Delineating and Monitoring Hydrilla in the New Croton Reservoir

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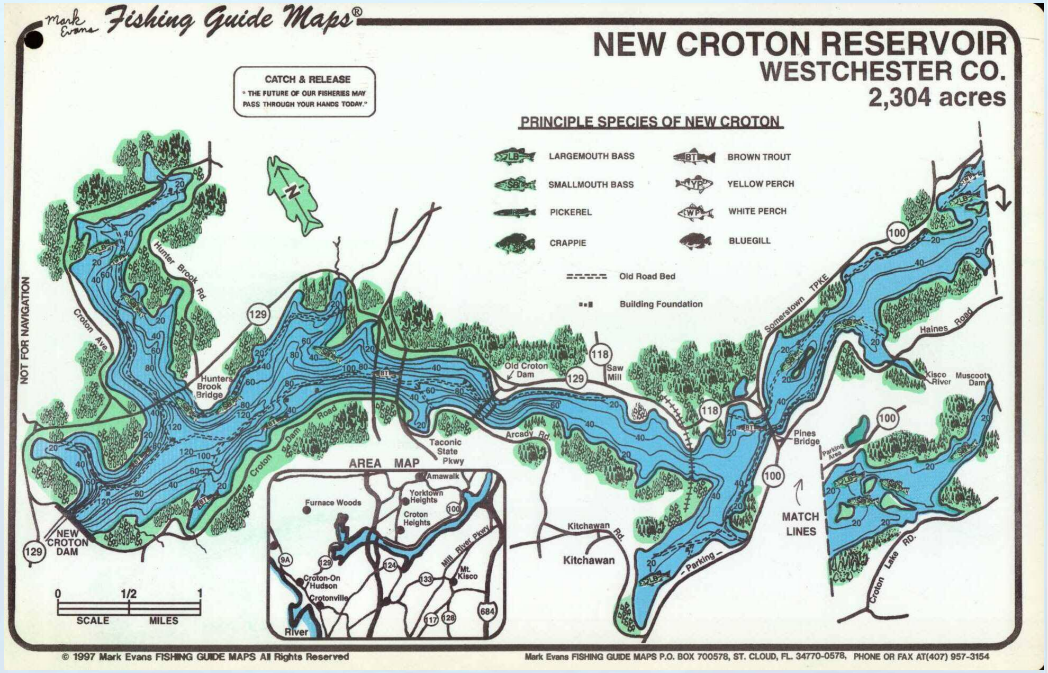
Restoring Balance. Enhancing Beauty.

Case Study #4: New Croton Reservoir

(aka finding hydrilla in a 2300+ acre haystack)



- **Westchester Co., NY**
- **2,304 surface acres**
  - Shoreline 35.8 miles
  - Limited Littoral Zone
- **Limited Bathymetry**
  - Scheduled 2017
- **Hydrilla Confirmed 2014**
- **Formal Monitoring Started 2016**

Project Challenges

- **Undefined Littoral Zone**
  - Where to start?
- **2,300+ acres, 35+ miles shoreline**
  - Traditional PIM: 15-20 days
- **2016 Budget:** 6 Days
- **Staff and Equipment Access**
  - Security Clearance
  - Mandatory Boat/Equipment Cleaning

Three Phase Approach to 2016 Hydrilla Monitoring

1. Aquatic Plant Bio-volume Mapping

Hydroacoustic mapping

Assumed Littoral Zone

2. PIM Aquatic Plant Mapping

On select areas from Phase 1

Coves and Shorelines

3. Tuber Monitoring

Stations Selected from

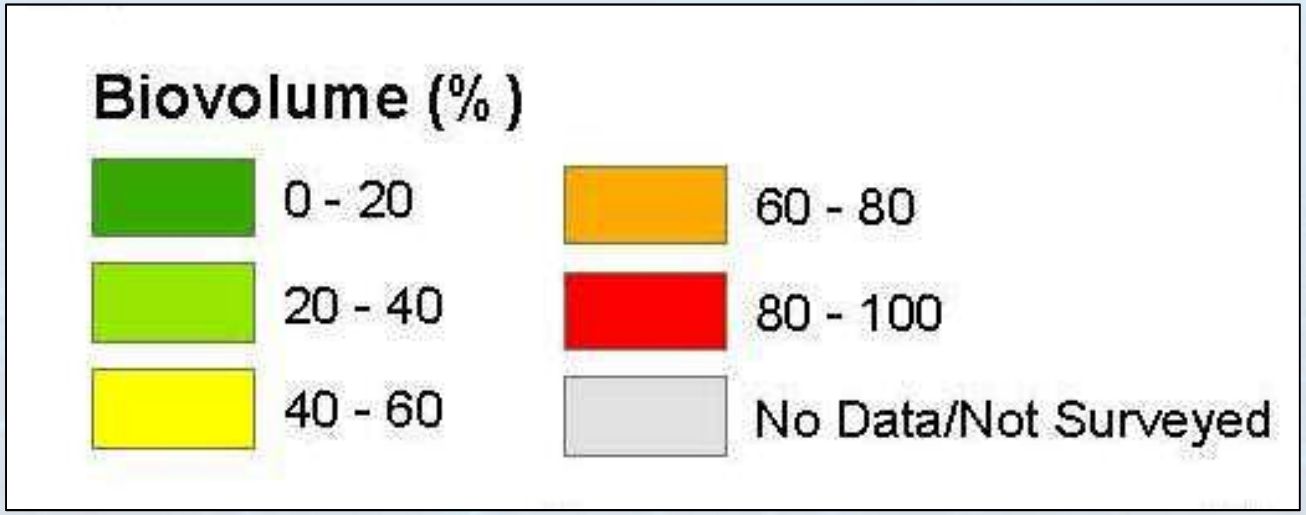
Phase 2 Results

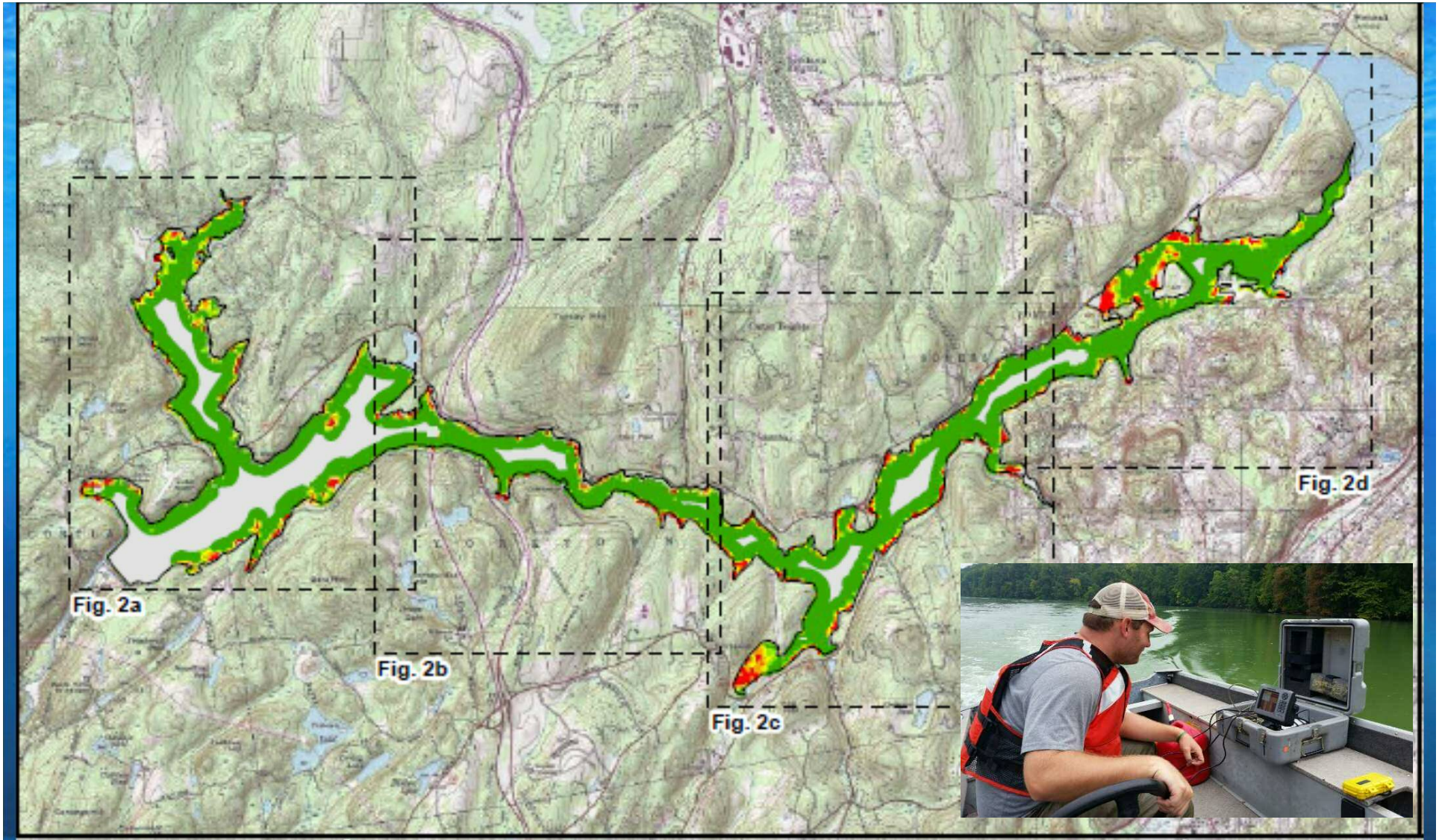
Phase 1: Hydroacoustic Plant Mapping

1. **Side Scan Fathometer**
2. **Data Collection**
   - Late August
   - Boat Speed: < 8 mph
   - Shorelines, coves and littoral zone
   - 18 hours on water data collection
   - 20-minute runs (file size)
3. **Data Outputs**
   - Uploaded to Manufacturer Server (QC/Interpolation)
   - Reprocessed with Spatial Analyst
   - ArcMap 10.3
   - Bathymetry and Bio-volume Maps

Submersed Aquatic Plant Bio-volume

1. **% of SAV in Water Column**
   - Ex. Plants at Surface = 100%
   - Ex. Water Depth 10 ft.; Plant Height 5 ft. = 50%
2. **Displayed in a Color Array**
3. **Doesn't Differentiate Species**





New Croton Reservoir

Westchester County, NY

Biovolume

FIGURE:	SURVEY DATE:	MAP DATE:
2	8/30-9/1/16	11/30/16

Legend:

Biovolume (%)

- 0 - 20
- 20 - 40
- 40 - 60
- 60 - 80
- 80 - 100
- No Data/Not Surveyed

0 0.5 1 1.5 2 Miles

N

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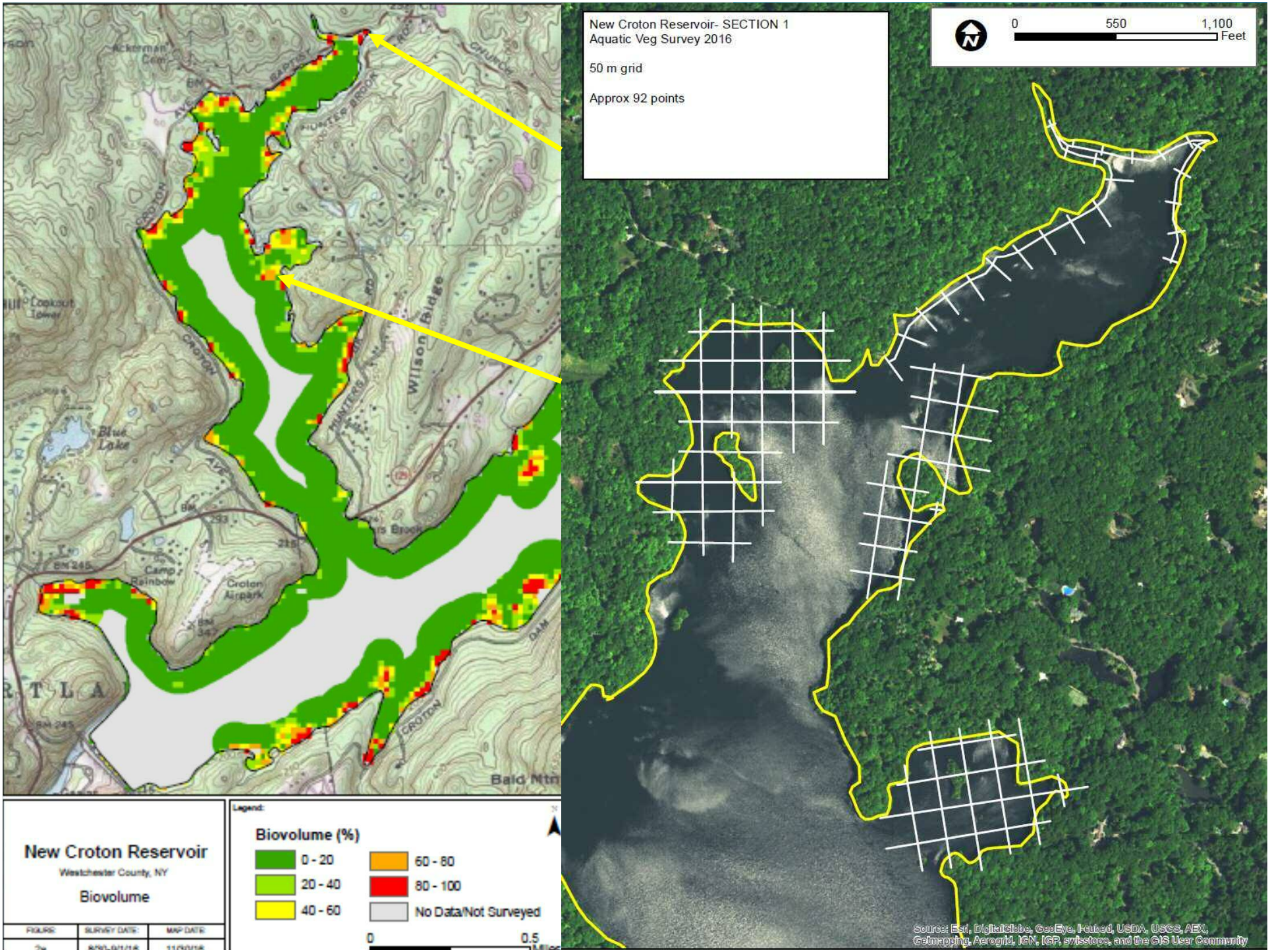
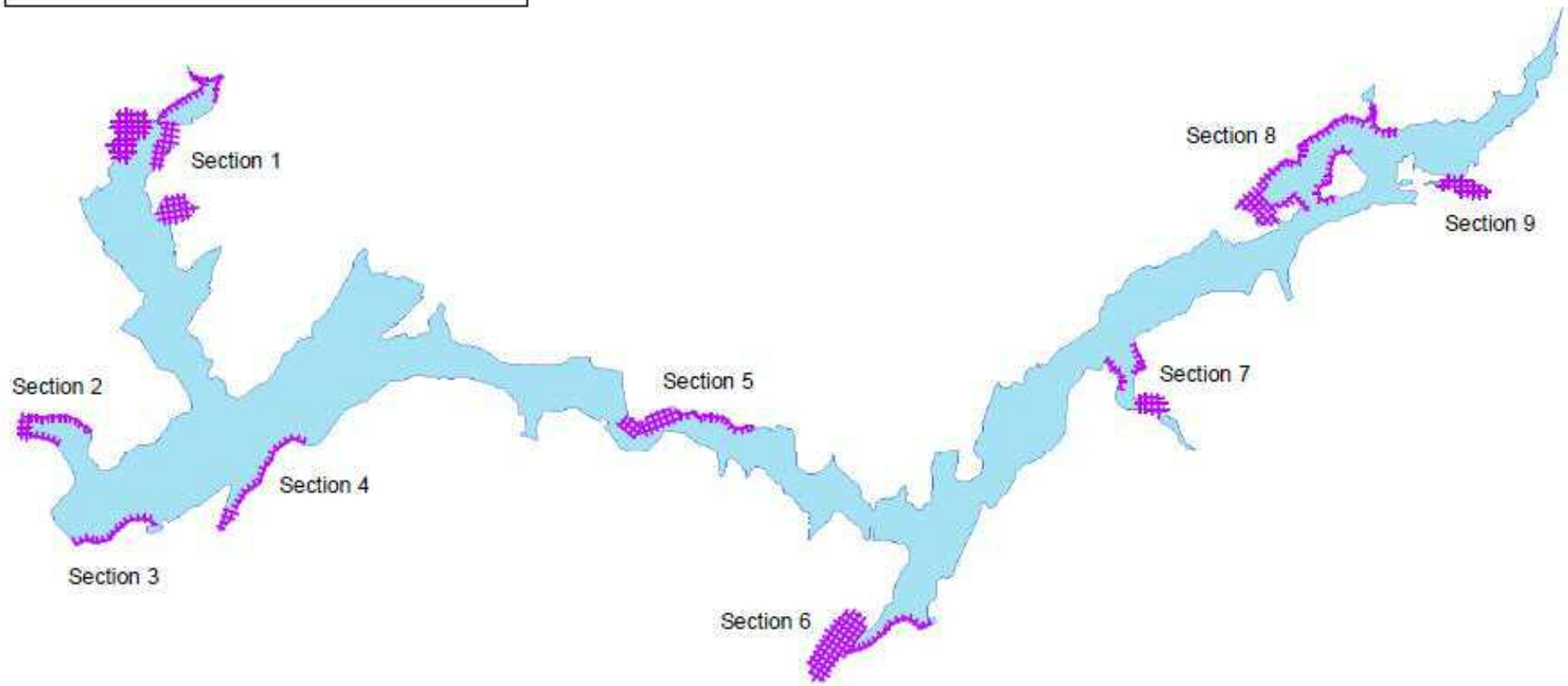
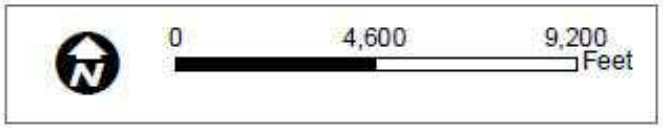

New Croton Reservoir- SECTION 1
Aquatic Veg Survey 2016
50 m grid
Approx 92 points
0
550
1,100
Feet
New Croton Reservoir
Westchester County, NY
Biovolume
Legend:
Biovolume (%)
0 - 20
20 - 40
40 - 60
60 - 80
80 - 100
No Data/Not Surveyed
0
0.5
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

New Croton Reservoir- Overview
Aquatic Veg Survey 2016

Sections 1-9

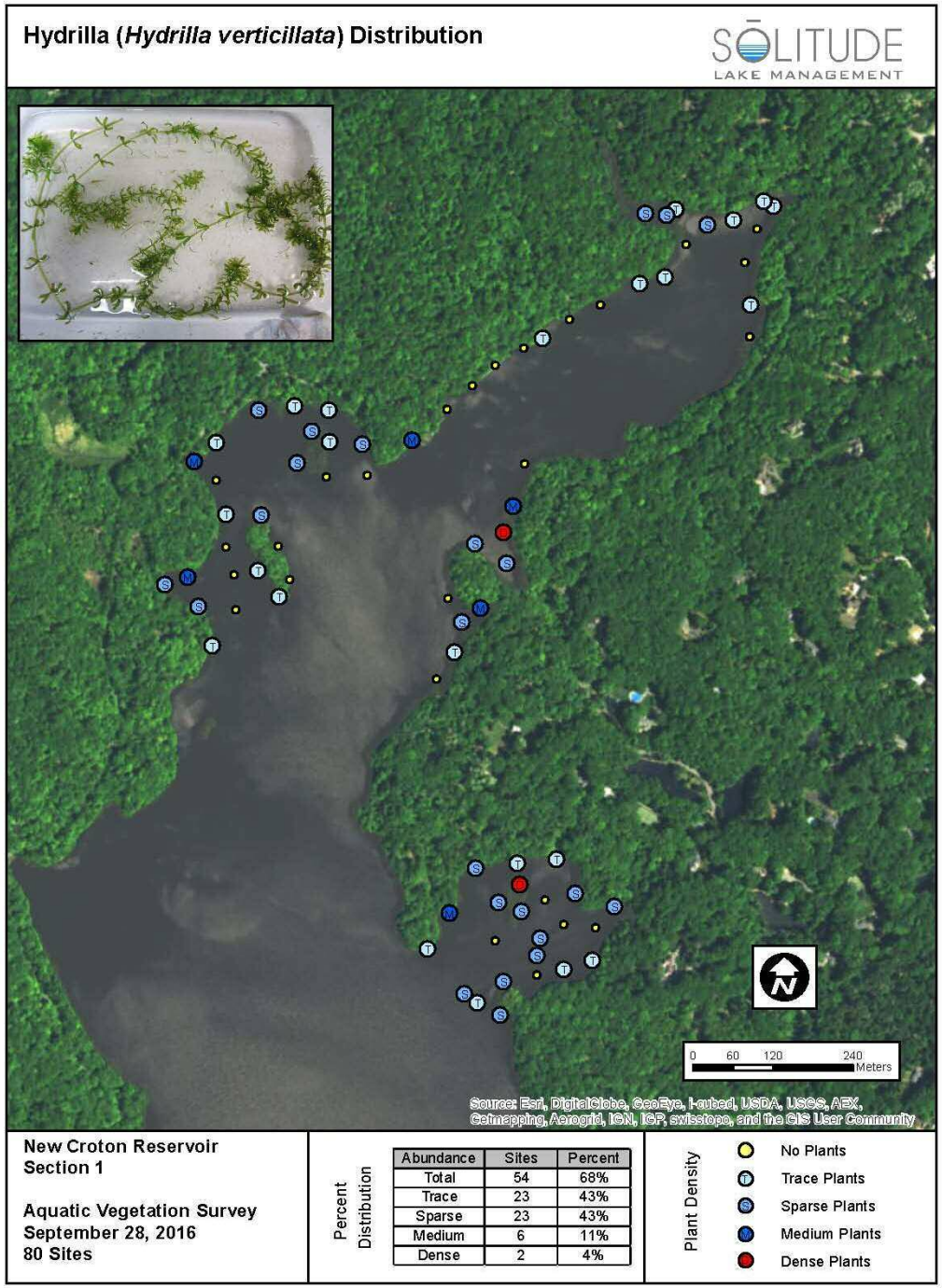
50 meters grid





Phase 2: PIM Mapping

- Late September
- 9 Sections
- 342 Stations
- 2 tosses/station
- 50-meter grid
- All SAV species



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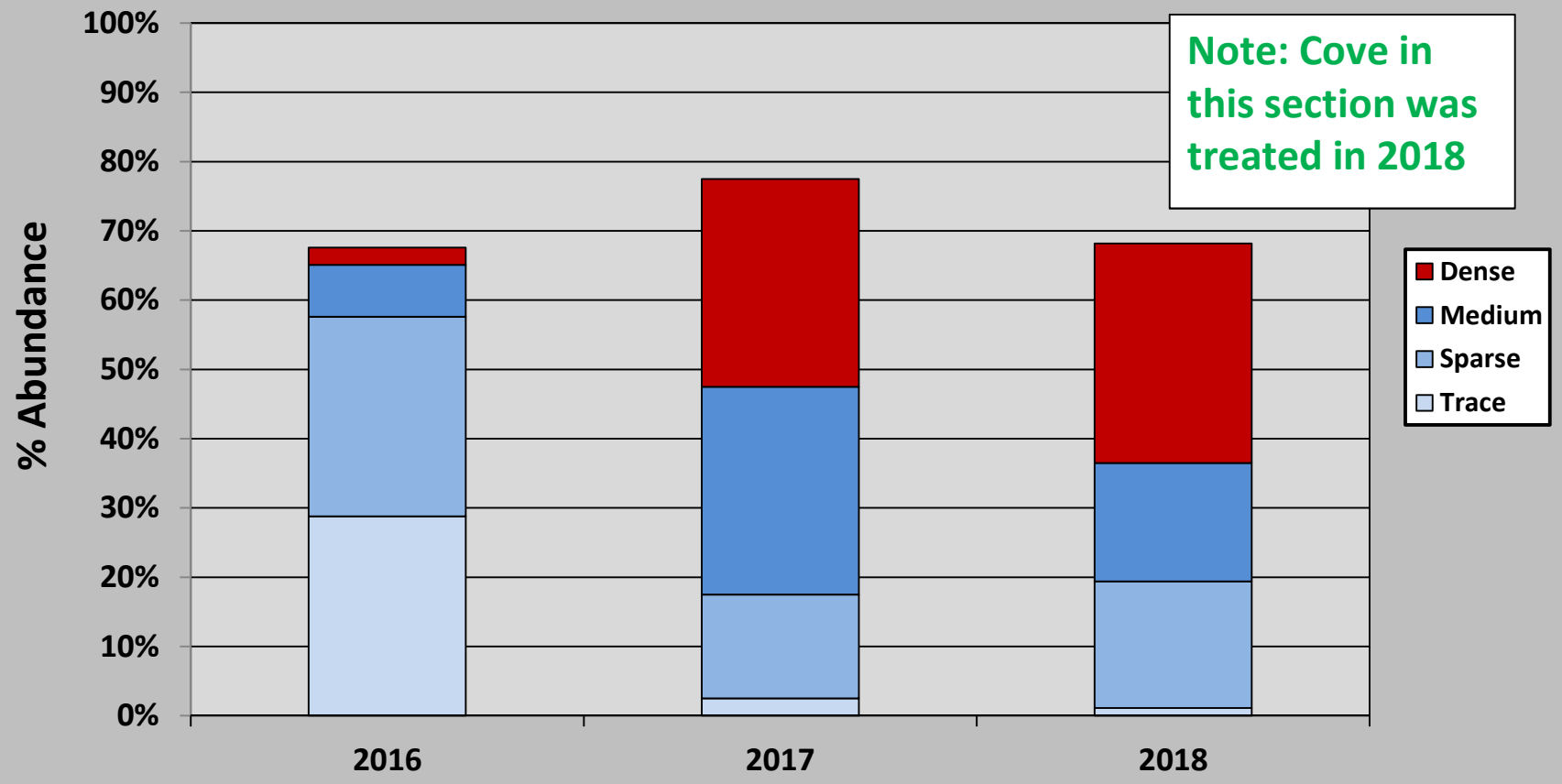
Hydrilla (*Hydrilla verticillata*)
Percent Abundance 2016/2017/2018
New Croton Reservoir
Section 1

n = 82



Note: Cove in this section was treated in 2018

2016 New Croton Reservoir SAV Frequency of Occurrence

Common Name	Scientific Name	# Occurrences	% Occurrence
Overall SAV		339	99.1%
Coontail	*Ceratophyllum demersum*	310	90.6%
Eurasian Water Milfoil	*Myriophyllum spicatum*	306	89.5%
Hydrilla	*Hydrilla verticillata*	114	33.3%
Benthic Filamentous Algae		111	32.5%
Water Smartweed	*Polygonum amphibium*	44	12.9%
Small Duckweed	*Lemna minor*	20	5.8%
Great Duckweed	*Polyrhiza spirodela*	14	4.1%
Common Watermeal	*Wolffia columbiana*	13	3.8%
Brittle Naiad	*Najas minor*	10	2.9%
White Water Lily	*Nymphaea odorata*	3	0.9%
Leafy Pondweed	*Potamogeton foliosus*	3	0.9%
Long-leaf Pondweed	*Potamogeton nodosus*	3	0.9%
Clasping-leaf Pondweed	*Potamogeton richardsonii*	1	0.3%
Bassweed	*Potamogeton amplifolius*	1	0.3%
Spikerush	*Eleocharis sp.*	1	0.3%

New Croton Reservoir SAV Mapping

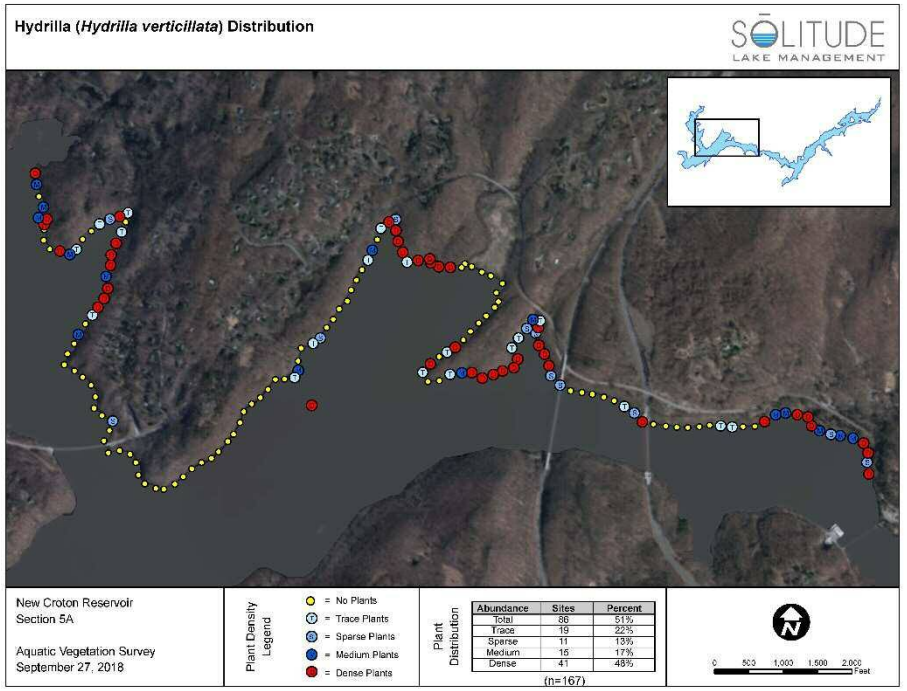
2016-2018 SAV Mapping

- 2016: 9 Sections (Red)
- 2017: Added 6 Sections (Green)
- 2018: Entire Littoral Zone (Purple)

2018 SAV Summary

1226 GPS-referenced locations

- SAV at 92.5% (1124)
- EWM dominant (90.4%)
- Coontail: 89.3%
- Hydrilla 36.3% total locations
- Not present at:
  - 7, 7A, 8, 9, 9A
  - **But present at 8A**



2018-2019 Projects

Pilot Herbicide Applications
Herbicide Conc. Monitoring
SAV Mapping (Entire Lit. Zone)
Hydrilla Tuber Monitoring

New Croton Reservoir
Aquatic Vegetation Survey
2016-2018

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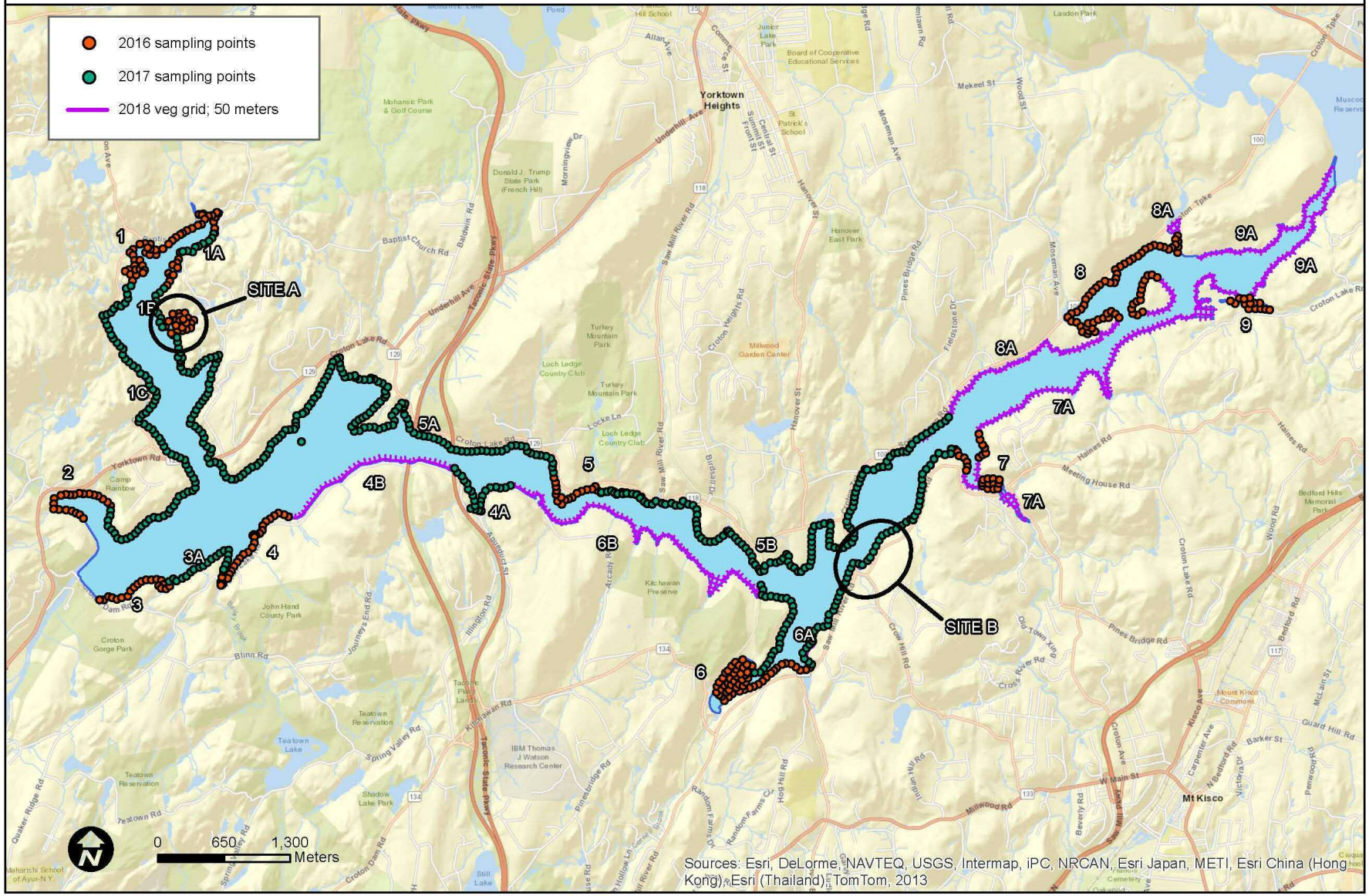
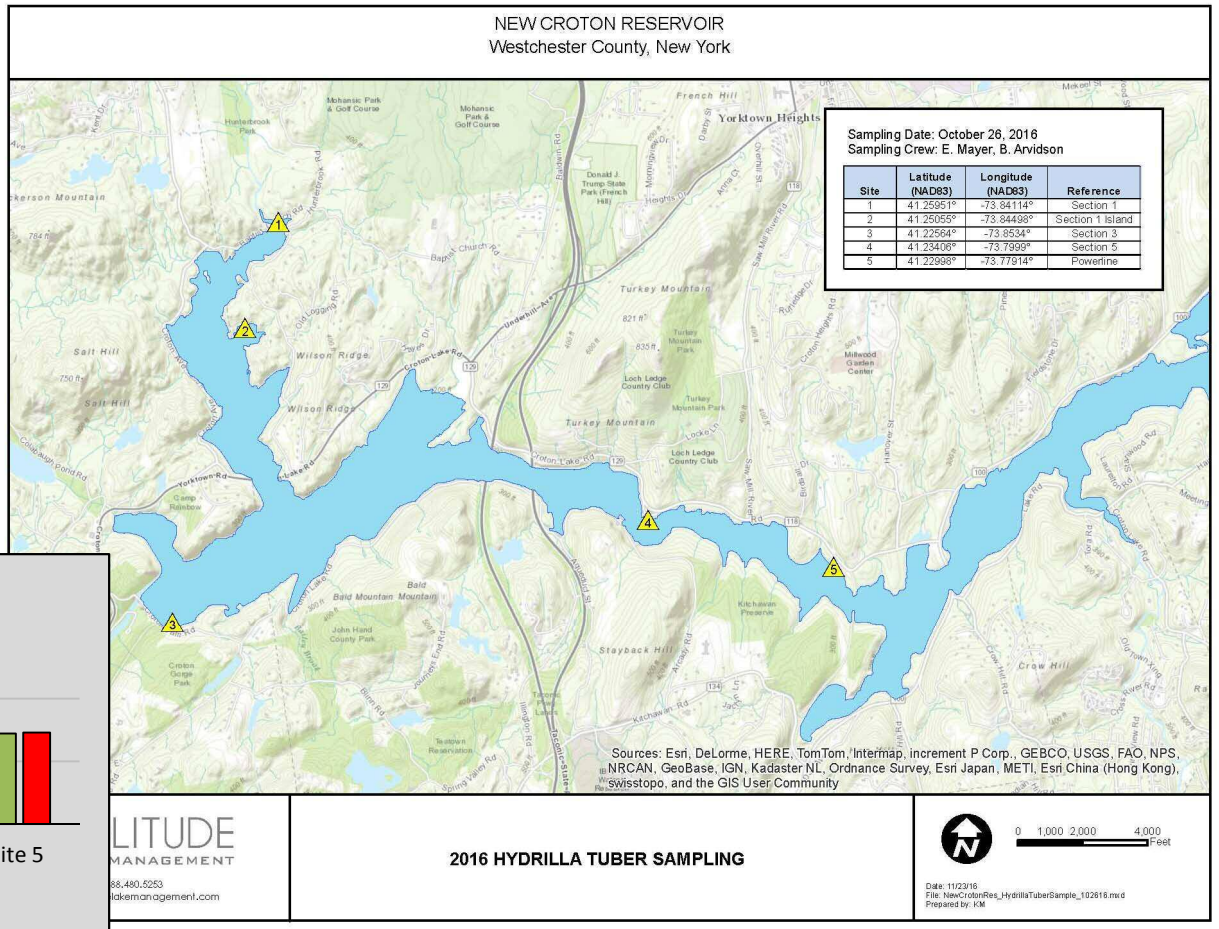
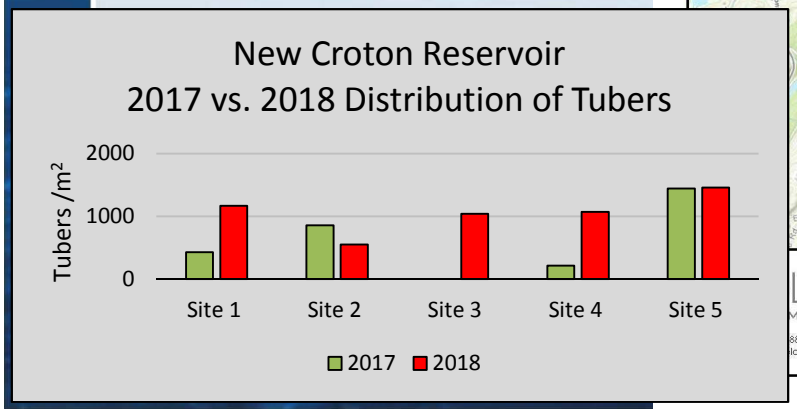


Phase 3: Hydrilla Tuber Monitoring

Site	Description	# Cores	Tubers (m^2)	Turions (m^2)
NCR-1	Section 3; corner of dam	3	1299.4	0
NCR-2	Section 1; Inlet Cove	4	187.6	0
NCR-3	Section 1; Islands	4	1112.2	26.8
NCR-4	Section 5; Boat Launch	3	1997.8	53.4
NCR-5	North Shoreline by Power Lines	4	1031.8	26.8

- November
- 5 Stations
- 3-5 Cores per station





Thank you!
Questions?

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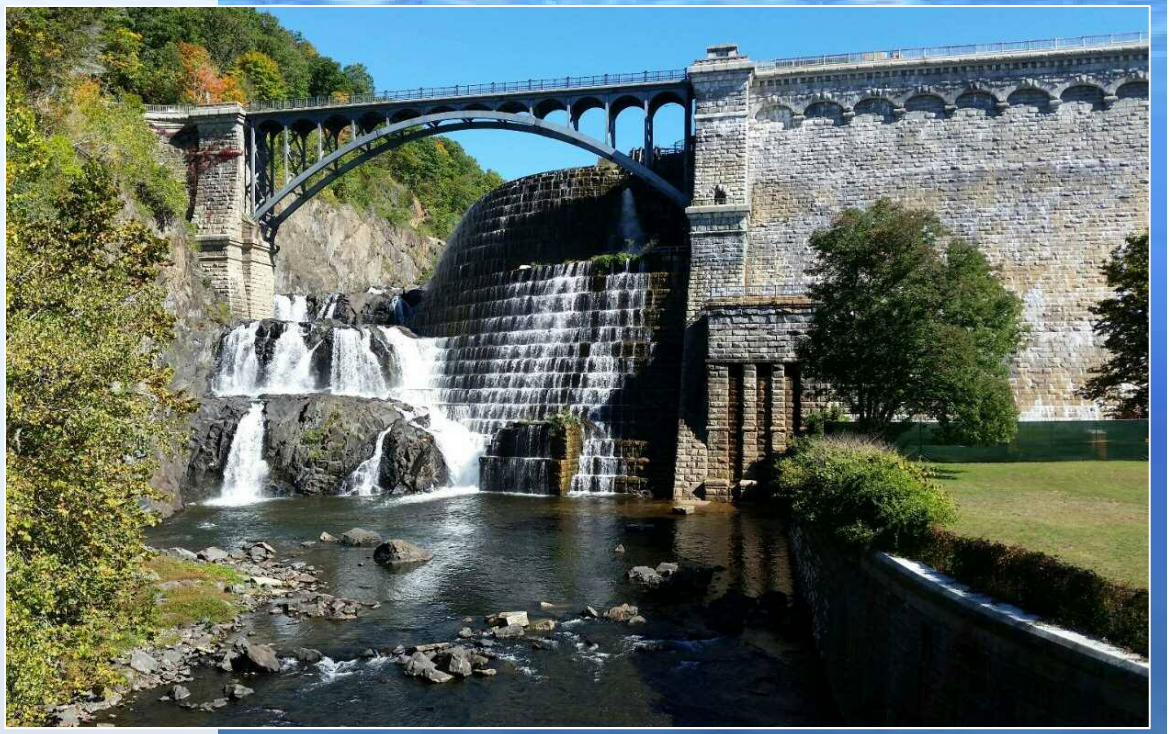

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