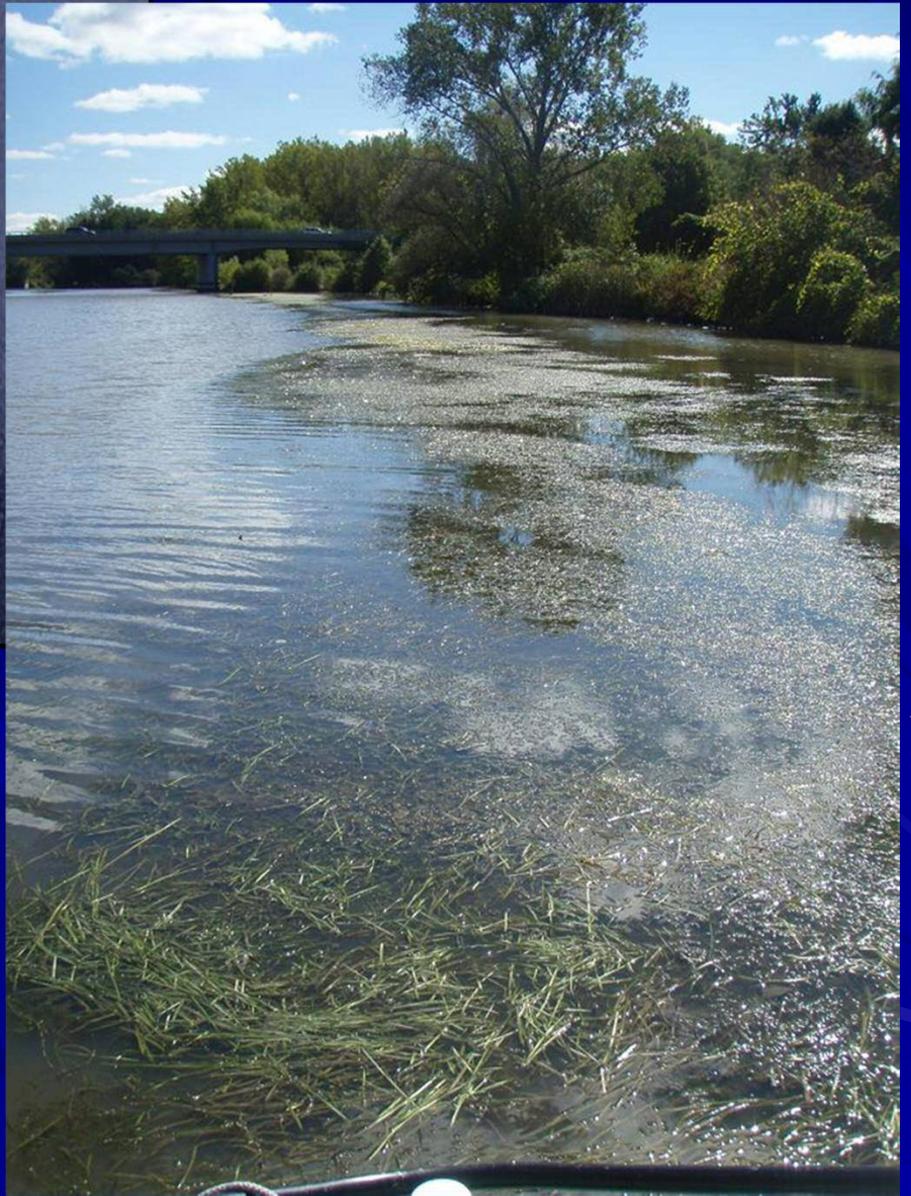


Hydrilla - “The Almost Perfect Weed”

- * Ability to cover thousands of contiguous acres
- Rapid spread and establishment
 - fragments, turions, tubers, crowns
 - tubers can remain quiescent for years (seed)
- High growth rates and physiological adaptations
- Invading diverse and high value waters in the North
- Our only “National” aquatic weed

Map Source: U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, FL. October 2016





Methods for Monitoring Hydrilla

- Visual survey – **Opinion, can be incomplete or biased**
- Aerial survey – **technical limitations for SAVs**
- Biomass collections – species and abundance data
 - **WORK/benefit**
- Tuber sampling – insight to population
- Hydroacoustic survey – spatially depicts SAV abundance
 - **Does not differentiate species**
- Traditional Point Intercept – Most widely accepted
 - Species and frequency
 - Powerful statistical tool
 - **Lack of an abundance metric**
 - **Distribution is generally not shown**



Hydrilla Tubers



Hydrilla tubers
Photo by Alison Fox

2017 Cayuga Tuber Sampling – Buffalo District/ERDC

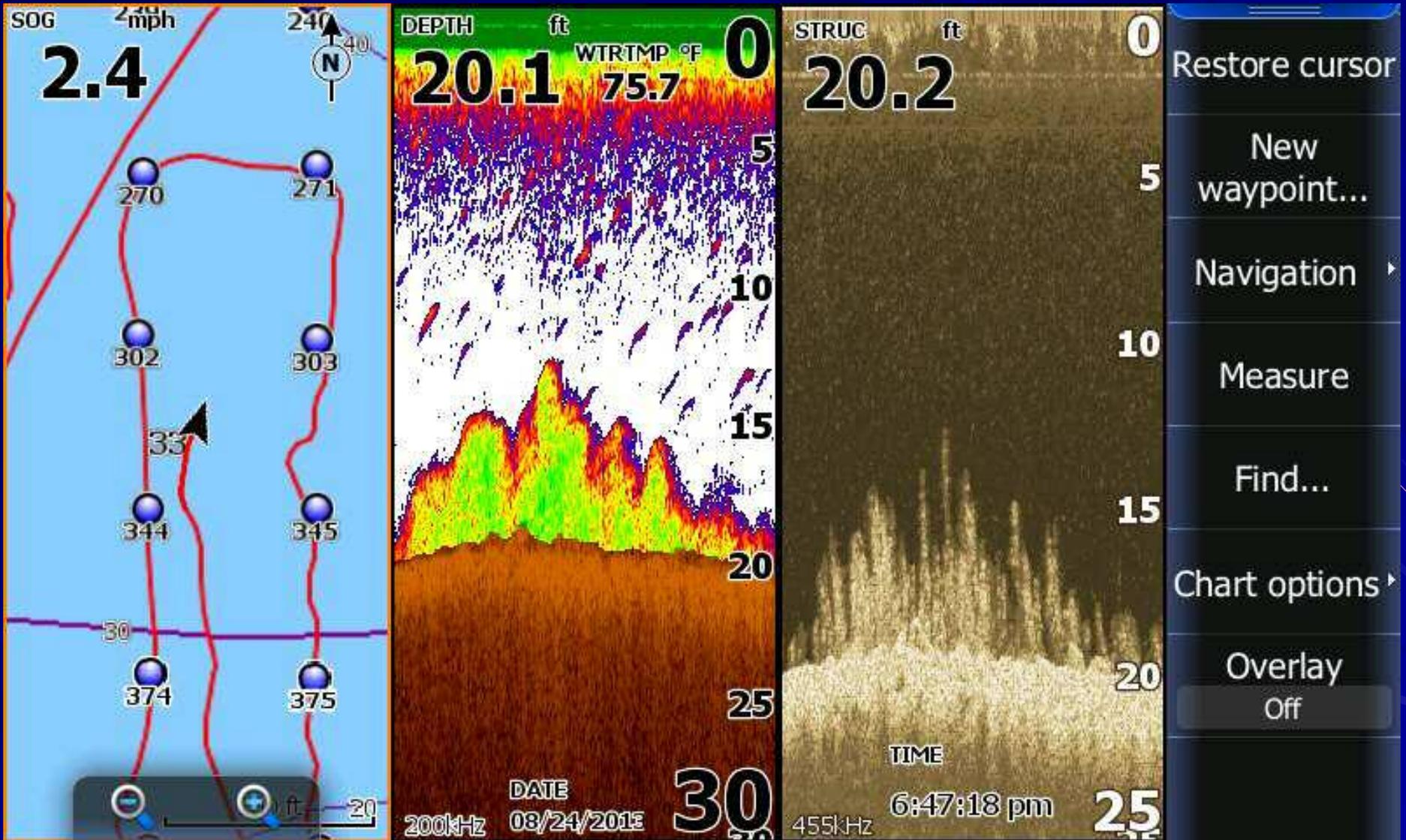
- 5 sites at 40 cores/site
 - Sampled on May 24
 - 8.5% sprouting
 - water temp = 12 C
 - Sampled again on June 8
 - 15% sprouting
 - water temp = 13 C
 - Sampled again on June 28
 - 82% sprouting
 - water temp = 21 C
 - Sampled again on Aug 8
 - 88% reduction in tubers
- ★ 179 total tubers on 6/28 to 23 total tubers on 8/8
- ★ Time herbicide application with mass tuber sprouting



Lowrance Hardware



Screenshot



Data Processing

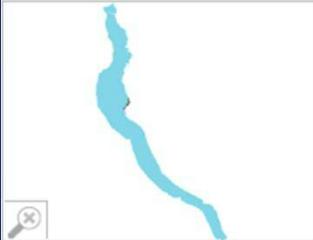
The screenshot shows a web browser window with the address bar displaying "www.biobasemaps.com". The website header includes the BioBase logo and navigation links for "Solutions", "Plans", "Support Resources", and "Blog". There are "Log In" and "Register" buttons in the top right corner. The main content area features a large background image of a sonar scan of an underwater environment. Overlaid on this image is the "ECO SOUND" logo, with the text "Automated creation of aquatic habitat maps from consumer sonar devices." below it. A green button labeled "LOG INTO DEMO" is positioned on the left side of the main image. An orange button labeled "EcoSound Solutions" is centered at the bottom of the main image. The Windows taskbar is visible at the bottom of the browser window, showing the search bar and various application icons. The system tray on the right indicates the time as 10:41 AM on 6/1/2019.

Cayuga Lake, Cayuga New York

Generated: 10/11/2018 4:01:35 PM (UTC)

Waterbody Size: 43088.93 acres

[report link](#)



Data Collector	Dean Jones
Data Collection Date	7/31/2018 1:20:44 PM (UTC)
Average Water Temperature	75.28° F
Location	Start: 42.73555843, -76.70539938 End: 42.73549885, -76.70548050

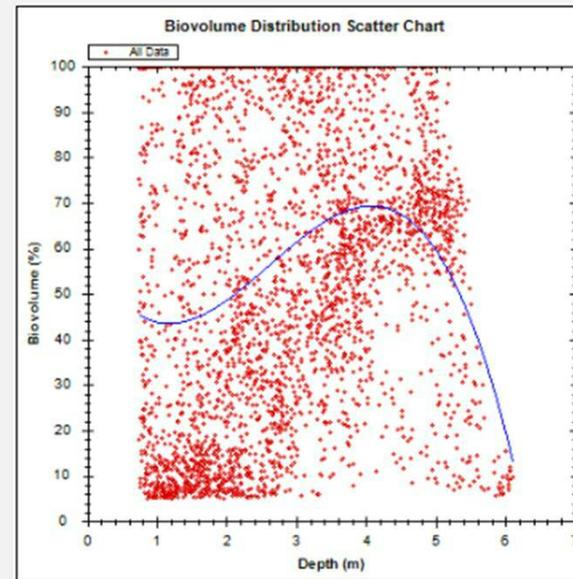
Survey Size	Area: 174.97 acres Percent: 0.41% of waterbody Volume: 1767.65 acre ft	Manual Offset	0 ft
Settings	Track Buffer: 35 m Grid Cell Size: 7.0 m Min. BV Detect: 5% Min. Veg Depth Detect: 0.73 m		

Survey Summary

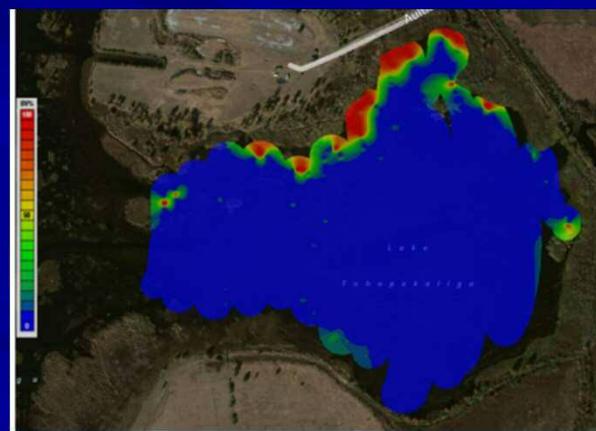
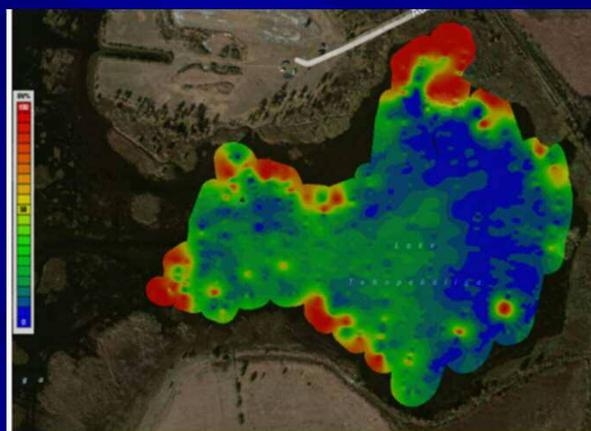
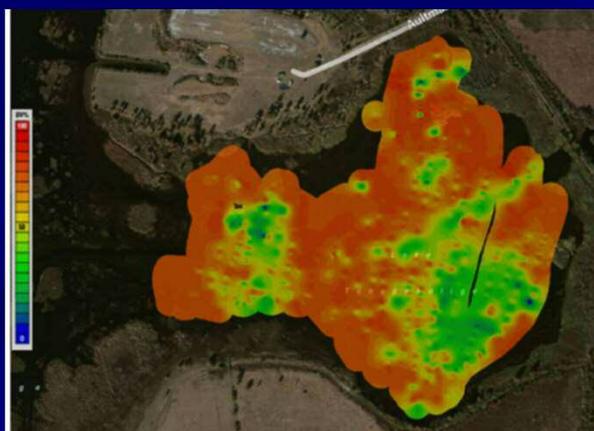
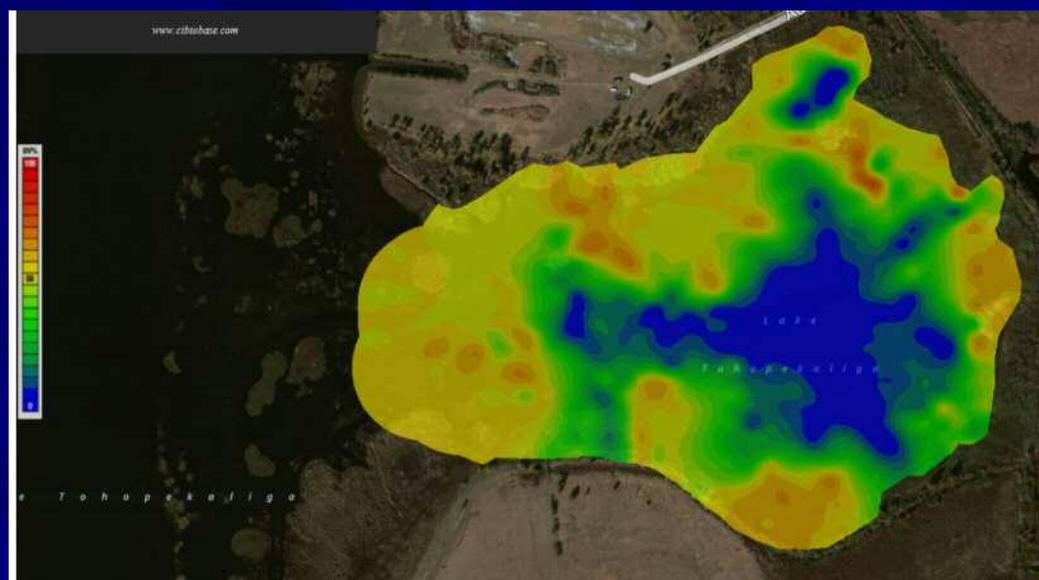
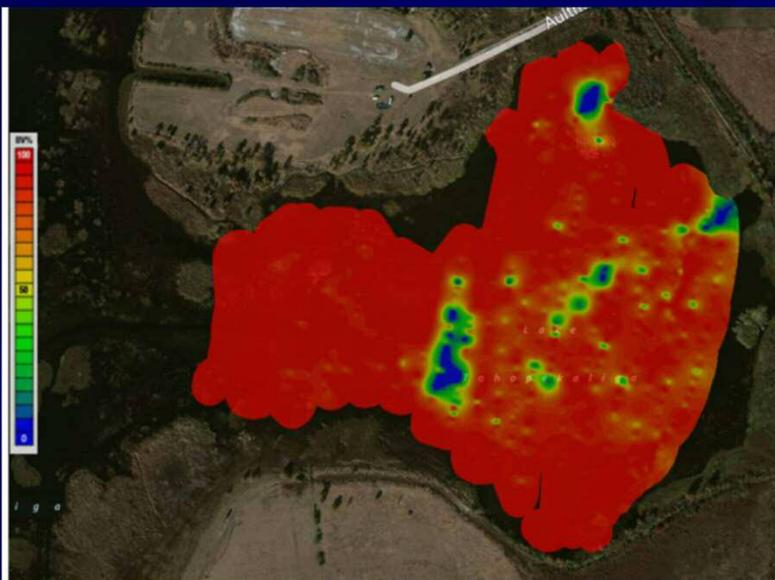
	Type ?	PAC ?	Avg BVP ?	SD BVP ?	Avg BVw ?	SD BVw ?	Depth Range	Avg Depth	Distance	No. Points
Full Survey	Point	79.1%	58.3%	±31.6%	46.2%	±30.1%	1.03 - 26.93 ft	8.88 ft	10.10 miles	11711
	Grid	90.7%	45.6%	±27.1%	41.4%	±29.0%	0.10 - 26.46 ft	10.10 ft	-	24142

Vegetation Biovolume Heat Map

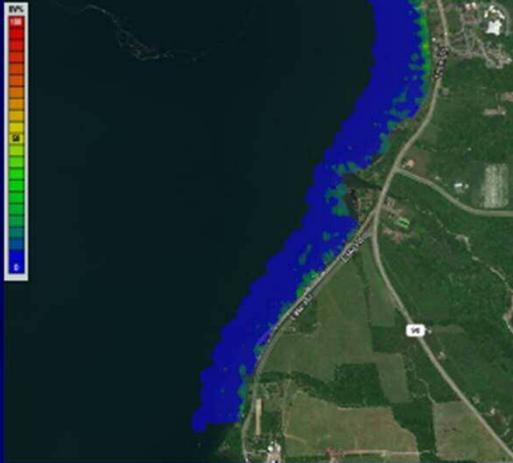
Biovolume Distribution Scatter Chart



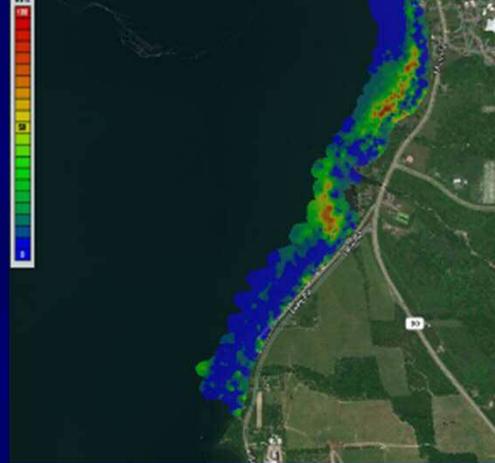
Time lapse series



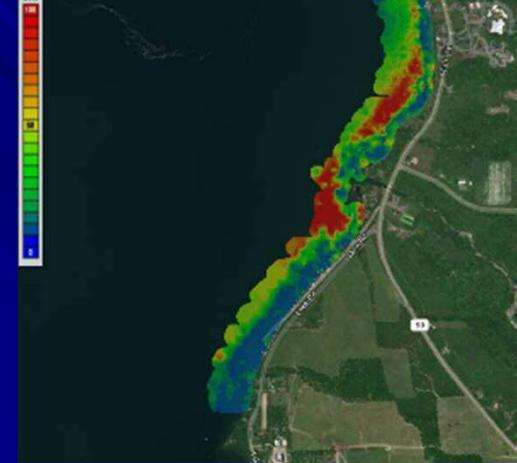
June 5, 2018
PAC – 15.9%
BV – 1.6%
Water temp – 13 C



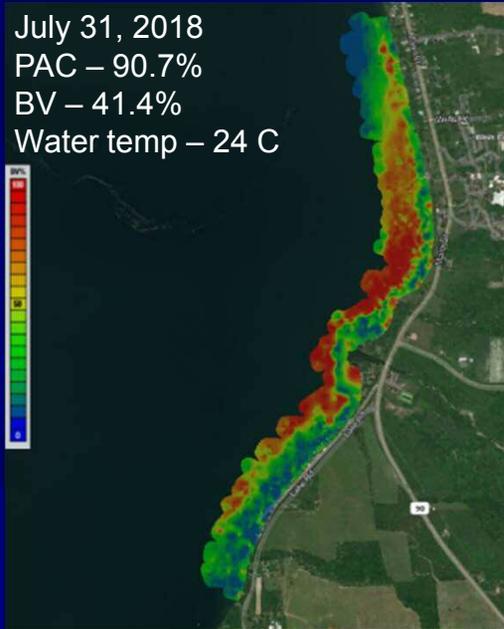
June 26, 2018
PAC – 48.2%
BV – 9.8%
Water temp – 19 C



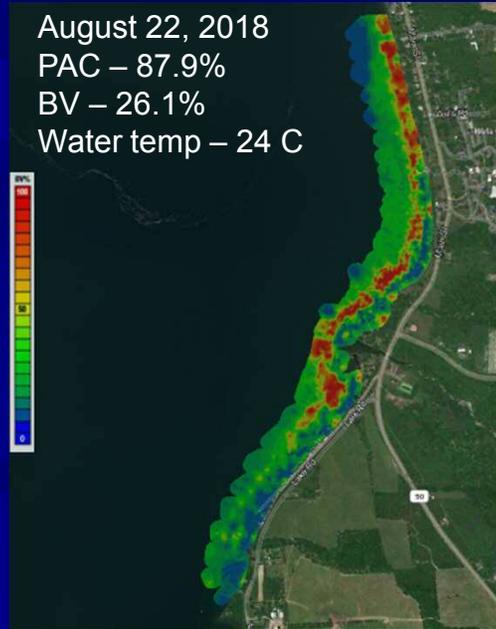
July 9, 2018
PAC – 74.9%
BV – 28.1%
Water temp – 24 C



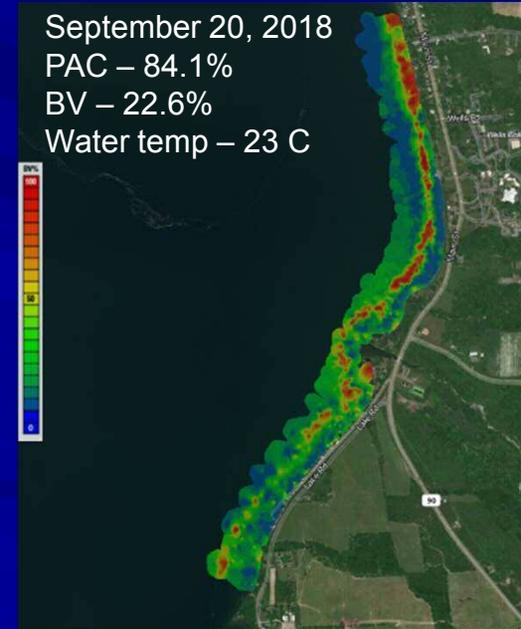
July 31, 2018
PAC – 90.7%
BV – 41.4%
Water temp – 24 C

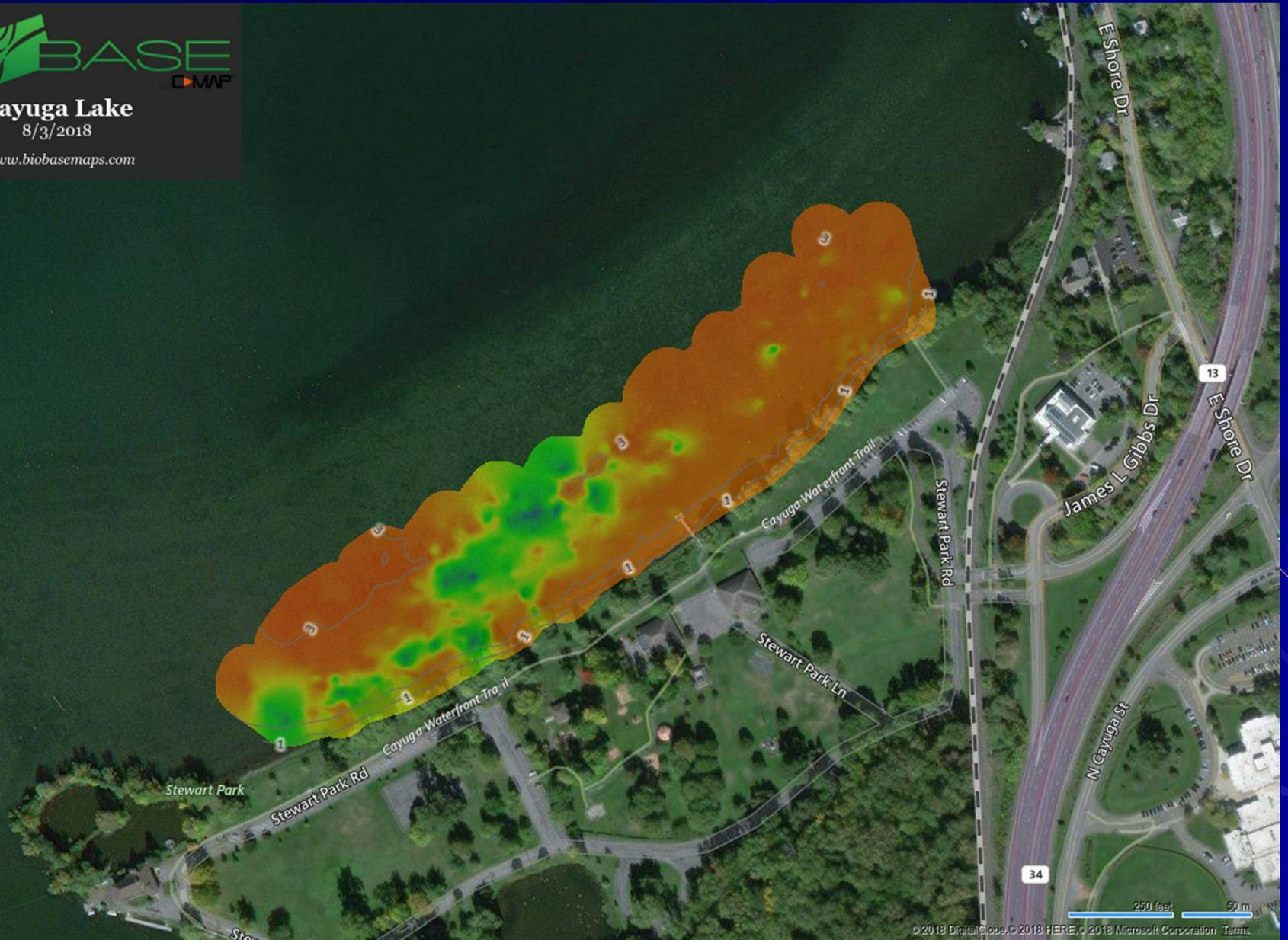


August 22, 2018
PAC – 87.9%
BV – 26.1%
Water temp – 24 C



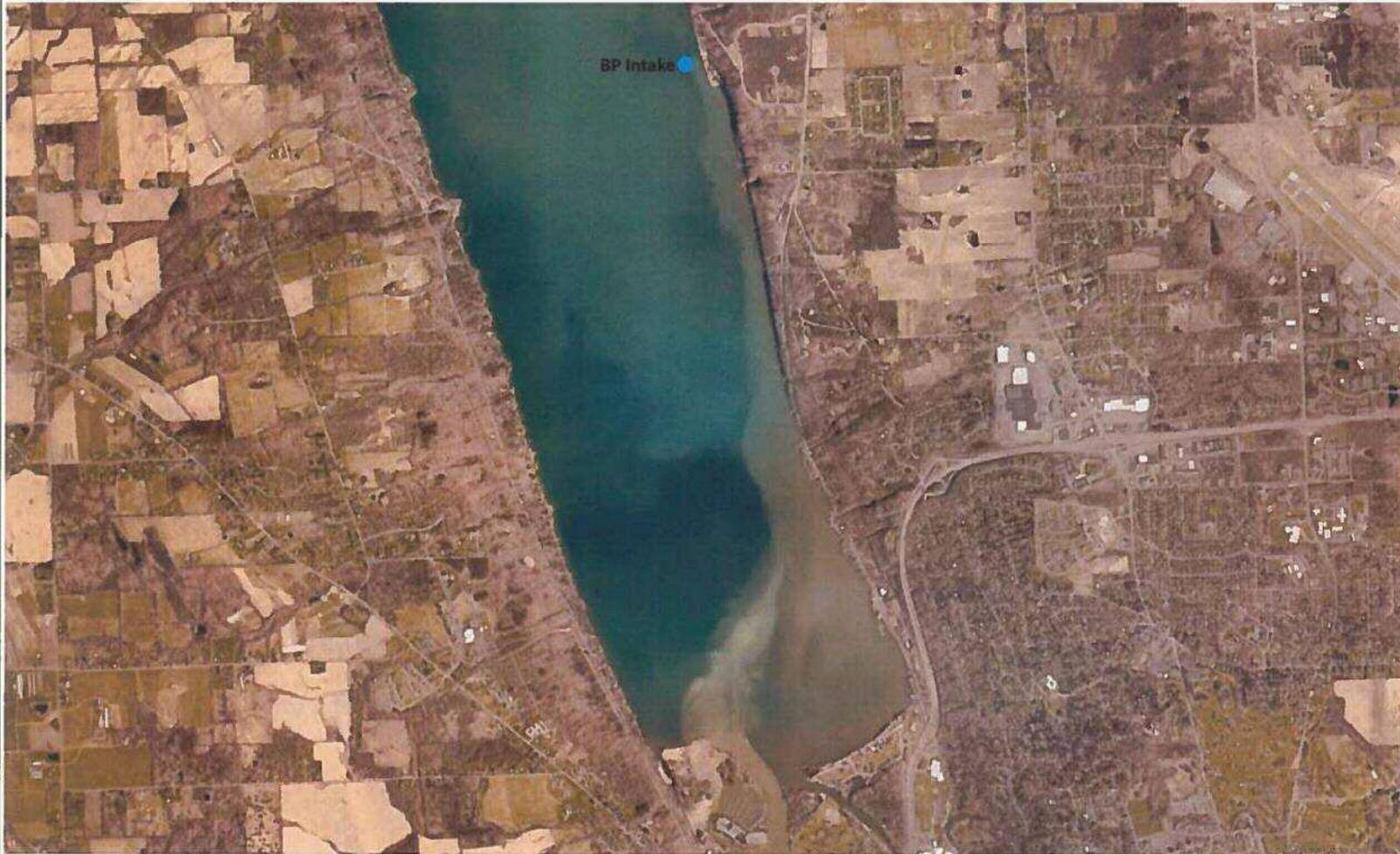
September 20, 2018
PAC – 84.1%
BV – 22.6%
Water temp – 23 C







Bolton Point Water System Details



- Legend**
- Water Lines**
- Private hydrant stem
 - Private outstation main
 - City of Ithaca water main
 - Cornell water main
 - Hydrant stem
 - Service line
 - T-main hydrant stem
 - Transmission main
 - Water main
- Customer Facilities**
- Facilities**
- TCGIS_2014_Taxparcel_BP**
- Customer with curb card
 - Customer without curb card
 - Multiple customers
 - Not a customer

1:36,112



6,018.7 0 3,009.33 6,018.7 Feet

WGS_1984_Web_Mercator_Auxiliary_Sphere
© 2014 Tompkins County GIS

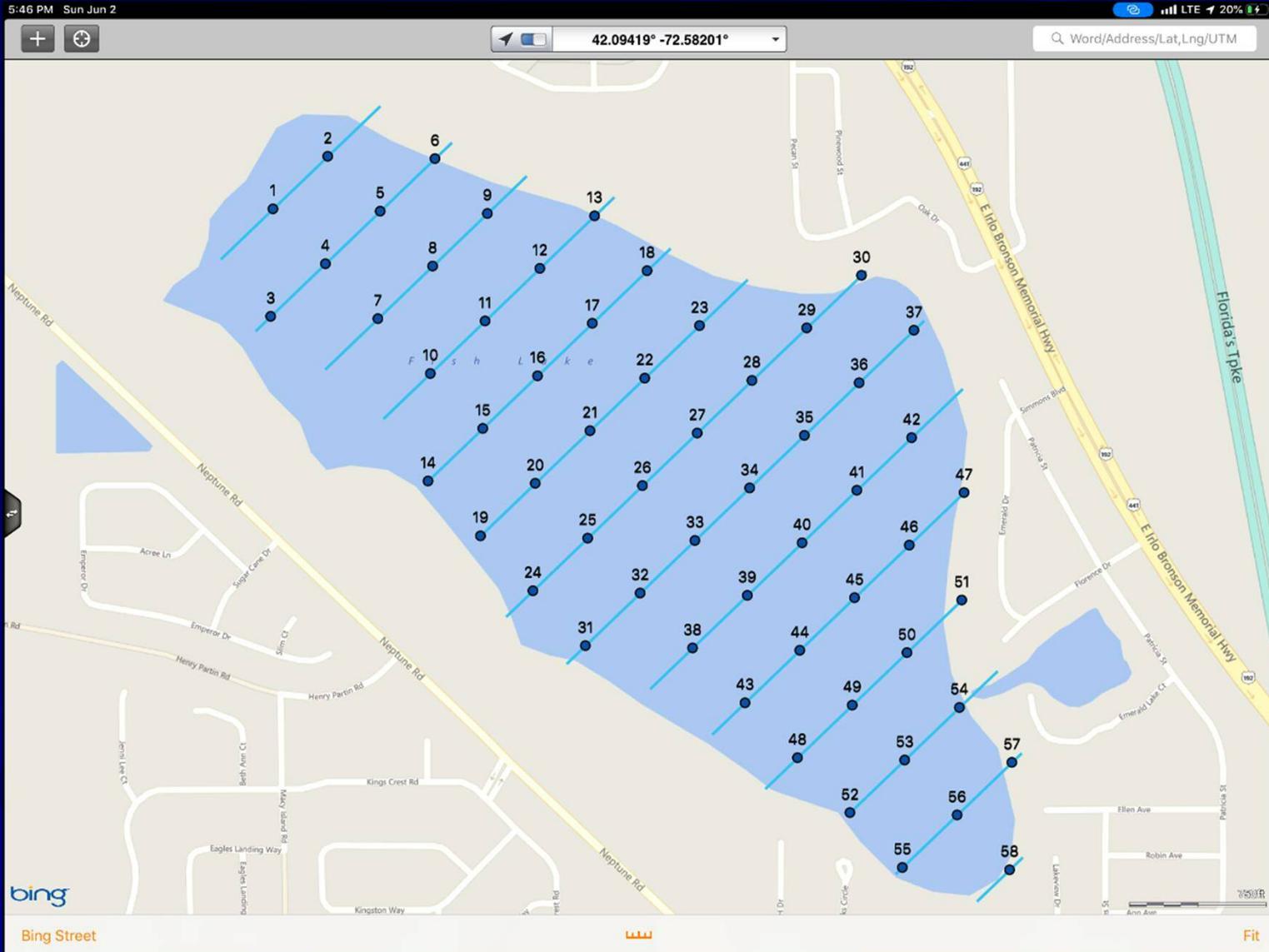
Map is user generated and is to be used as a reference only. Data layers are not guaranteed to be accurate or up-to-date.

DO NOT USE FOR CONVEYANCE OR NAVIGATION

Notes

This map was automatically generated using Geocortex Essentials. Your tax dollars at work!

Modified Point Intercept Survey



Density Ratings



- 0 – No plants
- 1 – Sparse
- 2 – Moderate
- 3 – Dense

Recording data

7:34 AM Mon Jun 3 LTE 100%

← Cayuga 2017 **Pis 082117** 182 records 11 of 182 Edit + ☆ ☰

Site #	Plant Name	Count
August 2017		
Site #: 301	No plant	
Site #: 283	Alisma gramineum (narrowleaf water plantain)	
Site #: 334	Ceratophyllum demersum (coontail)	1
Site #: 375	Chara vulgaris (muskgrass)	
Site #: 275	Elodea sp. (elodea)	
Site #: 346	Hydrilla verticillata (hydrilla)	
Site #: 248	Myriophyllum spicatum (eurasian watermilfoil)	2
Site #: 368		
Site #: 257	Najas flexilis (slender naiad)	
Site #: 338	Najas guadalupensis (southern naiad)	
Site #: 288	Nitellopsis obtusa (starry stonewort)	2
Site #: 340	Nymphaea odorata (fragrant water lily)	
Site #: 332	Potamogeton crispus (curly-leaf pondweed)	
Site #: 278	Potamogeton foliosus (leafy pondweed)	
Site #: 354	Potamogeton praelongus (white-stem pondweed)	1
Site #: 252		

08/17

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Alternative

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Collector for ArcGIS

Overview Resources **Free Trial**

Collector for ArcGIS

Accurate data collection made easy

Collect

GPS Accuracy: 6.8

Trail: Orange Blossom

ADD POINT

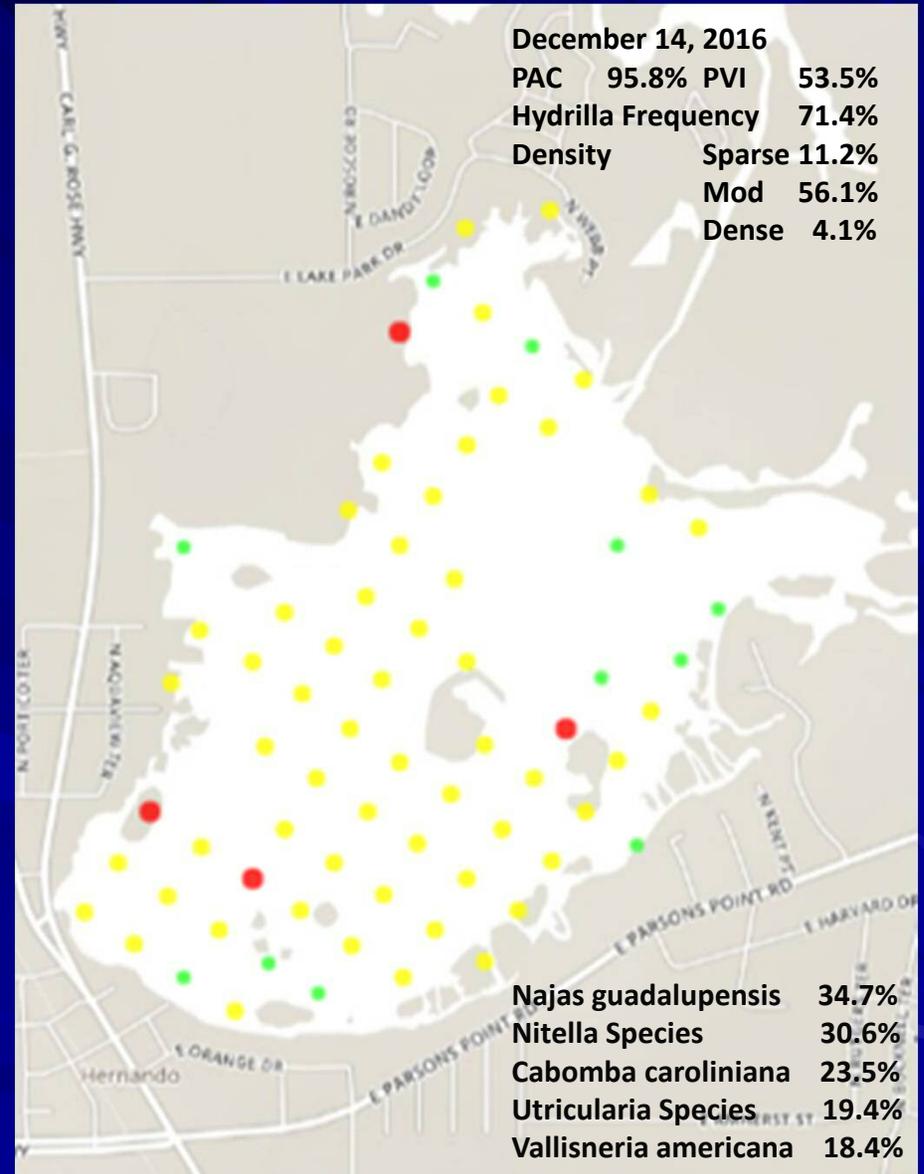
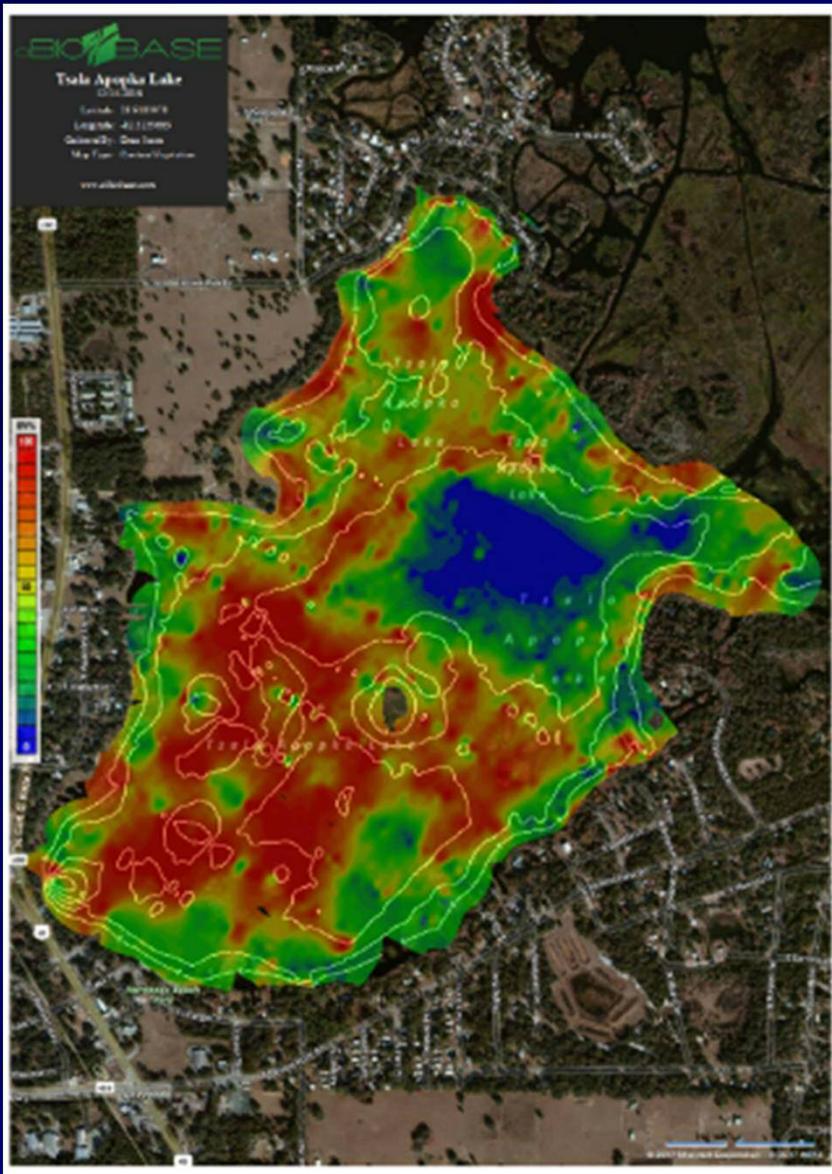
TAKE PHOTO ATTACH

Trail: Orange Blossom

TAKE PHOTO ATTACH

Trail: Orange Blossom

TAKE PHOTO ATTACH



Fish Lake 2018 - Osceola County, FL

Treatment Plot Pretreatment Survey August 6, 2018

Hydroacoustic PAC 100%
BV 64.9%

Point Intercept

HV	Frequency (Count)
○ 0	95.2% (20)
● Sparse	4.8% (1)
⊙ Moderate	66.7% (14)
⊕ Dense	23.7% (5)

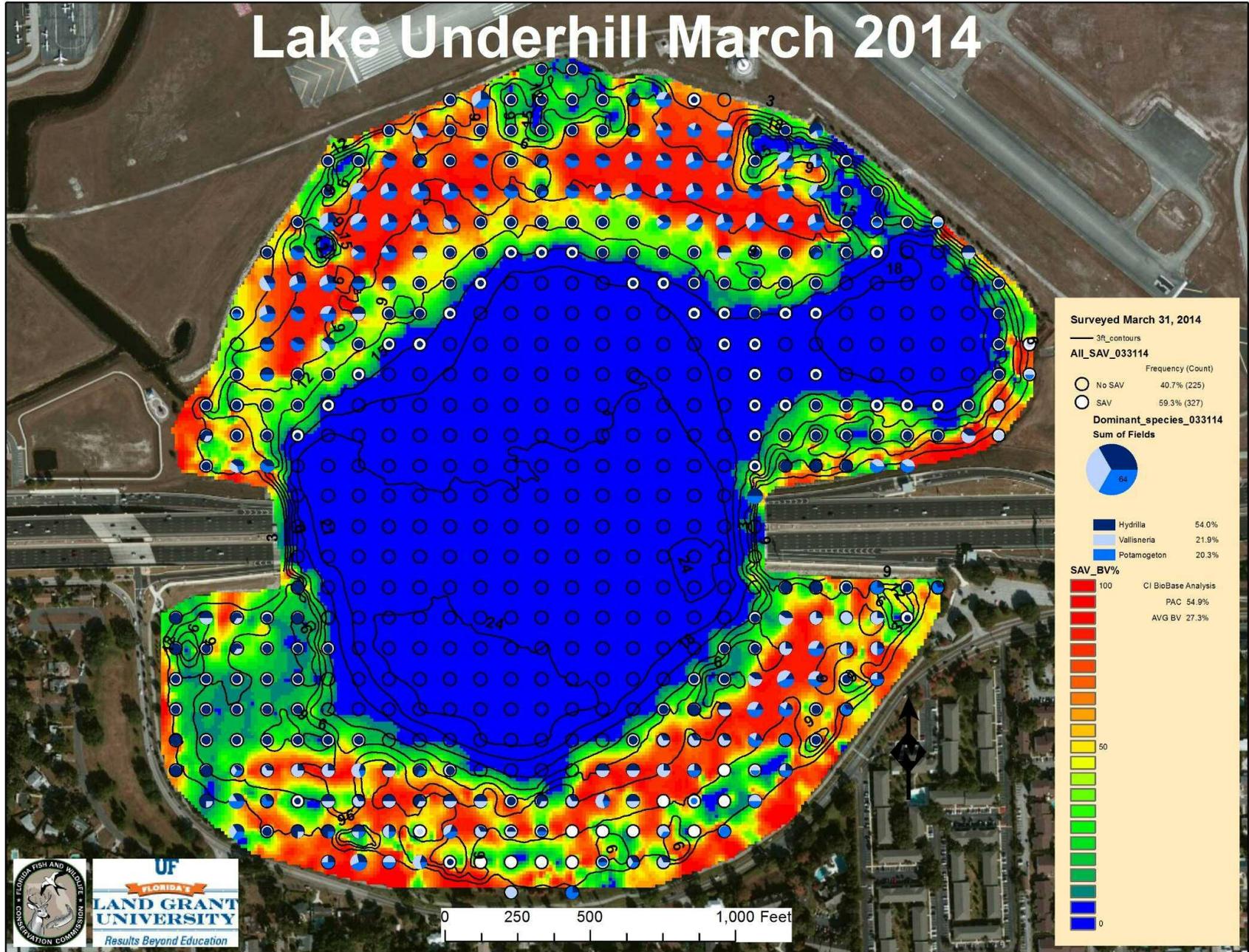
□ Fish_trt_poly_081418

0 330 660 1,320 Feet



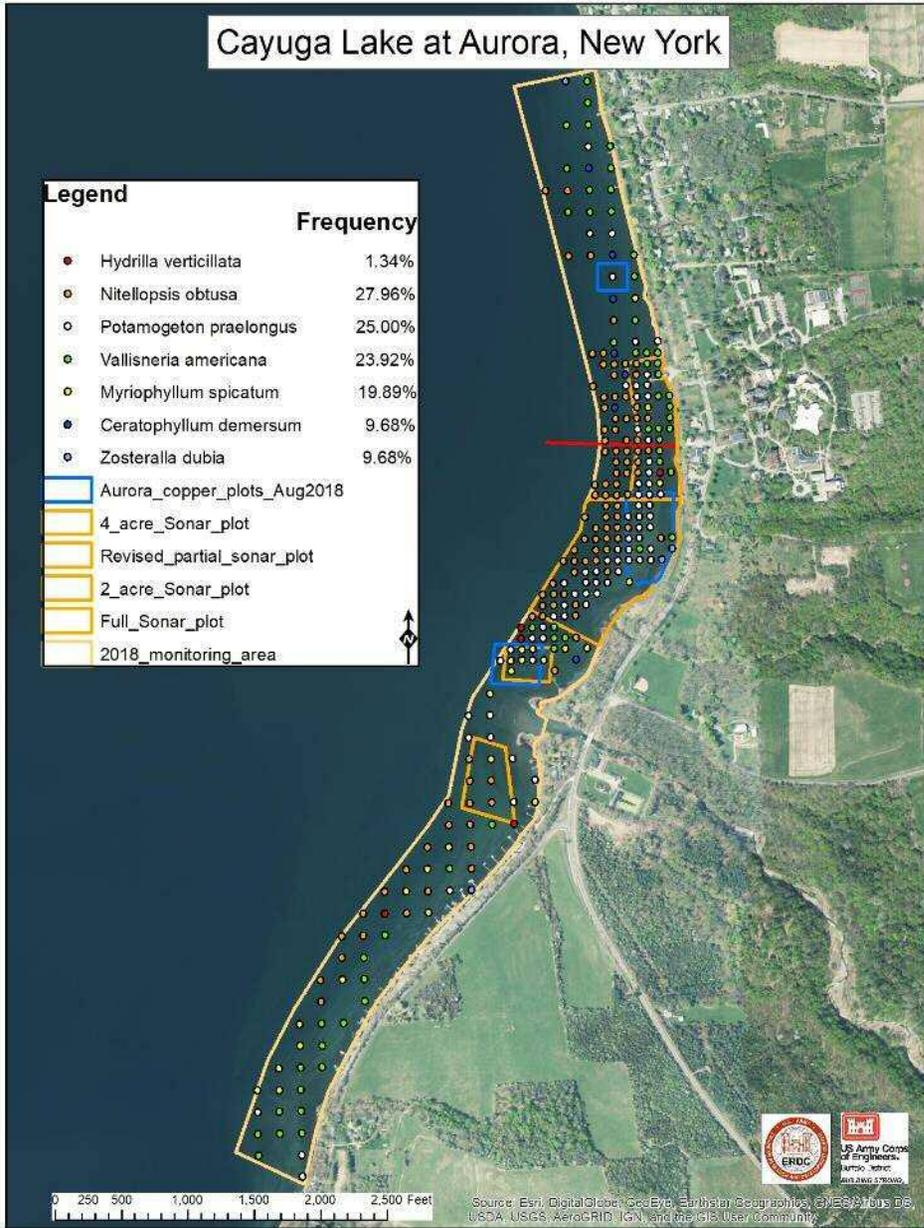
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Lake Underhill March 2014



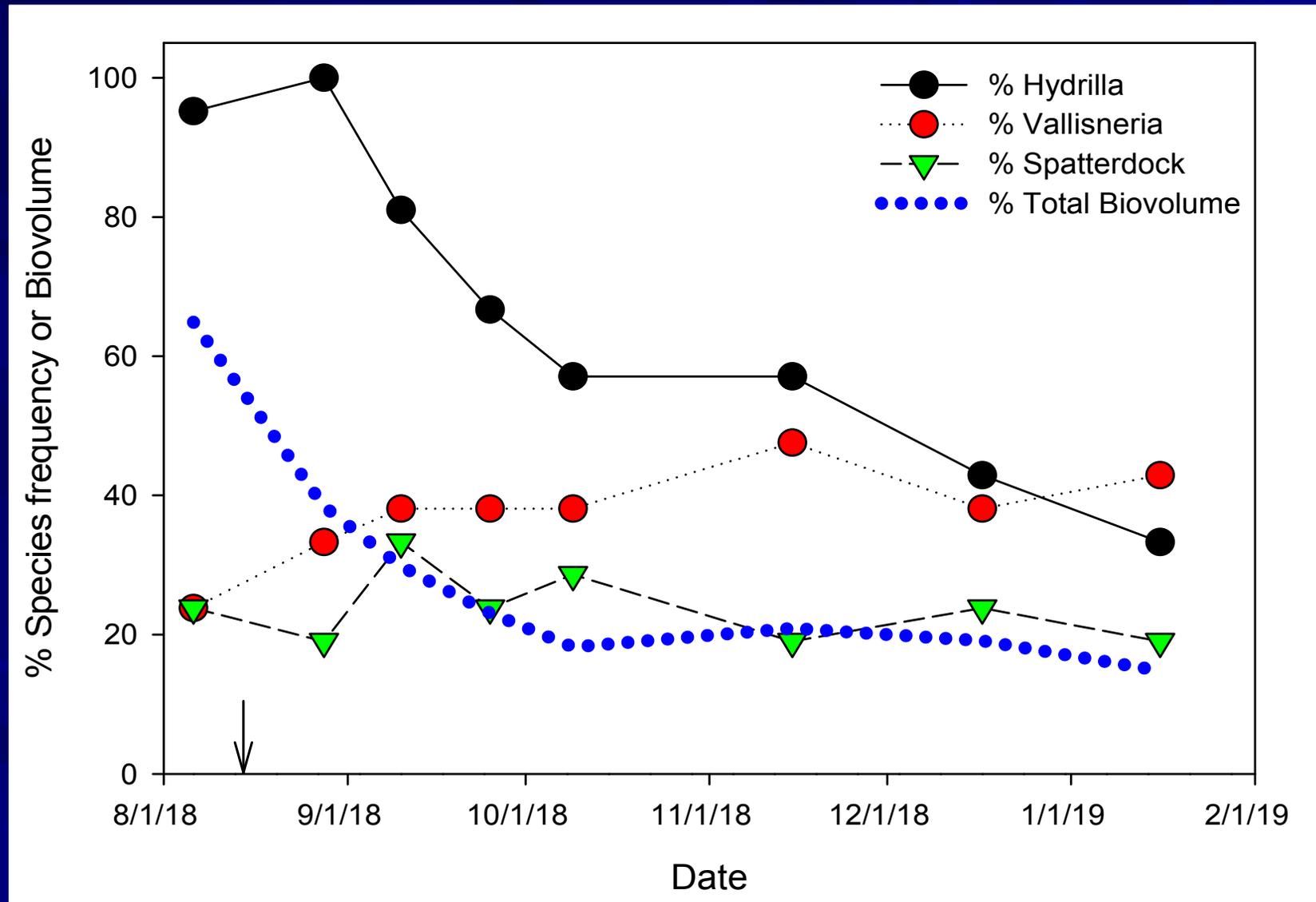
Cayuga Lake at Aurora, New York

Legend		Frequency
●	Hydrilla verticillata	1.34%
○	Nitellopsis obtusa	27.96%
○	Potamogeton praelongus	25.00%
○	Vallisneria americana	23.92%
○	Myriophyllum spicatum	19.89%
●	Ceratophyllum demersum	9.68%
○	Zosterella dubia	9.68%
□	Aurora_copper_plots_Aug2018	
□	4_acre_Sonar_plot	
□	Revised_partial_sonar_plot	
□	2_acre_Sonar_plot	
□	Full_Sonar_plot	
□	2018_monitoring_area	



Good diversity has been maintained while managing hydrilla

Frequency of Occurrence of Common Plants ProcettaCOR Management Area (vs. Biovolume)



In summary, utilizing a combination these survey methods will aid with the following:

- Spatially depict SAV abundance
- Delineate extent of hydrilla problem
- Establish a baseline hydrilla frequency
- Help guide development of a containment plan
- Assist with development of management strategies, treatment timing and determining water volumes for herbicide calculations
- Monitor treatment efficacy, longevity and selectivity
- Evaluate tuber densities following implemented strategies
- Generate data driven status reports for stakeholders

Questions

