

The Borough of Mountain Lakes 2022 Year-End Report

By Bob Schindler
Project Manager
Aquatic Biologist



December 6th, 2022

SOLITUDE
LAKE MANAGEMENT

Restoring Balance. Enhancing Beauty.

2022 Year-End Report

Borough of
Mountain Lakes
2022 Year-End Report

2022 Climate and Precipitation Data Individual Lake Descriptions

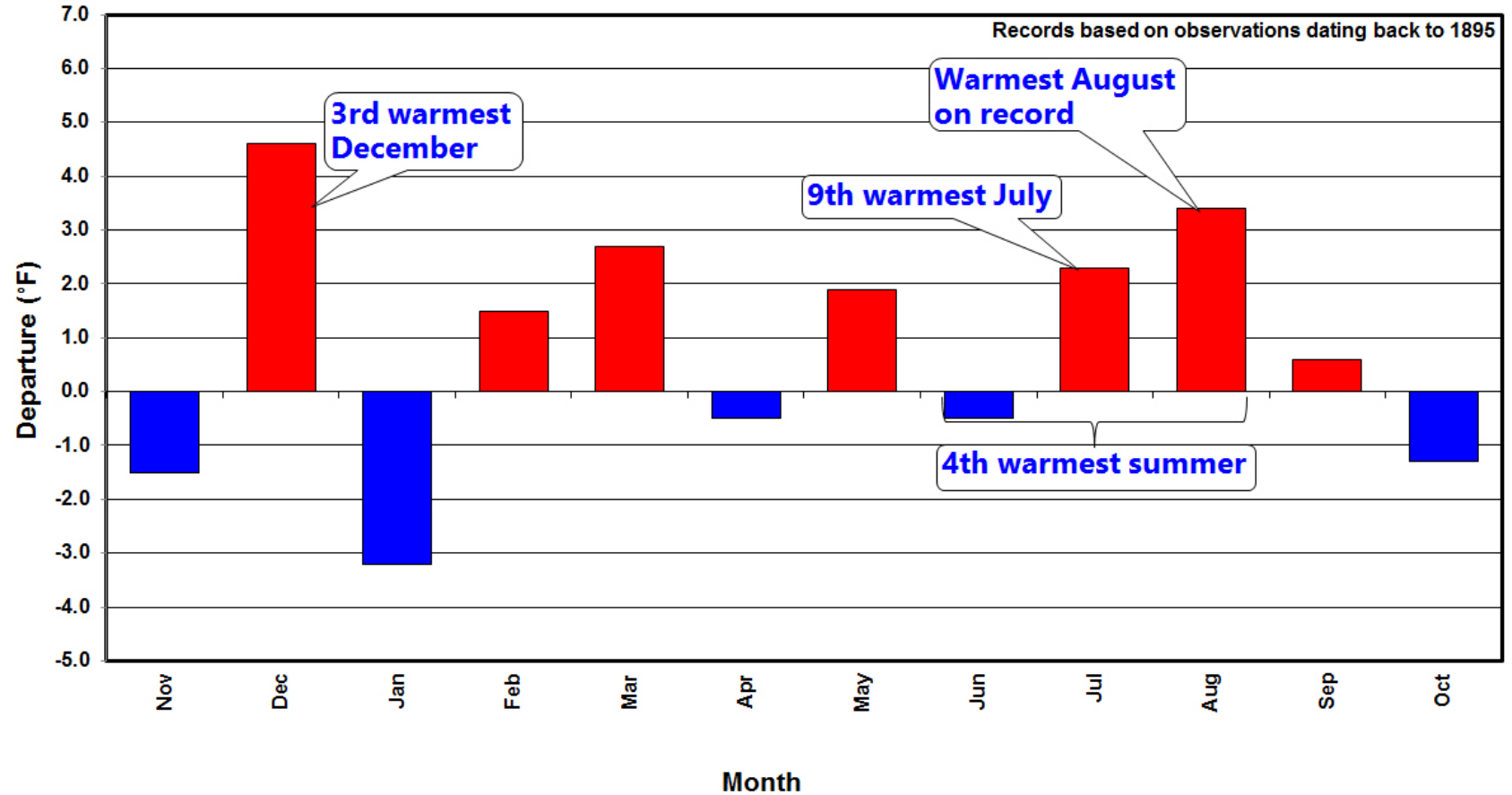
- 2022 Aquatic Plant and Algae Control
- 2008-2022 Historical Plant and Algae Control
- 2022 Water Quality and Phytoplankton Results

Additional Lake Management Projects

- Small Basin DO
- TPO4 at All Nine Lakes
- Birchwood and Mountain Lake Fecal Coliform Testing
- 2022 Lakes Cleaning Project
- Mountain Lakes Aquatic Plant Guide

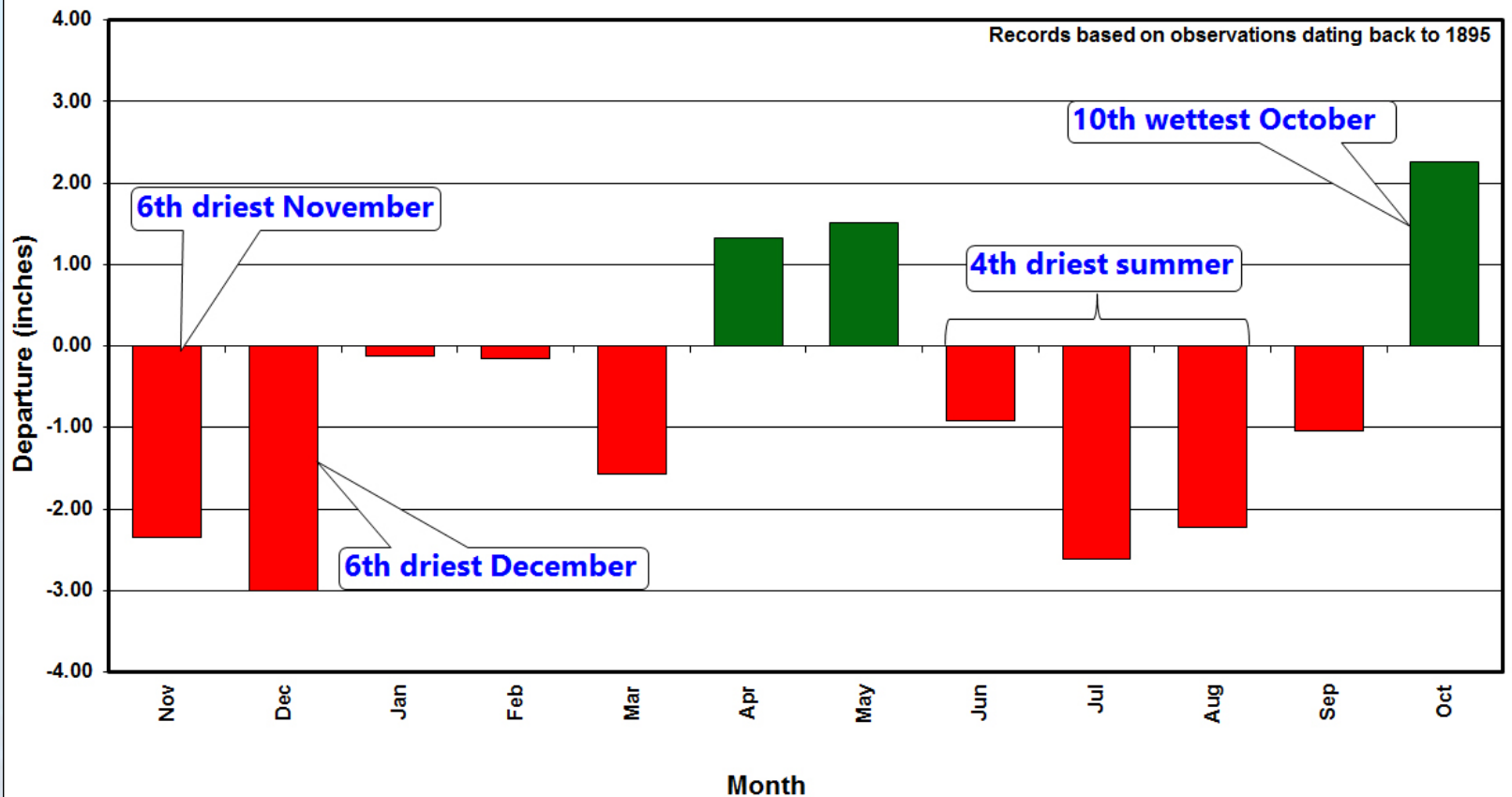
NJ Monthly Temperature Departures (November 2021 – October 2022)

Departures calculated from differences between observed monthly temperatures and 1991–2020 monthly averages

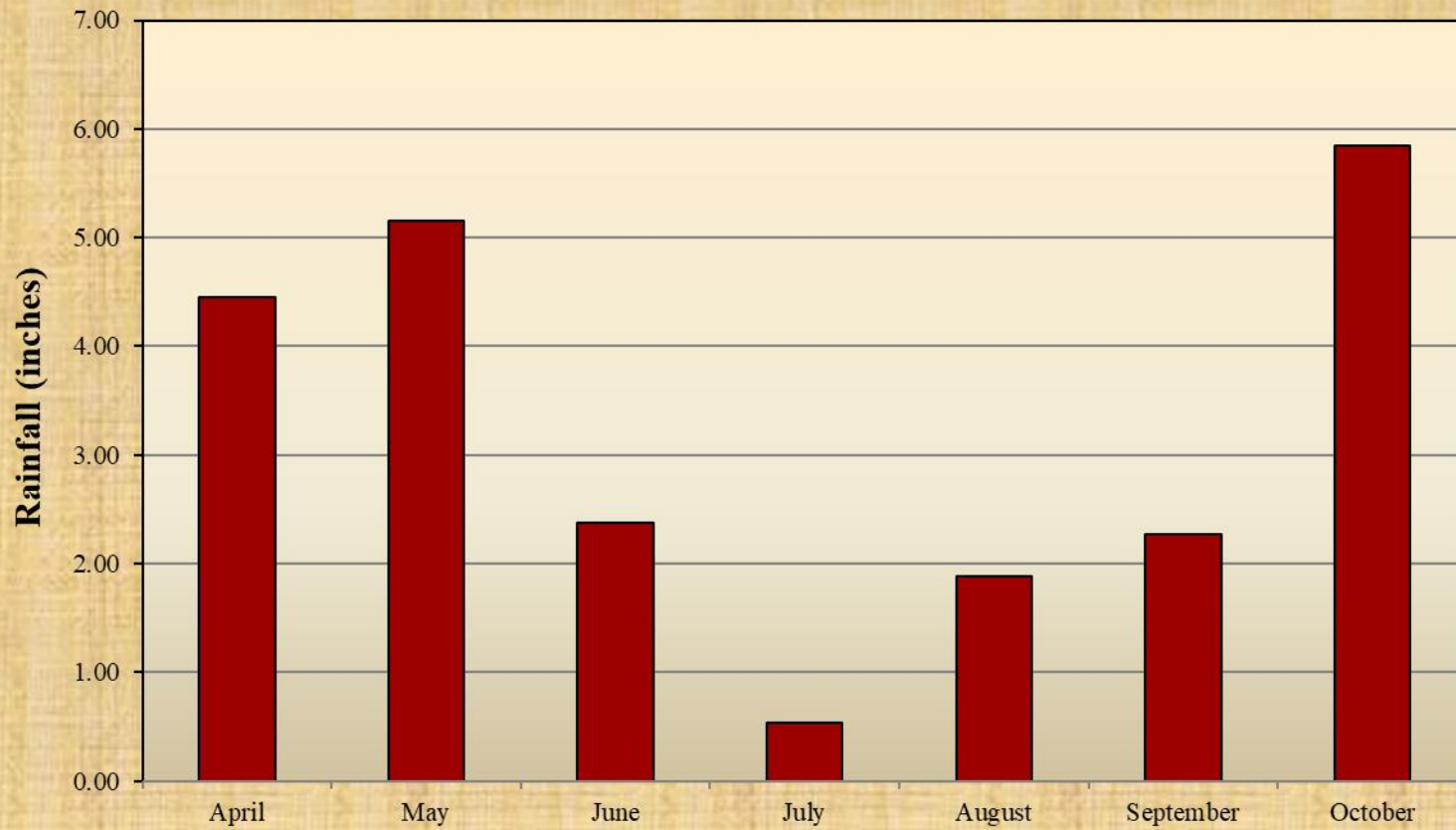


NJ Monthly Precipitation Departures (November 2021 – October 2022)

Departures calculated from differences between observed monthly precipitation and 1991–2020 monthly averages



2022 Monthly Rainfall Mountain Lakes, NJ



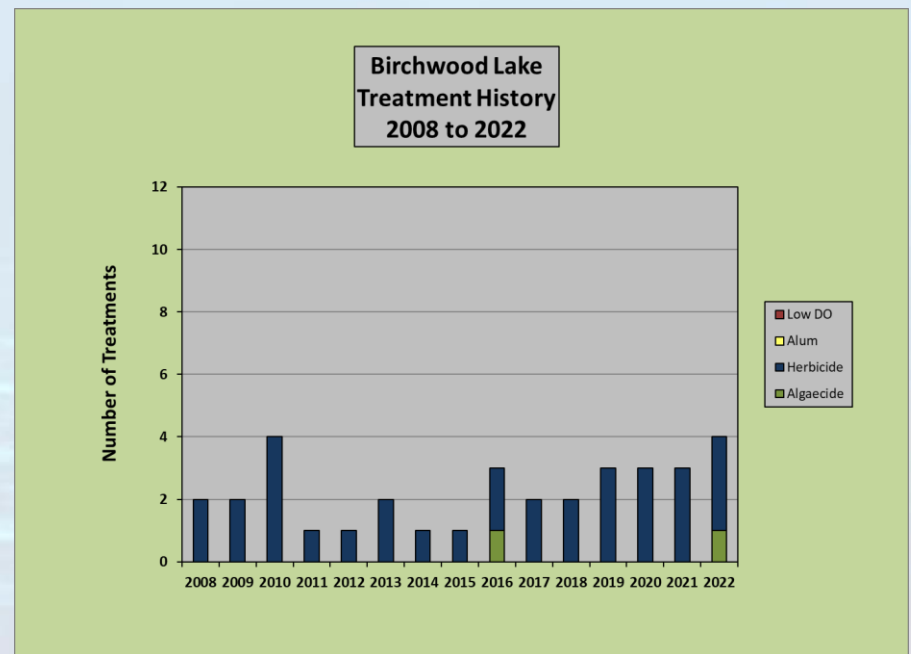
■ 2022

Birchwood Lake

Birchwood Lake			
Date	Product Applied	Acres Treated	Target Species
5/9/2022	Flumioxazin	0.75	Curly-leaf pondweed
6/6/2022	Captain	0.41	Filamentous algae
6/27/2022	Flumioxazin	0.5	Bladderwort
8/29/2022	AquaNeat	0.5	Water lilies

Birchwood Lake Control Notes

- Two Algaecide Applications
- Three Herbicide Applications
 - Pondweed/milfoil in swim lanes
 - Water Lilies
- Dam Vegetation Spray

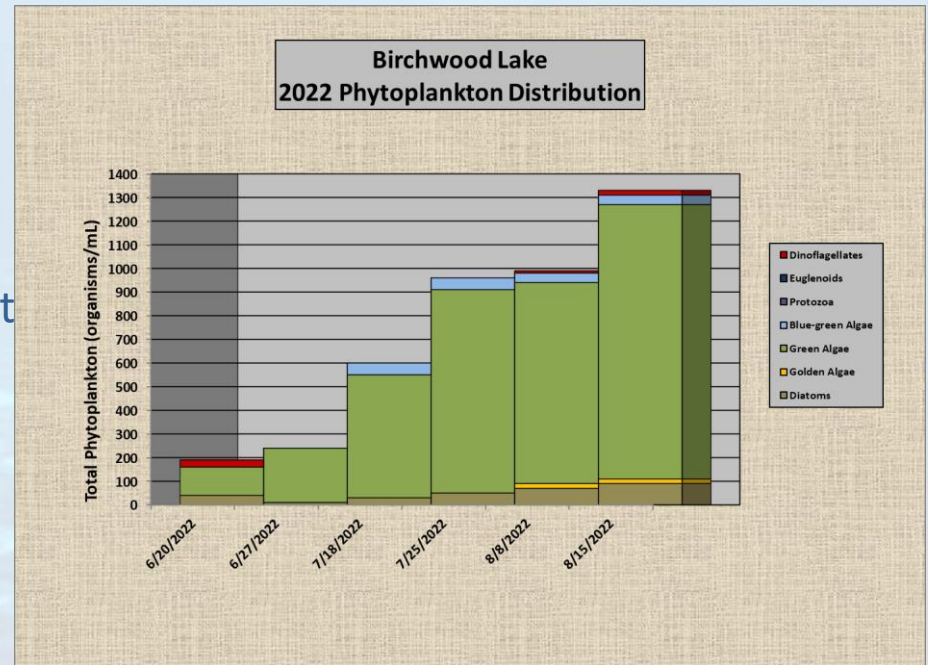


Birchwood Lake-Water Quality

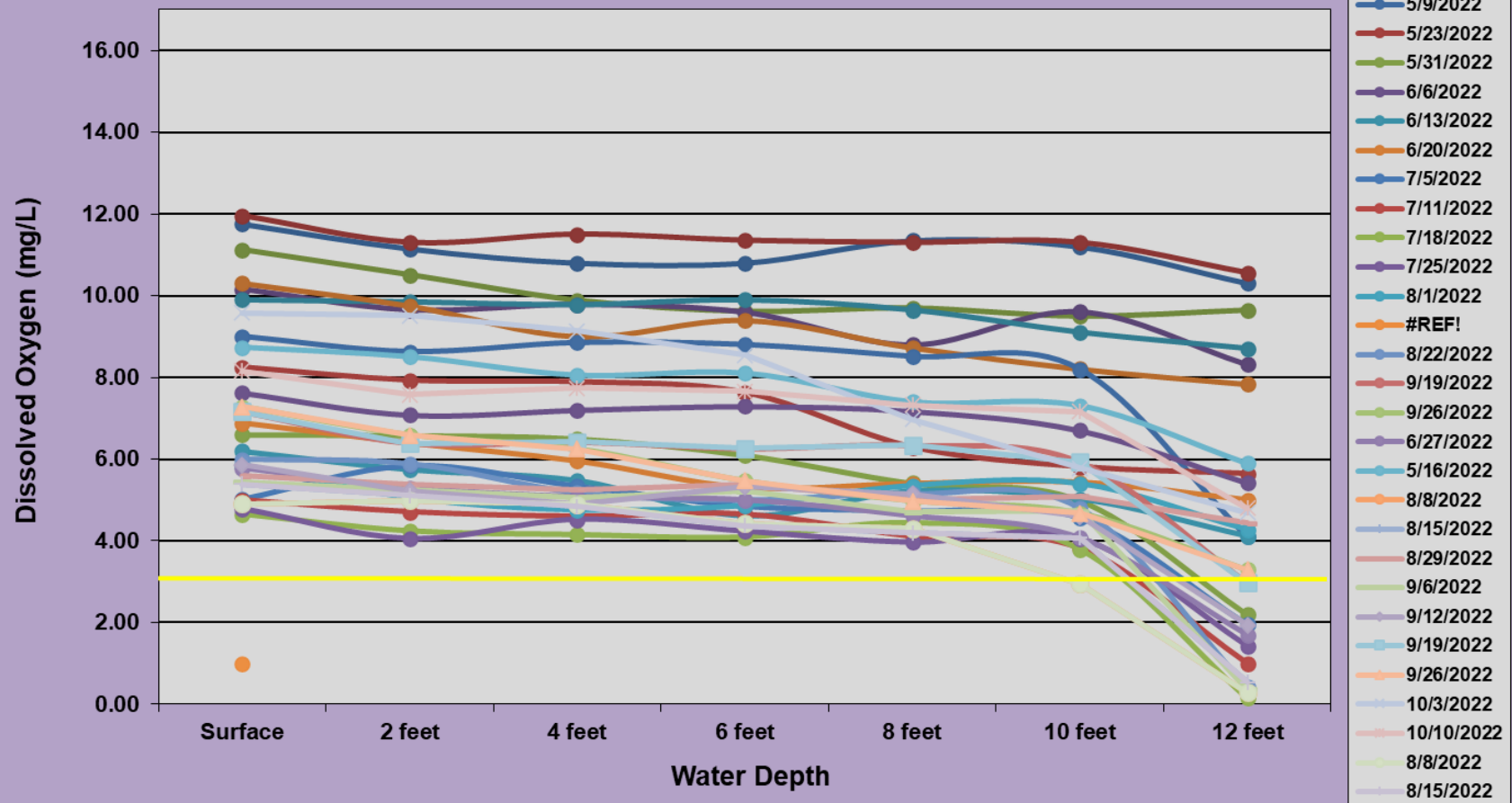
Birchwood Lake	Units	6/13/2022	7/18/2022	8/8/2022
Temperature	°C	23.4	27.3	28.9
Dissolved Oxygen	mg/L	6	4.65	4.9
Alkalinity	mg/L	64	68	68
pH	SU	6.75	7	7.25
Water Clarity	feet	7	5.5	5
Nitrate	mg/L	ND	ND	ND
Turbidity	NTU	1.2	1.8	2.8
Total Phosphorous	mg/L	0.020	0.025	0.022

Birchwood Lake WQ Notes

- Dissolved Oxygen
- pH consistent all dates
- TPO4 favorable all dates
- Phytoplankton
 - Green algae bloom in July/August
 - Trace B-G on four dates



Birchwood Lake 2022 Dissolved Oxygen Profile Data

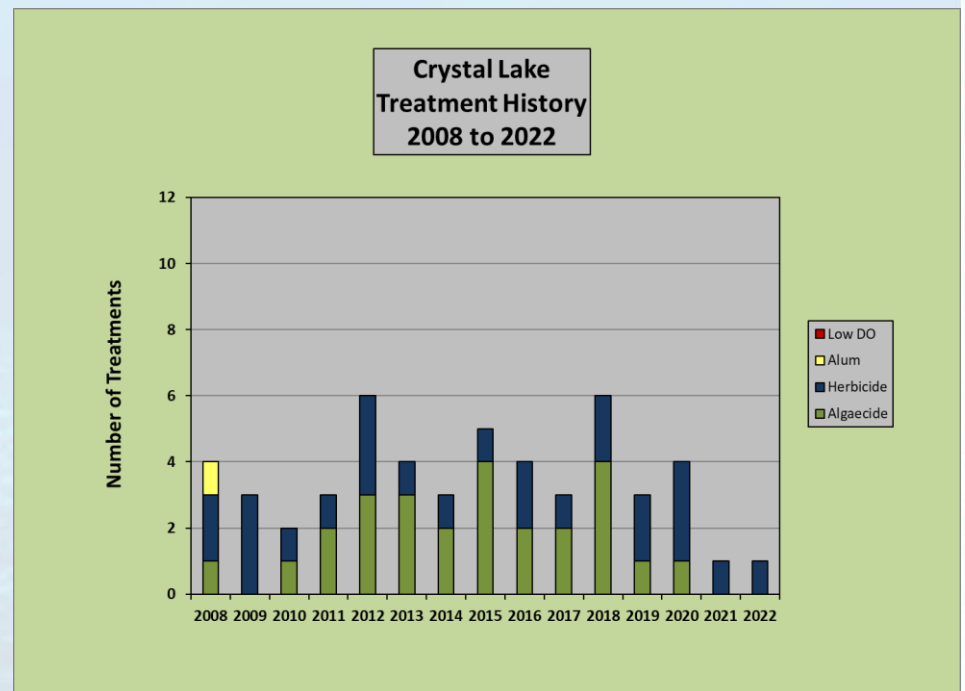


Crystal Lake

Crystal Lake			
Date	Product Applied	Acres Treated	Target Species
7/18/2022	Aquastrike	2.25	Bassweed

Crystal Lake Control Notes

- **No Algaecide Applications**
 - Trace filamentous algae
 - Green algae bloom August
 - Dissipated quickly
- **One Herbicide Application**
 - Bassweed in July
- **Dam Treatment**

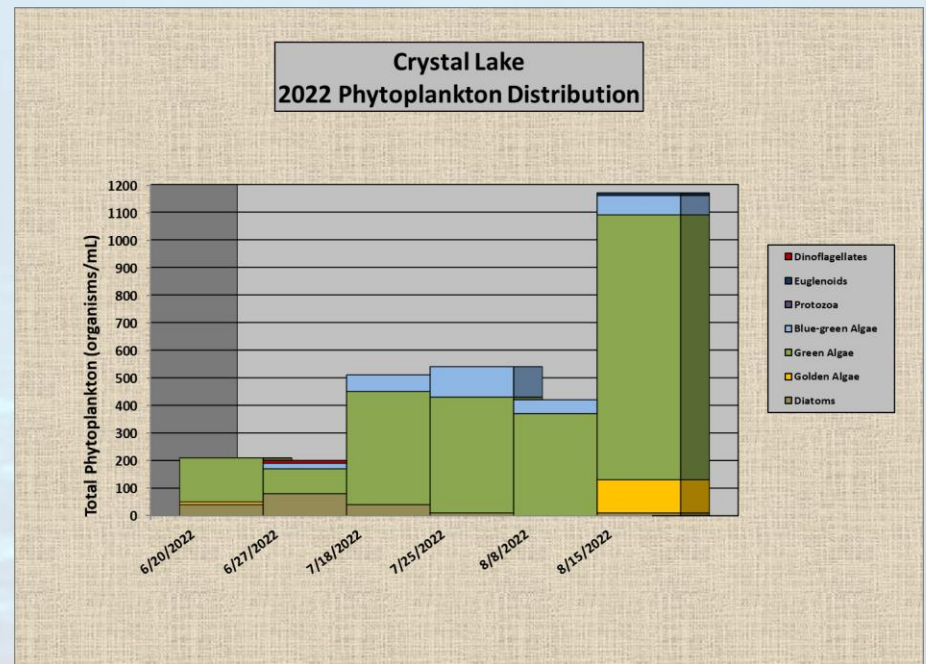


Crystal Lake-Water Quality

Crystal Lake	Units	6/13/2022	7/18/2022	8/8/2022
Temperature	°C	23.6	27.2	28.4
Dissolved Oxygen	mg/L	6.94	5.25	6.29
Alkalinity	mg/L	60	64	68
pH	SU	7	7	7.5
Water Clarity	feet	10	5	5
Nitrate	mg/L	ND	ND	ND
Turbidity	NTU	1.30	2	2.4
Total Phosphorous	mg/L	0.012	0.013	0.018

Crystal Lake WQ Notes

- TPO4 suitable all season
- Good Clarity all season
- Phytoplankton
 - August Green algae bloom
 - Blue green algae (BGA)
 - Typically, green algae growth

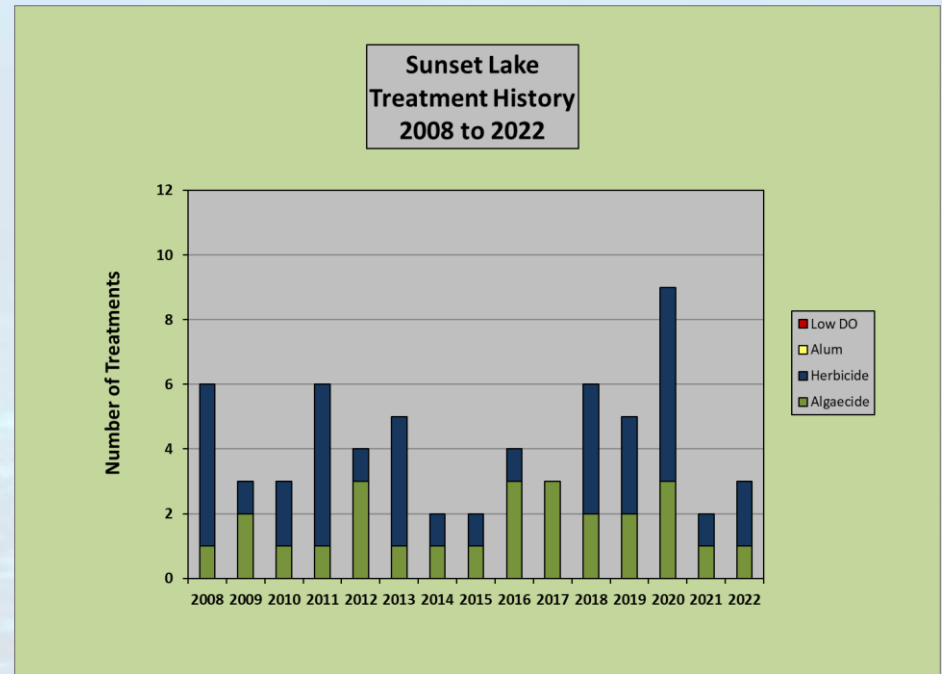


Sunset Lake

Sunset Lake			
Date	Product Applied	Acres Treated	Target Species
6/15/2022	Aquastrike	2.25	Bassweed
	Copper Sulfate	2.5	Filamentous Algae
	Flumioxazin	1.2	Water lilies

Sunset Lake Control Notes

- **One Algaecide Application**
 - Target: Filamentous Algae
 - Limited Acreage (~6.5 ac)
- **Two Herbicide Applications**
 - Target: bassweed once
 - water lily control on one date

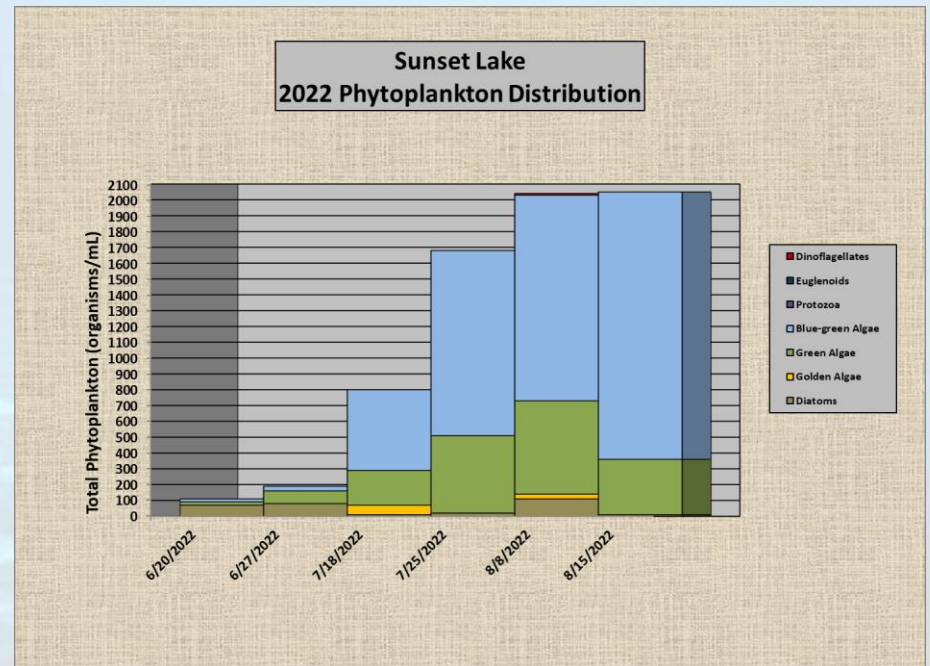


Sunset Lake-Water Quality

Sunset Lake	Units	6/13/2022	7/18/2022	8/8/2022
Temperature	°C	21.5	25.4	27.5
Dissolved Oxygen	mg/L	7.58	8.14	6.38
Alkalinity	mg/L	60	64	68
pH	SU	7	7	7.5
Water Clarity	feet	8	4	3
Nitrate	mg/L	ND	ND	ND
Turbidity	NTU	1.3	4.8	8.0
Total Phosphorous	mg/L	0.018	0.0380	0.032

Sunset Lake WQ Notes

- TPO4 elevated July/August
- Phytoplankton
 - BGA – July and August
 - Higher than typical seasons
 - Increased phosphorous

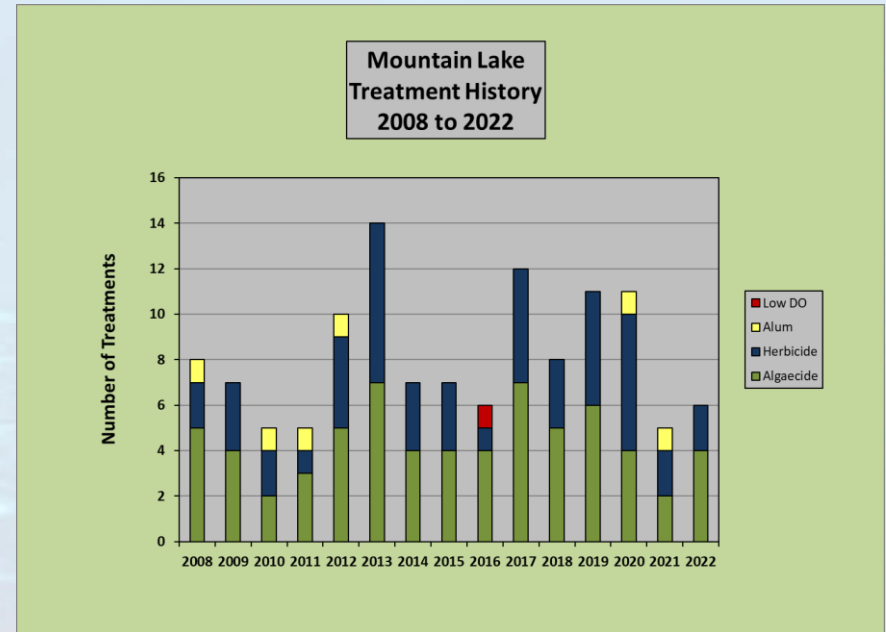


Mountain Lake

Mountain Lake			
Date	Product Applied	Acres Treated	Target Species
5/9/2022	Copper Sulfate	9.6	Filamentous algae
6/2/2022	Tribune	3.0	Coontail
	Flumioxazin	1.5	Curly-leaf pondweed
6/17/2022	Aquastrike	6.67	Bassweed
	Copper Sulfate	25.6	Filamentous algae
8/3/2022	Copper Sulfate	25.6	Filamentous algae
8/23/2022	Copper Sulfate	2.9	Filamentous algae
10/12/2022	AquaNeat	3	Water Primrose
11/10/2022	Aluminum Sulfate	76	Nutrients

Mountain Lake Control Notes

- **Four Herbicide Applications**
 - Expanded Bassweed
 - Curly-leaf pondweed / Coontail
 - Shoreline water primrose
- **Four Algaecide Applications**
 - Filamentous Algae – (~25 acres)
- **Alum treatment in November**

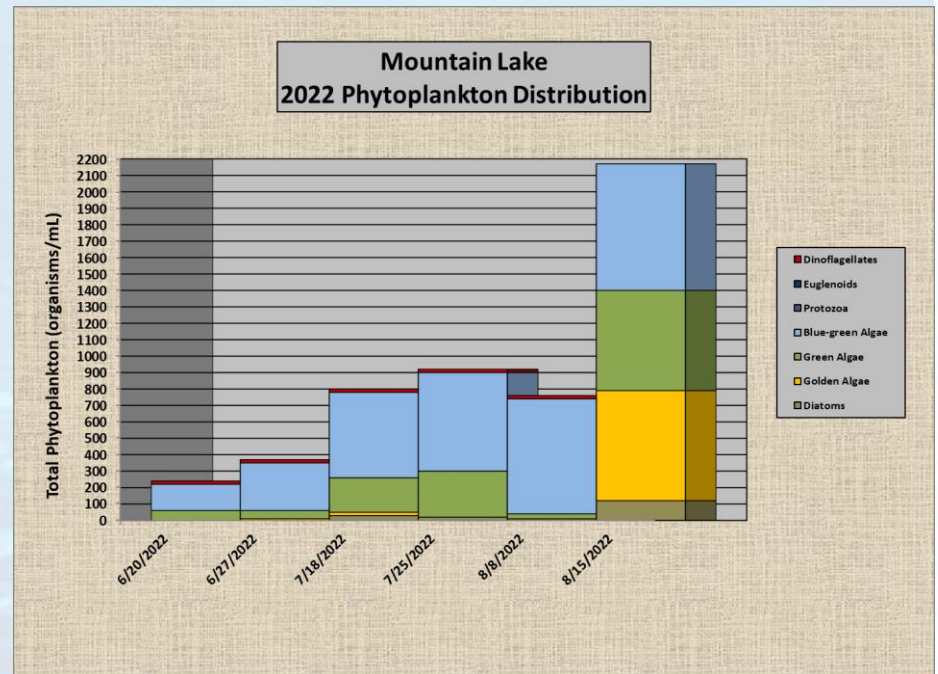


Mountain Lake-Water Quality

Mountain Lake	Units	6/13/2022	7/18/2022	8/8/2022
Temperature	°C	22	25.9	27.9
Dissolved Oxygen	mg/L	7.08	8.59	6.38
Alkalinity	mg/L	68	76	80
pH	SU	7.25	7.5	7.75
Water Clarity	feet	10	5	4.5
Nitrate	mg/L	ND	ND	ND
Turbidity	NTU	1.3	2.7000	3.8
Total Phosphorous	mg/L	0.016	0.0160	0.022

Mountain Lake WQ Notes

- Water Clarity mostly favorable
 - Decrease in average
- TPO4 low all season
- Oxygen levels stable
- Phytoplankton
 - Counts low June and July
 - Moderate BGA presence July/August



Average Water Clarity

2006: 7.54 feet

2007: 5.24 feet

2008: 6.50 feet

2009: 9.08 feet

2010: 6.51 feet

2011: 5.33 feet

2012: 7.33 feet

2013: 8.71 feet

2014: 10.03 feet

2015: 9.94 feet

2016: 6.18 feet

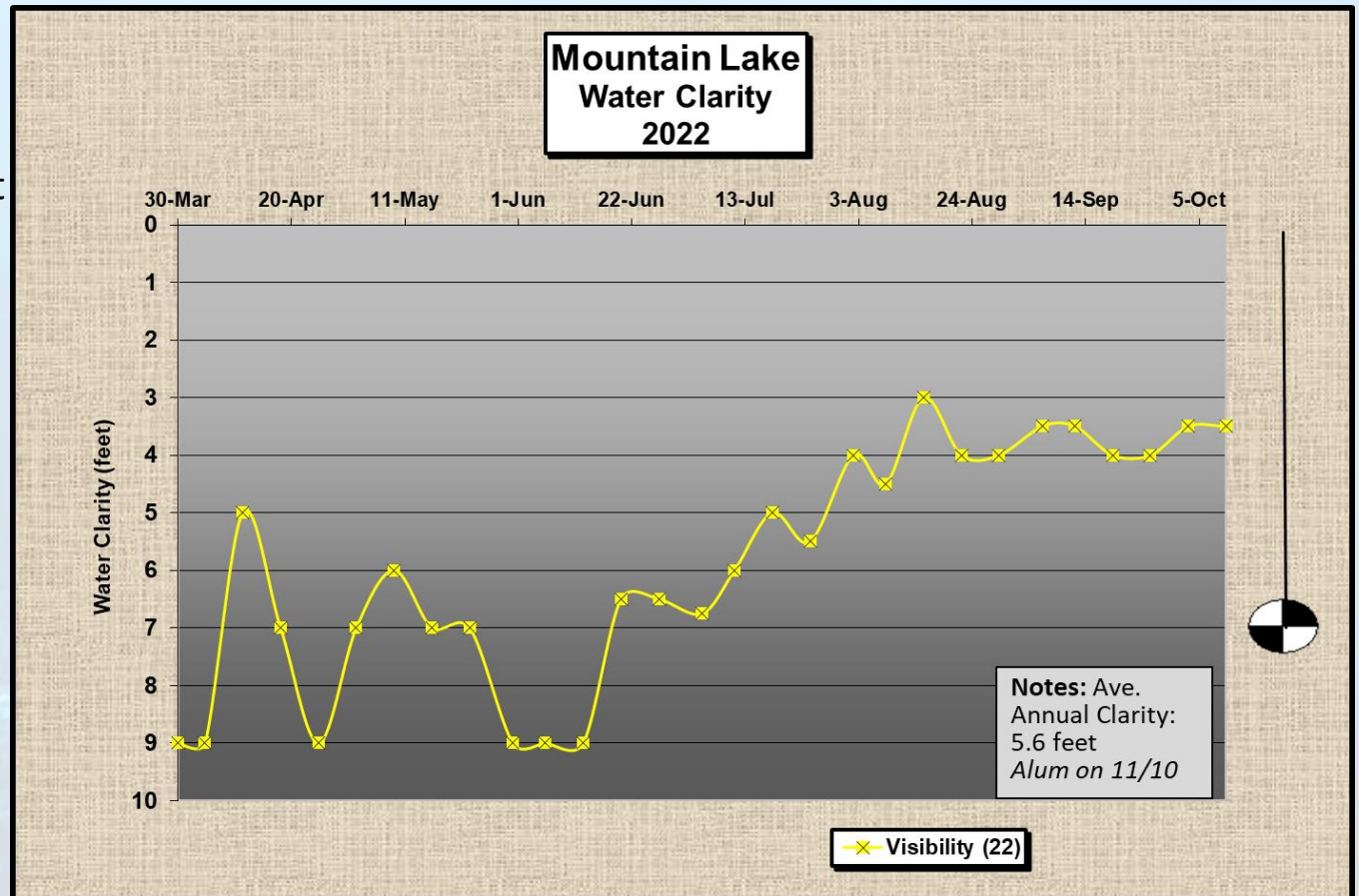
2018: 8.34 feet

2019: 6.32 feet

2020: 8.14 feet

2021: 8.1 feet

2022: 5.6 feet

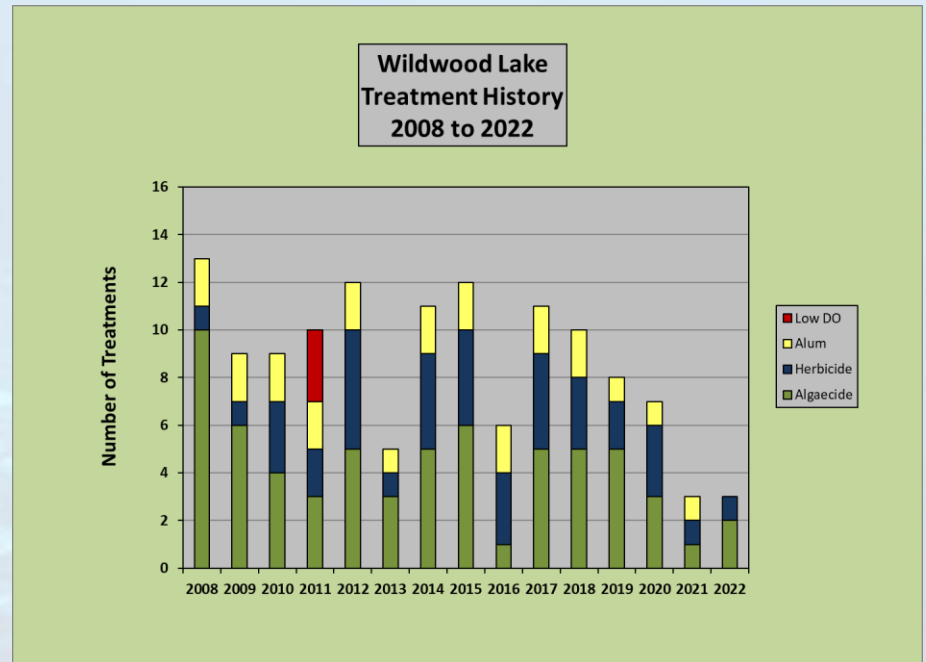


Wildwood Lake

Wildwood Lake			
Date	Product Applied	Acres Treated	Target Species
6/2/2022	Copper Sulfate	6.4	Filamentous algae
	Aquastrike	6	Curly-leaf pondweed / Eurasian watermilfoil
7/12/2022	Copper Sulfate	6.4	Filamentous algae
10/12/2022	AquaNeat	1	Water Primrose
11/10/2022	Aluminum Sulfate	15	Nutrients

Wildwood Lake Control Notes

- **Two Herbicide Applications**
 - Early curly-leaf pondweed / Eurasian watermilfoil
 - Shoreline water primrose
- **Two Algaecide Applications**
 - Filamentous algae
 - Average Year: 4
- **Alum Use (1x)**
 - Reduced from 2 - comparisons
 - November

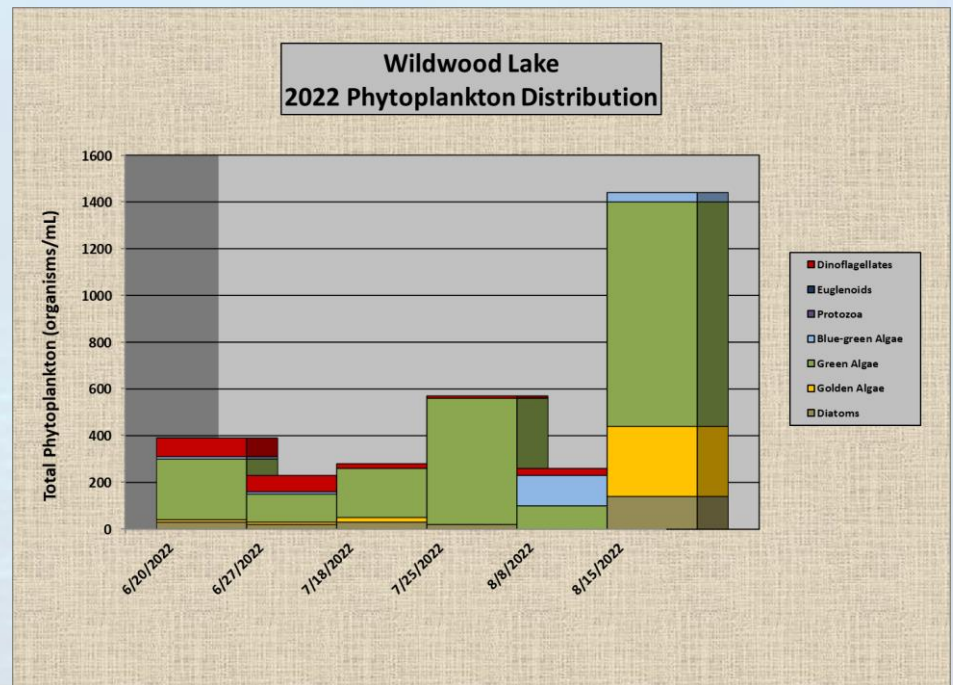


Wildwood Lake-Water Quality

Wildwood Lake	Units	6/13/2022	7/18/2022	8/8/2022
Temperature	°C	21.9	26.2	28.1
Dissolved Oxygen	mg/L	6.87	7.19	6.29
Alkalinity	mg/L	68	76	80
pH	SU	7.25	7.5	7.75
Water Clarity	feet	4	4	4
Nitrate	mg/L	ND	ND	ND
Turbidity	NTU	2.3	2.8	2.5
Total Phosphorous	mg/L	0.029	0.023	0.024

Wildwood Lake WQ Notes

- **TPO4 reduced all season**
 - Alum Use / plant growth
- **Phytoplankton**
 - Light and favorable but one date
 - Trace BGA August
 - No unicellular treatments

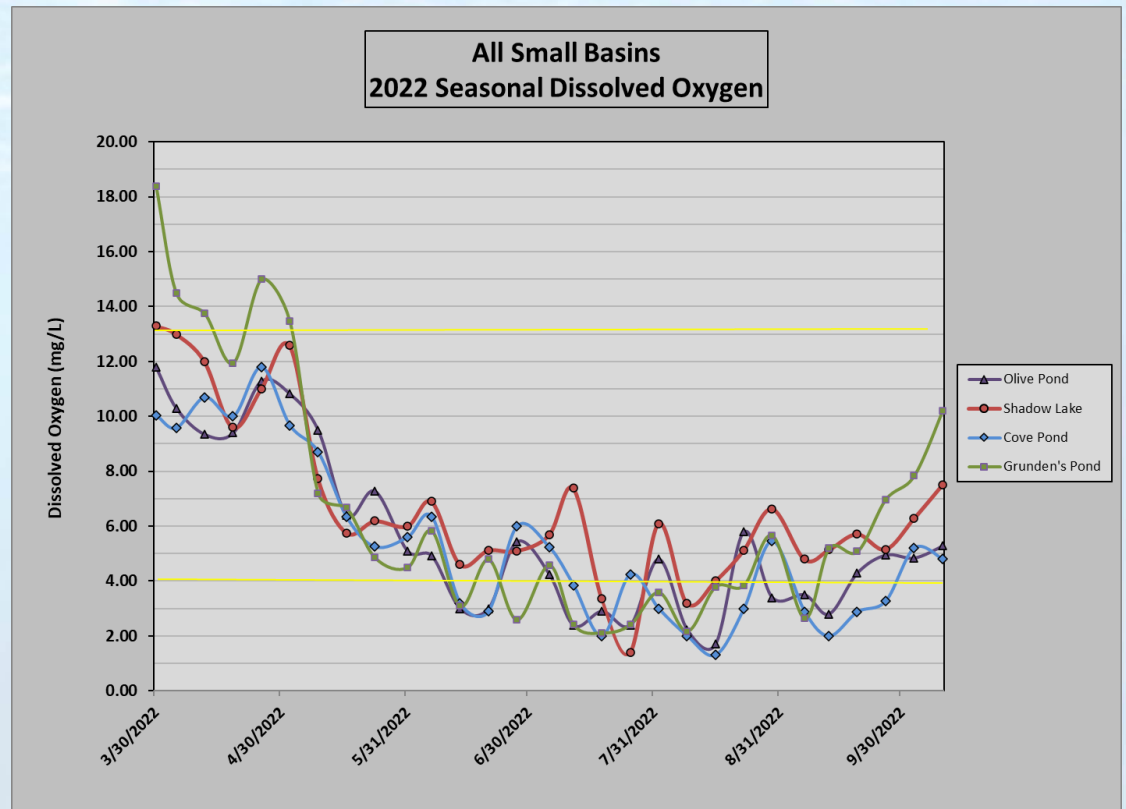


Small Basin Dissolved Oxygen

Stressful to Aquatic Biota:
< 5.0 mg/L
Preventing Control Work:
< 4.0 mg/L

Dissolved Oxygen

- Measured Weekly
- Basin Summary (< 4.0 mg/L / 4.0-5.0 mg/L)
 - Olive Pond:
 - Cove Pond:
 - Grunden's Pond:
 - Shadow Lake:
 - Overall, basins reduced dissolved oxygen compared to recent seasons – second year in a row for trend

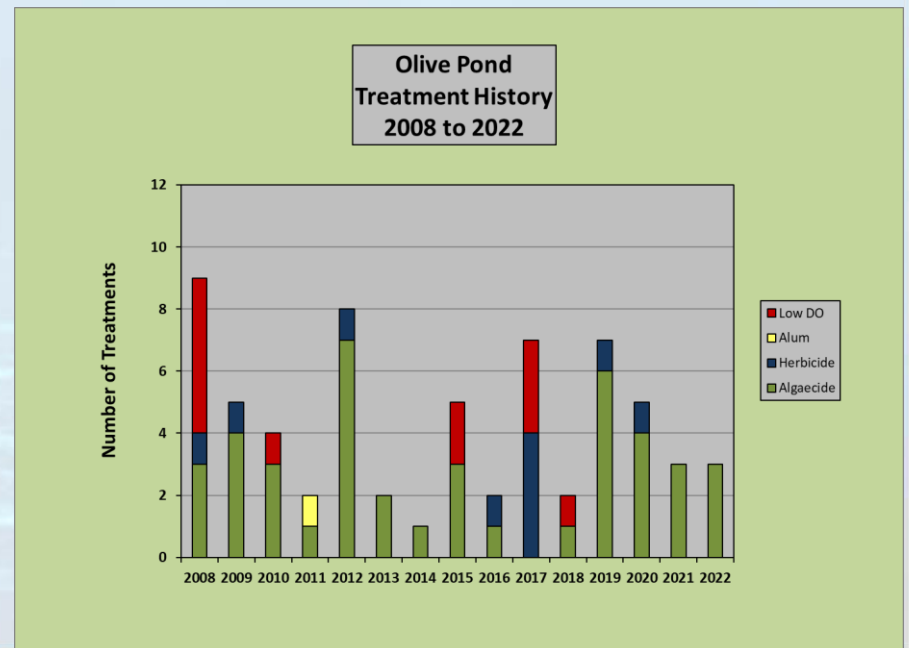


Olive Pond

Olive Lake			
Date	Product Applied	Acres Treated	Target Species
4/25/2022	Captain XTR	0.4	Filamentous algae
7/5/2022	Earthtec	0.5	Unicellular algae
8/19/2022	Captain XTR	0.4	Unicellular algae

Olive Pond Control Notes

- **Three Algaecide Application**
 - Earthtec – preventative applications
 - Shadow Lake impact
 - Minimal Filamentous Algae
- **No Herbicide Application**
 - Water meal not observed

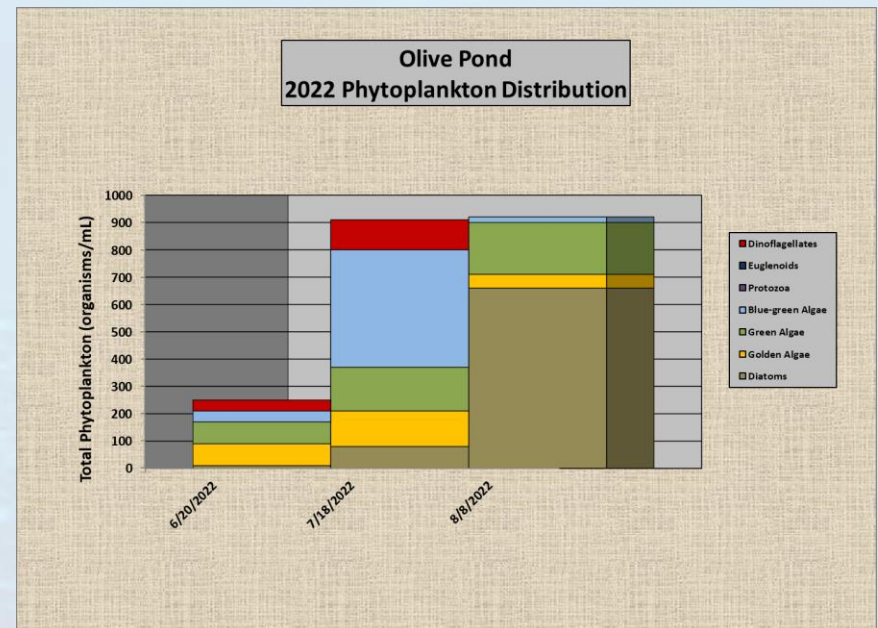


Olive Pond-Water Quality

Olive Pond	Units	6/13/2022	7/18/2022	8/8/2022
Temperature	°C	22.5	25.7	28.4
Dissolved Oxygen	mg/L	3	2.9	2.23
Alkalinity	mg/L	60	64	68
pH	SU	7.5	8.5	8.75
Water Clarity	feet	2	2	2
Nitrate	mg/L	ND	ND	ND
Turbidity	NTU	3.3	4.4	2.4
Total Phosphorous	mg/L	0.082	0.126	0.065

Olive Pond WQ Notes

- **Oxygen depressed on many dates**
 - No disruption of service
- **High TPO4 all dates**
 - Typical in recent years
 - Need to actively manage
- **Phytoplankton**
 - Moderate blue-green in July
- **Clarity poor on all three dates**

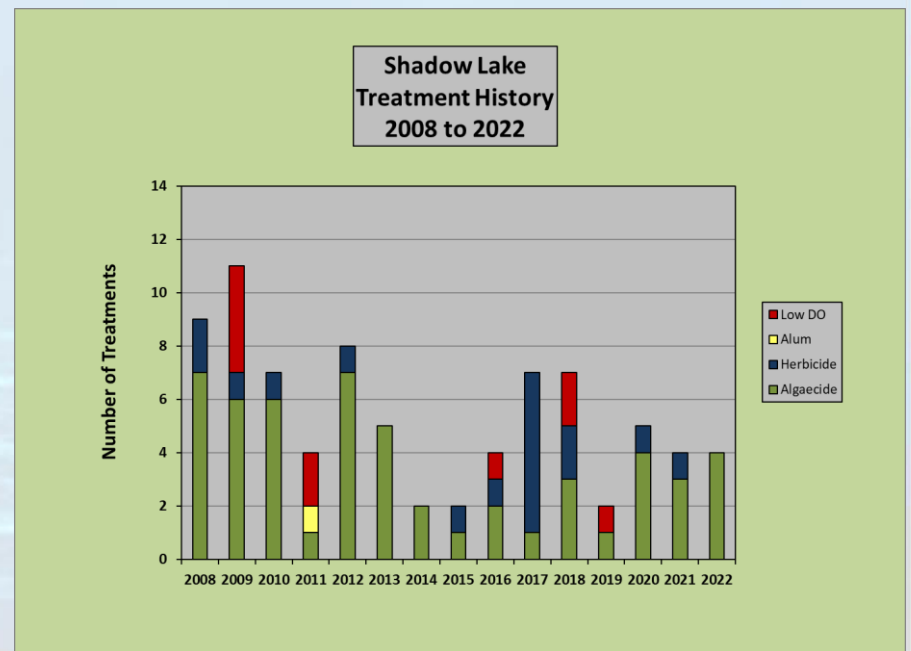


Shadow Lake

Shadow Lake			
Date	Product Applied	Acres Treated	Target Species
4/25/2022	Captain XTR	0.83	Filamentous algae
5/31/2022	Captain XTR	0.63	Filamentous algae
7/11/2022	Captain XTR	1	Unicellular algae
8/19/2022	Captain XTR	0.83	Unicellular algae

Shadow Lake Control Notes

- **Three Algaecide Applications**
 - Filamentous Algae / BGA
- **No Herbicide Application**
 - No watermeal / duckweed

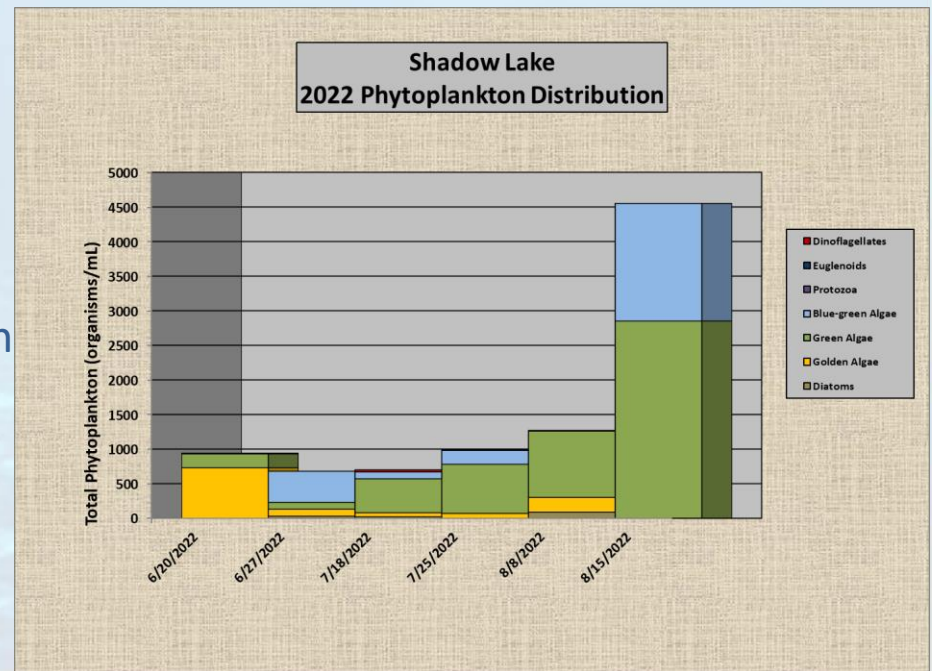


Shadow Lake-Water Quality

Shadow Pond	Units	6/13/2022	7/18/2022	8/8/2022
Temperature	°C	22.8	26.5	29.1
Dissolved Oxygen	mg/L	4.61	3.36	3.2
Alkalinity	mg/L	60	64	68
pH	SU	7.5	8.5	9
Water Clarity	feet	4	2	4
Nitrate	mg/L	ND	ND	ND
Turbidity	NTU	2.3	3.6	2.1
Total Phosphorous	mg/L	0.058	0.115	0.062

Shadow Lake WQ Notes

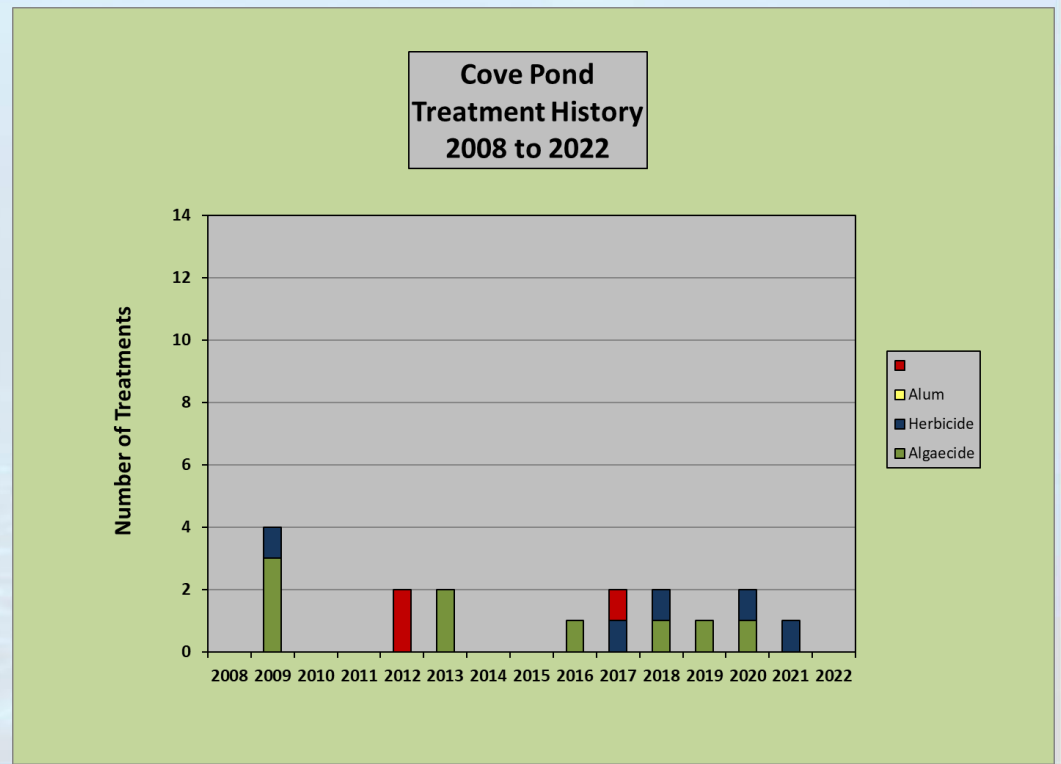
- **Elevated TPO4 all dates**
 - Typical in recent years
 - Needs active management
- **Phytoplankton**
 - Trace blue-green to moderate in August
 - Green most abundant



Cove Pond

Cove Pond Control Notes

- Typically, minimal Control Needed at this Site
- No Treatments in 2022
 - Hydro-raking??

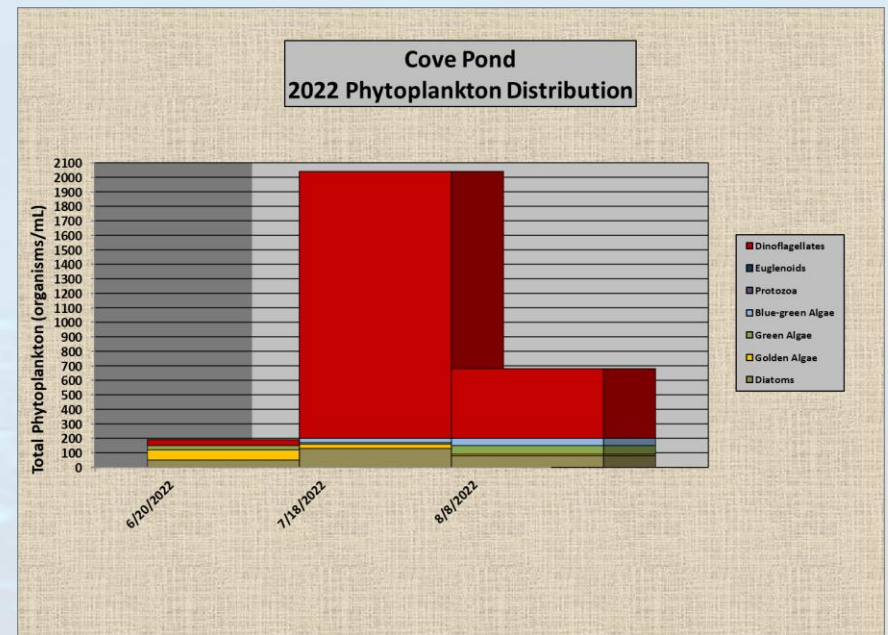


Cove Pond-Water Quality

Cove Pond	Units	6/13/2022	7/18/2022	8/8/2022
Temperature	°C	22.5	25	24.5
Dissolved Oxygen	mg/L	3.2	2	2.01
Alkalinity	mg/L	60	64	68
pH	SU	7.5	8.5	8.75
Water Clarity	feet	2	1	1.5
Nitrate	mg/L	ND	ND	ND
Turbidity	NTU	2.8	5.8	5.4
Total Phosphorous	mg/L	0.046	0.071	0.059

Cove Pond WQ Notes

- Water Clarity
 - poor on most dates
- TPO4 Elevated on all Dates
- Phytoplankton
 - *Ceratium*

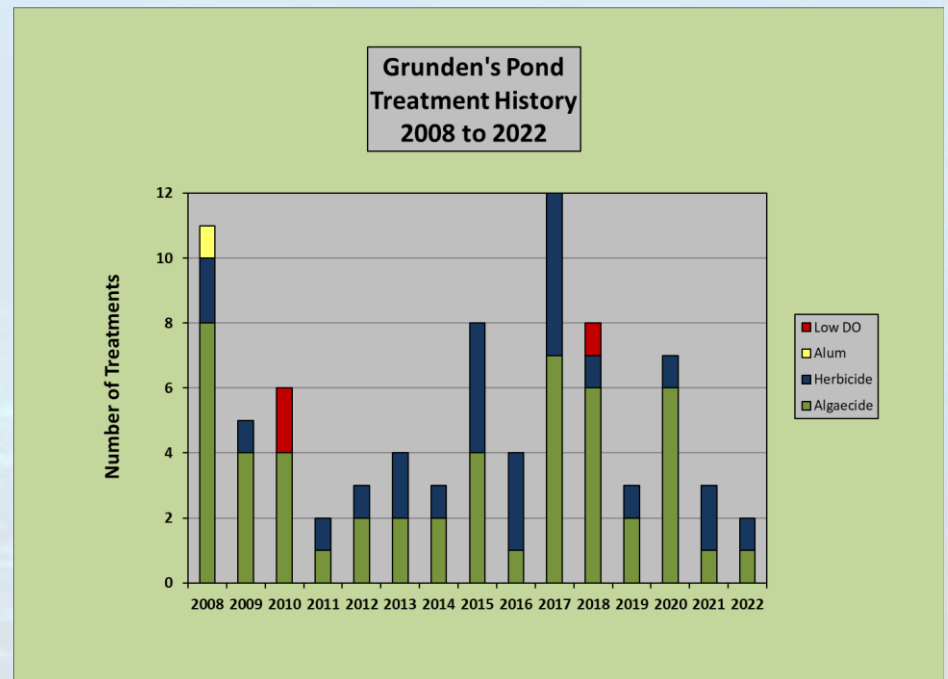


Grunden's Pond

Grunden's Pond			
Date	Product Applied	Acres Treated	Target Species
5/9/2022	Flumioxazin	0.5	Curly-leaf pondweed
8/18/2022	Captain XTR	1.1	Filamentous algae

Grunden's Pond Control Notes

- **One Algaecide Application**
 - Target: Filamentous Algae
 - Lower abundance than normal
 - Seasonal low water level
- **One Herbicide Application**
 - Early: curly-leaf pondweed
 - Only traces of water meal

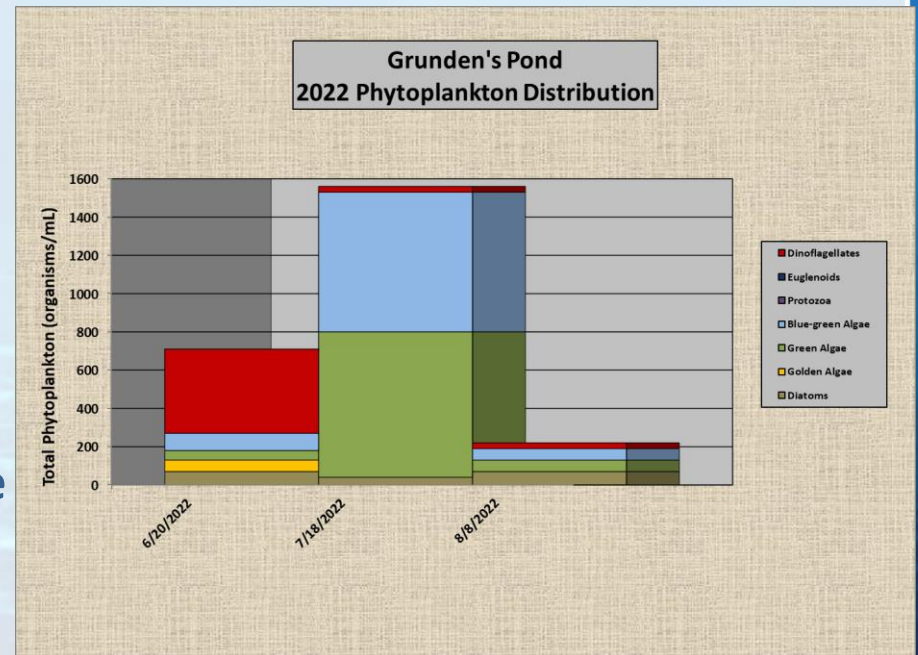


Grunden's Pond-Water Quality


Grundens Pond	Units	6/13/2022	7/18/2022	8/8/2022
Temperature	°C	24	26.4	27.4
Dissolved Oxygen	mg/L	3.09	2.12	2.18
Alkalinity	mg/L	60	64	68
pH	SU	7.5	8.5	9
Water Clarity	feet	2	1	2
Nitrate	mg/L	ND	ND	ND
Turbidity	NTU	4.3	7.4	3.2
Total Phosphorous	mg/L	0.092	0.093	0.051

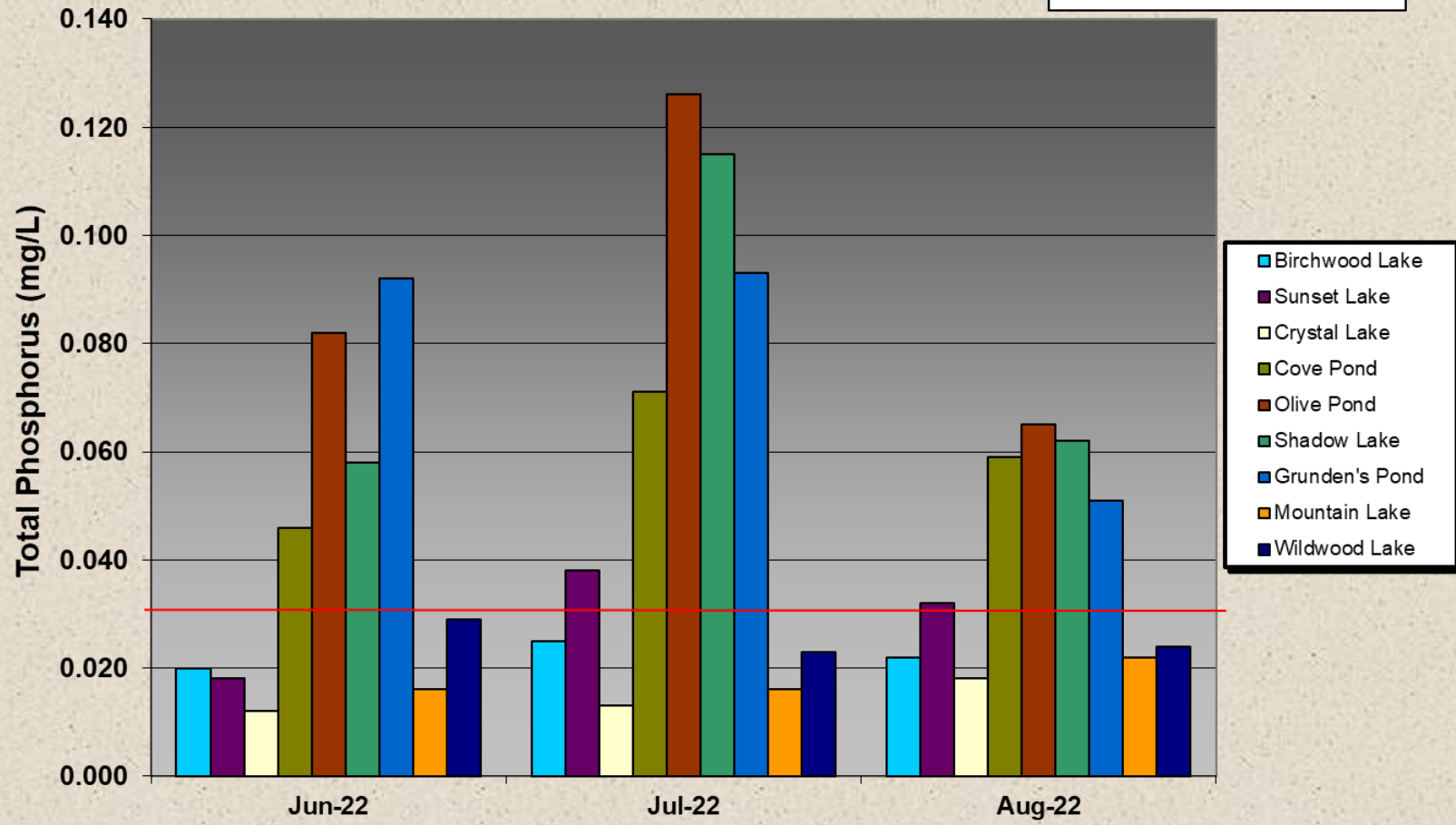
Grunden's Pond WQ Notes

- **TPO4 elevated all three dates**
 - Requires active management
- **Phytoplankton**
 - Moderate density July
 - Green / BG algae
 - Trace density June/July
- **Poor water clarity – below average**

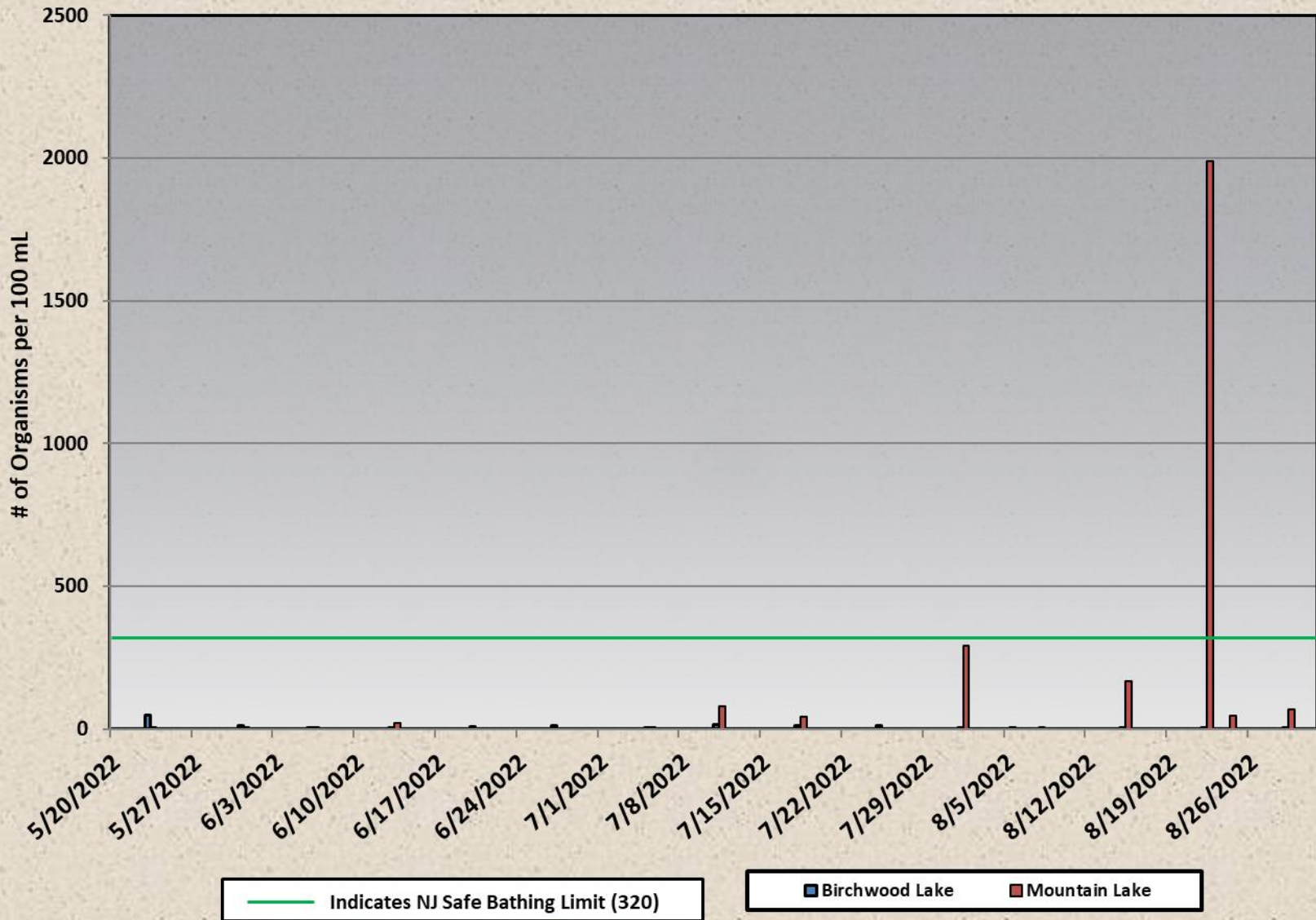


Mountain Lakes 2022 Total Phosphorus

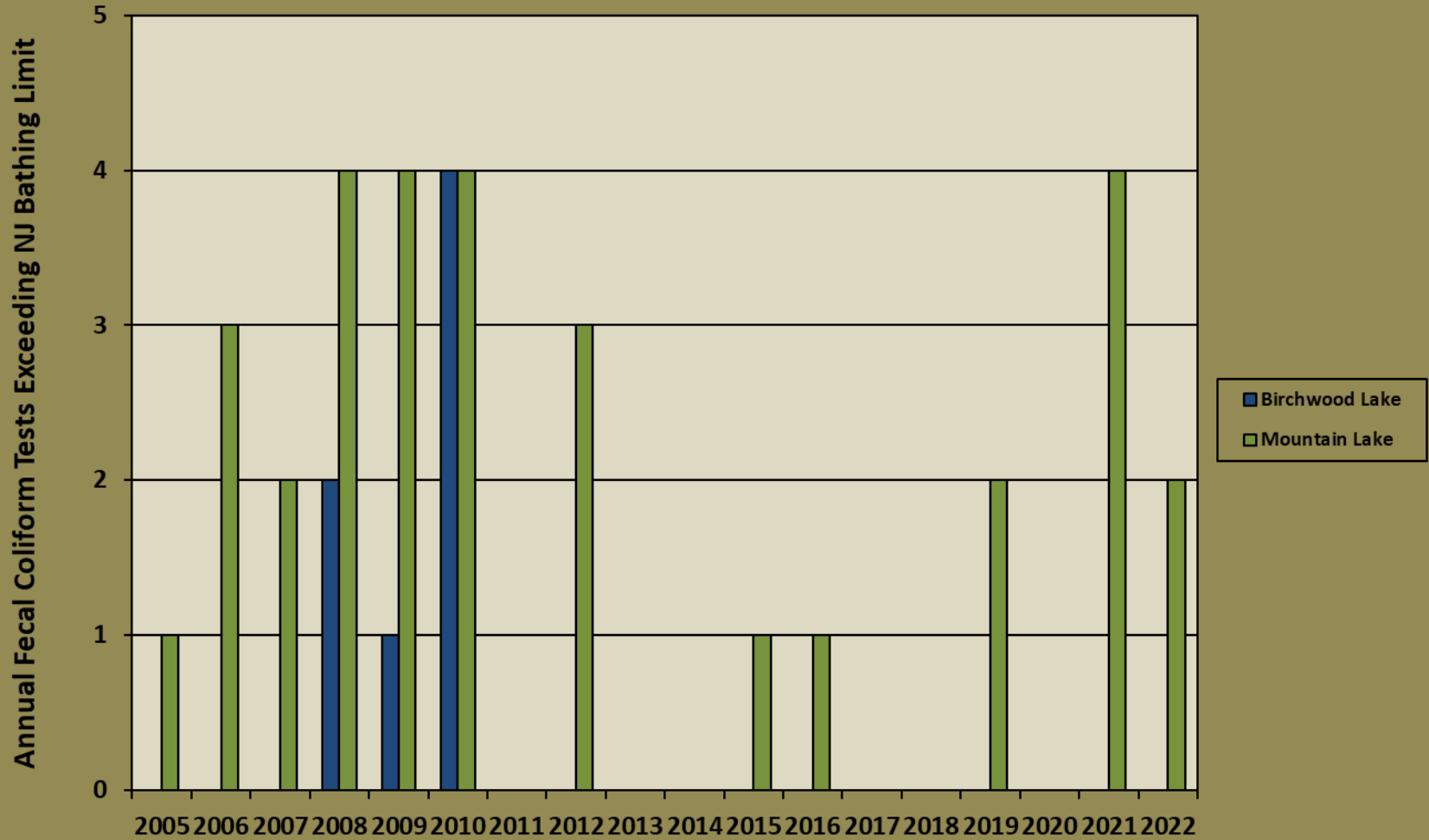
TPO4 Threshold 



Mountain Lakes 2022 Escherichia coli Data



**Annual Escherichia coli Test Failures
2005 to 2022**



Lakes Cleaning-2022

**Spring 2022 – Nine days with rake only
Cove Pond
Wildwood Lake**



Fall 2022 – Completion of Five-Year Plan with one week with two barges

2023 Recommended Lake Management

- **Continue WQ Program**
 - Weekly Surveys
- **Birchwood Lake Limited Herbicide Use**
 - Add'l Lily Control Lakewide
 - Maintain suitable recreational areas
- **Crystal Lake Herbicide Use as needed**
 - Generally reactive management – lilies / bassweed
- **Sunset Lake**
 - Whole Basin Water Lily Control
 - Aggressive bassweed management
 - Loosestrife Management
- **Olive, Shadow, Cove, Grunden's Pond**
 - Chelated copper algaecide / Earthtec
 - Bacterial Enhancement
 - Early season sodium aluminate treatments



2023 Recommended Lake Management (con't)

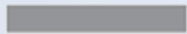
- **Mountain Lake**
 - Late Season Low Dose Alum Use
 - Reactive plant management
 - Water primrose management
 - Sonar not anticipated for milfoil control
- **Wildwood Lake**
 - Milfoil observed across southern lake in 2022
 - Procellacor in 2023
 - Alum: 1x
 - Water primrose management
- **Canal**
 - Monthly (at least) surveys
 - Treat as needed
 - Water primrose management
- **Sediment Depth Probing Survey (Outfalls)**
- **Mt. Lakes Plant Guide (March)**



Thank you! Questions?

By Bob Schindler

bschindler@solitudelake.com



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LAKE MANAGEMENT

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April 14, 2023