

2023 Woodford Lake (Big Pond) Water Quality Monitoring Results: Lay Monitoring Program and LaRosa Partnership Program

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VT Department of Environmental Conservation, UVM Lake Champlain Sea Grant



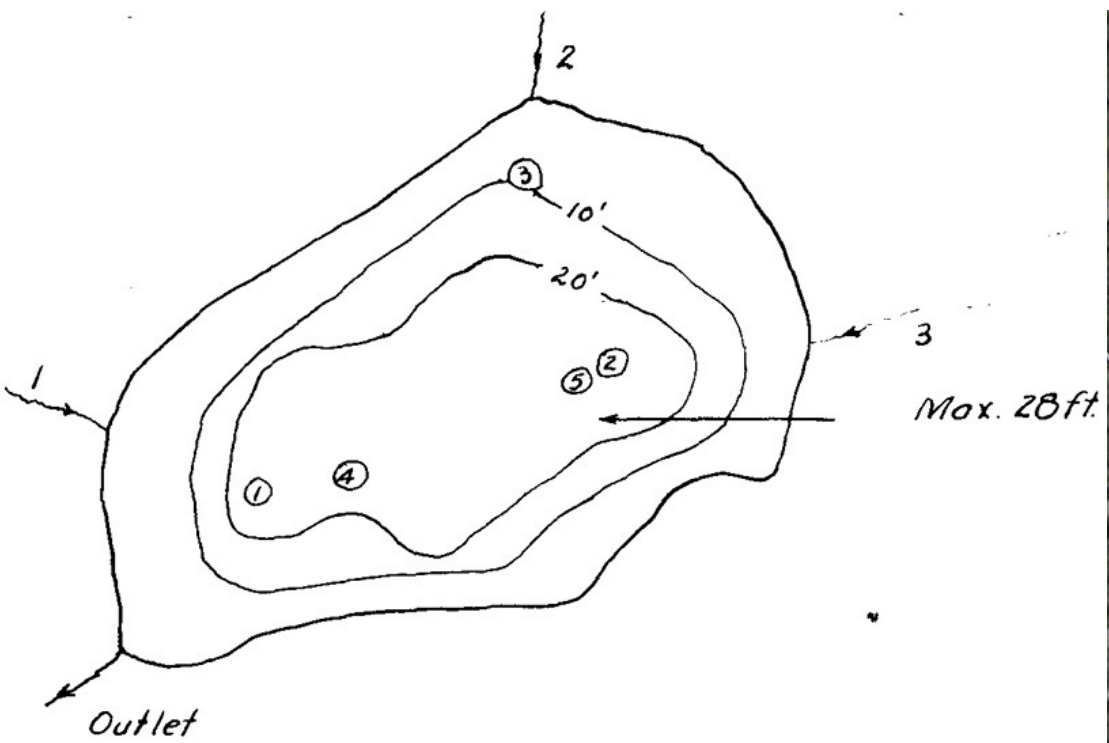


Lay Monitoring Program (LMP) 2023 Lake Sampling Overview

- Biweekly from June through August (total of 6 samples for summer mean):
 - *Basic Sampling*: Measure Secchi disk transparency depth (clarity)
 - *Supplemental Sampling*: Collect epilimnetic water samples that are lab tested for total phosphorus (nutrient) concentration and chlorophyll-a (algae) concentration
 - Pilot caffeine sampling (wastewater)
 - Complete a lake sampling webform (and report cyanobacteria conditions)

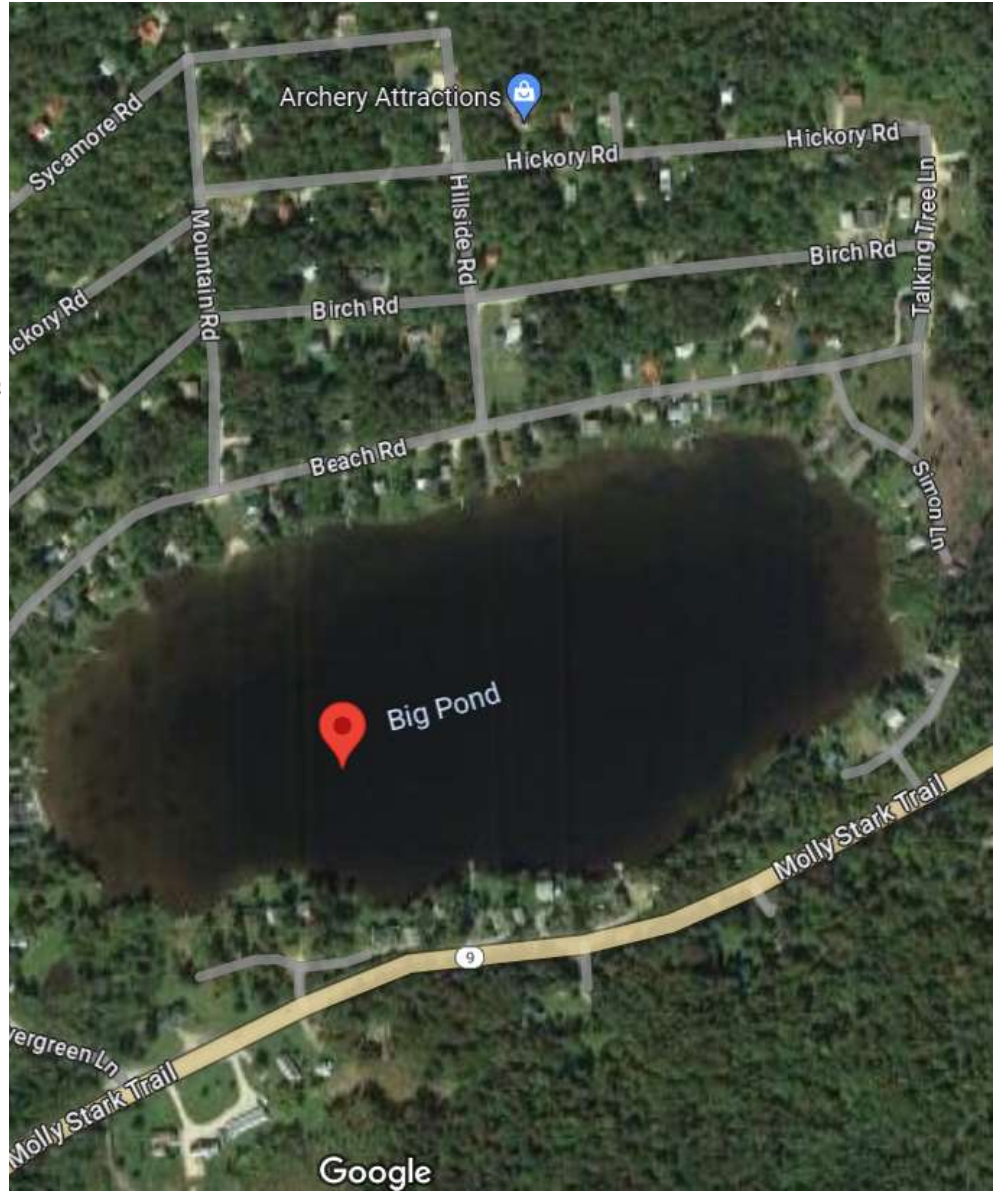


<https://dec.vermont.gov/watershed/lakes-ponds/monitor/lay-monitoring>



**BIG POND
(WOODFORD POND)
WOODFORD, VT.**

Altitude 2263
 Scale 12 in = 1 mi.
 July 22, 1941
 Sounded by Halnon & Trapido
 Area 31 Acres.



Vermont Lake Score Card

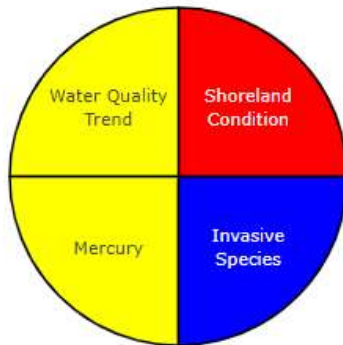
Big Pond (Woodford Lake)

<https://dec.vermont.gov/watershed/lakes-ponds/data-maps/scorecard>

Scores

Water Quality Data

Lake Information



Watershed: **Moderately Disturbed**

WQ Standards: **Stressed**

WQ Standards Details

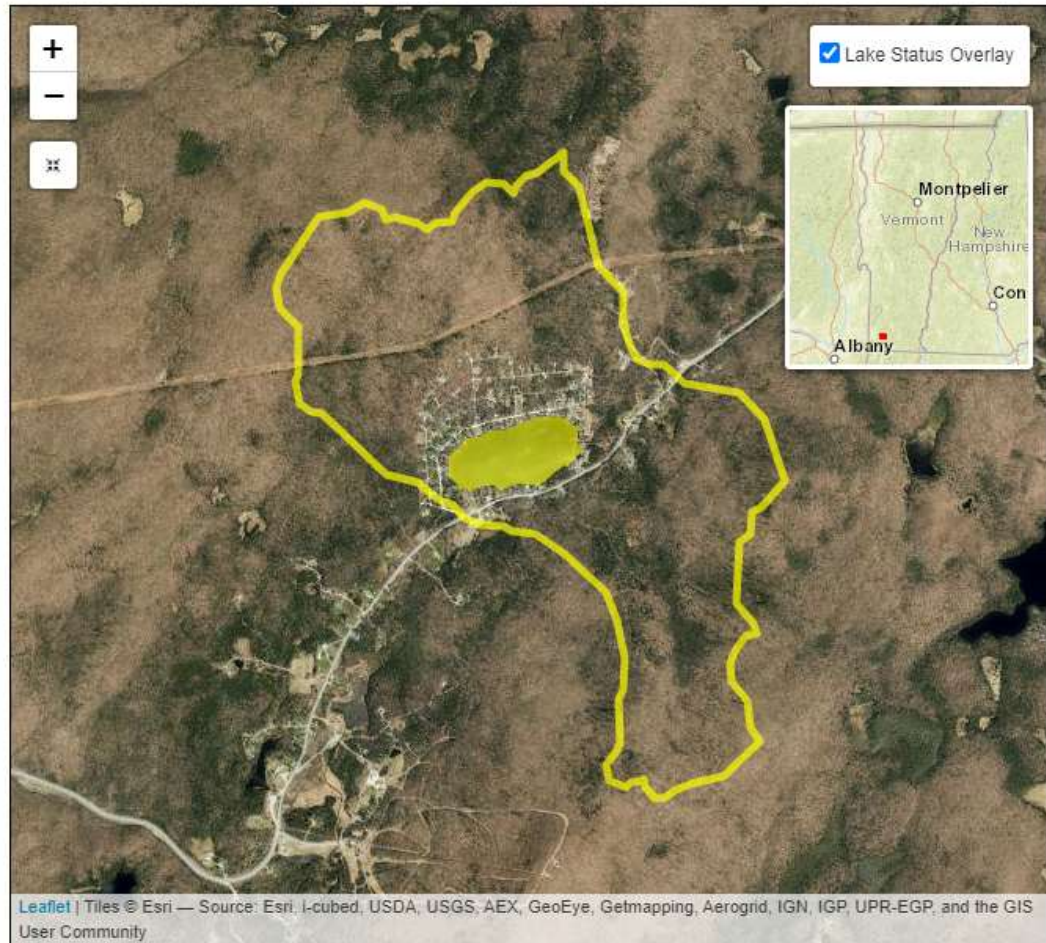
Stressed - pH

Stressed - Phosphorus

Color Scoring System

- Good Conditions
- Fair Conditions
- Poor Conditions
- Insufficient Data

[Learn How Lakes Are Scored](#)



Scores

Water Quality Data

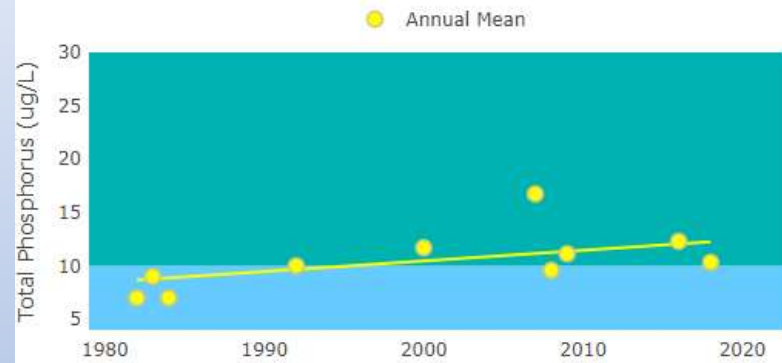
Lake Information

Plots

- Trophic condition thresholds are indicated by shading:
 - Hypereutrophic ■ Eutrophic ■ Mesotrophic ■ Oligotrophic
- Click on "Daily Mean" or "Annual Mean" to toggle on or off the data layer.

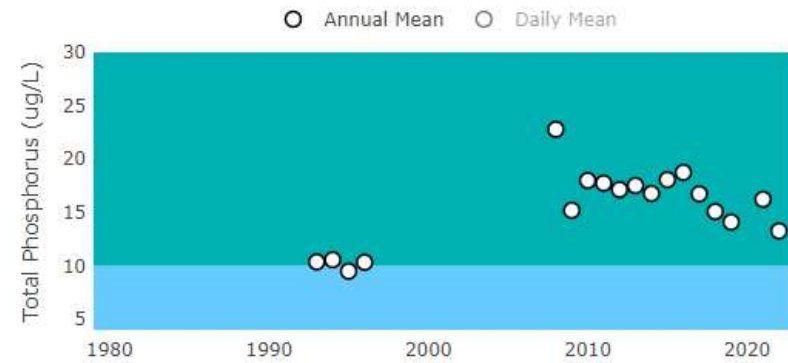
Spring Phosphorus

Trend: Significantly Increasing (p-value = 0.0482)



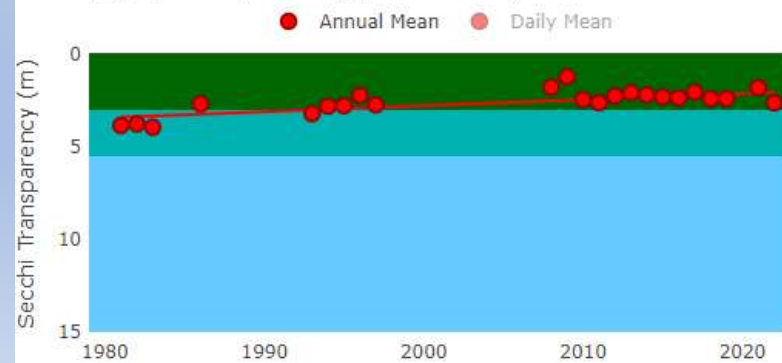
Summer Phosphorus

Trend: Stable (p-value = 0.216)



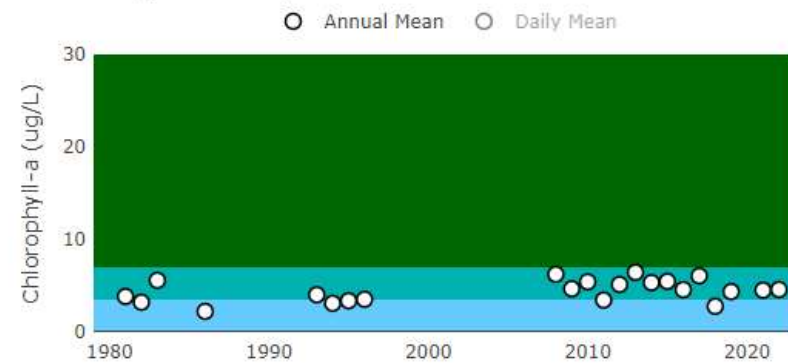
Summer Secchi

Trend: Highly Significantly Decreasing (p-value = 0.0035)



Summer Chlorophyll-a

Trend: Stable (p-value = 0.421)



Scores

Water Quality Data

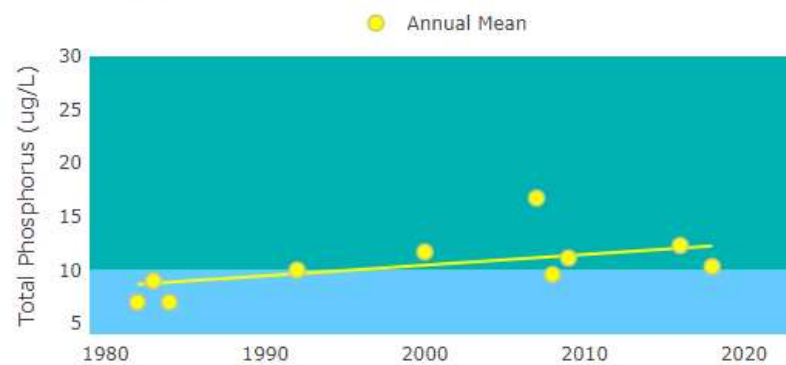
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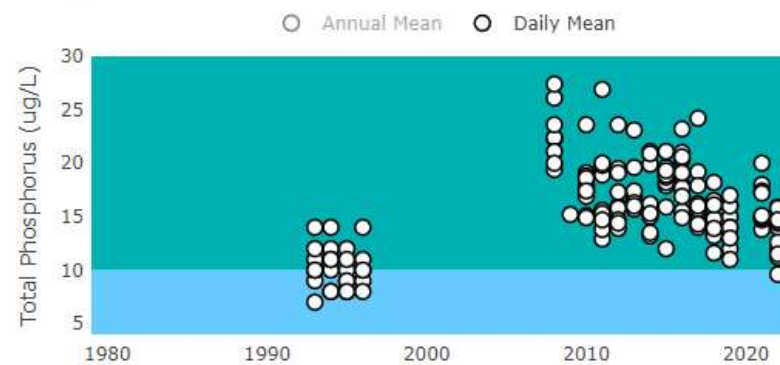
Spring Phosphorus

Trend: Significantly Increasing (p-value = 0.0482)



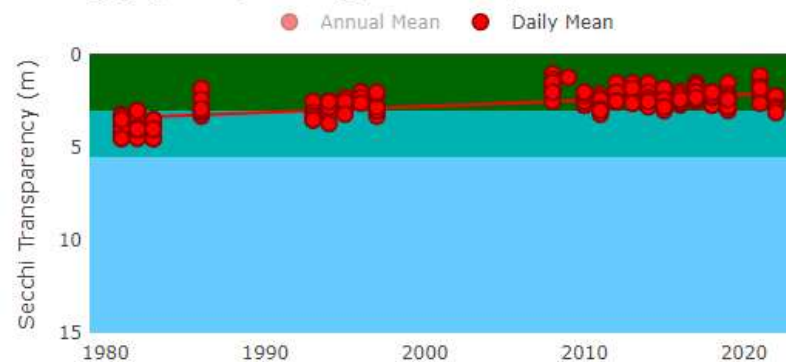
Summer Phosphorus

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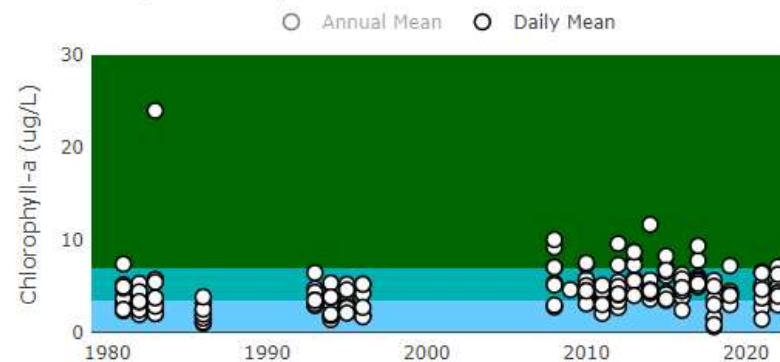
Summer Secchi

Trend: Highly Significantly Decreasing (p-value = 0.0035)



Summer Chlorophyll-a

Trend: Stable (p-value = 0.421)



BIG POND (WOODFORD LAKE)

Woodford, VT

Lay Monitor:

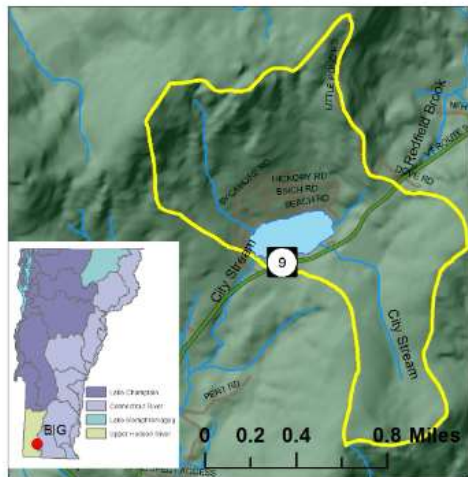
Physical

Big Pond is a small, warmwater lake.

Lake Surface Area: 34 acres
 Drainage Basin Area: 715 acres
 Ratio (Basin/Lake): 21:1
 Maximum Depth: 28 ft (8.5 m)
 Mean Depth: 13 ft (4.0 m)

2023 Summary (Station 1)

Parameter	Days	Min	Mean	Max
Secchi (m)	6	1.7	2.1	2.4
Secchi with View Tube (m)	6	2.3	2.5	2.9
Chl-a (µg/L)	5	2.6	3.3	4.6
Summer TP (µg/L)	6	8.9	12.0	13.8
Spring TP (µg/L)	1		10.6	



BIG POND (WOODFORD LAKE)

Annual Data (Station 1)

Year	Days Sampled	Secchi (m)	Secchi View Tube (m)	Chloro-a (µg/l)	Summer TP (µg/l)	Spring TP (µg/l)
1979						7.0
1981	13	3.8		3.8		
1982	13	3.8		3.2		7.0
1983	10	3.9		5.6		9.0
1984						7.0
1986	10	2.7		2.2		
1993	8	3.2		4.0		10.4
1994	7					
1995	10	2.8		3.4		9.5
1996	7					
1997	8	2.7				
2000						11.7

VT Standard* 2.6 7.0 18.0

* VT Water Quality Standards Nutrient Criteria for Class B2 Lakes > 20 acres

Annual Data (Station 1)

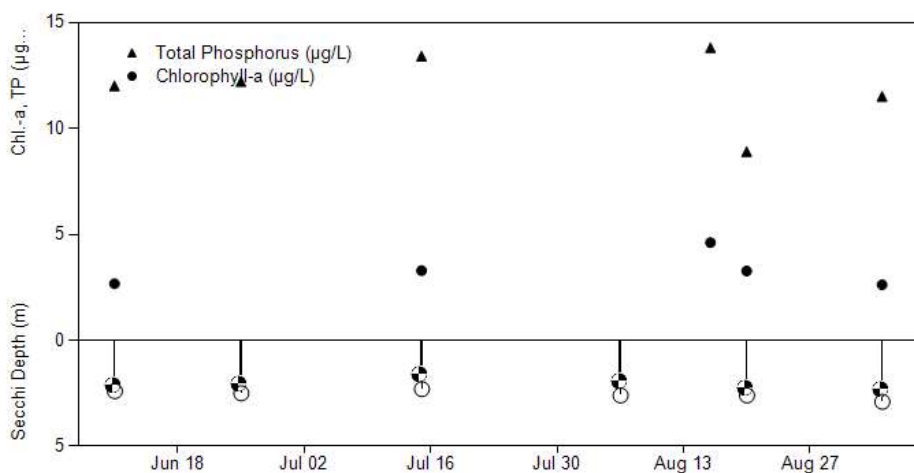
Year	Days Sampled	Secchi (m)	Secchi View Tube (m)	Chloro-a (µg/l)	Summer TP (µg/l)	Spring TP (µg/l)
2007						16.7
2008	8	1.8		6.2		22.8
2009	1					9.6
2010	12	2.4		5.4		11.1
2011	10	2.6		3.4		17.7
2012	9	2.2		5.1		17.1
2013	9	2.1		6.4		17.5
2014	9	2.2		5.3		16.8
2015	11	2.3		5.5		18.1
2016	11	2.4		4.6		18.8
2017	11	2.0		6.1		16.7
2018	8	2.4		2.8		15.1
2019	10	2.4		4.4		14.1
2021	9	1.8		4.5		16.2
2022	11	2.6		4.6		13.3
2023	7					10.6

VT Standard* 2.6 7.0 18.0

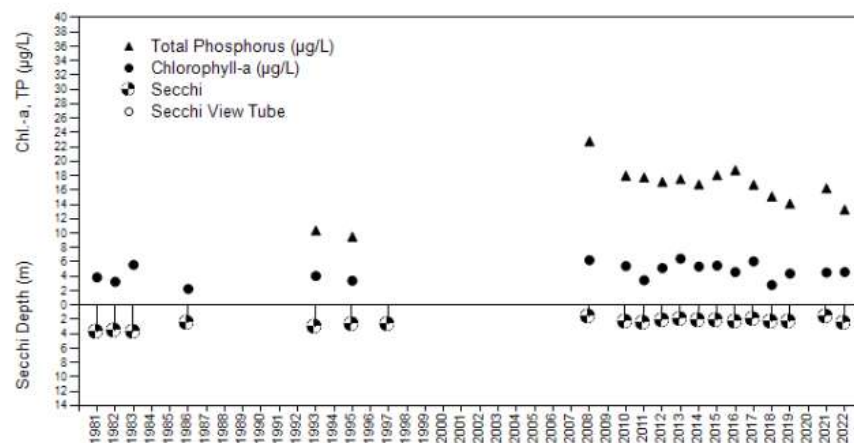
* VT Water Quality Standards Nutrient Criteria for Class B2 Lakes > 20 acres

Trophic State	Mean Secchi Clarity (m)	Mean Chlorophyll-a (µg/L)	Mean Total Phosphorus (µg/L)
Oligotrophic	> 5.5	< 3.5	< 10.0
Mesotrophic	3.0 - 5.5	3.5 - 7.0	10.0 - 30.0
Eutrophic	< 3.0	> 7.0	> 30.0

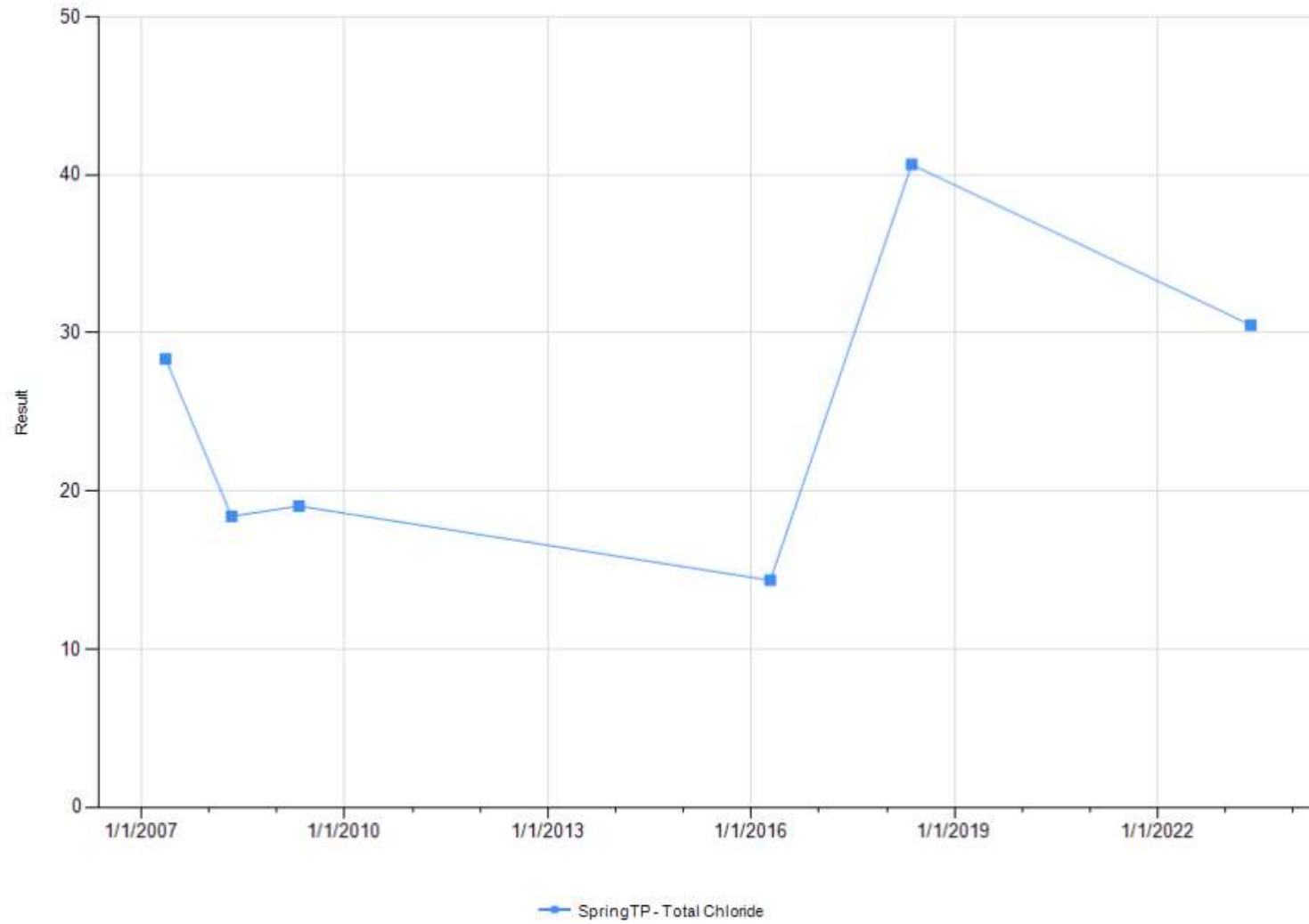
2023 Daily Values (Station 1): Total Phosphorus, Chlorophyll-a, and Secchi Depth



Summer Annual Means (Station 1): Total Phosphorus, Chlorophyll-a, and Secchi Depth



Big Pond (Woodford Lake)



LPP Sample Parameters Overview: Total Phosphorus & Chloride

Total Phosphorus

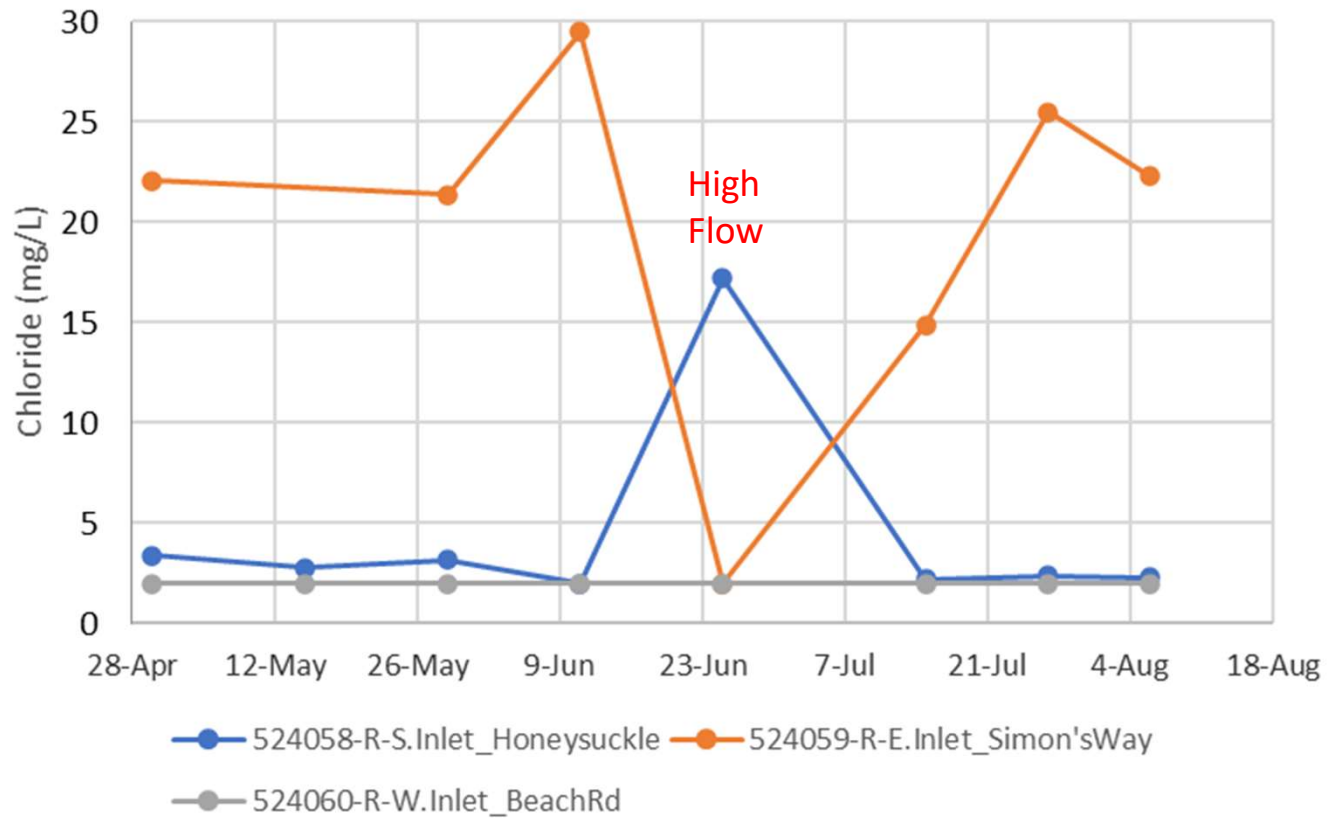
- Sources
 - Developed land runoff, roads, driveways
 - Fertilizers – lawns and agriculture
- Impacts
 - Feeds plants, algae and cyanobacteria
 - Aesthetics, Recreation, Aquatic Life Uses
- Vermont Water Quality Standards Nutrient Criteria for Aquatic Biota Use (+ Biological Criteria)
 - Not to be exceeded at low median monthly flow (baseflow) during June through October
 - 12 ug/L for small high gradient streams (SHG)
 - 15 ug/L for medium high gradient streams (MHG)
 - 27 ug/L for warm-water medium gradient streams and rivers (WWMG)

Total Chloride

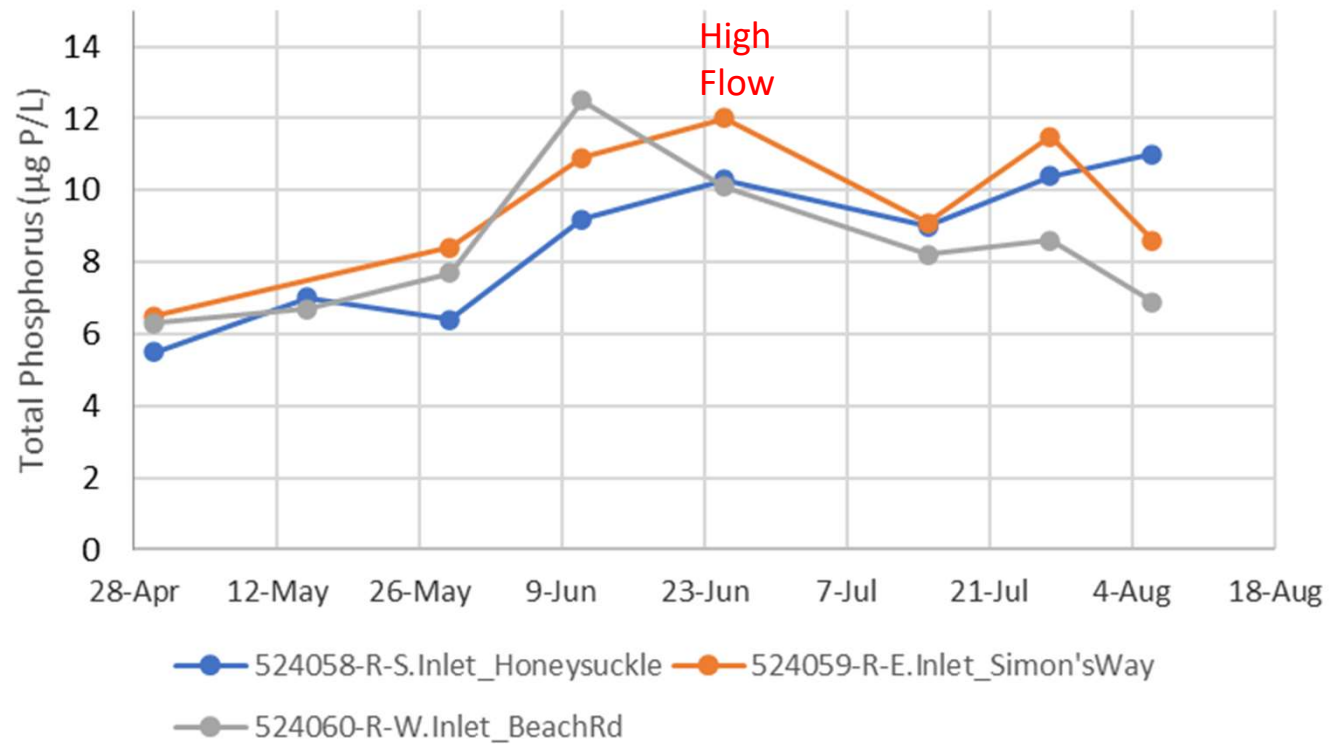
- Sources
 - Road salt
 - Wastewater, water softeners
- Impacts
 - Affects chemical processes of biological organisms
 - Aquatic Life Use
- Vermont Water Quality Standards Chloride Criteria for Aquatic Biota Use
 - 860 mg/L maximum (acute)
 - 230 mg/L average (chronic)
 - Studies show chloride can impact organisms at lower concentrations

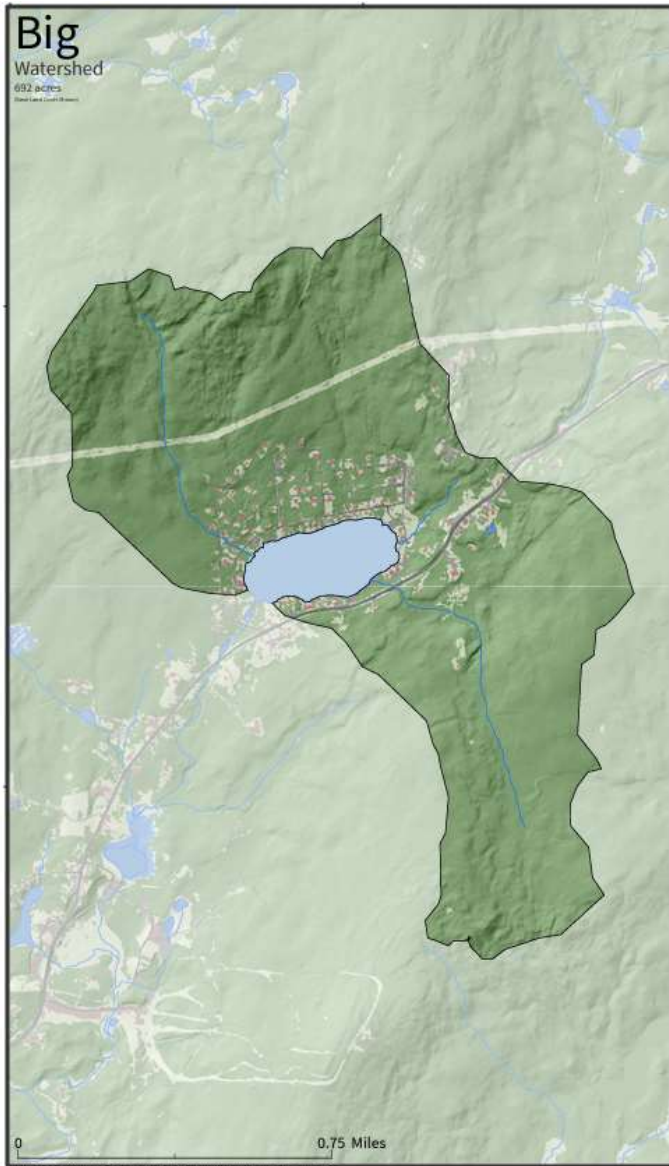


2023 Big Pond Lake Tributary Chloride Monitoring



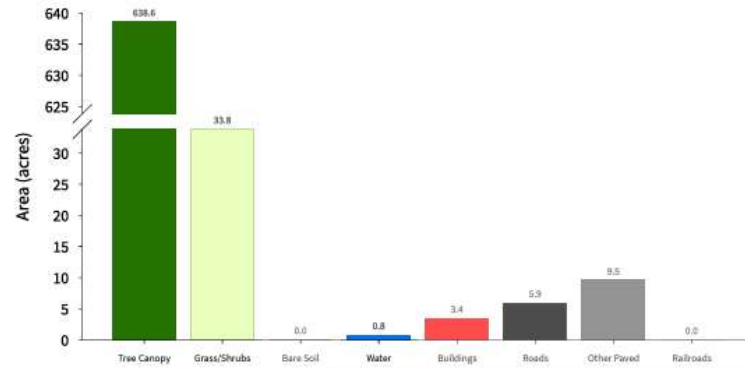
2023 Big Pond Lake Tributary Total Phosphorus Monitoring





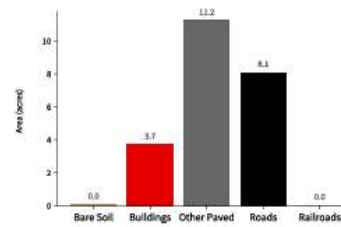
High-Resolution Land Cover Summary

Base Land Cover (Top-Down*)



Supplemental Land Cover

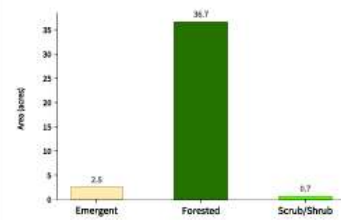
Impervious Surfaces (23.01 acres - 3.3 % of total) (Bottom-Up**)



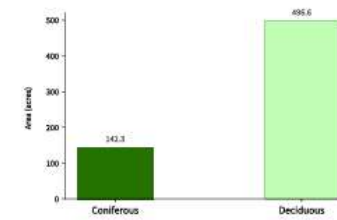
Agriculture (0 acres - 0 % of total)

No Agricultural Land Cover Mapped in this Area

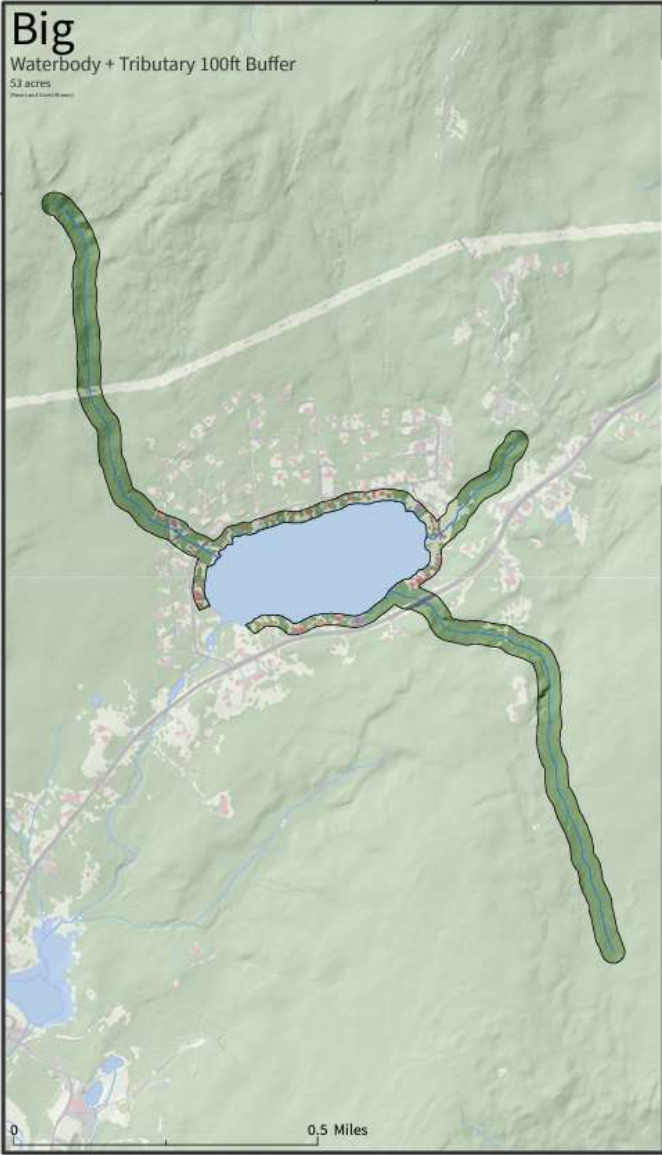
Wetlands (39.86 acres - 5.8 % of total)



Tree Canopy (638.95 acres - 92.3 % of total)

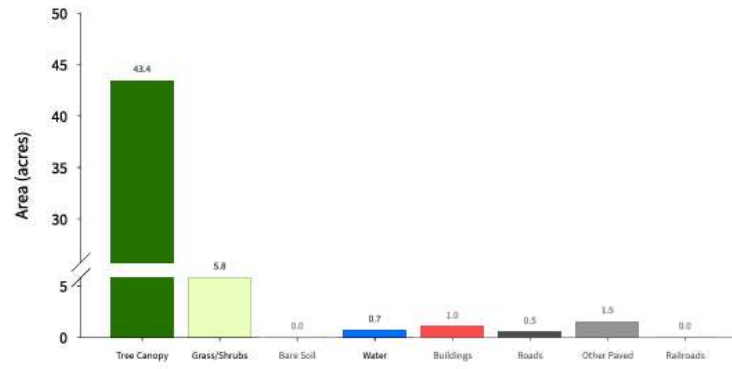


*Top-Down: Aerial imagery-based mapping approach. Land cover is mapped as the observed land cover class.
**Bottom-Up: Aerial imagery-based mapping approach. Land cover is mapped as the observed land cover class. This approach results in reported mapping of both observed and inferred land cover. This approach is used for the Big Watershed and other 2022 Watershed reports.



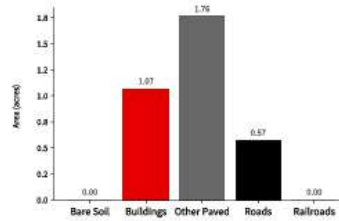
High-Resolution Land Cover Summary

Base Land Cover (Top-Down*)



Supplemental Land Cover

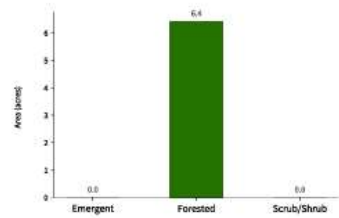
Impervious Surfaces (3.4 acres - 6.4% of total) (Bottom-Up**)



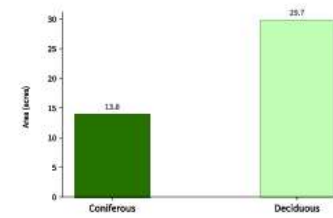
Agriculture (0 acres - 0% of total)

No Agricultural Land Cover Mapped in this Area

Wetlands (6.43 acres - 12.1% of total)



Tree Canopy (43.51 acres - 82.1% of total)



*This chart is a top-down land cover mapping approach. Land cover is mapped at the regional level (county level).
 **Bottom-Up: A bottom-up land cover mapping approach. Land cover is mapped at the local level (parcel level). This approach results in the most detailed mapping of land cover available and is the most accurate.
 Source: USGS, High-Resolution Land Cover (HRLC) Data (2012)