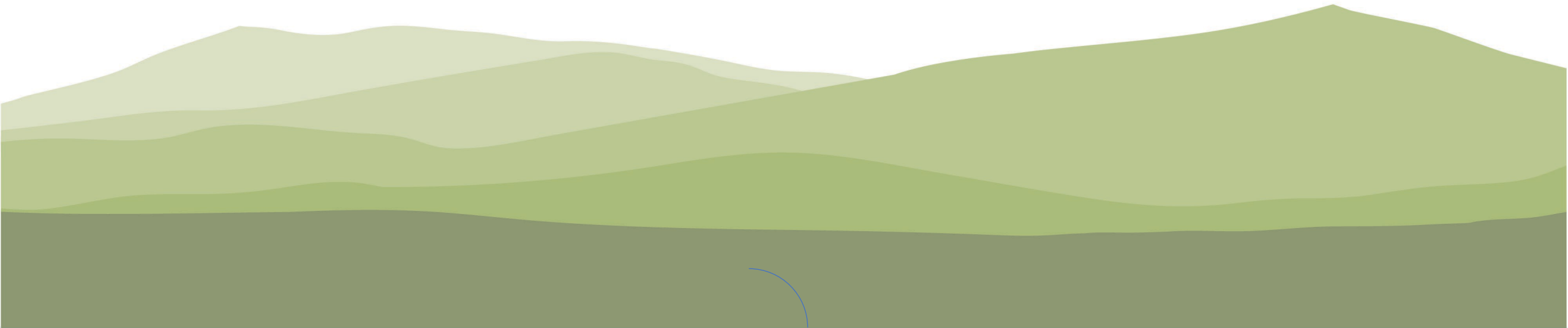


# Eurasian watermilfoil management: an overall timeline and the surprising sediments impacts recently discovered



**Chris L. Mikolajczyk, CLM**

Senior Manager - Aquatics

[cmiko@princetonhydro.com](mailto:cmiko@princetonhydro.com)

908-237-5660

# Introduction - Chris L. Mikolajczyk, CLM

- ✓ NALMS Certified Lake Manager
- ✓ PH employee for 27+ years
- ✓ 36+ years experience
- ✓ A.A.S. - Ecology & Environmental Technology
- ✓ B.S. - Geography (Water Resources Emphasis)
- ✓ M.S. - Geography (Watershed Management)
- ✓ Past-President – NALMS
- ✓ President – CLRMA
- ✓ Congressional Testimony on National Water Quality

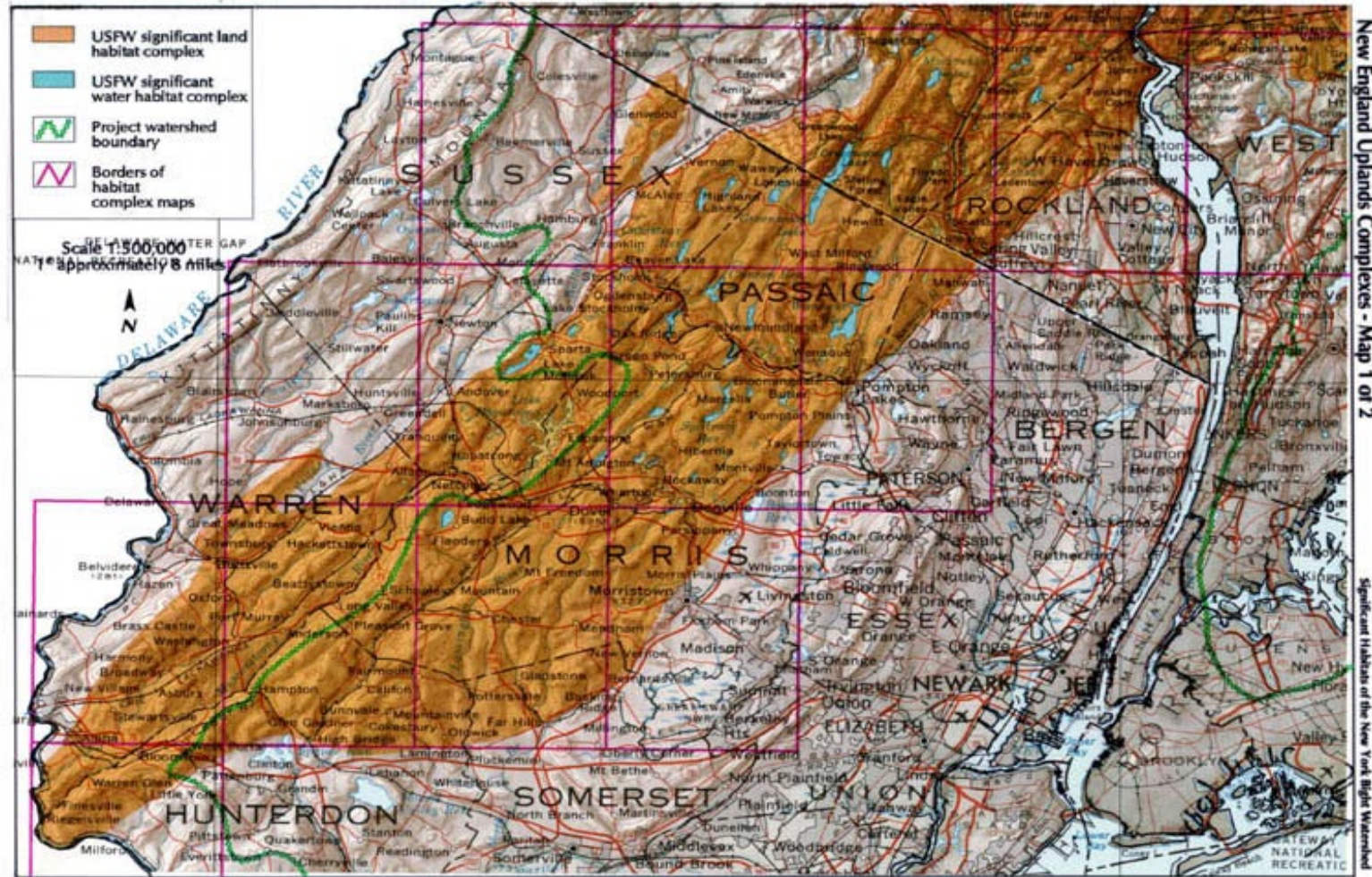


# Introduction – NY/NJ Highlands Region

# NY/NJ Highlands Region

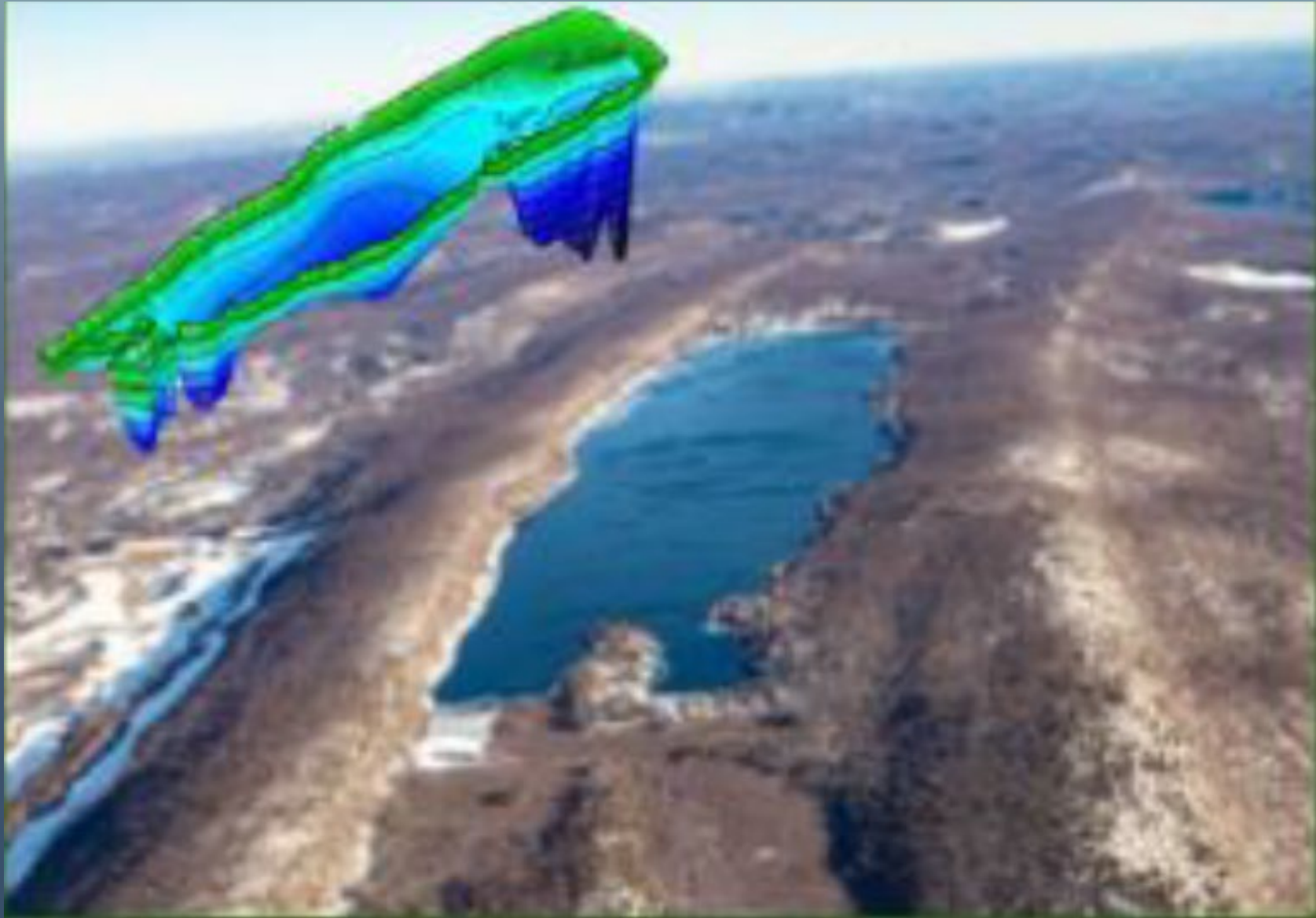
- ✓ A geological formation composed primarily of Precambrian igneous and metamorphic rock running from the Delaware River to the Hudson River.
- ✓ Geographic Scope: Covers approximately 1,300 square miles in New Jersey and extends into southeastern New York (including the Hudson Highlands).
- ✓ Key Features: Known for its steep ridges, historic iron mining, diverse forests, and extensive recreational trails.
- ✓ The northern region is also known as the Hudson Highlands and the southern as the New Jersey Highlands.
- ✓ The Highlands are a subrange of the Appalachian Mountains.
- ✓ In November 2004, the federal Highlands Conservation Act was passed. The Highlands Conservation Act “recognizes the importance of the water, forest, agricultural, wildlife, recreational, and cultural resources of the Highlands region, and the national significance of the Highlands region to the United States.”

# NY/NJ Highlands Region



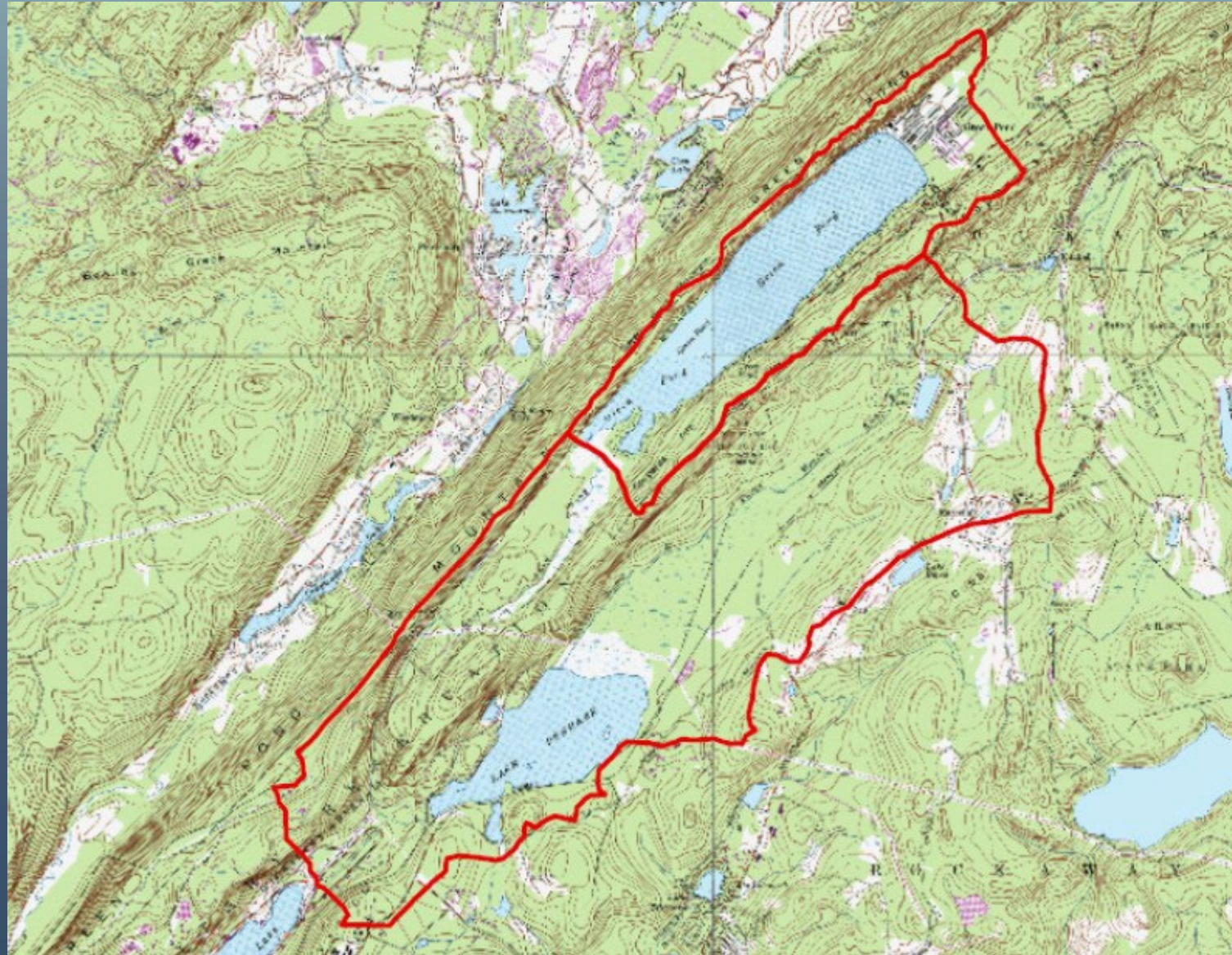
# Watershed Characteristics

# Private Lake – Highlands Region NY/NJ



SCIENCE  
ENGINEERING  
DESIGN

# Private Lake – Highlands Region NY/NJ



SCIENCE  
ENGINEERING  
DESIGN

# Private Lake – Highlands Region NY/NJ

<b>Land Use Category</b>	<b>Area</b>	<b>Percent of Total</b>
	(acres)	(%)
Forest	488	71
Urban	168	24
Barren Land	15	2
Wetlands	14	2
Water	6	1
Sum	691	100

# Private Lake – Highlands Region NY/NJ



SCIENCE  
ENGINEERING  
DESIGN

# Private Lake – Highlands Region NY/NJ

## Watershed Nutrient Load

Land Use	Area	Load		
		TN	TP	TSS
	(ha)	(kg/yr)	(kg/yr)	(kg/yr)
Barren Land	6.0	21.3	3.3	4,254.8
Forest	197.5	493.7	39.5	49,374.1
Urban	68.0	409.7	40.6	56,364.2
Water	2.6	0.0	-0.6	-517.2
Wetlands	5.6	0.0	-1.4	-1,125.4
Sum	279.7	924.7	81.3	108,350.5

# Private Lake – Highlands Region NY/NJ

<b>Pollutant Loading Summary Load (Kg/Yr)</b>			
<b>Loading Source</b>	<b>TN</b>	<b>TP</b>	<b>TSS</b>
<b>Stormwater (Watershed-Based)</b>	924.7	81.3	108,350.5
<b>Atmospheric</b>	1,588	89	1,417
<b>Septic</b>	1,077	65	N/A
<b>Internal regeneration</b>	N/A	158.6	N/A
<b>Total</b>	<b>3,589.7</b>	<b>393.9</b>	<b>109,767.5</b>

# Annual Monitoring

# Private Lake – Highlands Region NY/NJ



2025 SECCHI DISK CLARITY (METERS)	
Sampling Station	30 JULY 2025
Station 1	2.2+
Station 2	4.2
Station 3	4.2
Station 4	3.4+
Station 5	5.2
Station 6	4.2
Station 7	1.5+
Station 8	4.5

# Private Lake – Highlands Region NY/NJ



**Table 1: In-Situ Monitoring 7/30/2025**

Station	DEPTH (meters)		Sample	Temperature	Conductivity	Dissolved Oxygen	Dissolved Oxygen	pH
	Total	Secchi		(°C)	(µS/cm)	(mg/L)	(%)	(units)
ST-1	2.2	2.2+	Surface	28.77	98.700	8.19	109.9	8.24
			1.0	28.73	98.700	8.22	110.3	8.32
			2.0	28.59	99.110	8.52	114.3	8.53
ST-2	4.4	4.2	Surface	28.84	97.120	8.00	107.7	8.01
			1.0	28.54	97.720	8.09	107.9	7.91
			2.0	27.91	97.740	8.80	116.9	8.36
			3.0	27.22	97.090	8.48	110.1	8.09
			4.0	26.84	97.020	8.06	104.0	7.87
ST-3	4.7	4.2	Surface	28.75	95.050	8.08	108.1	7.97
			1.0	28.54	98.030	8.23	98.0	7.90
			2.0	28.41	97.630	8.06	107.2	7.89
			3.0	27.21	97.330	8.29	96.8	8.12
			4.0	26.82	96.840	8.13	96.8	7.97
			4.5	26.77	97.400	7.54	97.1	7.19
ST-4	3.4	3.4+	Surface	28.25	87.690	8.18	108.6	6.88
			1.0	27.64	88.120	8.31	109.4	8.07
			2.0	27.14	88.880	8.79	114.3	8.36
ST-5	7.5	5.2	3.0	26.98	89.630	7.24	93.1	7.85
			Surface	28.38	98.180	8.10	107.8	7.90
			1.0	27.68	98.350	8.20	107.8	7.77
			2.0	27.27	98.980	8.05	105.0	7.67
			3.0	26.62	99.080	8.12	104.8	7.62
			4.0	25.97	102.300	8.30	102.3	7.53
			5.0	21.23	119.600	9.56	112.5	7.49
ST-6	5.5	4.2	6.0	17.86	127.000	9.20	127.0	7.21
			7.0	16.05	142.800	4.06	35.3	6.98
			Surface	29.85	114.000	7.69	105.2	7.55
			1.0	28.65	106.000	7.97	106.9	7.38
			2.0	27.98	98.210	8.11	107.6	7.54
			3.0	27.43	91.870	8.08	105.7	7.42
ST-7	1.5	1.5+	4.0	27.11	86.490	7.88	102.1	7.34
			5.0	26.68	91.560	7.15	91.5	7.24
			0.0	29.31	97.940	7.90	107.3	7.34
			1.0	28.72	98.090	8.40	112.8	7.73
			Surface	29.78	97.840	7.87	107.2	7.76
ST-8	14	4.5	1.0	29.24	98.010	8.00	108.4	7.76
			2.0	28.81	97.860	8.18	109.6	7.80
			3.0	27.74	97.410	8.42	110.0	7.97
			4.0	26.82	97.200	7.96	102.5	7.71
			5.0	25.46	95.440	7.68	96.7	7.56
			6.0	20.85	92.450	7.15	82.0	7.39
			7.0	17.86	92.740	4.39	50.7	7.20
			8.0	16.81	94.480	2.10	21.9	7.01
			9.0	14.82	98.200	1.48	14.7	6.93
			10.0	14.23	100.600	0.83	7.0	6.89
			11.0	13.66	106.100	0.21	1.9	6.87
			12.0	14.49	107.800	0.03	0.3	6.90
			13.0	13.39	113.100	0.00	0.1	6.91

# Private Lake – Highlands Region NY/NJ

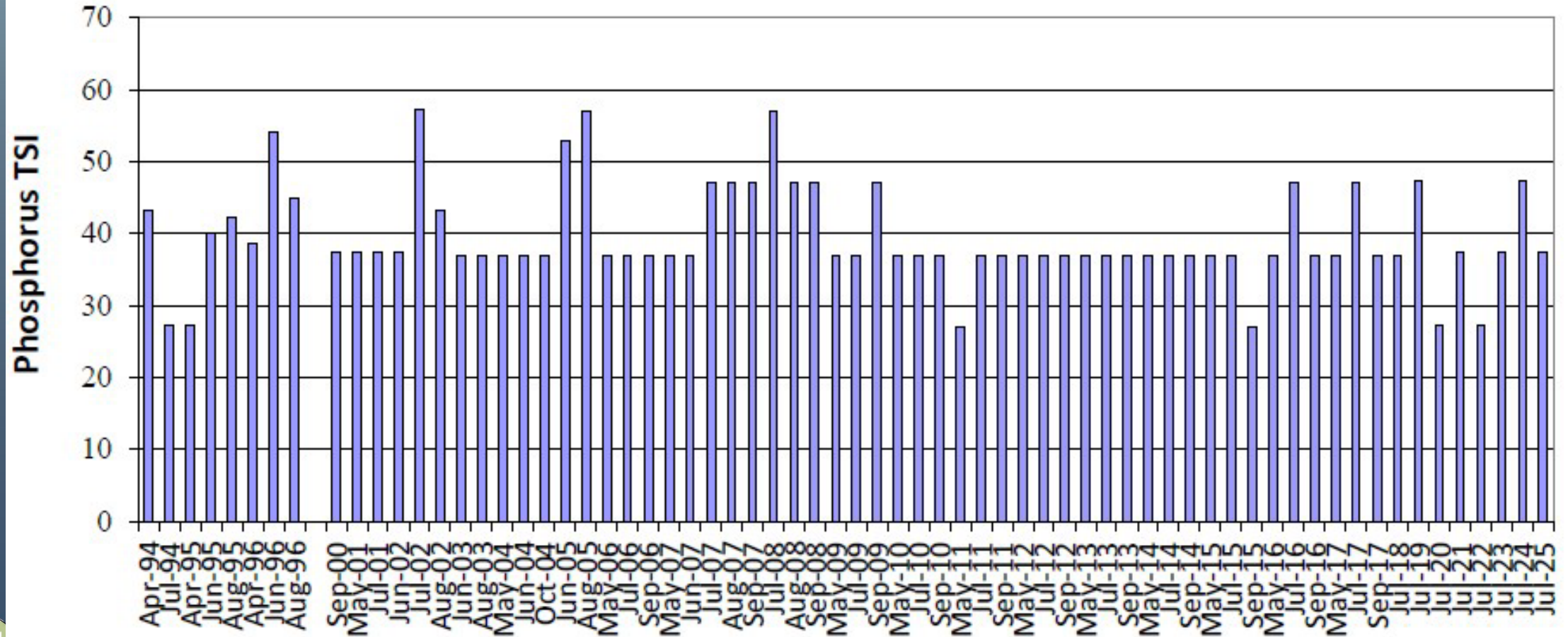
SAMPLE DATE: 30-July-2025					
STA ID	CHL A (mg/M <sup>3</sup> )	NO3-N (mg/L)	SRP (mg/L)	TP (mg/L)	TSS (mg/L)
ST-4 SURFACE	0.68	0.11	0.003	0.01	ND <2
ST-4 DEEP	5.2	0.12	0.002	0.02	11
ST-8 SURFACE	ND <0.6	ND <0.03	0.001	0.01	ND <2
ST-8 MID	2.9	0.03	0.001	0.02	6
ST-8 DEEP	7.6	0.20	0.002	0.02	6



# Long Term Monitoring

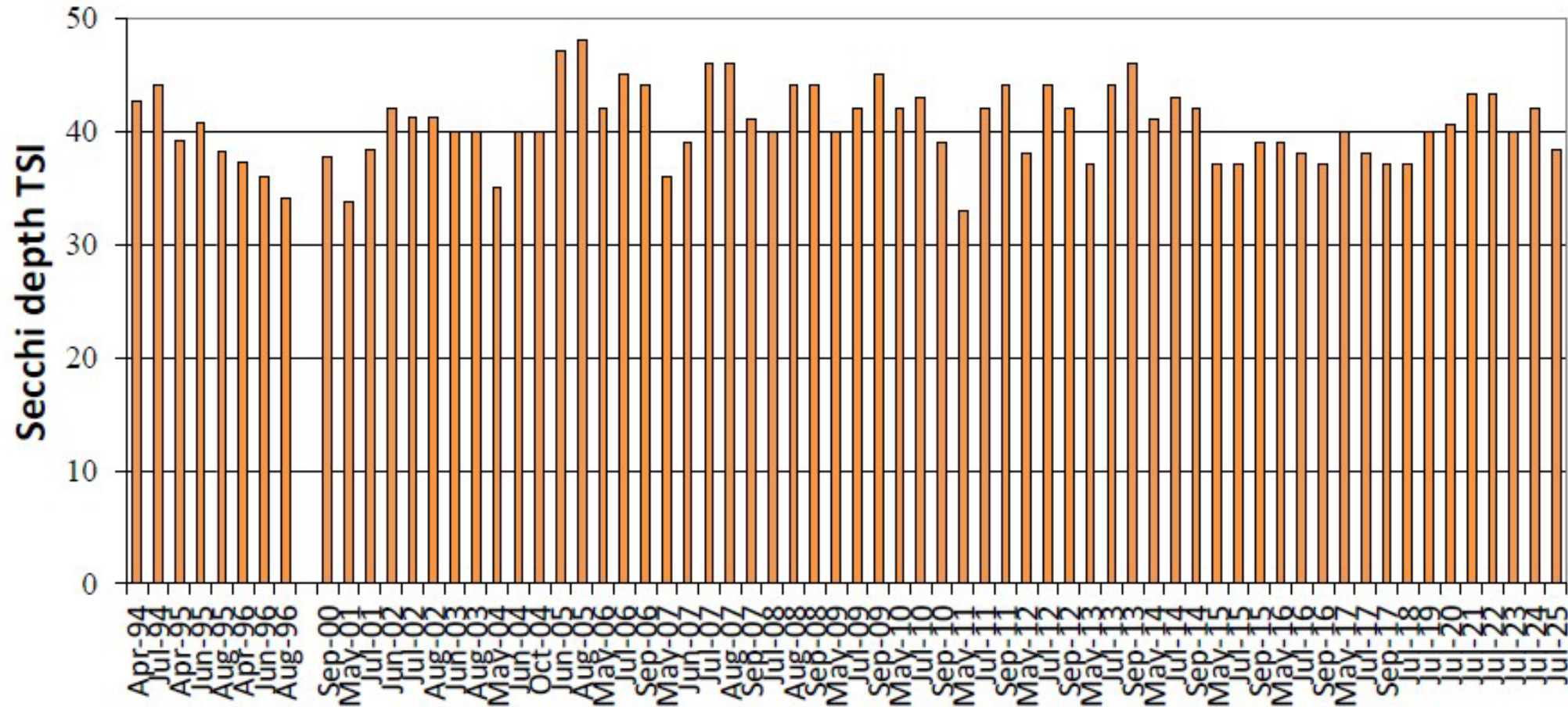
# Trophic State Index - Carlson

Long Term Phosphorus Trophic State Index (TSI) Values



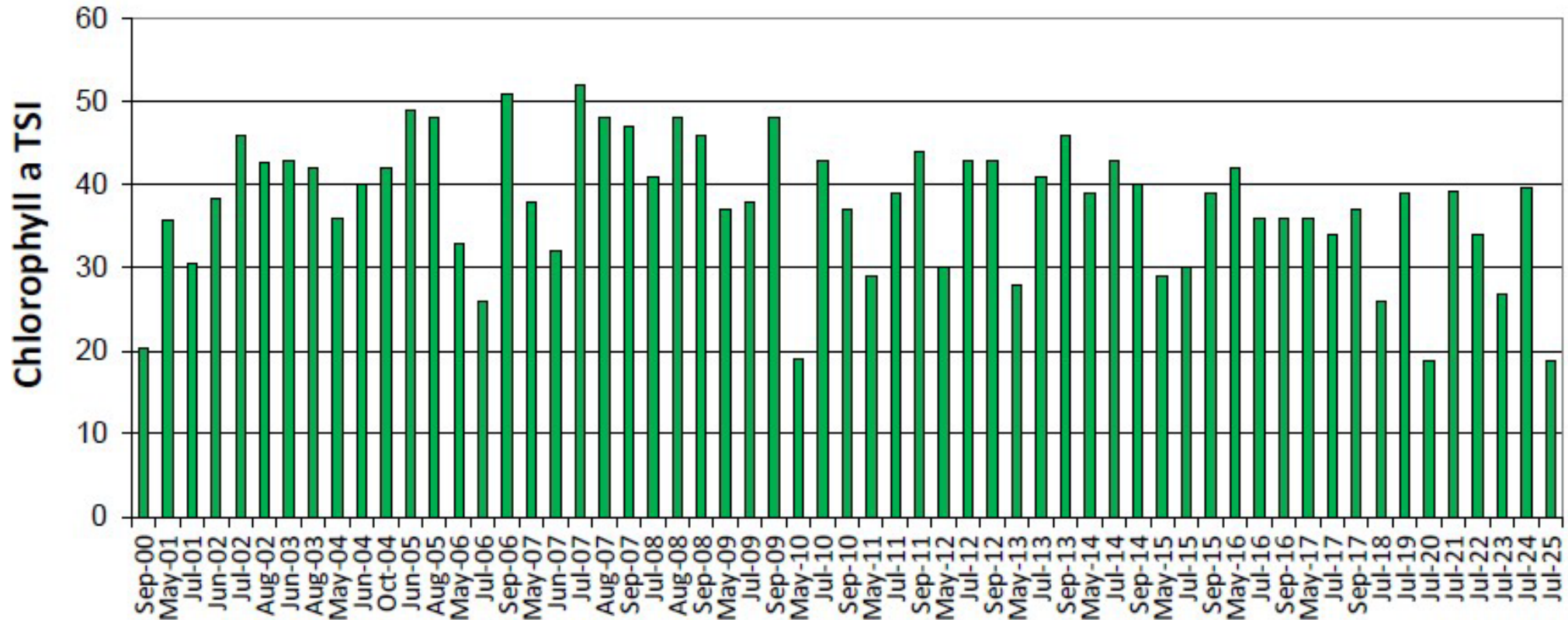
# Trophic State Index - Carlson

Long Term Secchi depth Trophic State Index (TSI) Values



# Trophic State Index - Carlson

Long Term Chlorophyll *a* Trophic State Index (TSI) Values



**Given all that – *How did we get here??***

# Eurasian watermilfoil



SCIENCE  
ENGINEERING  
DESIGN

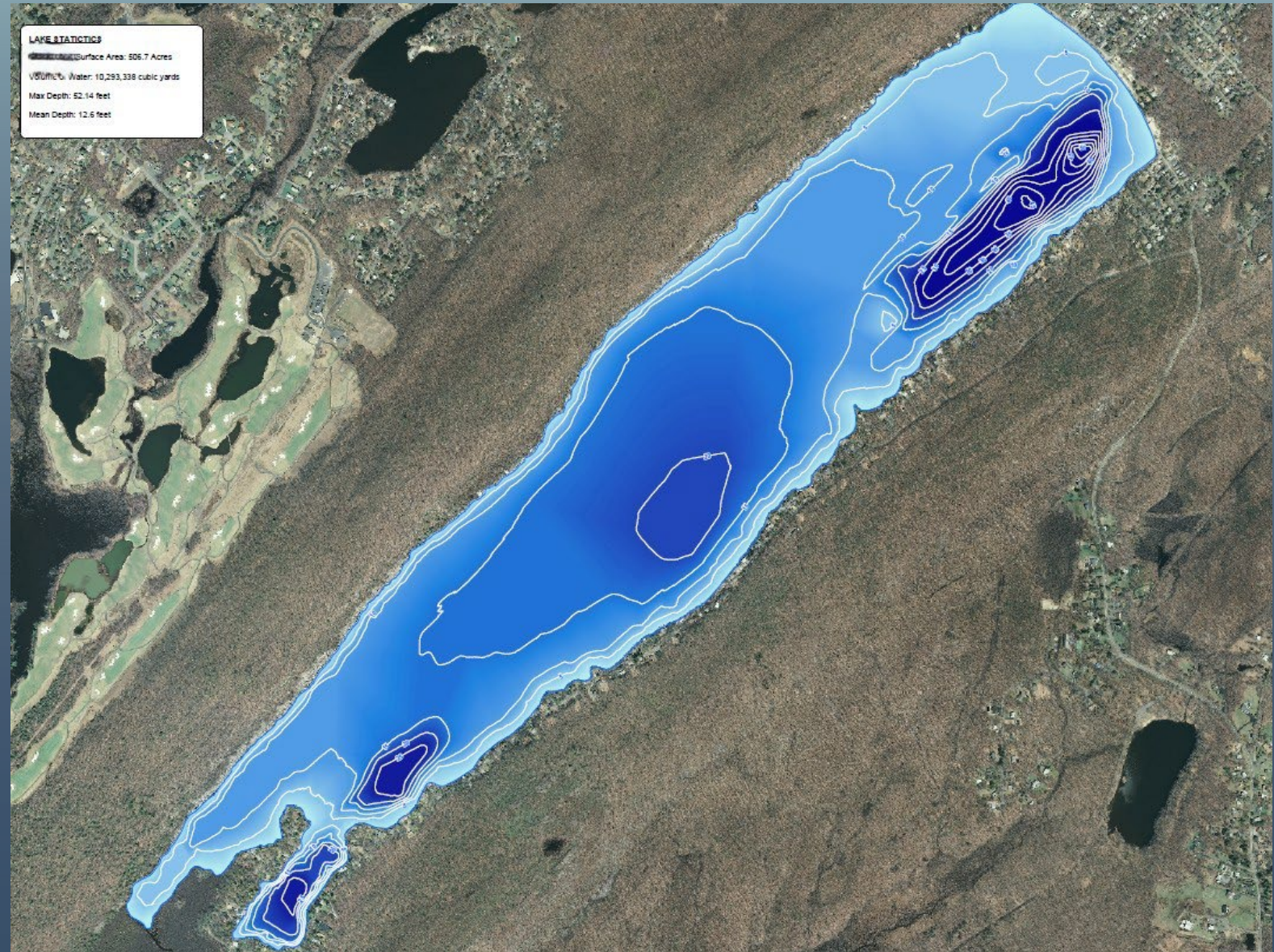
# An easy fix where I live!



SCIENCE  
ENGINEER  
DESIGN

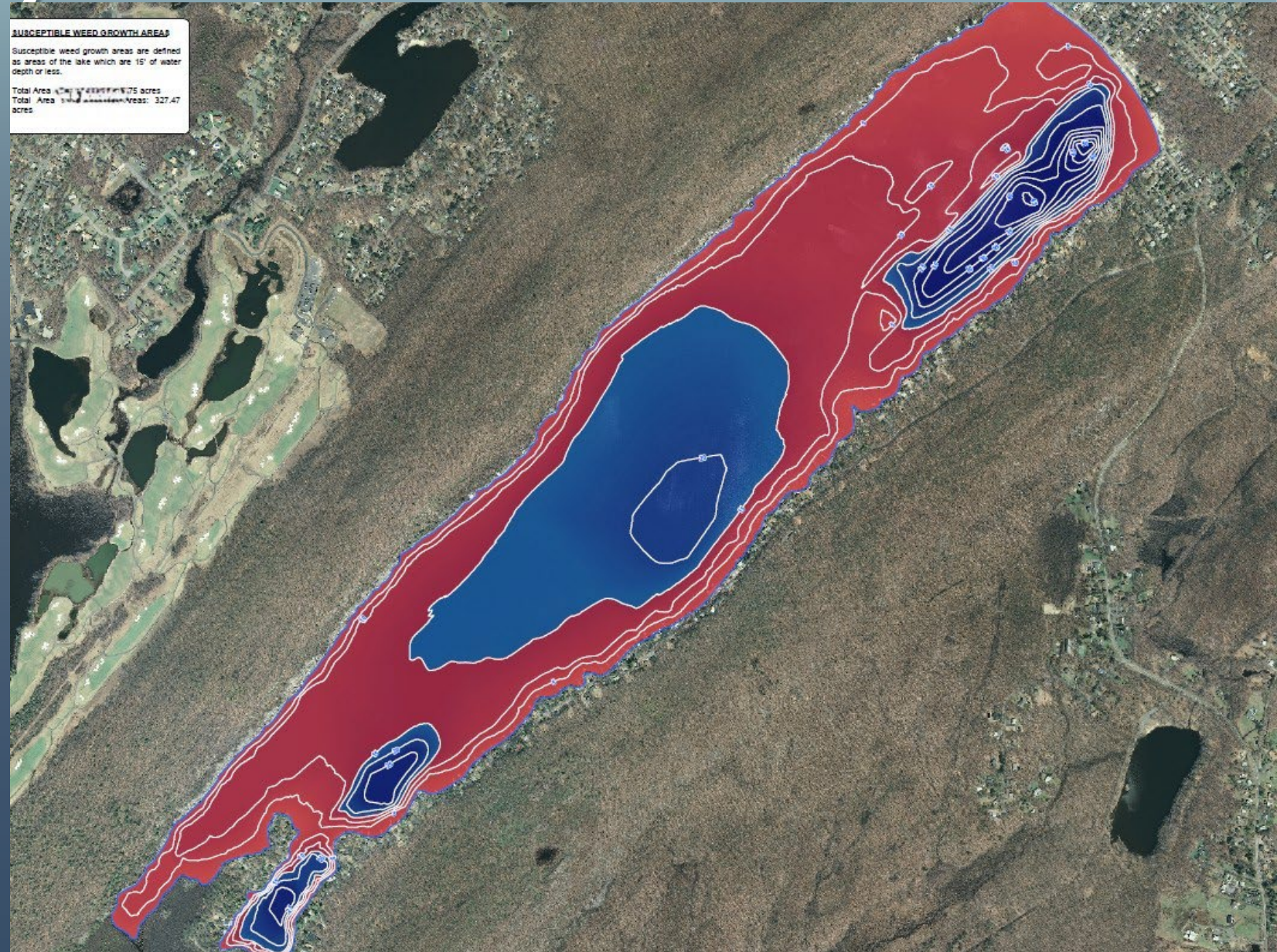
# Bathymetric Statistics

- ✓ 500+ Acres
- ✓ Max Depth 52 ft
- ✓ Mean 12.6 ft
- ✓ EXCELLENT clarity



# Bathymetric Statistics

- ✓ 500+ Acres
- ✓ Max Depth 52 ft
- ✓ Mean 12.6 ft
- ✓ Areas <15 ft: 327 acres (65%)



SCIENCE  
ENGINEERING  
DESIGN

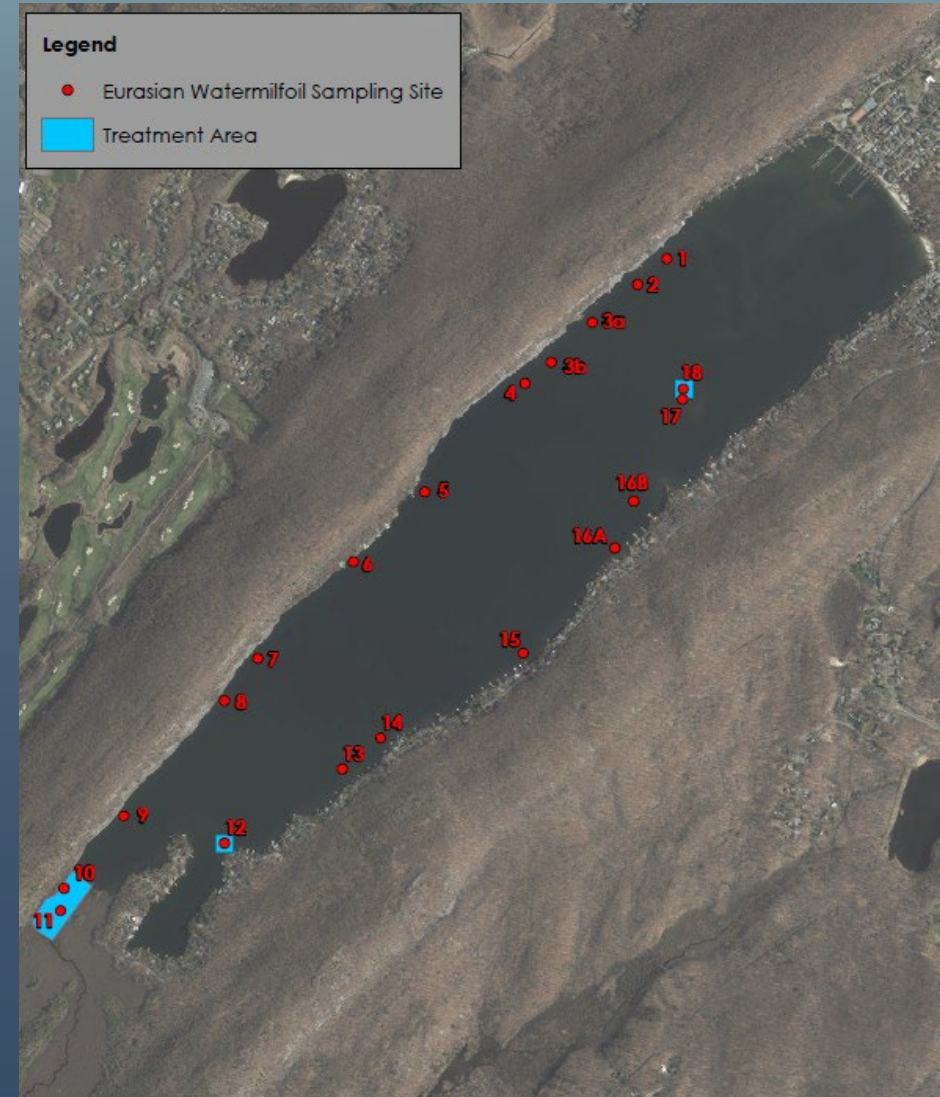
# Eurasian watermilfoil (*Myriophyllum spicatum*)

- ✓ First detected in Fall 2013
- ✓ June 2014 – Test Treatment
- ✓ Reward herbicide  
(diquat dibromide)
- ✓ Scuba survey for EWM
- ✓ Detected at depths to 20'



# Eurasian watermilfoil (*Myriophyllum spicatum*)

- ✓ EWM Spreads
- ✓ July 2016 – Further Treatment
- ✓ Aug 2016 – Treatment continues
- ✓ Reward herbicide  
(diquat dibromide)
- ✓ Expanded areas
- ✓ Detected at depths to 20'



# Eurasian watermilfoil (*Myriophyllum spicatum*)

- ✓ EWM Further spread
- ✓ Sept 2017– Further Treatment
- ✓ Clipper herbicide  
(flumioxazin)
- ✓ Expanded areas
- ✓ SCUBA hand-pull operation
- ✓ Most density is 8'-12' depths  
and offshore





**ProcellaCOR**<sup>®</sup>  
Aquatic Herbicide

- ✓ 2019
- ✓ ProcellaCOR EC  
(florpyrauxifen-benzyl)
- ✓ SePRO oversight
- ✓ Requires 40x-100x less than  
typical herbicides
- ✓ Acts quickly (hours to days)
- ✓ Offers long-term control
- ✓ 3-year guarantee



# Eurasian watermilfoil (*Myriophyllum spicatum*)

- ✓ EWM Further spread
- ✓ July 2019– Further Treatment
- ✓ ProcellaCOR EC  
(florpyrauxifen-benzyl)
- ✓ 3-acre test plot – Central lake
- ✓ Sept 2019– Further Treatment
- ✓ 20 acres – North shoreline
- ✓ NO residential lots
- ✓ SePRO field oversight



# Eurasian watermilfoil (*Myriophyllum spicatum*)



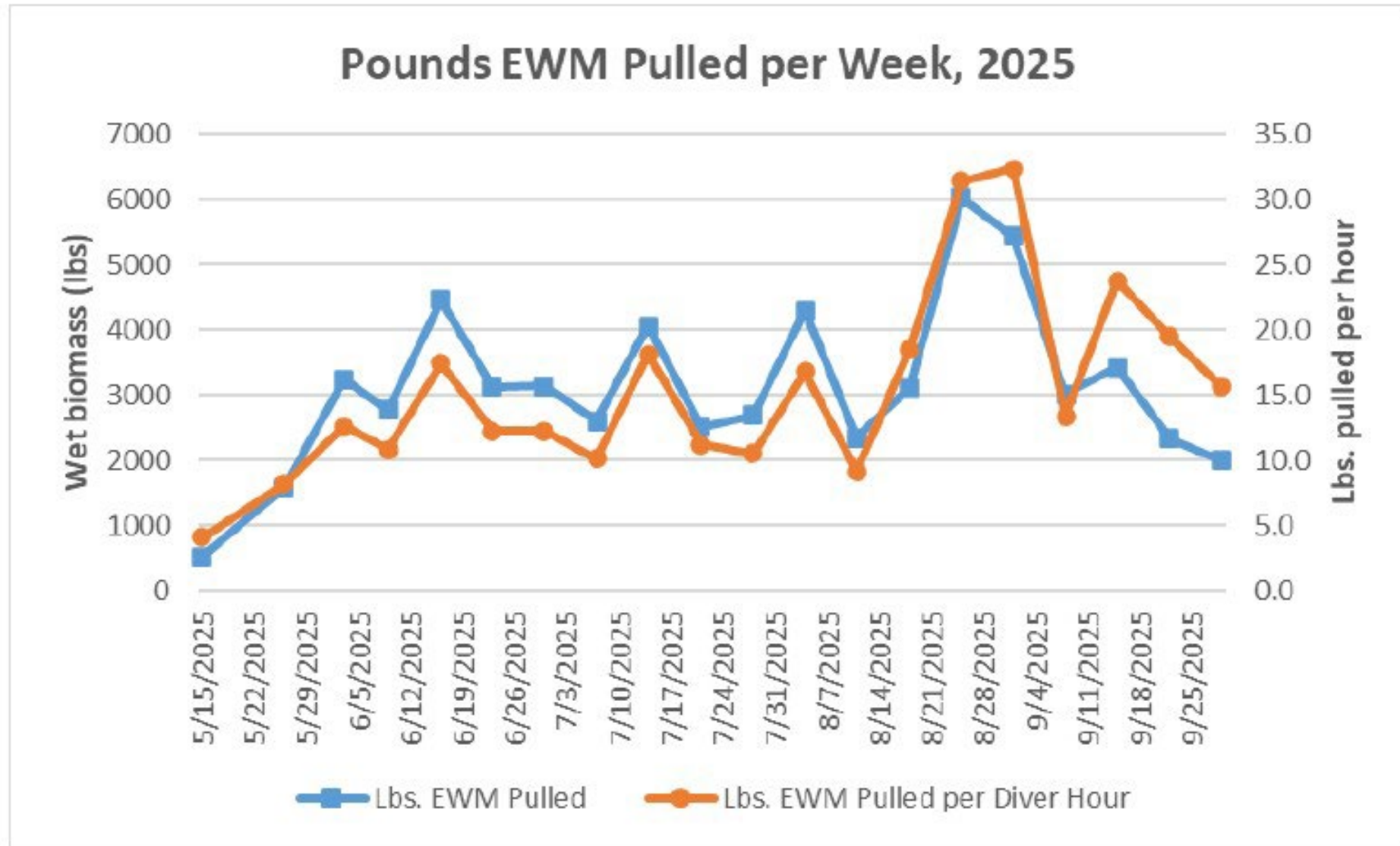
SCIENCE  
ENGINEERING  
DESIGN

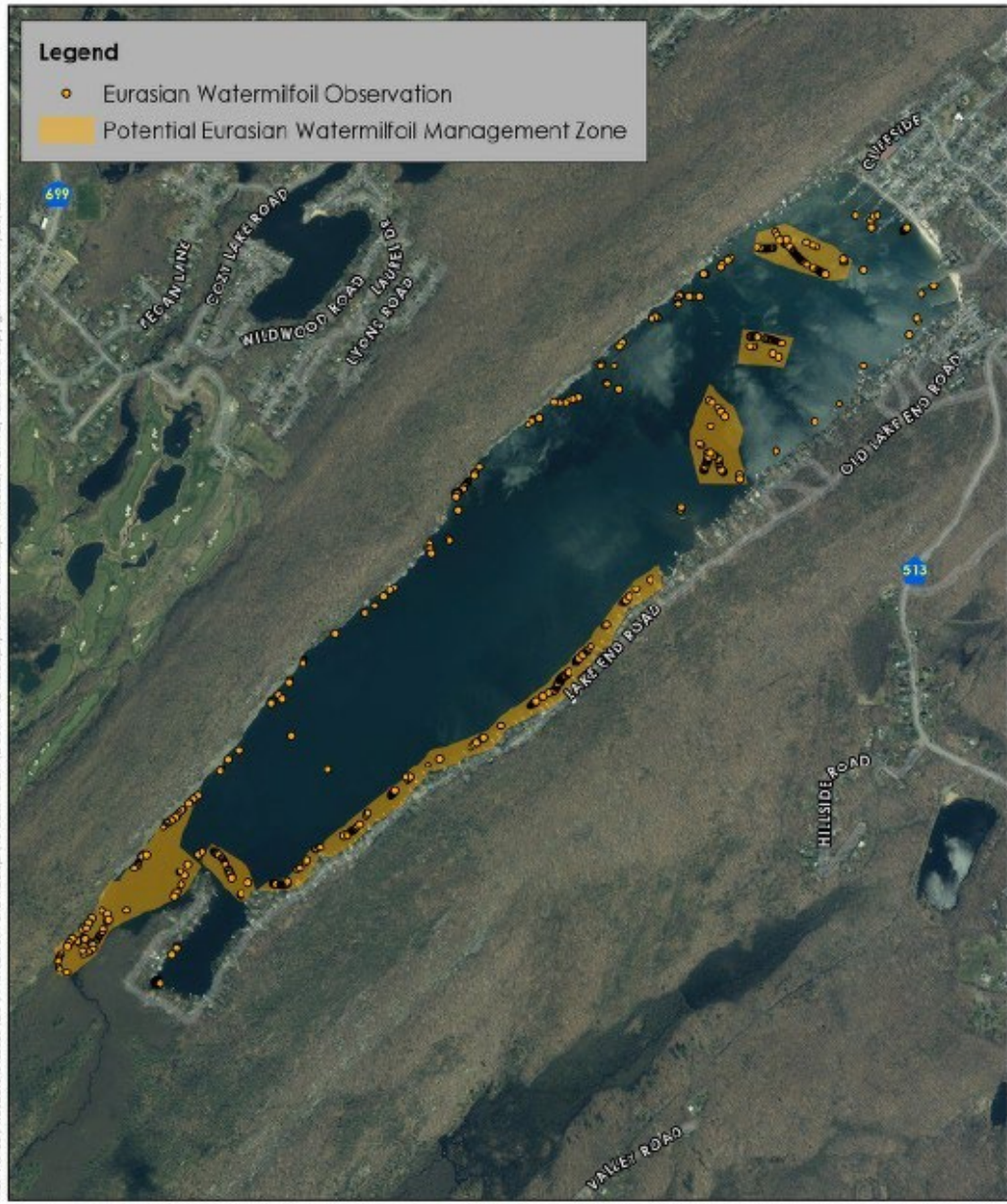
# DASH Team Formation

# DASH Team Formation

- ✓ A 501(c)3 non profit organization focused on research, education and fundraising to support lakes in the Highlands region deal with challenges to water quality. Research activities involve scientific data collection, analysis and technology including a homegrown invasive species removal system. Education focuses on projects, studies and public domain searches to produce useful information for lake communities in the Highlands region.
- ✓ Multi-boat system
- ✓ Operating since 2020

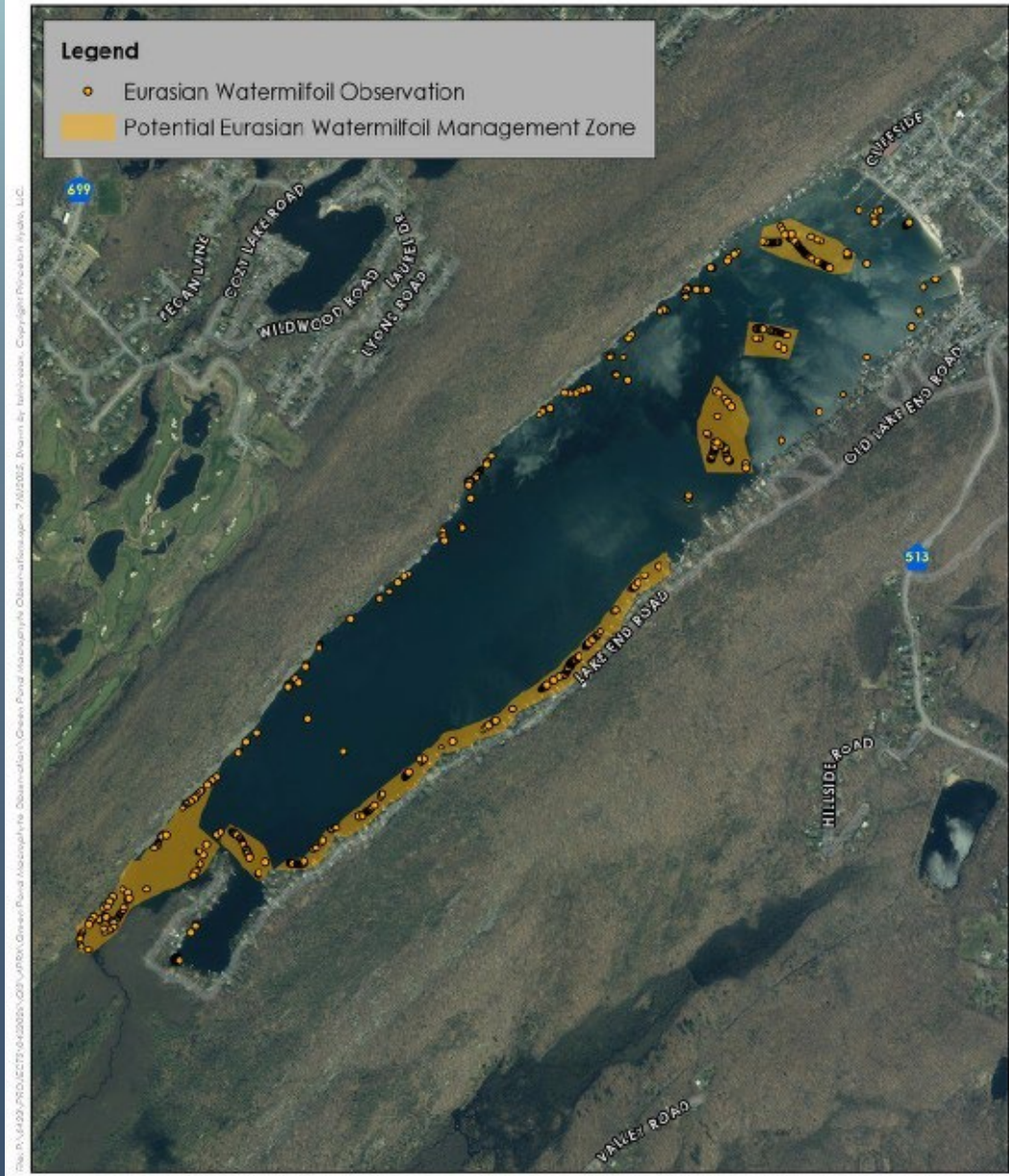
# DASH Team Operation





NOTES:  
 1. Eurasian watermilfoil observation locations and potential management zones are approximate. Observations conducted by Princeton Hydro, LLC, on 6/20/2025.  
 2. 2020 orthorectified and reclassified terrain data from the 41 Geographic Information Network (NAD83) Open Data portal: <https://ngmcc.gov/>  
 Map Projection: NAD 1983 StatePlane New Jersey FIPS 2901 Feet

**EURASIAN WATERMILFOIL  
 OBSERVATIONS, 6/20/2025**



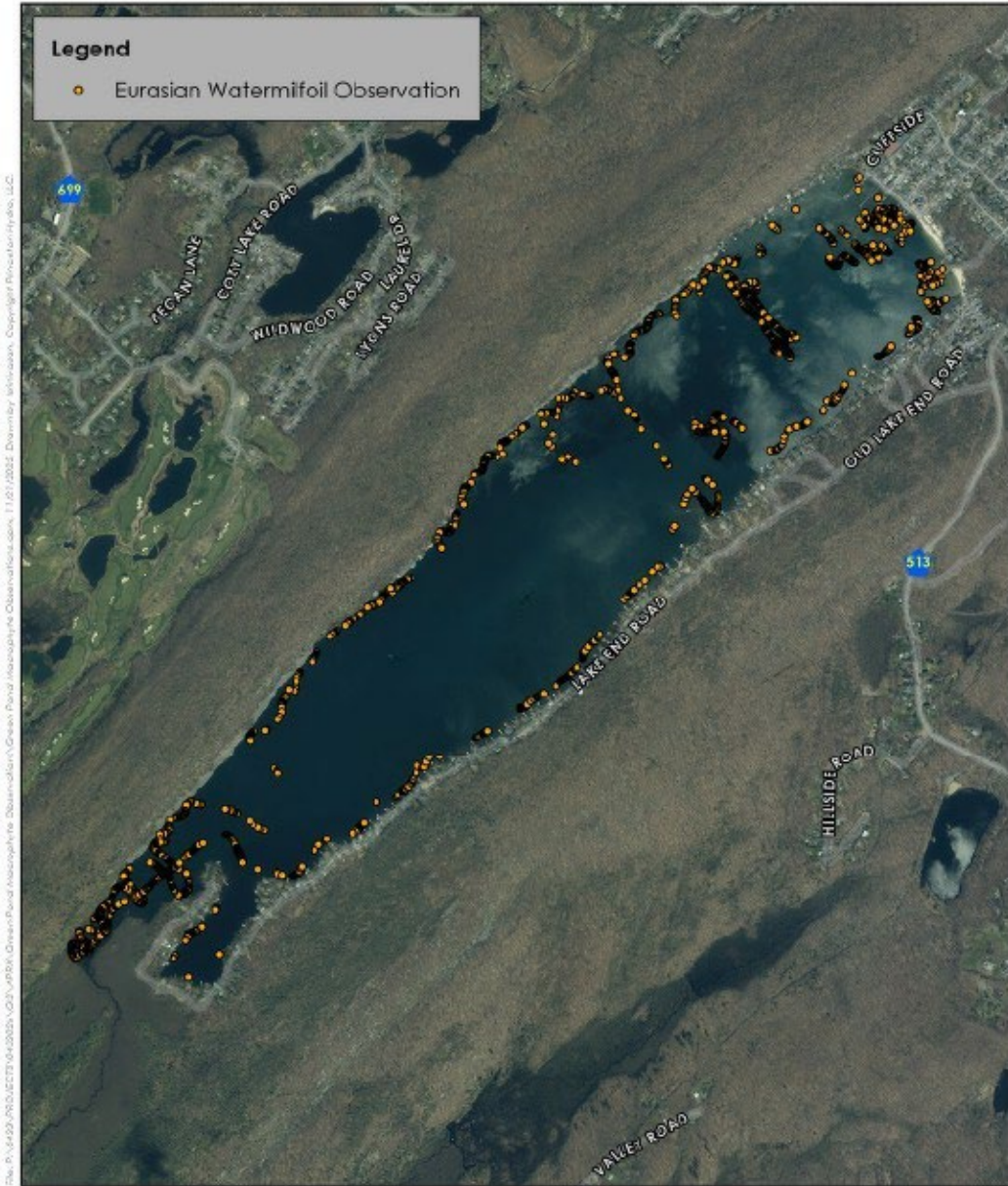
NOTES:  
 1. Eurasian watermilfoil observation locations and potential management zones are approximate. Observations conducted by Princeton Hydro, LLC, on 6/20/2025.  
 2. 2020 orthorectified and reclassified terrain data from the 41 Geographic Information Network (NAD83) Open Data portal: <https://ngmcc.gov/>  
 Map Projection: NAD 1983 StatePlane New Jersey FIPS 2901 Feet

**EURASIAN WATERMILFOIL  
 OBSERVATIONS, 6/20/2025**



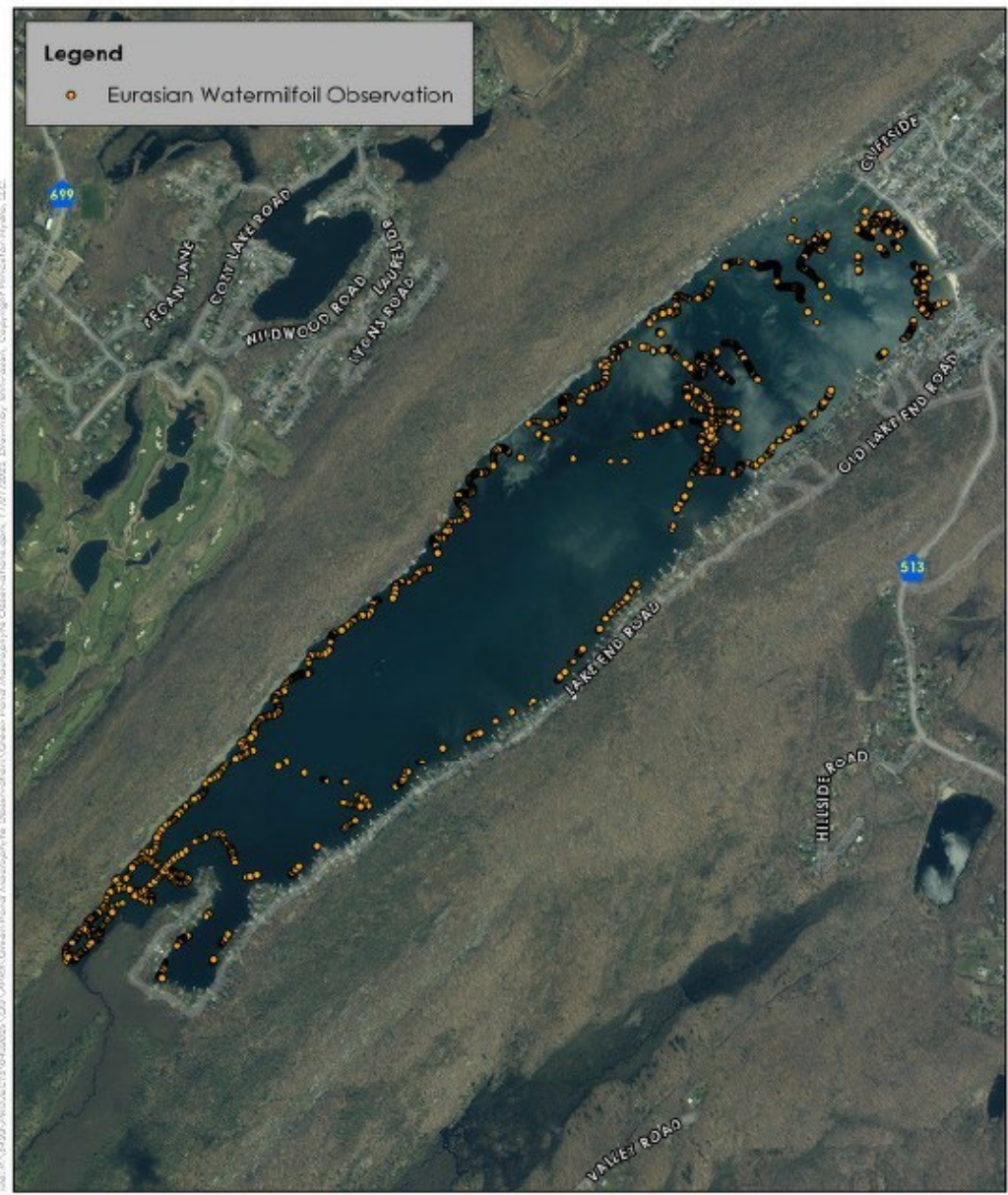
SEED

RO.COM



NOTES:  
 1. Eurasian watermilfoil observation locations are approximate.  
 2. Observations conducted by Princeton Hydro, LLC on 8/26/2025.  
 3. 2020 orthorectified imagery and roads obtained from the NCEM Geospatial Information Network (NCEM) Open Data portal: <https://gisnj.gov/>  
 Map Projection: NAD 1983 StatePlane New Jersey 185 2903 Feet

**EURASIAN WATERMILFOIL  
 OBSERVATIONS, 8/26/2025**

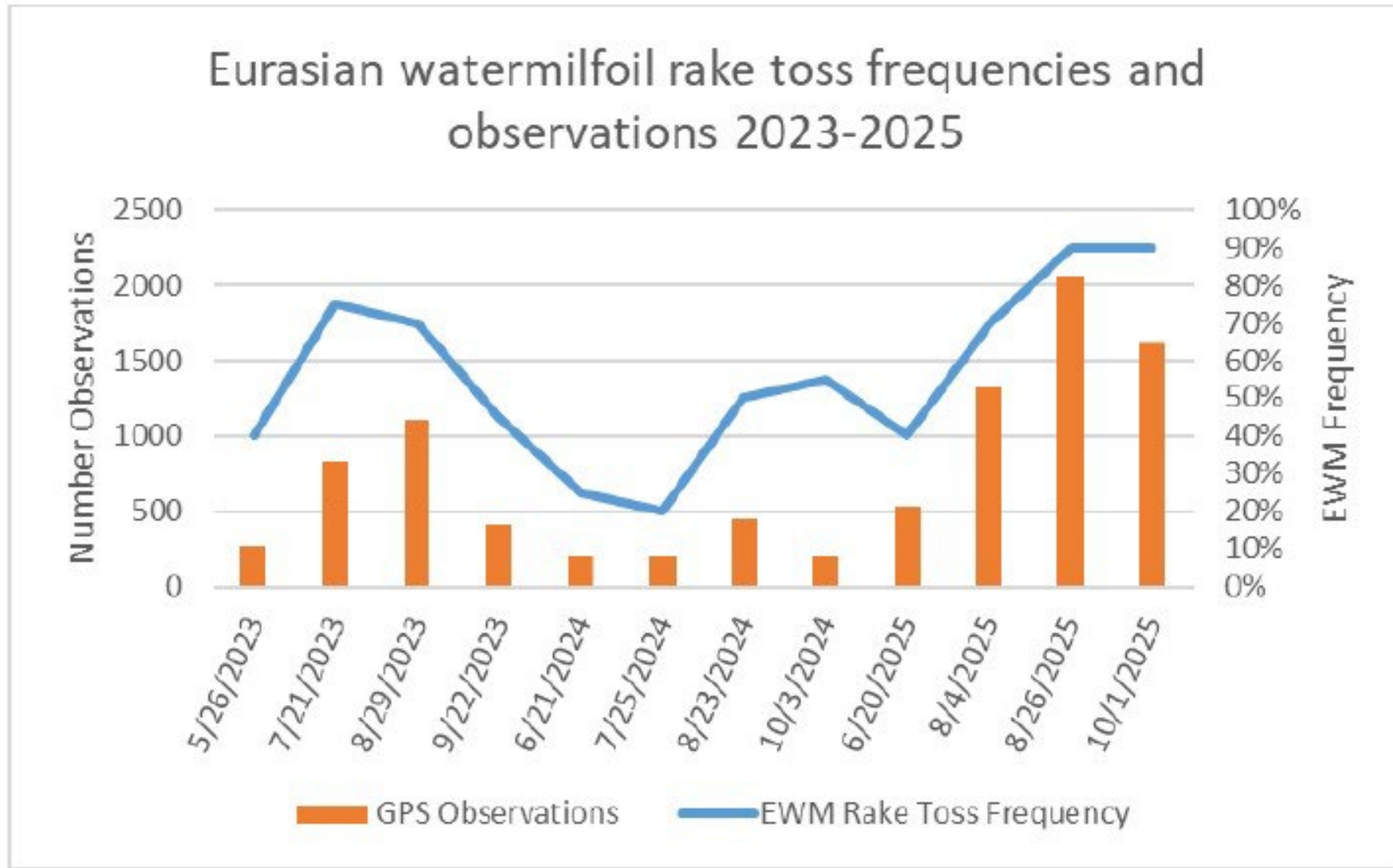


NOTES:  
 1. Eurasian watermilfoil observation locations are approximate.  
 2. Observations conducted by Princeton Hydro, LLC on 10/1/2025.  
 3. 2020 orthorectified imagery and roads obtained from the NCEM Geospatial Information Network (NCEM) Open Data portal: <https://gisnj.gov/>  
 Map Projection: NAD 1983 StatePlane New Jersey 185 2903 Feet

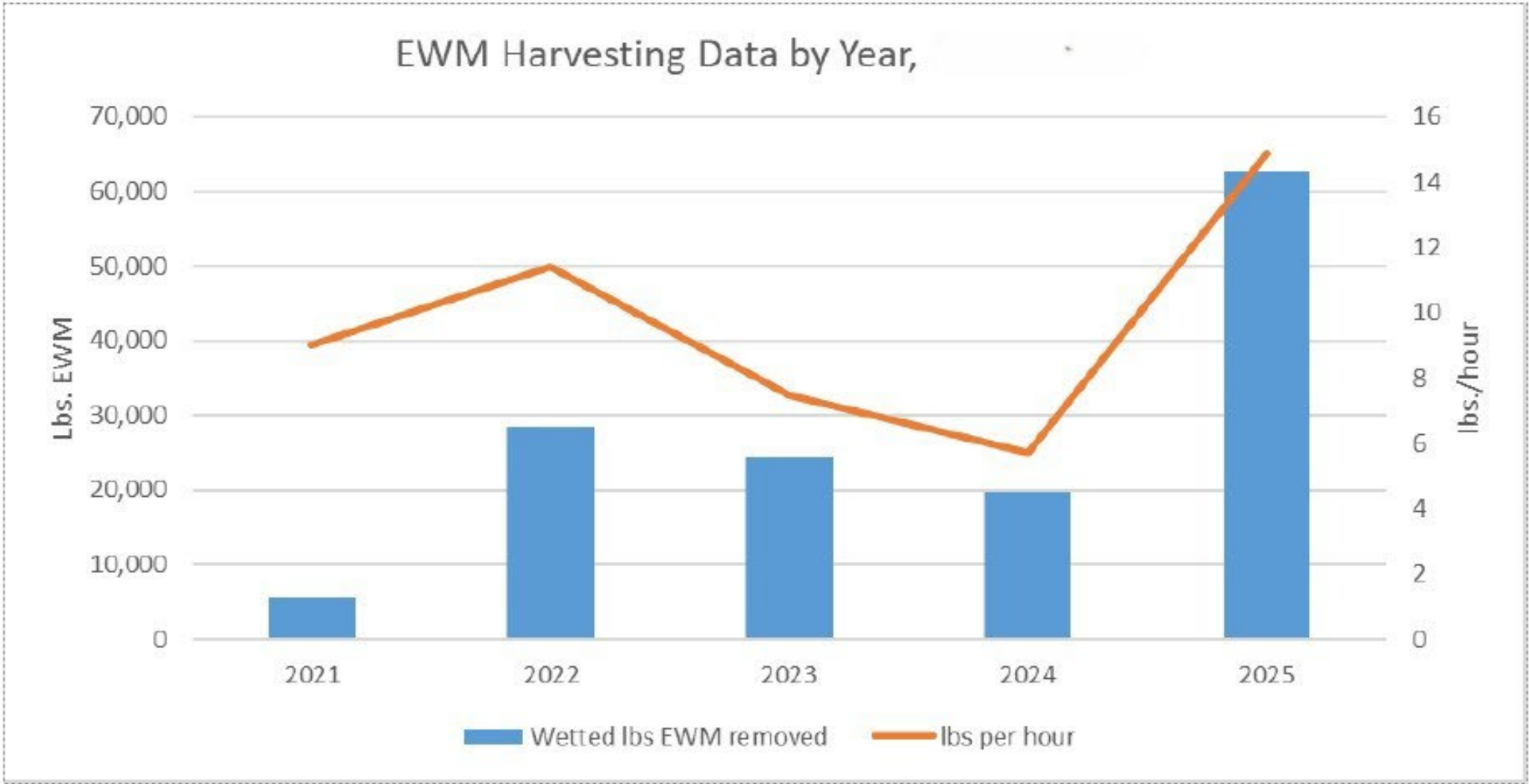
**EURASIAN WATERMILFOIL  
 OBSERVATIONS, 10/1/2025**



# DASH Team Operation



# DASH Team Operation



# 2026: A change in approach?

# Concerns

# Concerns

- ✓ Florpyrauxifen-benzyl
- ✓ Florpyrauxifen
- ✓ Hydroxy-FPB
- ✓ Dechloro-FPB
- ✓ Hydroxy-florpyrauxifen
- ✓ Dechloro-florpyrauxifen

**Florpyrauxifen-benzyl, florpyrauxifen, hydroxy-FPB, dechloro-FPB, Hydroxy-florpyrauxifen, Dechloro-florpyrauxifen** are all related to a systemic synthetic auxin herbicide, in this case ProcellaCOR, used to control submerged aquatic vegetation. Florpyrauxifen-benzyl (“active ingredient”) is the ester form of florpyrauxifen, and it can break down into florpyrauxifen in the environment. The other compounds are all degradation products or metabolites of the original molecule (active ingredient).

# Concerns

## Persistence of florpyrauxifen-benzyl in sediments following application to a large oligotrophic lake to control Eurasian watermilfoil

Wiltse B.<sup>1</sup>, Mattes B.<sup>2</sup>, Navitsky C.<sup>1</sup>, Chakraborty S.<sup>5</sup>, Stager J.C.<sup>5</sup>, Buell E.<sup>1</sup> & Rose K.C.<sup>2,3,4</sup>

<sup>1</sup>Lake George Association, Lake George, NY 12845

<sup>2</sup>Darrin Fresh Water Institute, Rensselaer Polytechnic Institute, Bolton Landing, NY 12814

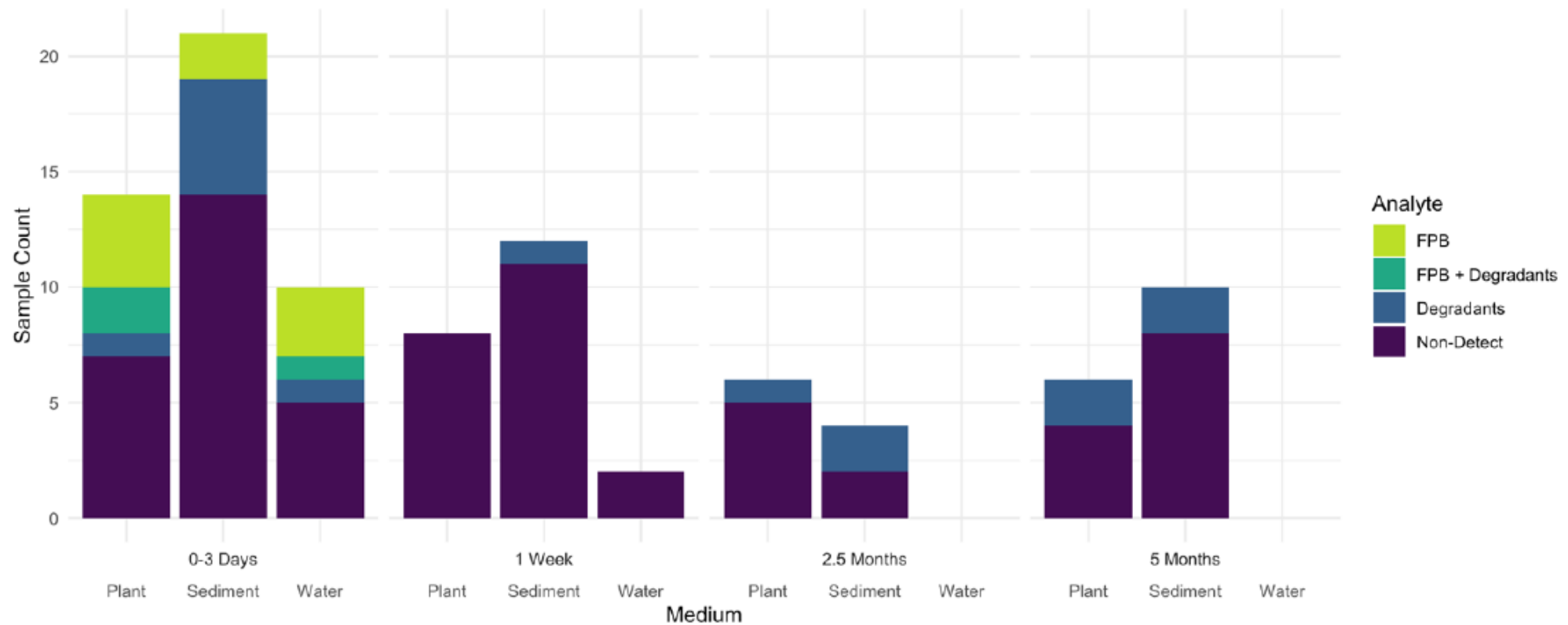
<sup>3</sup>Department of Biological Sciences, Rensselaer Polytechnic Institute, Troy, NY 12180

<sup>4</sup>Department of Civil and Environmental Engineering, Rensselaer Polytechnic Institute, Troy, NY 12180

<sup>5</sup>Paul Smith's College, Paul Smiths, NY 12970

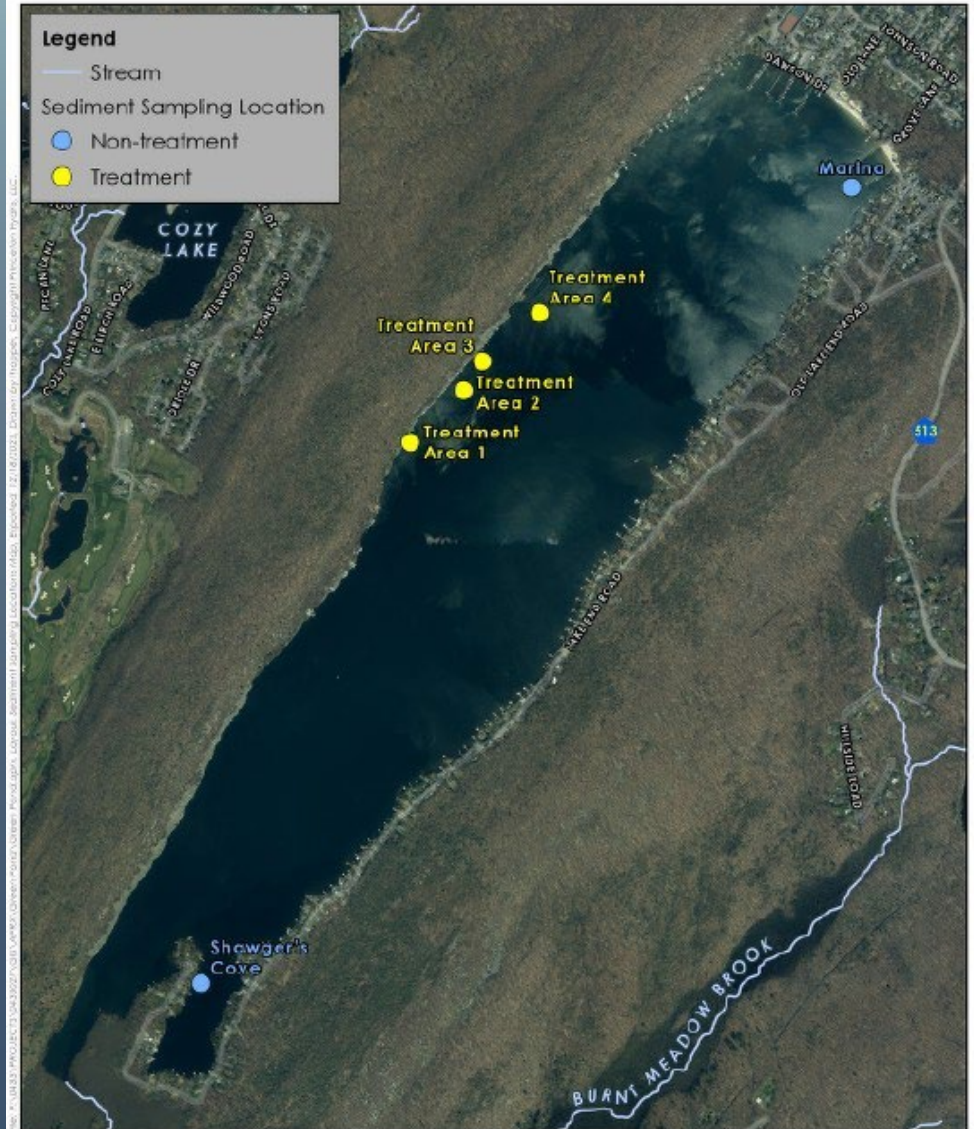
Corresponding Author: Brendan Wiltse, [bwiltse@lakegeorgeassociation.org](mailto:bwiltse@lakegeorgeassociation.org)

# Concerns



# 2025 Sediment Study

# 2025 Sediment Study



**SEDIMENT SAMPLING LOCATIONS**

# 2025 Sediment Study

Table 1 – Sediment Analysis

Center for Environmental Sciences and Engineering		Fax: # ( 860 ) 486-5468		Princeton Hydro LLC					
University of Connecticut		Telephone: # ( 860 ) 486-4015		Order# 250423 revised					
Annex 4 Building		Email: cecustein@uconn.edu		Matrix: Soil					
3107 Horsebarn Hill Road, Unit 4210		Analysts: A. Provasis, M. Vatteroni		Contact: Chris Mikolajczyk					
Storrs, CT 06269-4210				Report Date: 2/2/26					
				Reported by: C. Perina					
Instrument				UHPIC-QTOF	UHPIC-QTOF	UHPIC-QTOF	UHPIC-QTOF	UHPIC-QTOF	UHPIC-QTOF
Units				ng/g	ng/g	ng/g	ng/g	ng/g	ng/g
Prep date				12/5/25	12/5/25	12/5/25	12/5/25	12/5/25	12/5/25
Analysis date				1/12/26	1/12/26	1/12/26	1/12/26	1/12/26	1/12/26
				Florpyrauxif-en-b-enopyl	Florpyrauxif-en	Hydroxy-PPB	Dieth iono-PPB	Hydroxy-florpyrauxif-en	Dieth iono-florpyrauxif-en
CESE ID	Field ID	Collected	Received						
250423-001	Shoreline	11/19/2025	11/20/2025	ND	ND	ND	ND	ND	ND
250423-002	Treatment1	11/19/2025	11/20/2025	ND	ND	ND	ND	ND	ND
250423-003	Treatment2	11/19/2025	11/20/2025	ND	ND	ND	ND	ND	ND
250423-004	Treatment3	11/19/2025	11/20/2025	ND	ND	ND	ND	ND	ND
250423-005	Treatment4	11/19/2025	11/20/2025	ND	ND	ND	ND	ND	ND
250423-006	Marina	11/19/2025	11/20/2025	ND	ND	ND	ND	ND	ND
			Reporting Limit	3.3	n/a	n/a	n/a	n/a	n/a

# 2026: A change in approach?

# Collaboration

- ✓ Procellacor treatment in dense prone to spread areas “reset”
- ✓ 40-60 acres for treatment over two main source areas
- ✓ DASH harvesting elsewhere
- ✓ Continued monitoring, PH and DASH
- ✓ Increased fragment control
- ✓ Additional invasives targeted

# Parting Shot



SCIENCE  
ENGINEERING  
DESIGN

# QUESTIONS?



**Chris L. Mikolajczyk, CLM**

Senior Manager - Aquatics

Princeton Hydro, LLC

[cmiko@princetonhydro.com](mailto:cmiko@princetonhydro.com)

908-237-5660/908-507-3999



[PRINCETONHYDRO.COM](http://PRINCETONHYDRO.COM)