BOROUGH OF MOUNTAIN LAKES

LISTED IN NATIONAL AND STATE REGISTERS OF HISTORIC PLACES

Lakes Management Advisory Committee
Borough Council Presentation Feb 26, 2024

A Diverse Committee Membership

- Members live on Mountain Lake, Sunset Lake, Crystal Lake, Olive Pond and Shadow Pond. However, most members do not live on a lake.
- Average member tenure 4 years. Longest tenure 18 years.

- Alpesh Amin
- Debra Dewing
- Lucien Foster
- Andy Hilton
- Derek Jackson (Chair)
- Jason Miner
- Nikki Riley
- Wayne Roth
- Mike Russo
- Billy Barrett (Student)
- John Corbo (Student)
- Connor Higgins (Student)
- Jack Buckley (Student)

Advisors

- Chris Richter (Council Liaison)
- Jackie Bay (Environment Commission Liaison)
- Mitchell Stern (Borough Manager)
- Bob Schindler (Black Lagoon Pond Management)

Goals and Objectives

- Advocate for the health and preservation of the borough's bodies of water by "advising and assisting the government in matters pertaining to the maintenance and restoration of the quality of the watersheds, lakebeds and waters of the Lakes of Mountain Lakes"
- Educate residents about our lakes and how they can help preserve them

What do we do?

- Formally meet the first Tuesday of each month
- Report topics of concern to the borough manager, council and/or our lake management vendor partner
- Meet on an adhoc basis onsite to observe, discuss lake conditions or other specific topics of interest
- Research and/or educate ourselves on matters related to our lakes
- Collaborate with similar Borough and/or lake association committees on experiences and lessons learned
- Create educational campaigns and material for residents
- Observe, make use of, and hopefully enjoy our lakes

2023 Lake Maintenance Review

- Maintenance Contract Transition
  - Our long time vendor Solitude experienced employee attrition which caused it to be incapable of servicing contracts in New Jersey, including ours.
  - There was a gap in service from April until July while Solitude was unresponsive and a new vendor was found
  - Hired a new vendor partner Tigris (Black Lagoon)
- Ongoing Maintenance Work
  - Spring hydro-raking with traditional equipment in Wildwood
  - Winter hydro-raking with harvesting machine in Mountain Lake
  - In addition to the budgeted Borough scope, at least 20 waterfront residents explored private weed and sediment removal on their waterfront

Climate change is impacting the lakes' environment and health

Source: Tigris 2023 Year End Presentation

- Higher atmospheric temperatures and frequent severe rain events increase runoff and make the environment more hospitable to algae growth.
- The warmer winters encourage early season algae blooms in most lakes in the region. Mountain Lakes follows this trend.
- Despite the earlier blooms, NJ DEP regulations limit algae treatments to be between April 1 and September 30.

Algae in our lakes is not at toxic levels

Source: Tigris 2023 Year End Presentation

- There are low levels of green, golden brown and blue-green algae in our lakes. It is normal and healthy to find this algae in lakes.
- Although blue-green algae can be toxic in abundance, the observed species and/or cell counts are not at a level of risk. We have counts of 100 cells / ml vs 20000+ cells / ml that NJ associates with Harmful Algae Blooms (HABs).

Some algae and aquatic plant growth is healthy for the lakes

Source: Tigris 2023 Year End Presentation

- There are many benefits including
  - Habitat and food for fish and wildlife
  - Improved water clarity and quality
  - Protect shorelines and lake bottoms
  - Can be visually attractive

Beauty is in the eye of the beholder

Source: Tigris 2023 Year End Presentation

- Residents have differing opinions about the beauty and use of the lakes.
  - Lake clarity and color
  - Sandy beach vs living shoreline
  - Aquatic growth impact on distance swimmers, sailors, paddlers and fishermen

Too much of a good thing is bad

Source: Tigris 2023 Year End Presentation

- Too much algae and/or plants can accelerate eutrophication, thereby decreasing oxygen levels and aquatic life
- There is a delicate balance in nature
  - Because of the many factors that influence the lakes, including competing recreational objectives of residents, there is no precise formula and science to achieve balance
  - For example, bass weed helps create a healthy environment for fish but has become so abundant in Mountain Lake that it now impacts other recreational activities.

Our maintenance is reacting to observed symptoms

- Given the large number of dynamic variables impacting our lakes, it is very difficult to determine cause and effect, or predict with certainty the impact of changes.
- NJ DEP limitations on treatment prevent us from proactively treating lakes early in the season.
- The Borough requires a strong strategic plan to proactively ensure the maintenance, preservation and restoration of the lakes.

2023 Lake Restoration Review

- Infrastructure Restoration
  - Sunset Lake dam – Remains in-progress
  - Grunden's Pond dam – under NJ DEP Review
- Bathymetric survey of lakes in the early Summer
  - Goal was to measure the depth and volume of sediment in the lake beds
  - We have a similar study from 2012 for comparison
  - Data is critical in developing a strategic plan

	Mean Depth (ft)	Mean Sediment Thickness (ft)	Mean Depth Change (ft) 2012 - 2023	Sediment Pct
Mountain Lake	6.80	2.10	0.23	24%
Shadow / Olive	3.70	1.70	Unknown	32%
Sunset Lake	4.40	3.64	0.32	45%
Crystal Lake	7.80	6.30	1.00	45%
Wildwood Lake	4.50	1.20	1.40	21%
Birchwood Lake	5.40	5.30	0.85	50%
Cove Lake	3.70	1.40	Unknown	29%
Grunden's Pond	2.90	1.70	Unknown	36%
Average	**4.90**	**2.92**	**0.76**	**35%**

The committee is focused on executing upon the charter defined by the Council

- To advise and assist the Borough government in matters pertaining to the maintenance and restoration of the quality of the watersheds, lakebeds and waters of the Lakes of Mountain Lakes, including tributaries and estuaries.
- The Committee consists of nine voting members that are appointed annually.
- The Committee will study methods of Lake maintenance and restoration to **develop a Management Plan for lake and watershed protection and improvement**. This Plan will include a program for monitoring existing lake and watershed conditions and a system of record keeping which will enable year-to-year comparison of the quality of the Borough lakes and streams.

We recommend an independent advisor to assist in the development of a maintenance, preservation and restoration plan

- Historically our lake management vendor performed treatments on the lakes, and was a strategic advisor on how to ensure the long term health of the lakes. This including advice on how to remove sediment, as well as the execution of the scope of work.
- We recommend the Borough retain the services of a third party lake consultant to provide unbiased advice on how to manage our lakes. This could broaden the range of services and/or solutions used beyond what our current partners provide. With this we can more confidently advise the Borough on the solutions needed to preserve the lakes.

With the help of an advisor we hope the 2024 plan will advise on mission critical questions and concerns

- Recommend how to balance recreation with natural aquatic growth needs which support marine life habitat
- How to manage and/or remove the sediment deposits that are naturally accumulating in the lakes in a cost efficient manner
- Review infrastructure enhancements needed to minimize stormwater impact on our lakes
  - One focus area should be Wildwood Lake where stormwater runoff appears to be filling in the northwest end along the Boulevard

Thank You

Appendix

Potential 2024 Budget Items

- Hydro-raking (typically ~$80K annually)
- Treatment / Remediation Partner (Tigris in 2024)
- Consultant - partner to help develop a strategy and plan
- Fish restocking in Sunset
- Communication Budget

Tigris / Black Lagoon Report

- Tigris presented the 2023 year end report during the Lakes Committee's February 6, 2023 public meeting.
- In addition to the members of the committee, six residents attended the meeting.

BLACK LAGOON

POND MANAGEMENT · INVASIVES CONTROL

The Borough of Mountain Lakes

2023 Year-End Report

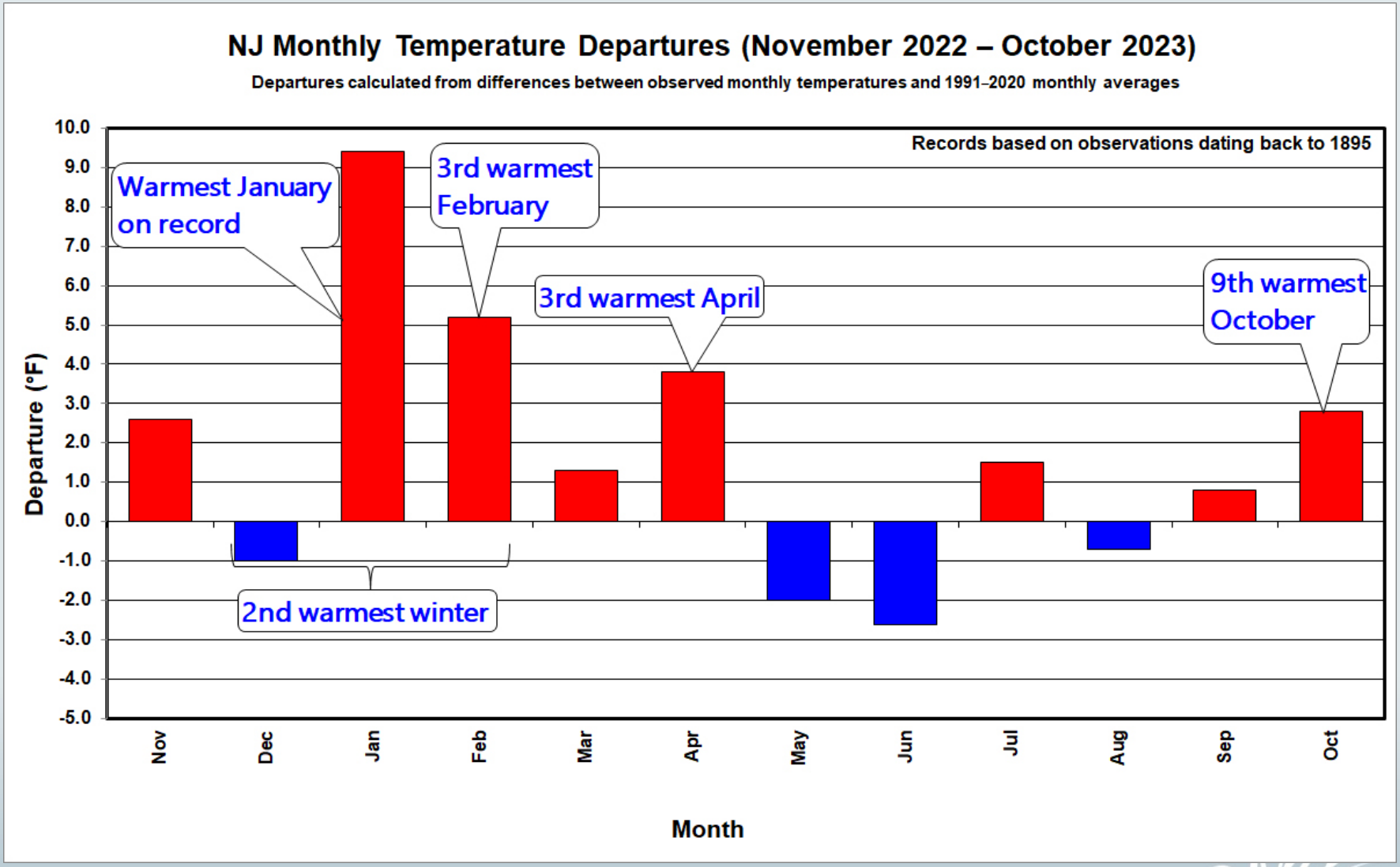
By Bob Schindler

Operations Director

Aquatic Biologist

2023 Year End Summary

- 2023 Lake Treatment Review
- 2023 Water Quality Data
- 2023 Algae Sampling Results


NJ Monthly Temperature Departures (November 2022 – October 2023)
Departures calculated from differences between observed monthly temperatures and 1991–2020 monthly averages
Records based on observations dating back to 1895
Warmest January on record
3rd warmest February
3rd warmest April
9th warmest October
2nd warmest winter
Departure (°F)
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
-1.0
-2.0
-3.0
-4.0
-5.0
Nov
Dec
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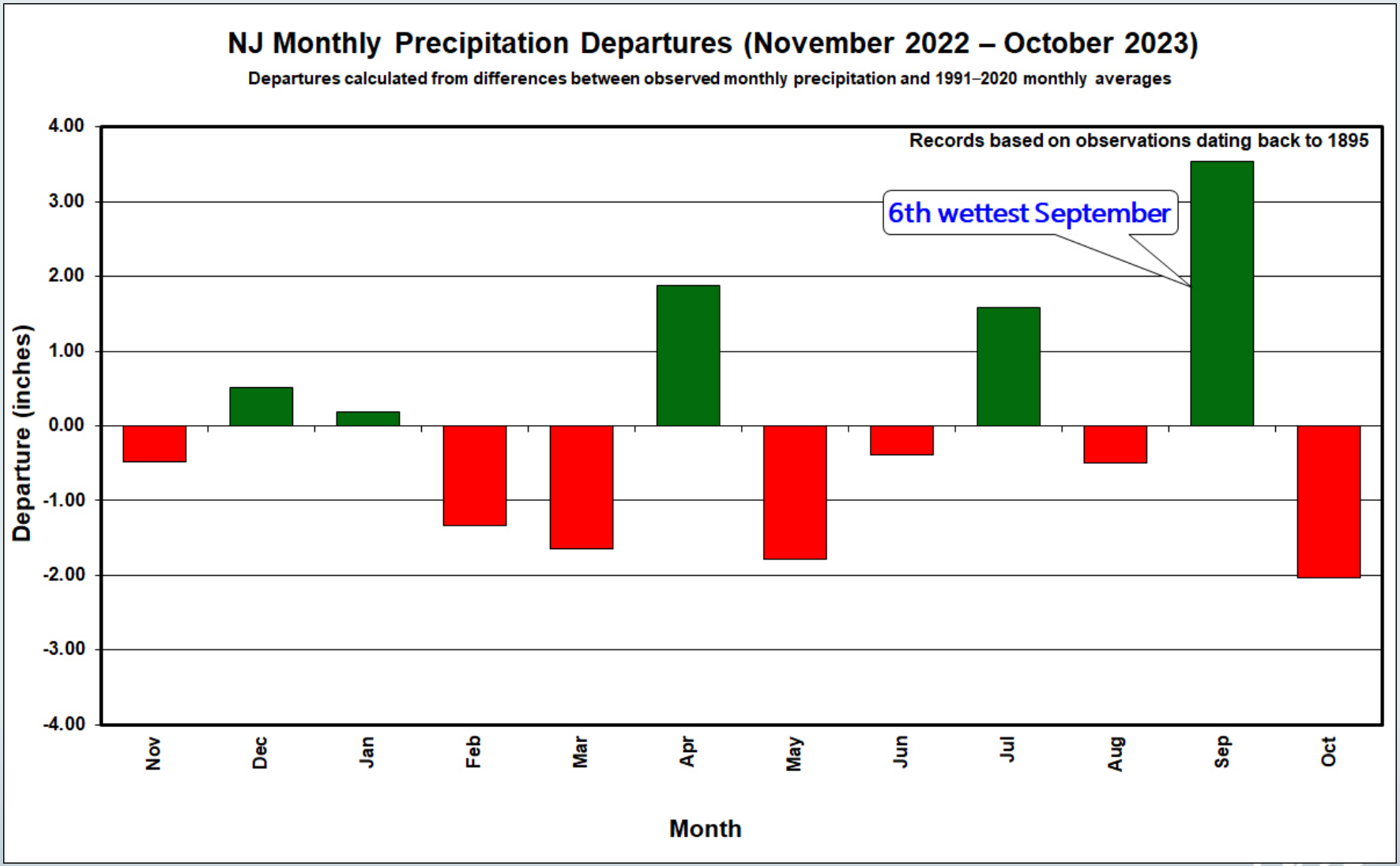
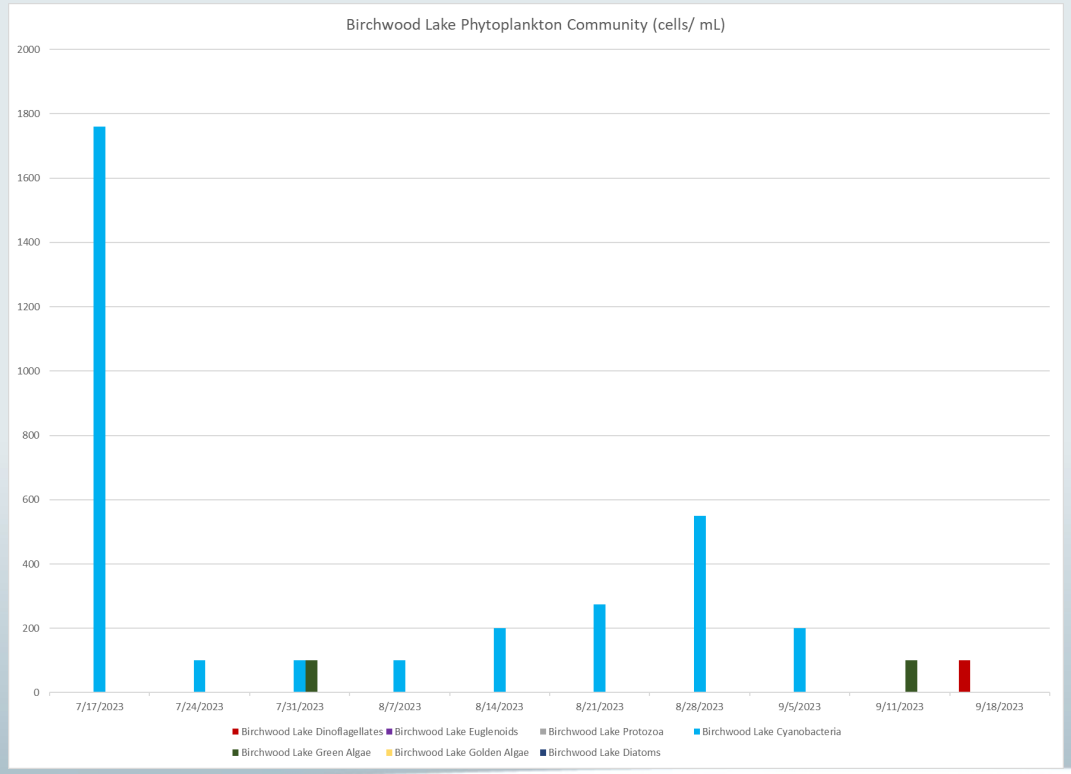

NJ Monthly Precipitation Departures (November 2022 – October 2023)
Departures calculated from differences between observed monthly precipitation and 1991–2020 monthly averages
Records based on observations dating back to 1895
6th wettest September
Departure (inches)
4.00
3.00
2.00
1.00
0.00
-1.00
-2.00
-3.00
-4.00
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Month

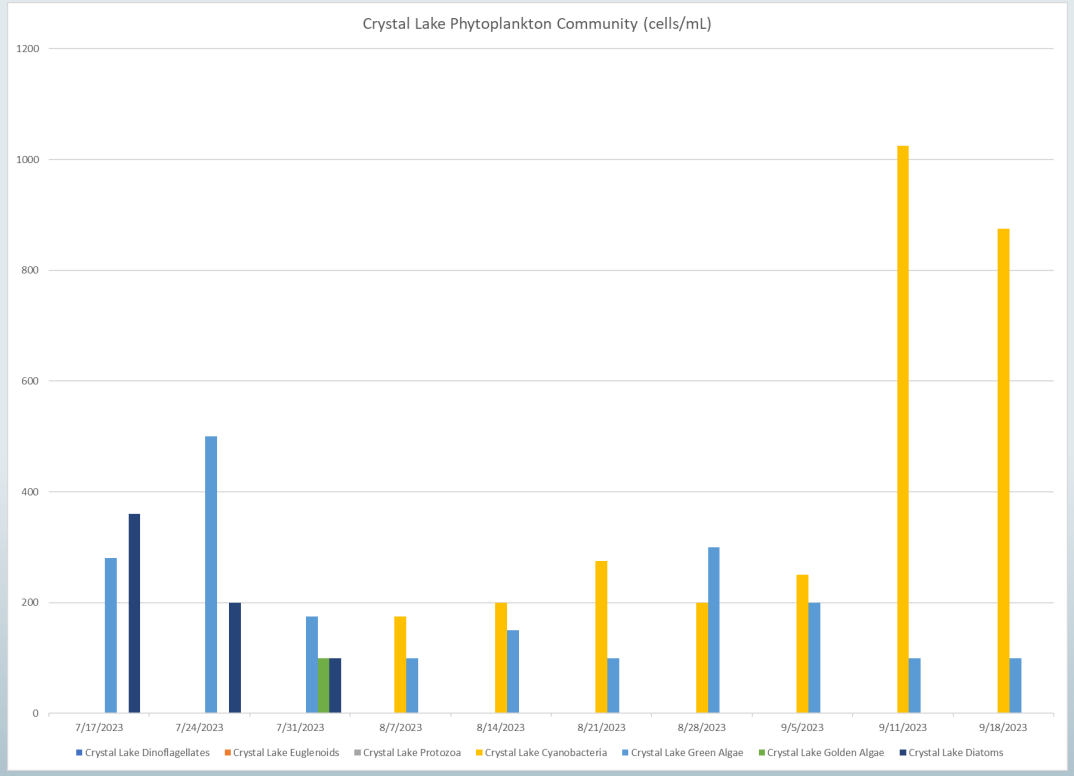
Birchwood Lake	Oxygen (mg/L)	pH	Temp (F)	Clarity (FT)
7/17/2023	7.4	8.1	72	3.5
7/24/2023	3.1	8.96	77.5	4.5
7/31/2023	6.68	9.41	73.6	4
8/8/2023	7.12	9.2	74.6	3
8/14/2023	7.45	9.1	77.75	3
8/21/2023	7.21	9.5	75.6	3.5
8/28/2023	5.48	10.12	74.6	3.5
9/5/2023	5.33	10.7	76.12	4
9/11/2023	4.7	10.27	75.26	2.5
9/18/2023	4.75	10.11	10.7	2.5



Turbidity (NTU)	3.2
Total Phosphorous(mg/L)	0.0175
Nitrate/Nitrite (mg/L)	0.03

- Lily densities increasing
- No algaecide Treatments
- Two herbicide treatments in beach and swim area

Crystal Lake	Oxygen (mg/L)	pH	Temp (F)	Clarity (FT)
7/17/2023	6.4	7.77	66	4.5
7/24/2023	6.11	9	77.74	4
7/31/2023	7.04	9.14	75.69	4.5
8/8/2023	7.13	8.62	76.7	3
8/14/2023	7.12	8.6	77.5	3
8/21/2023	7	9.1	76.69	4.5
8/28/2023	7	10.1	74.72	4.5
9/5/2023	7.12	10.2	75.24	3
9/11/2023	5.09	9.48	74.26	2.5
9/18/2023	5	9.48	74.26	2.5

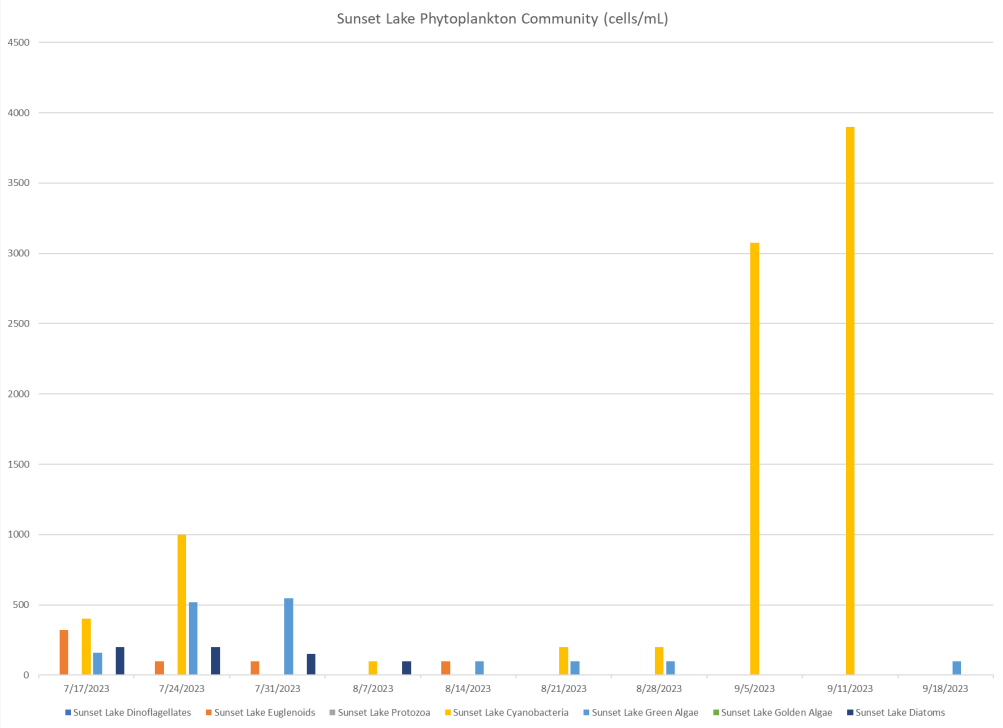


Turbidity (NTU)	5.2
Total Phosphorous(mg/L)	0.0241
Nitrate/Nitrite (mg/L)	<0.02

- No treatments performed in 2023
- Late season increase in cyanobacteria

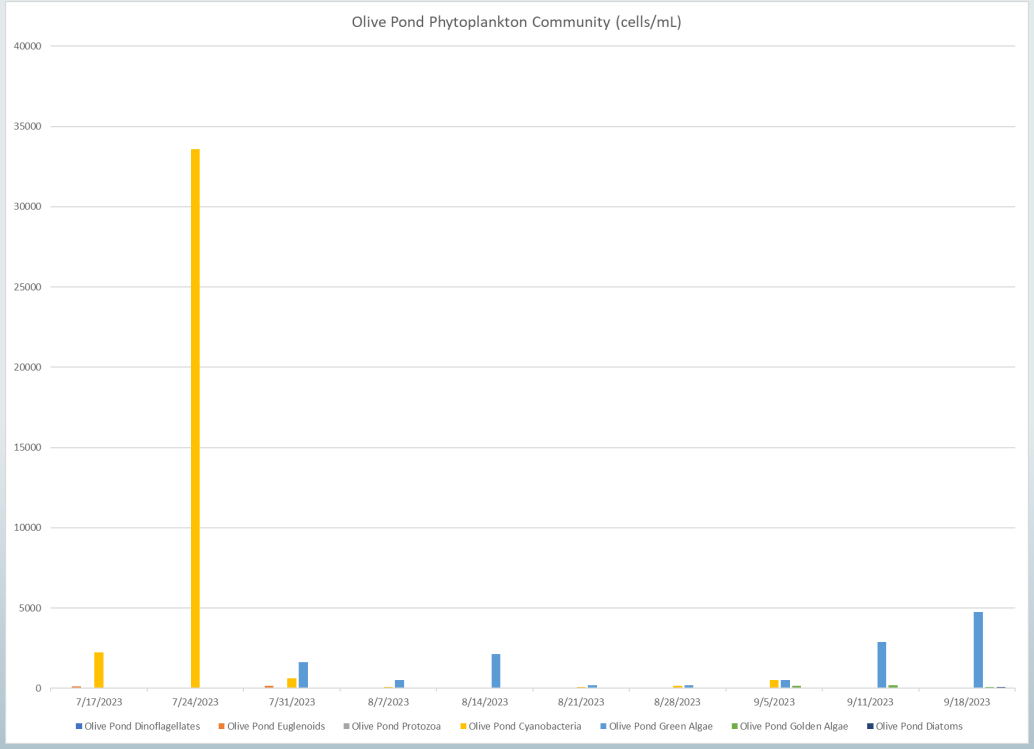
Sunset Lake	Oxygen (mg/L)	pH	Temp (F)	Clarity (FT)
7/17/2023	6.68	7.14	67	3
7/24/2023	4.4	9.04	78.1	0.8
7/31/2023	6.72	8.78	74.5	3
8/8/2023	6.53	8.01	77.2	3
8/14/2023	6.4	8	77.4	3
8/21/2023	6	8.7	76.5	3
8/28/2023	6	9.12	74.7	3
9/5/2023	5.31	10.7	76.11	2
9/11/2023	4.11	9.4	75	2
9/18/2023	4.1	9.2	70	2

Turbidity (NTU)	3.1
Total Phosphorous(mg/L)	0.033
Nitrate/Nitrite (mg/L)	0.03



- Lily and bassweed densities increased through season
- Two algaecide treatments performed for filamentous algae growth
- Late season Cyanobacteria bloom

Olive Pond	Oxygen (mg/L)	pH	Temp (F)	Clarity (FT)
7/17/2023	2.3	7.5	69	2.5
7/24/2023	6.4	9	76.82	0.8
7/31/2023	6.62	9.56	75.8	3
8/8/2023	5.2	8.77	77.6	3
8/14/2023	4.9	8.8	77.2	2
8/21/2023	5.5	9.5	76.71	3
8/28/2023	5.5	9.46	75.21	3
9/5/2023	6.15	9.58	77	2
9/11/2023	6.15	9.3	75	2
9/18/2023	6.15	9.1	70	2

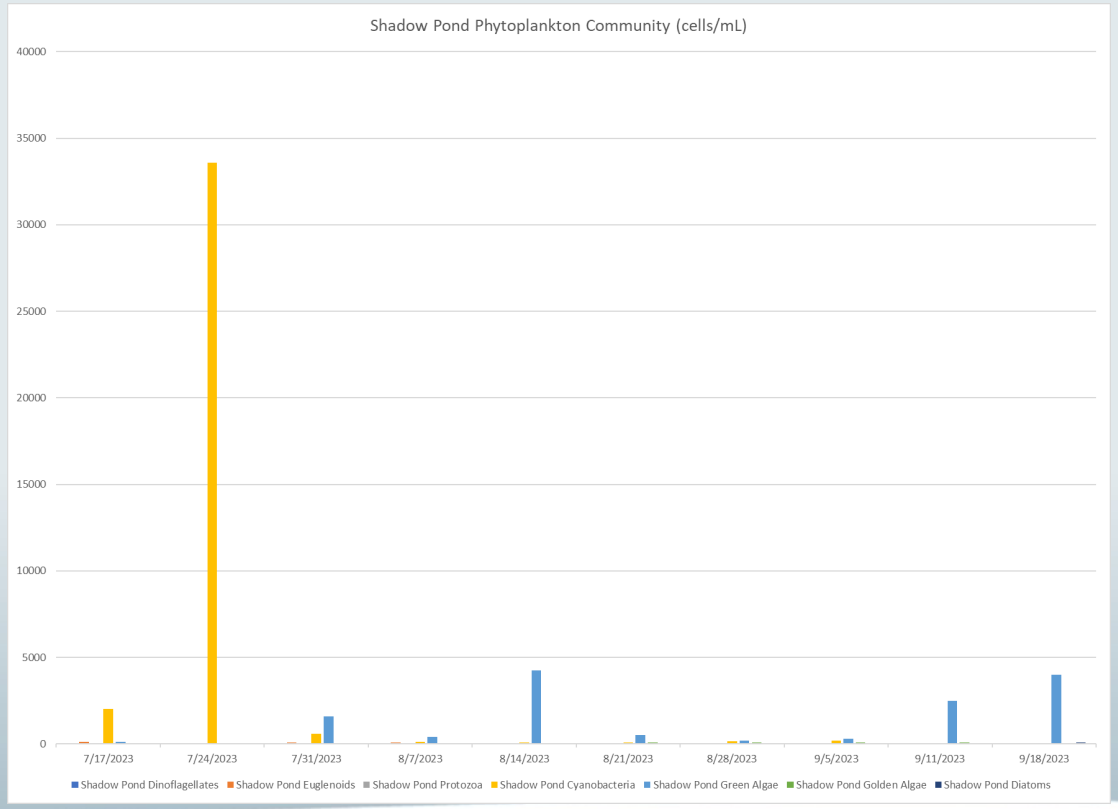


Turbidity (NTU)	3.7
Total Phosphorous(mg/L)	0.0407
Nitrate/Nitrite (mg/L)	<0.02

- Low oxygen levels most of summer
- High density cyanobacteria bloom in July
- Algaecide treatment able to be performed on 8/21

Shadow Pond	Oxygen (mg/L)	pH	Temp (F)	Clarity (FT)
7/17/2023	3.4	7.7	69	2.5
7/24/2023	6.4	9	76.9	0.8
7/31/2023	6.59	9.6	75.63	3
8/8/2023	6.02	8.81	77.63	3
8/14/2023	4.43	8.75	77.2	2
8/21/2023	5.59	9.52	78.63	3
8/28/2023	5.59	9.5	75.22	3
9/5/2023	6	9.5	77	2
9/11/2023	6	9.3	75	2
9/18/2023	6	9.1	70	2

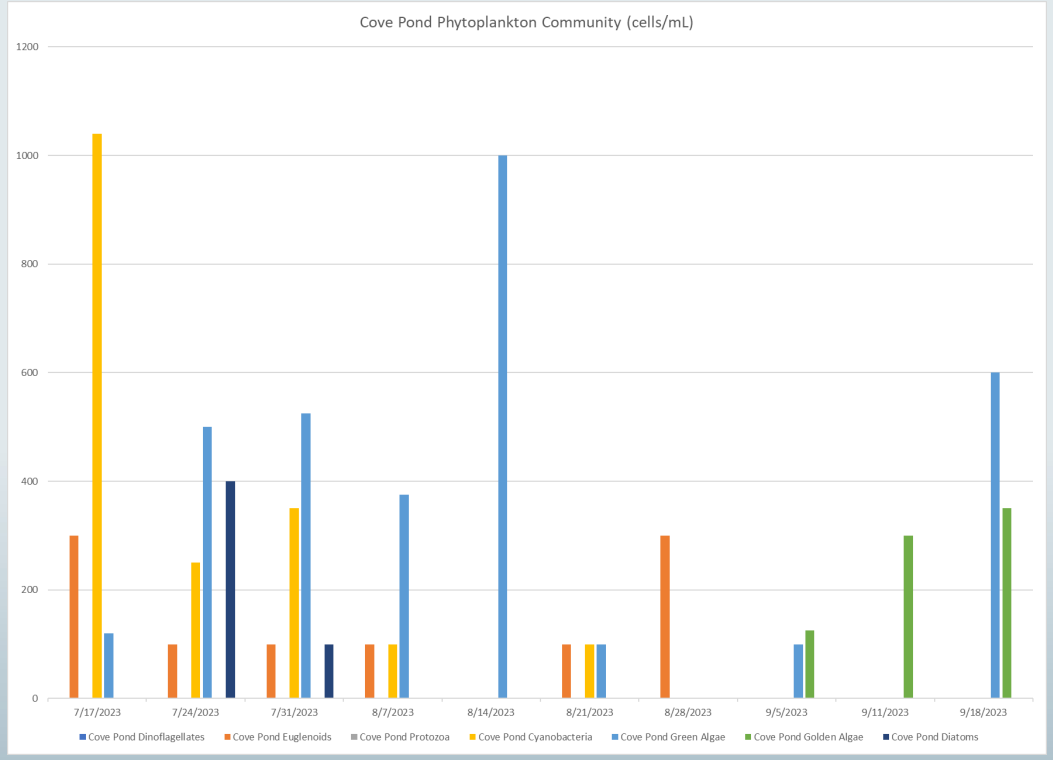
Turbidity (NTU)	3.7
Total Phosphorous(mg/L)	0.0405
Nitrate/Nitrite (mg/L)	<0.02



- Low oxygen levels periodically
- Algaecide treatments performed on 7/31 and 8/21.

Cove Pond	Oxygen (mg/L)	pH	Temp (F)	Clarity (FT)
7/17/2023	2.8	7.3	67	3
7/24/2023	5.01	9.24	74.5	3
7/31/2023	5.4	9.72	74.42	3
8/8/2023	4.7	9.2	77.37	2
8/14/2023	6.87	8.6	77.4	2.5
8/21/2023	5.4	9.7	76.82	3
8/28/2023	5.4	10.1	74.6	3
9/5/2023	5.5	9.98	77.42	2
9/11/2023	5.5	6.56	75.4	2
9/18/2023	5.5	6.4	70	2

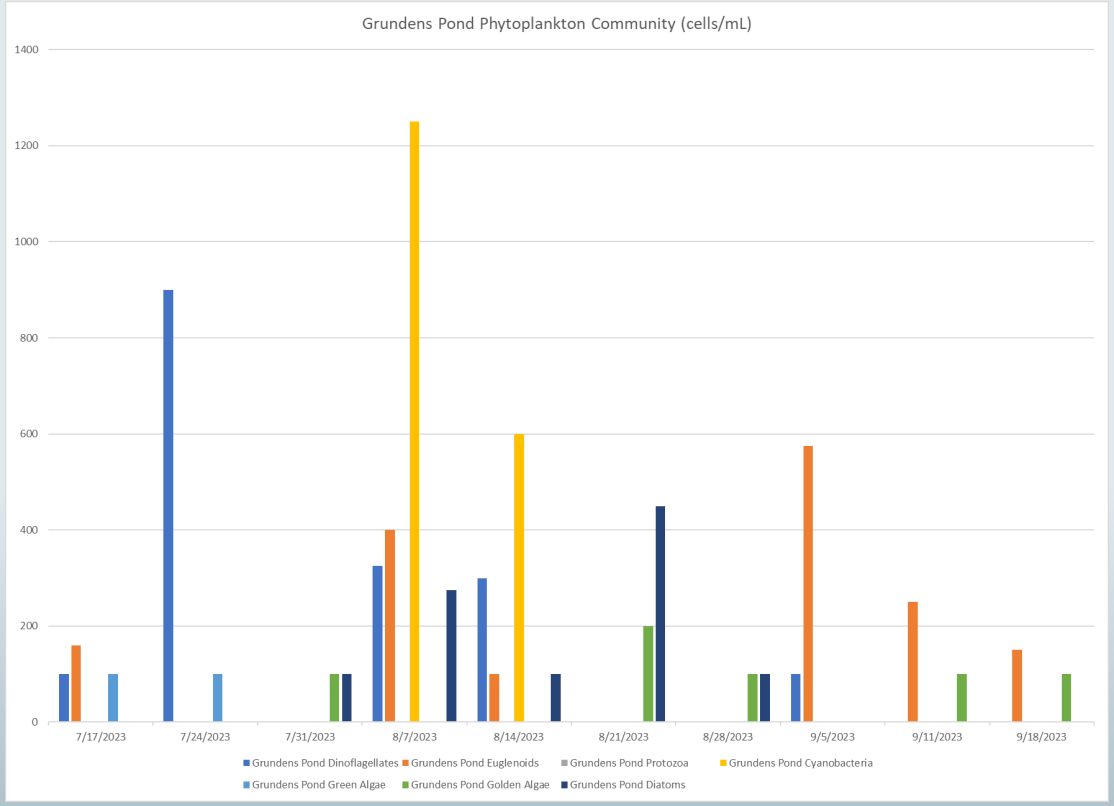
Turbidity (NTU)	3.9
Total Phosphorous(mg/L)	0.039
Nitrate/Nitrite (mg/L)	<0.02



- One herbicide treatment on 8/14 for bladderwort

Grundens Pond	Oxygen (mg/L)	pH	Temp (F)	Clarity (FT)
7/17/2023	4.4	7.4	66	2.5
7/24/2023	2.5	8	75.5	0.8
7/31/2023	6.68	9.07	74.89	3
8/8/2023	5.48	8.4	76.12	2
8/14/2023	6.5	8.3	76.85	2
8/21/2023	6.37	9	75.8	2.5
8/28/2023	5.4	9	74.6	2.5
9/5/2023	5.4	9.23	76.4	2.5
9/11/2023	4.37	9.1	76.4	2.5
9/18/2023	4.2	9.1	70	2.5

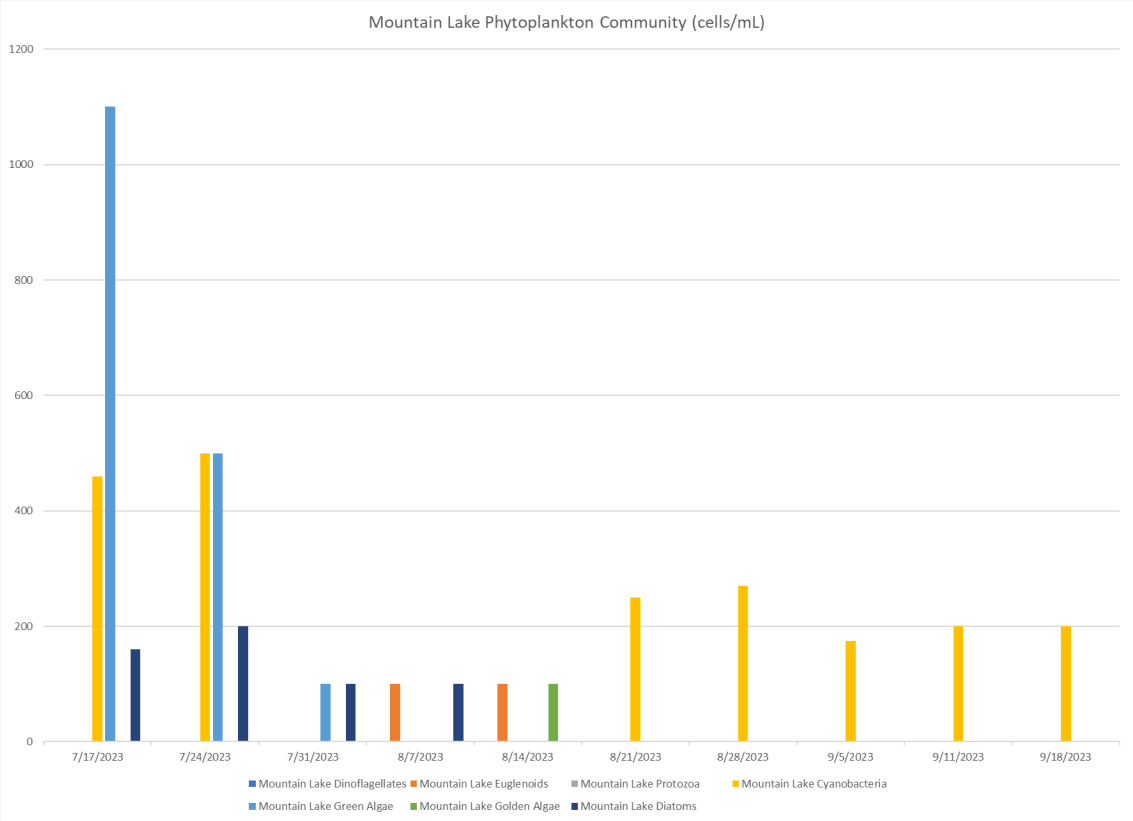
Turbidity (NTU)	3.3
Total Phosphorous(mg/L)	0.0589
Nitrate/Nitrite (mg/L)	0.03



- Three herbicide treatments for duckweed and watermeal
- Overall, low densities of phytoplankton for this pond

Mountain Lake	Oxygen (mg/L)	pH	Temp (F)	Clarity (FT)
7/17/2023	6.7	8	67	3.5
7/24/2023	7.5	9.5	80	3
7/31/2023	7.12	9.08	73.41	3
8/8/2023	6.55	9.02	75.63	3
8/14/2023	6.3	9.02	77.41	3
8/21/2023	6.92	9	76.78	3
8/28/2023	7	10.12	74.8	3
9/5/2023	8.26	9.63	77.32	3
9/11/2023	6.7	9.41	76.51	2
9/18/2023	6.5	9.2	70.2	2

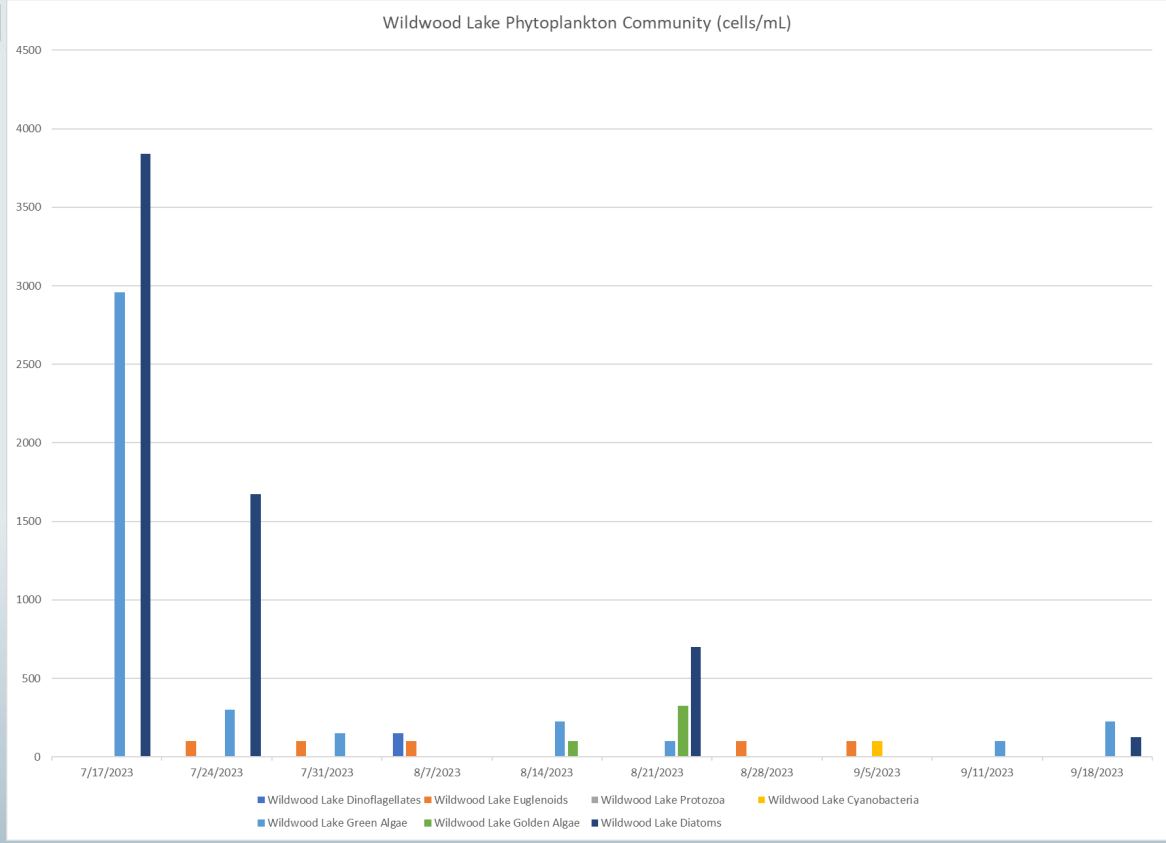
Turbidity (NTU)	5.2
Total Phosphorous(mg/L)	0.0276
Nitrate/Nitrite (mg/L)	0.02



- April Sonar application for Eurasian water milfoil
- August treatment for bassweed and primrose
- Alum application on 11/2
- Low density phytoplankton

Wildwood Lake	Oxygen (mg/L)	pH	Temp (F)	Clarity (FT)
7/17/2023	6.4	7.8	67	3
7/24/2023	7.98	9.46	78.03	2
7/31/2023	6.4	8.8	75.6	3
8/8/2023	7.1	8.3	76.5	2
8/14/2023	6.43	7.79	77.3	3
8/21/2023	6.4	8.7	76.8	3
8/28/2023	6.2	9.78	74.8	3
9/5/2023	8.28	9.67	77.48	3
9/11/2023	8.28	7.2	75.21	2.5
9/18/2023	8.28	7.3	70	2.5

Turbidity (NTU)	4.3
Total Phosphorous(mg/L)	0.0217
Nitrate/Nitrite (mg/L)	0.03



- 8/2 – treatment for brittle naiad, primrose and filamentous algae
- Consistent degraded water clarity most of latter half of summer
- Overall, low phytoplankton densities

2024 Recommendations

- Aggressive lily treatment in Birchwood and Crystal Lakes
- Alum application in Crystal Lake in spring
- Olive Pond – revisit aeration installation
  - Nutrient inactivation
  - Bacterial enhancement
- Shadow Pond – maintenance of aeration system
  - Nutrient inactivation
  - Bacterial enhancement
- Grundens Pond – Nutrient inactivation and bacteria
- Mountain Lake – aggressive bassweed and primrose treatment
  - Fall alum treatment
- Wildwood Lake – aggressive primrose treatment
  - Fall alum treatment