

The Borough of Mountain Lakes 2020 Year-End Report

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December 1st, 2020

SÖLITUDE
LAKE MANAGEMENT
Restoring Balance. Enhancing Beauty.

2020 Year-End Report

Borough of
Mountain Lakes
2020 Year-End Report

2020 Climate and Precipitation Data

Individual Lake Descriptions

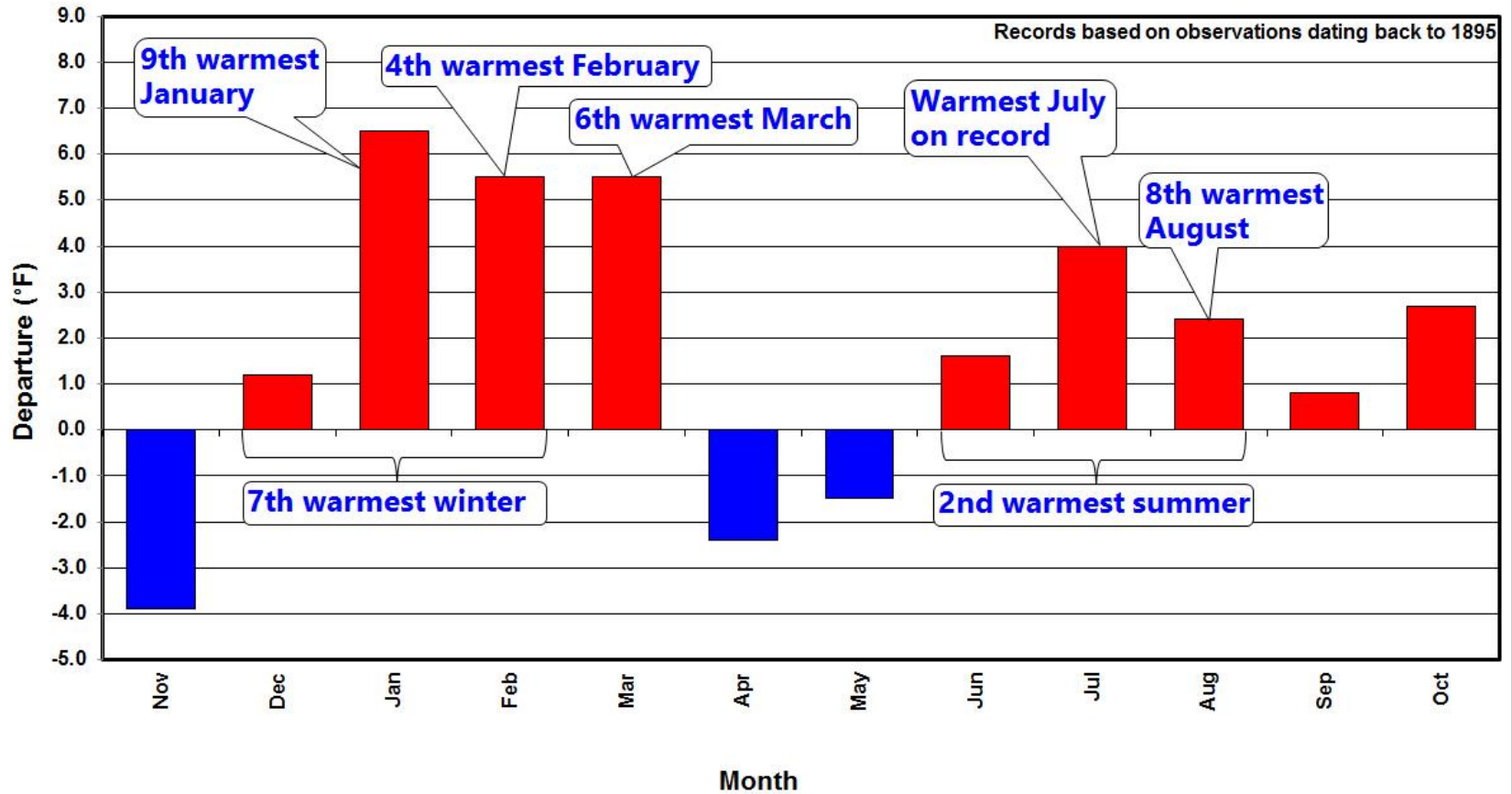
- 2020 Aquatic Plant and Algae Control
- 2007-2020 Historical Plant and Algae Control
- 2020 Water Quality and Phytoplankton Results

Additional Lake Management Projects

- Small Basin DO
- TPO4 at All Nine Lakes
- Birchwood and Mountain Lake Fecal Coliform Testing
- 2020 Lakes Cleaning Project
- Mountain Lakes Aquatic Plant Guide

NJ Monthly Temperature Departures (November 2019 – October 2020)

Departures calculated from differences between observed monthly temperatures and 1981–2010 monthly averages

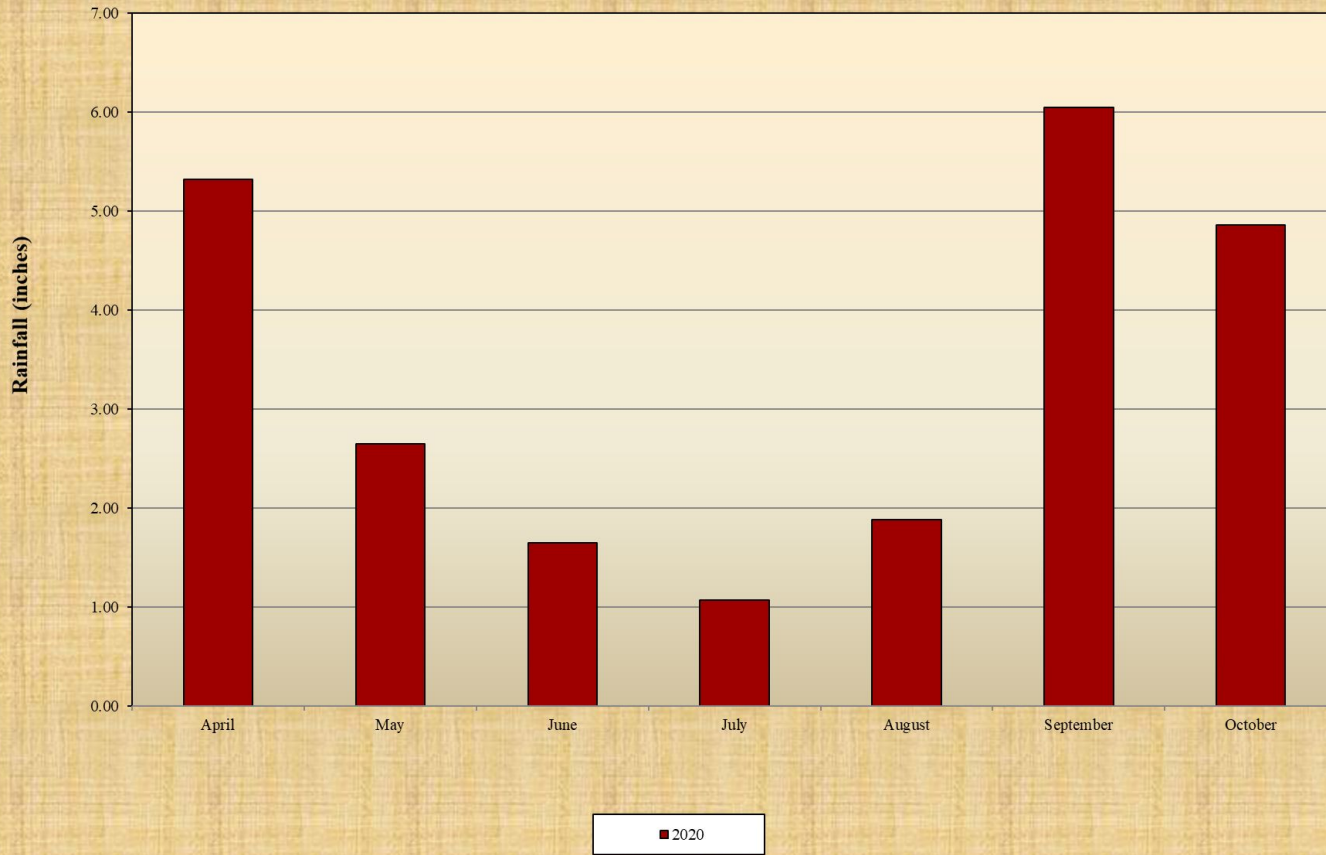


NJ Monthly Precipitation Departures (November 2019 – October 2020)

Departures calculated from differences between observed monthly precipitation and 1981–2010 monthly averages



**2020 Monthly Rainfall
Mountain Lakes, NJ**

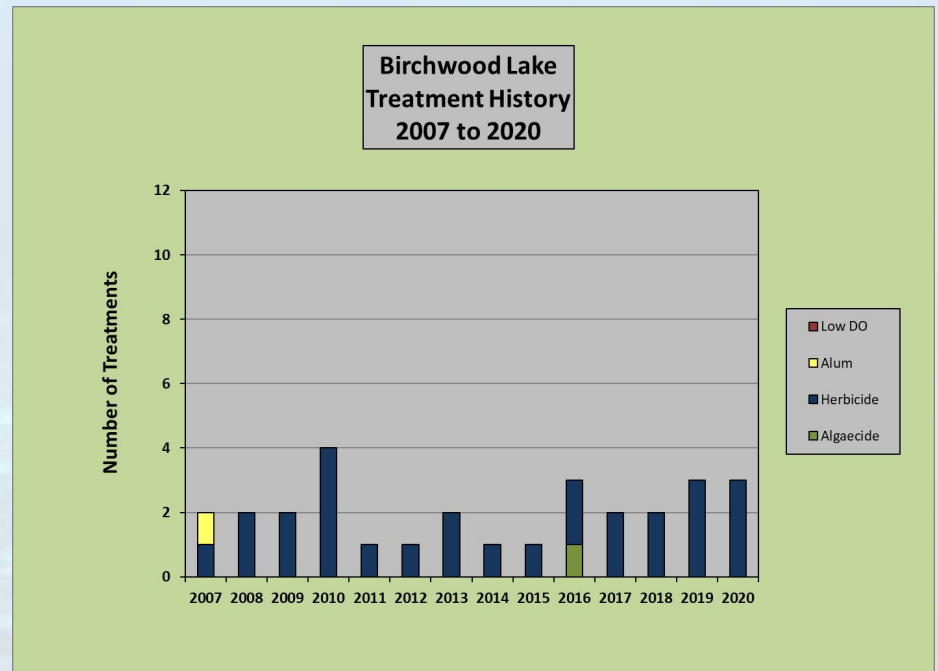


Birchwood Lake

Birchwood Lake			
Date	Product Applied	Acres Treated	Target Species
5/5/2020	Flumioxazin	1.5	Curly-leaf pondweed/ Low Water milfoil
6/23/2020	Rodeo	3	Water Lilies
7/2/2020	Tribune	0.5	Low milfoil/ Ribbon-leaf pondweed

Birchwood Lake Control Notes

- No Algaecide Applications
- Three Herbicide Applications
 - Pondweeds in swim lanes
 - Water Lilies
- Dam Vegetation Spray

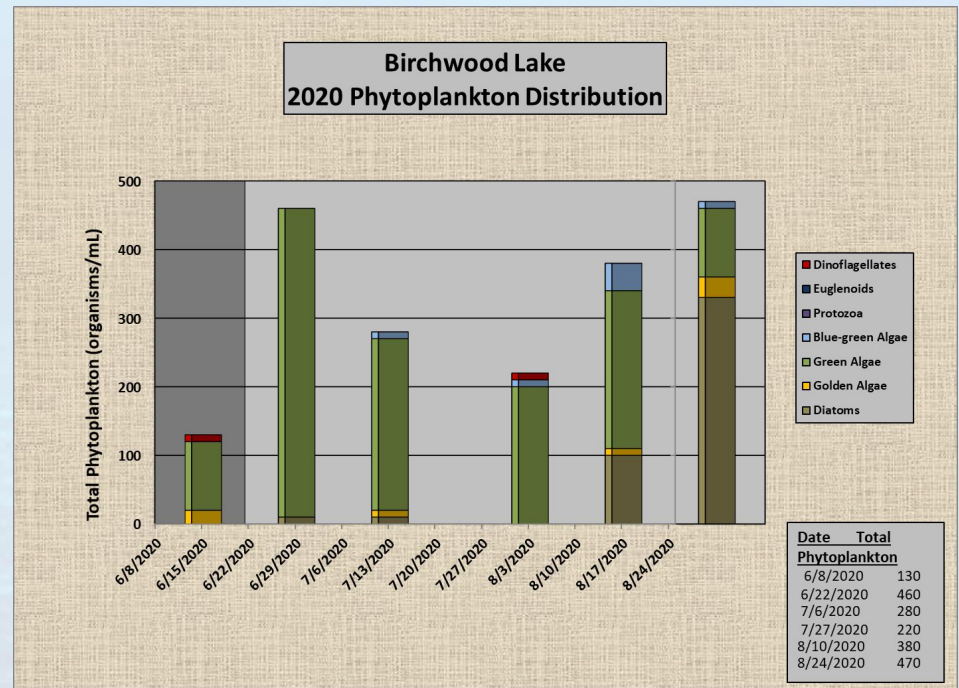


Birchwood Lake-Water Quality

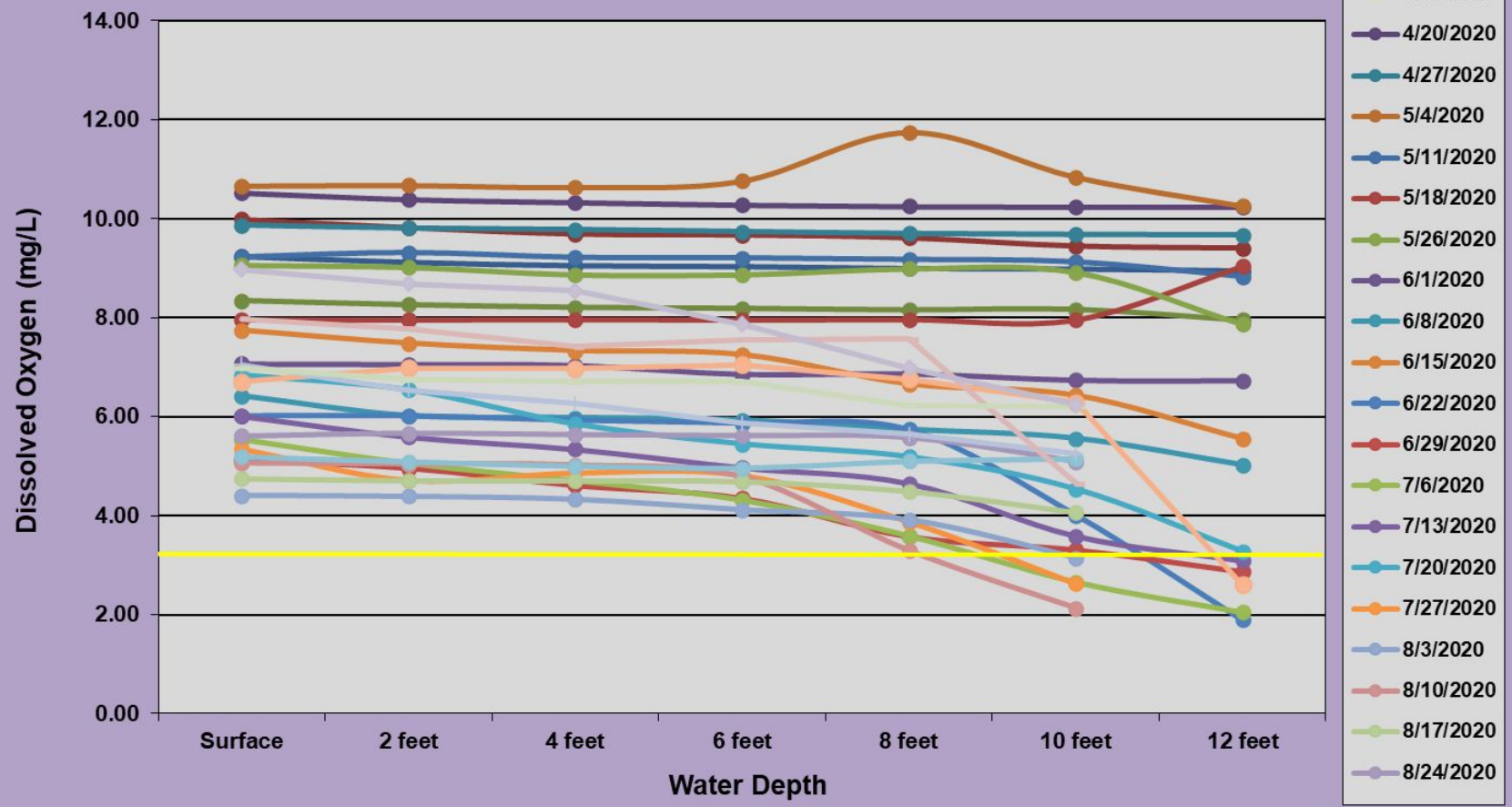
Birchwood Lake	units	6/8/2020	7/13/2020	8/24/2020
Temperature	°C	24.8	30.0	27.4
Dissolved Oxygen	mg/L	6.42	5.53	5.61
Alkalinity	mg/L	56	64	60
pH	SU	7.0	7.25	7.0
Nitrate	mg/L	ND	ND	ND
Total Phosphorus	mg/L	0.029	0.021	0.016
Turbidity	NTU	1.7	1.9	1
Water Clarity	feet	7.5	7.25	8.5

Birchwood Lake WQ Notes

- **Dissolved Oxygen**
Healthy oxygen all season
- **pH consistent all dates**
- **TPO4 favorable all dates**
- **Freshwater jellyfish**
- **Phytoplankton**
Low density on all dates
Traces B-G on four dates



Birchwood Lake 2020 Dissolved Oxygen Profile Data

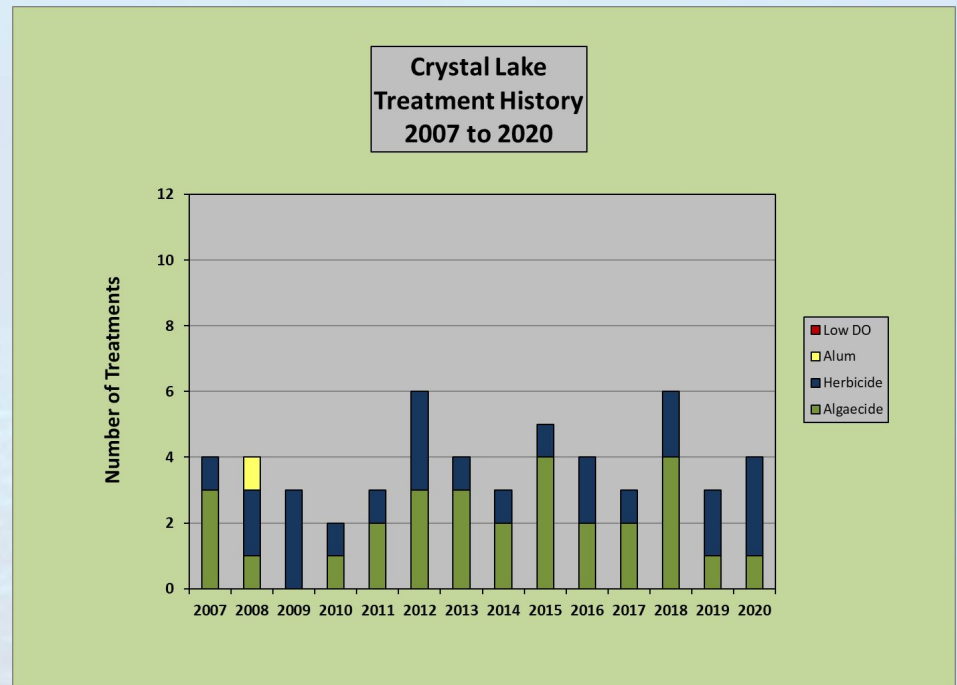


Crystal Lake

Crystal Lake			
Date	Product Applied	Acres Treated	Target Species
5/6/2020	Tribune	10	Curly-leaf pondweed
5/20/2020	Copper Sulfate	9.6	Filamentous Algae
6/26/2020	Aquastrike	4.5	Bassweed
9/23/2020	Rodeo	2	Water lilies

Crystal Lake Control Notes

- **One Algaecide Application**
 - Sparse filamentous algae
 - Green algae bloom August
- **Three Herbicide Applications**
 - Curly-leaf early season
 - Bassweed in June
 - Foliar Treatment in Sept.
- **Dam / cattails**

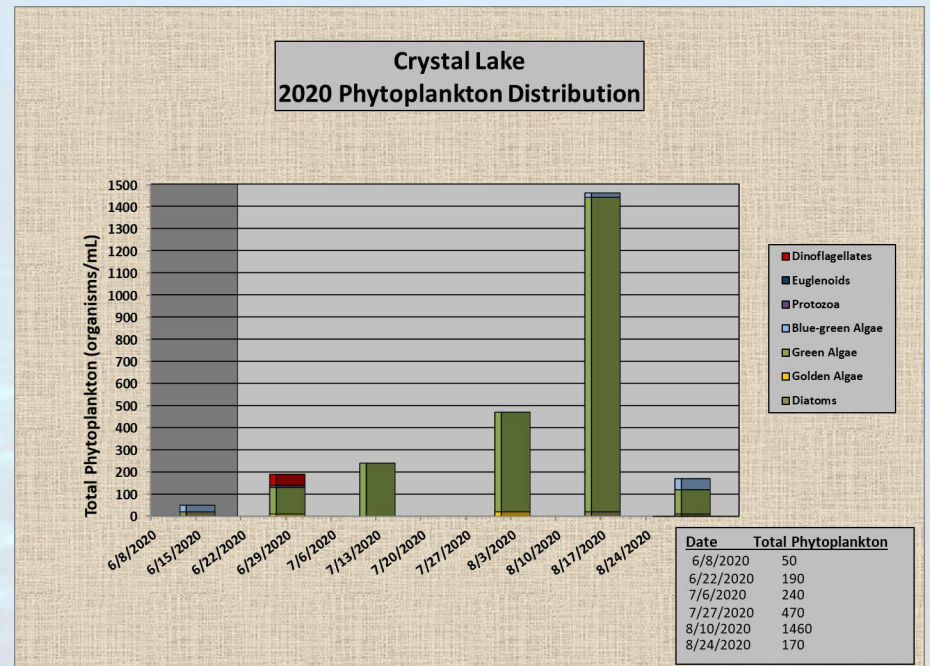


Crystal Lake-Water Quality

Crystal Lake	units	6/8/2020	7/13/2020	8/24/2020
Temperature	°C	25.4	30.8	27.9
Dissolved Oxygen	mg/L	8.54	6.87	7.81
Alkalinity	mg/L	56	64	60
pH	SU	7.0	7.5	7.25
Nitrate	mg/L	ND	ND	ND
Total Phosphorus	mg/L	0.015	0.019	0.022
Turbidity	NTU	5.3	2.2	1.7
Water Clarity	feet	15	12	7

Crystal Lake WQ Notes

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

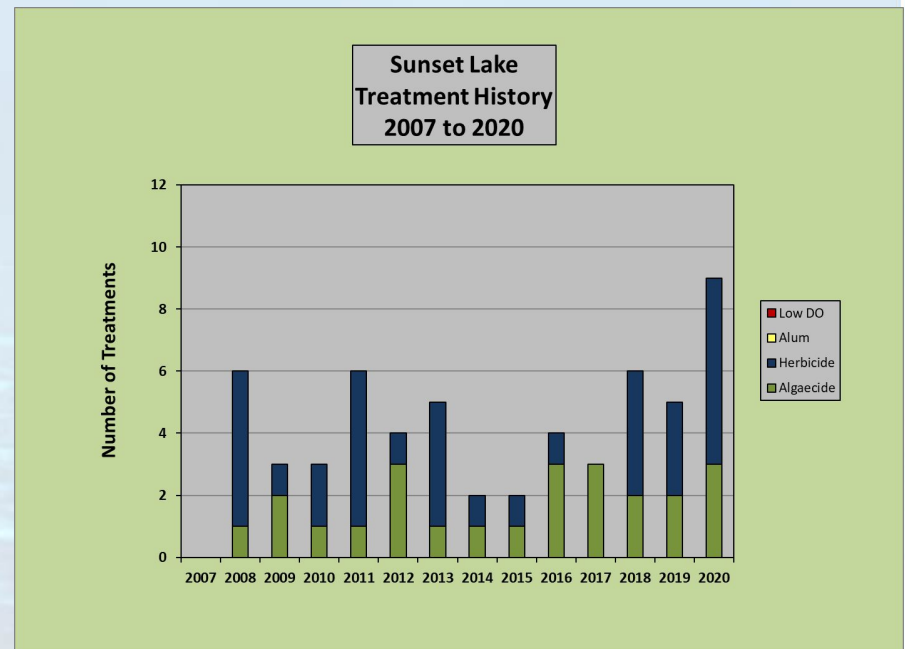


Sunset Lake

Sunset Lake			
Date	Product Applied	Acres Treated	Target Species
5/7/2020	Tribune	2.5	Curly-leaf pondweed
	Copper Sulfate	4	Filamentous Algae
5/21/2020	Aquastrike	4	Bassweed
	Copper Sulfate	4	Filamentous algae
6/15/2020	Rodeo	2	Water Lilies
6/29/2020	Flumioxazin	0.5	Water lilies
7/6/2020	Rodeo	3	Water lilies
	Copper Sulfate	1.5	Filamentous Algae
9/23/2020	Rodeo	3	Water lilies

Sunset Lake Control Notes

- **Three Algaecide Applications**
 - Target: Filamentous Algae
 - Limited Acreage (~9.5 ac)
- **Five Herbicide Applications**
 - Target: bassweed once 4 acres
 - Emphasize water lily control
 - Three treatments

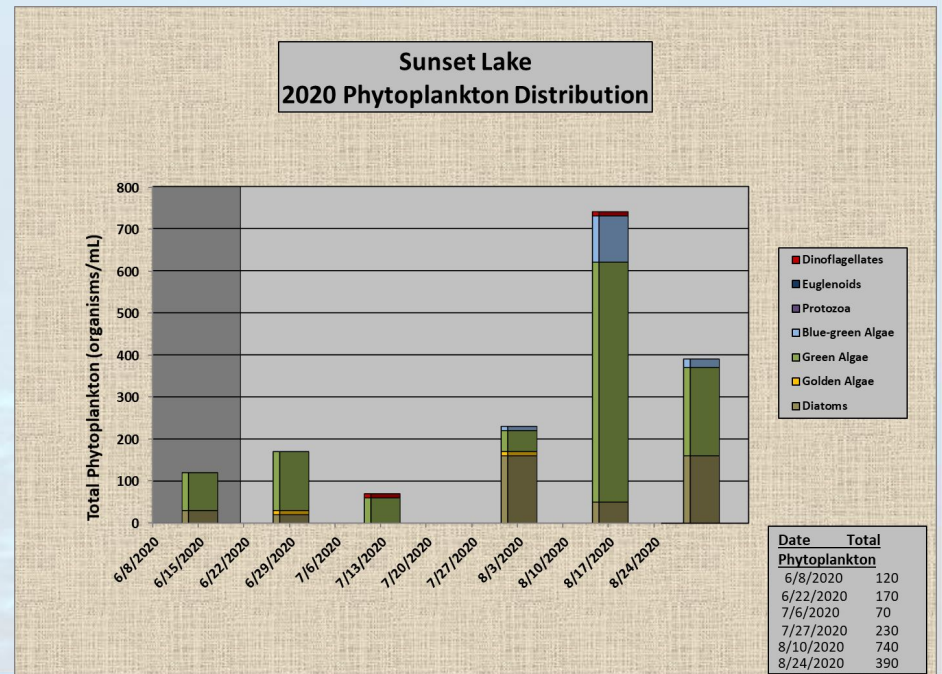


Sunset Lake-Water Quality

Sunset Lake	units	6/8/2020	7/13/2020	8/24/2020
Temperature	°C	25.2	30.9	28.4
Dissolved Oxygen	mg/L	7.24	5.98	6.02
Alkalinity	mg/L	60	64	64
pH	SU	7.0	7.5	7.25
Nitrate	mg/L	ND	ND	ND
Total Phosphorus	mg/L	0.025	0.031	0.044
Turbidity	NTU	1.8	2.2	4.5
Water Clarity	feet	8	8	6

Sunset Lake WQ Notes

- TPO4 elevated in July/August
- Phytoplankton
 - Suitable counts on most dates
 - Moderate Overall early August
 - green algae/
 - Trace BGA – 8/10 and 8/24 only
 - No phytoplankton treatments

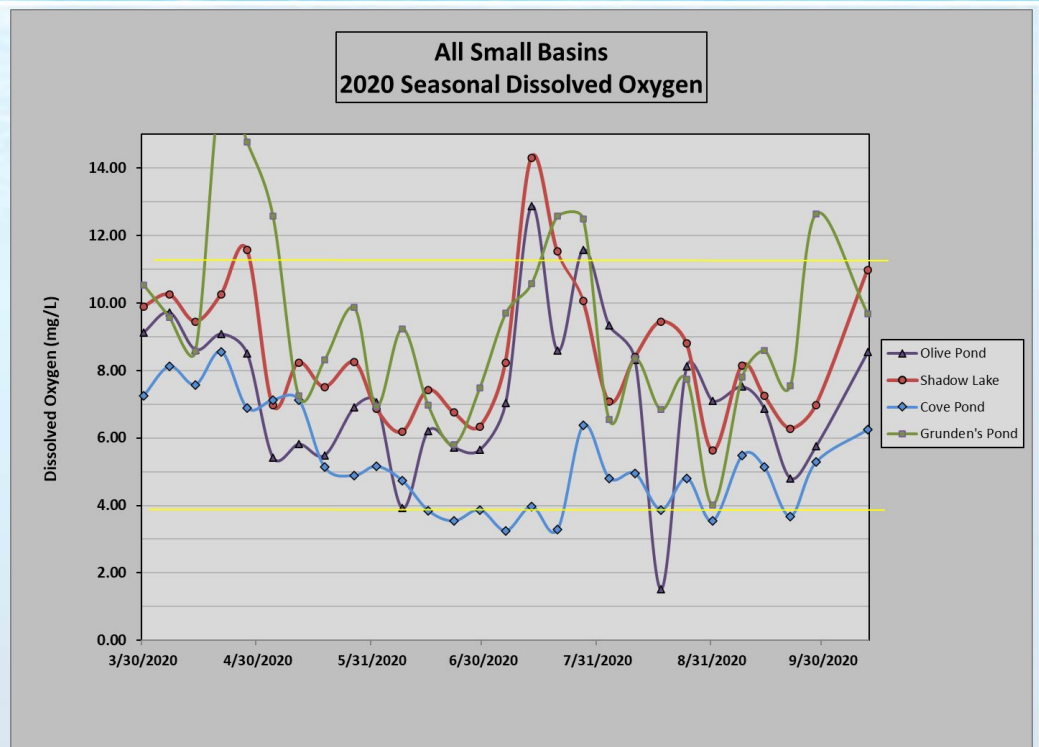


Small Basin Dissolved Oxygen

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: 1 dates (4 in 2018) / 1 dates Shadow Lake: 0 dates / 0 dates
 - Cove Pond: 5 dates / 9 dates
 - Grunden's Pond: 0 dates / 1 dates
- Overall, basins similar compared to 2019 season
- Olive Pond dissolved oxygen depressed due to water meal treatment

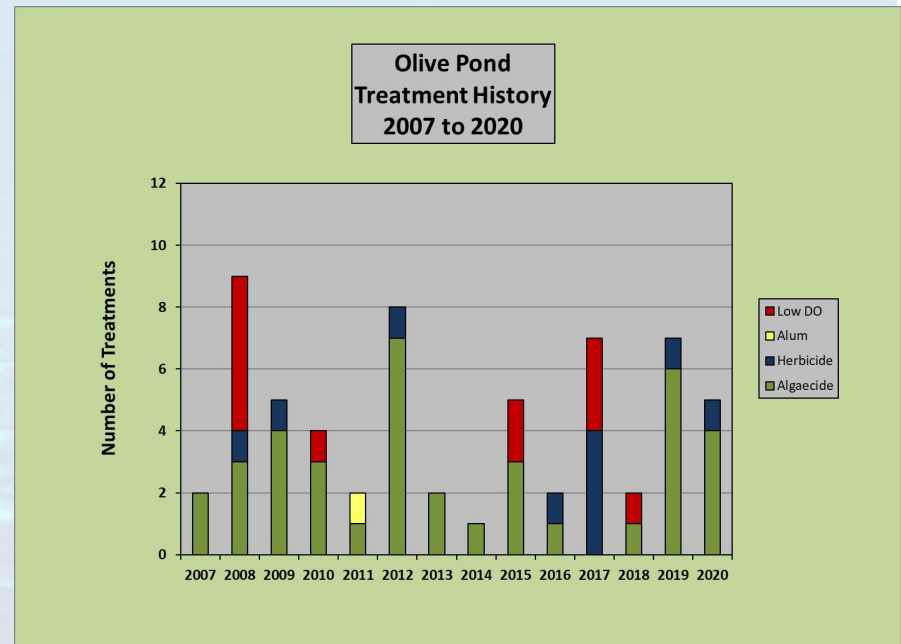


Olive Pond

Olive Lake			
Date	Product Applied	Acres Treated	Target Species
4/16/2020	Phoslock	1	Total Phosphorus
6/9/2020	Earthtec	0.5	Unicellular algae
6/23/2020	Earthtec	0.5	Unicellular algae
7/13/2020	Earthtec	0.5	Unicellular algae
7/29/2020	Earthtec	0.5	Unicellular algae
8/12/2020	Flumioxazin	0.5	Water meal

Olive Pond Control Notes

- **Four Algaecide Application**
 - Earthtec – preventative applications
 - Shadow Lake impact
 - Minimal Filamentous Algae
- **One Herbicide Application**
 - Water meal only (not in 2019)
- **Bacterial Enhancement**
 - Not on chart
- **Phoslock – phosphorus reduction**

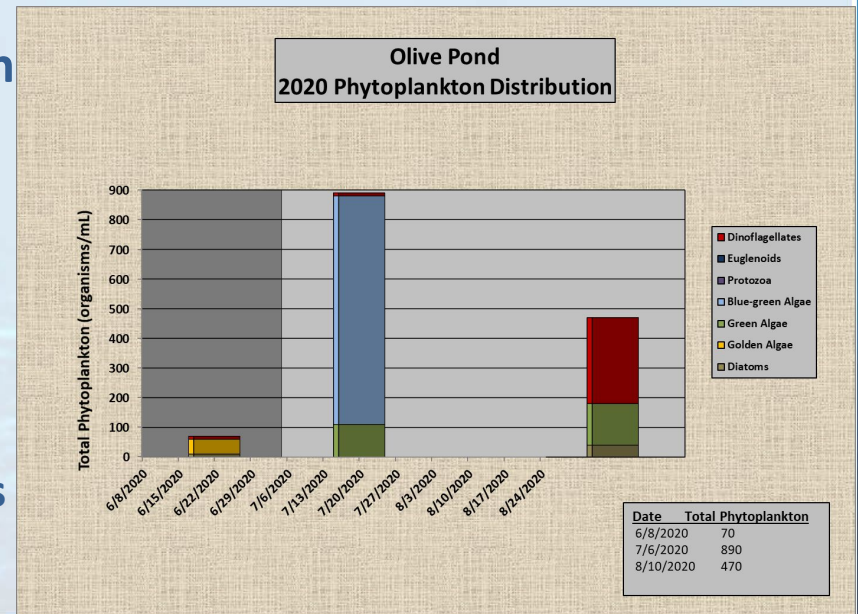


Olive Pond-Water Quality

Olive Lake	units	6/8/2020	7/13/2020	8/24/2020
Temperature	°C	24.8	30.5	28.5
Dissolved Oxygen	mg/L	3.92	12.87	8.12
Alkalinity	mg/L	56	64	68
pH	SU	7.5	8.25	8.0
Nitrate	mg/L	ND	ND	ND
Total Phosphorus	mg/L	0.060	0.113	0.052
Turbidity	NTU	2.0	12	2
Water Clarity	feet	4.5	2	4

Olive Pond WQ Notes

- **Oxygen overall good through season**
 - No disruption of service
- **High TPO4 all dates**
 - Typical in recent years
 - Need to actively manage
- **Phytoplankton**
 - Elevated July – blue-green algae
- **Turbidity high in July – algae / nutrients**

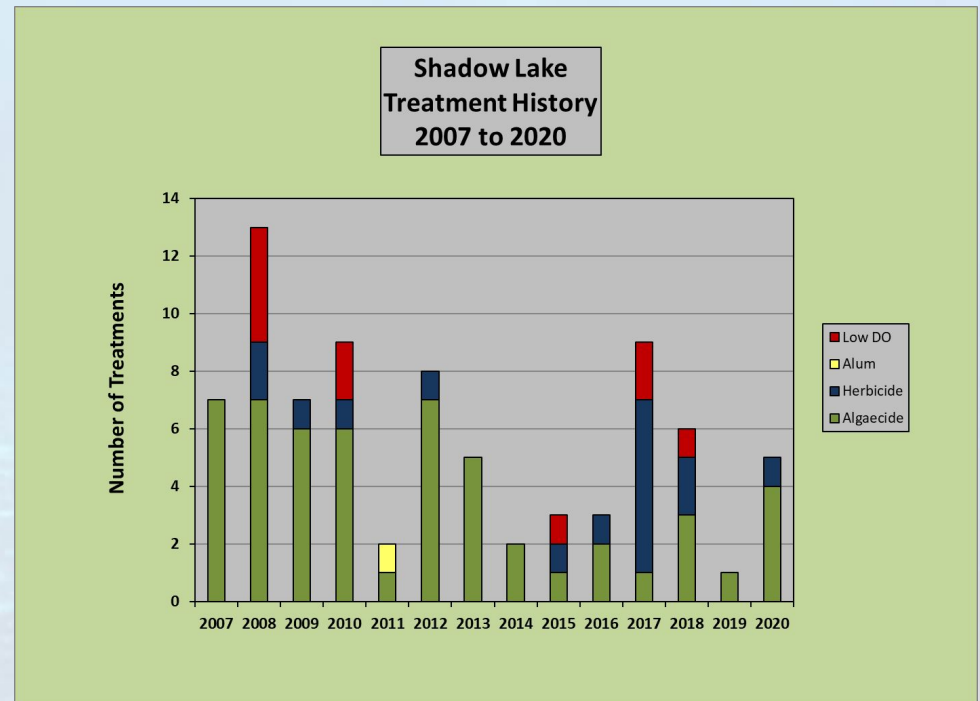


Shadow Lake

Shadow Lake			
Date	Product Applied	Acres Treated	Target Species
4/16/2020	Seclear	1.25	Filamentous algae
	Flumioxazin	1.25	Curly-leaf pondweed
6/26/2020	Captain XTR	1	Filamentous algae
7/16/2020	Earthtec	1	Unicellular algae
7/30/2020	Earthtec	1	Unicellular algae

Shadow Lake Control Notes

- **Four Algaecide Applications**
 - Early: Filamentous Algae
 - July Earthtec “prevent”
- **One Herbicide Application**
 - Early curly-leaf pondweed
 - No watermeal / duckweed

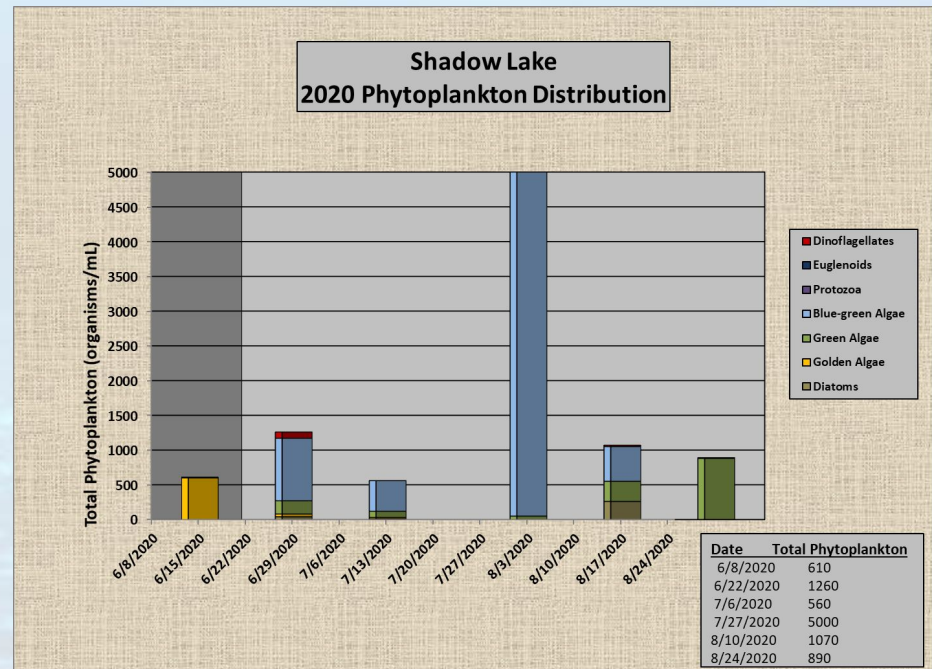


Shadow Lake-Water Quality

Shadow Lake	units	6/8/2020	7/13/2020	8/24/2020
Temperature	°C	24.9	31.1	29.3
Dissolved Oxygen	mg/L	6.18	14.31	8.81
Alkalinity	mg/L	56	68	64
pH	SU	7.25	8.0	7.75
Nitrate	mg/L	ND	ND	ND
Total Phosphorus	mg/L	0.066	0.265	0.112
Turbidity	NTU	2.6	40	6.4
Water Clarity	feet	3.5	2.5	4.5

Shadow Lake WQ Notes

- **Elevated TPO4 all dates**
 - Typical in recent years
 - Needs active management
- **Phytoplankton**
 - June and August favorable
 - BGA bloom through July
- **Turbidity High in July**
- **Increased oxygen fluctuation**

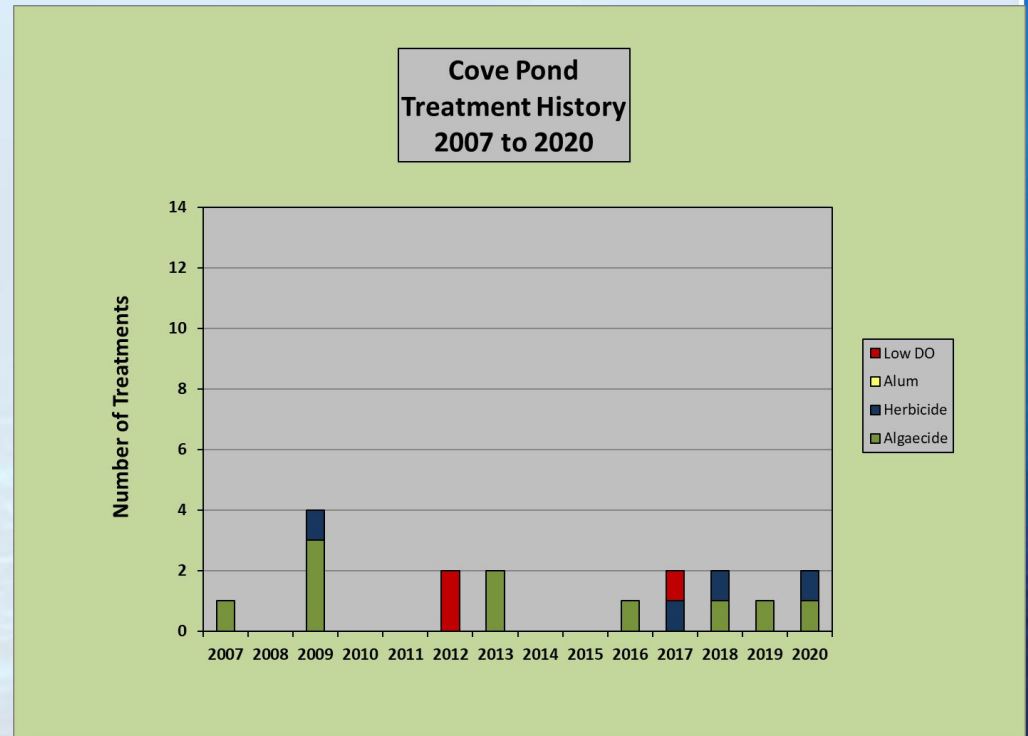


Cove Pond

Cove Pond			
Date	Product Applied	Acres Treated	Target Species
5/5/2020	Flumioxazin	0.5	Curly-leaf Pondweed
7/2/2020	Earthtec	0.5	Unicellular algae

Cove Pond Control Notes

- Typically Minimal Control Needed at this Site
- One Algaecide Application
- One herbicide application - Curly-leaf pondweed

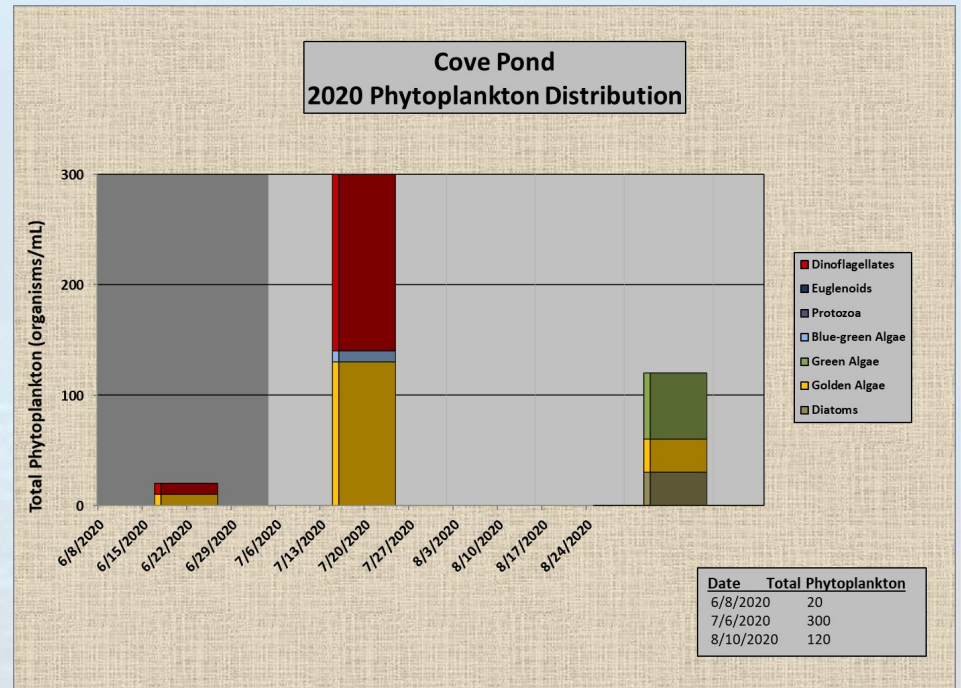


Cove Pond-Water Quality

Cove Pond	units	6/8/2020	7/13/2020	8/24/2020
Temperature	°C	24.5	30.5	28.6
Dissolved Oxygen	mg/L	4.74	3.97	4.81
Alkalinity	mg/L	60	64	62
pH	SU	7.25	7.5	7.5
Nitrate	mg/L	ND	ND	ND
Total Phosphorus	mg/L	0.047	0.058	0.04
Turbidity	NTU	2.5	5.1	2.2
Water Clarity	feet	3	3	3.5

Cove Pond WQ Notes

- Water Clarity consistent
- TPO4 Elevated on all Dates
- Phytoplankton
 - Golden algae (June)
 - Trace BGA bloom July
 - Earthtec

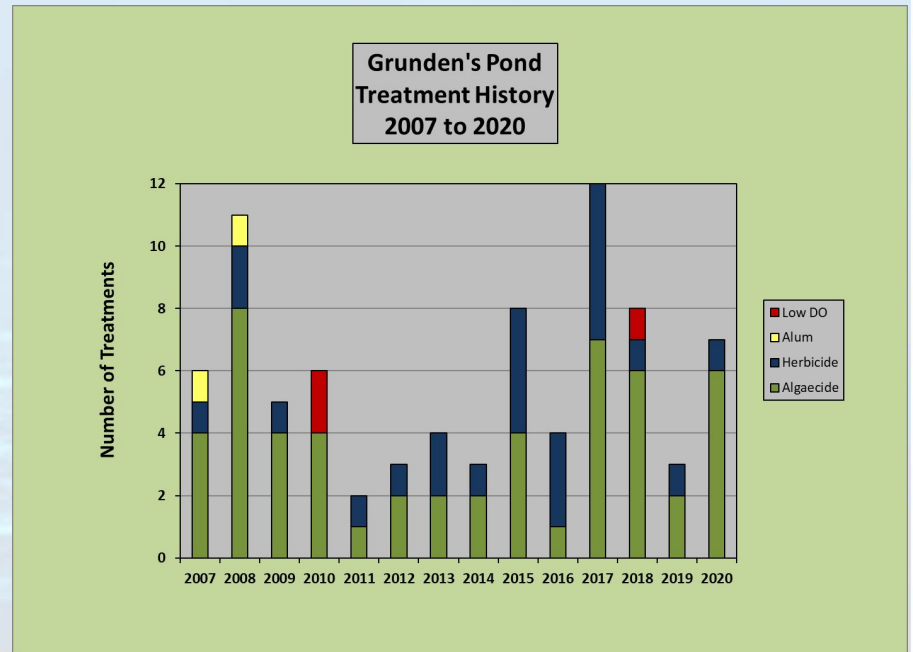


Grunden's Pond

Grunden's Pond			
Date	Product Applied	Acres Treated	Target Species
5/6/2020	Captain XTR	1.25	Filamentous algae
	Flumioxazin	1.25	Curly-leaf pondweed
6/9/2020	Earthtec	1	Unicellular algae
6/23/2020	Earthtec	1	Unicellular algae
7/13/2020	Earthtec	1	Unicellular algae
7/29/2020	Earthtec	1	Unicellular algae
8/18/2020	Earthtec	1	Unicellular algae

Grunden's Pond Control Notes

- **Six Algaecide Application**
 - Target: Filamentous Algae
 - Earthtec “prevent”
 - Continued Improvement
 - Seasonal low water level
- **One Herbicide Application**
 - Early: CLP
 - Only traces of water meal

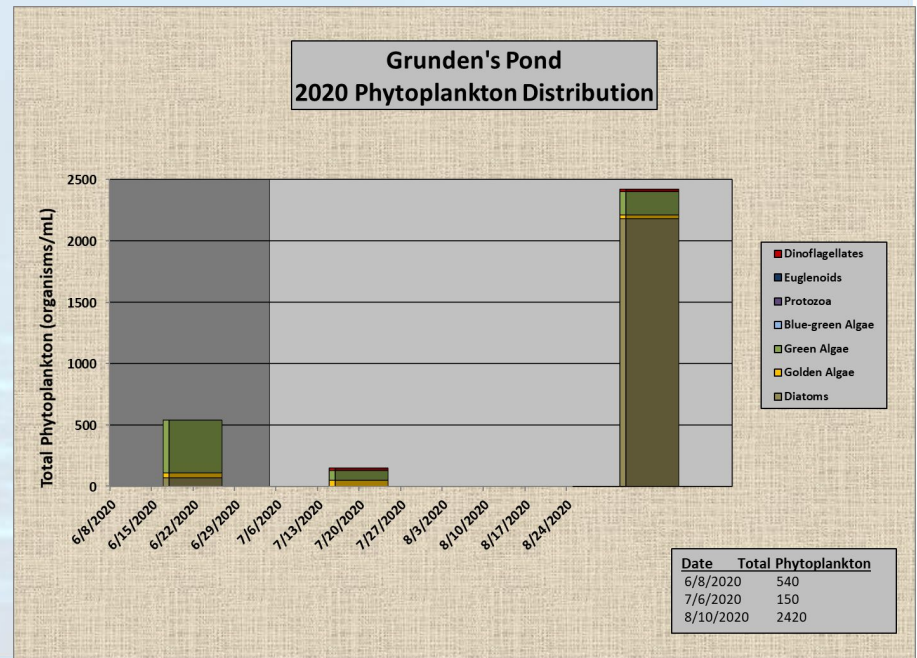


Grunden's Pond-Water Quality

Grunden's Pond	units	6/8/2020	7/13/2020	8/24/2020
Temperature	°C	24.5	31.2	28.1
Dissolved Oxygen	mg/L	9.24	10.58	7.74
Alkalinity	mg/L	60	64	64
pH	SU	7.25	7.5	7.5
Nitrate	mg/L	ND	ND	ND
Total Phosphorus	mg/L	0.121	0.082	0.047
Turbidity	NTU	11	5.8	4.1
Water Clarity	feet	3	4	4

Grunden's Pond WQ Notes

- **TPO4 elevated all three dates**
 - Requires active management
- **Phytoplankton**
 - Moderate density June
 - Green algae
 - Trace density July
 - Limited BG bloom
 - August - high diatom bloom
- **Favorable water clarity**



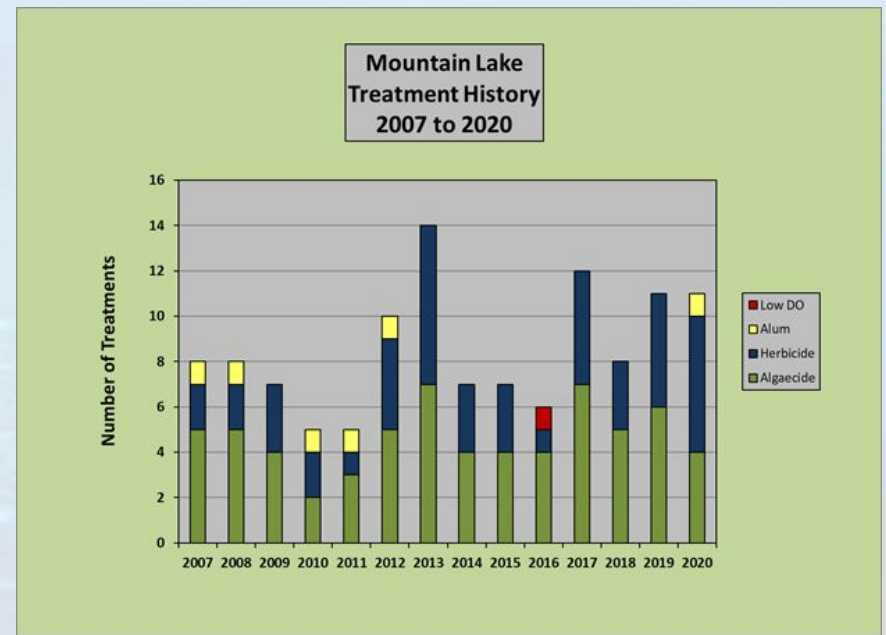
Mountain Lake

Mountain Lake			
Date	Product Applied	Acres Treated	Target Species
4/6/2020	Sonar Genesis	76.6	Eurasian Water milfoil
5/4/2020	Sonar Genesis	76.6	Eurasian Water milfoil
	Copper Sulfate	4	Filamentous Algae
5/20/2020	Copper Sulfate	17.5	Filamentous Algae
5/27/2020	Sonar Genesis	76.6	Eurasian Water milfoil
6/17/2020	Aquastrike	3	Bass weed
7/1/2020	Aquastrike	3.4	Bass weed
	Copper Sulfate	9.7	Filamentous algae
8/10/2020	Copper Sulfate	38	Unicellular algae
8/26/2020	Aluminum Sulfate	76.6	Nutrients
10/12/2020	Rodeo	0.2	Water primrose

Mountain Lake

Mountain Lake Control Notes

- **Six Herbicide Applications**
 - Eurasian Watermilfoil Management
 - Shoreline Bassweed
 - Shoreline water primrose
- **Four Algaecide Applications**
 - Filamentous Algae – (~30 acres)
 - Lower abundance
 - One BG algae treatment - bloom
- **Alum treatment in August**
 - Nutrient release from treatment
 - First since 2012
 - **Not Planned for 2021**

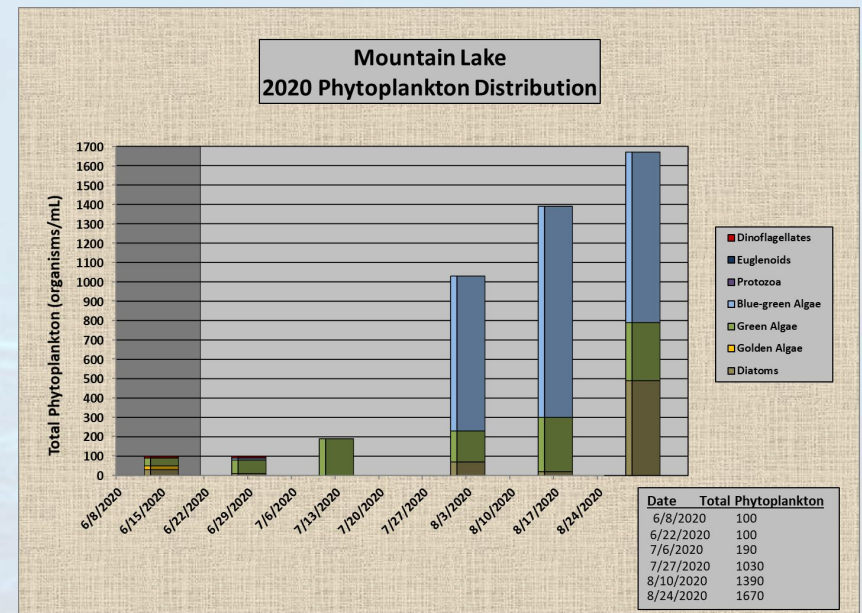


Mountain Lake-Water Quality

Mountain Lake	units	6/8/2020	7/13/2020	8/24/2020
Temperature	°C	25.9	29.1	28.3
Dissolved Oxygen	mg/L	8.59	7.46	8.54
Alkalinity	mg/L	68	72	72
pH	SU	7.25	7.5	7.5
Nitrate	mg/L	ND	ND	ND
Total Phosphorus	mg/L	0.032	0.027	0.025
Turbidity	NTU	2.7	1.9	2.2
Water Clarity	feet	10	8.5	6.5

Mountain Lake WQ Notes

- Water Clarity mostly favorable
- TPO4 elevated in June
- Oxygen levels stable
- Phytoplankton
 - Counts low June and early July
 - Moderate BGA bloom in late July through August
 - Required rapid response 8/10
 - Copper sulfate
 - Aluminum sulfate



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

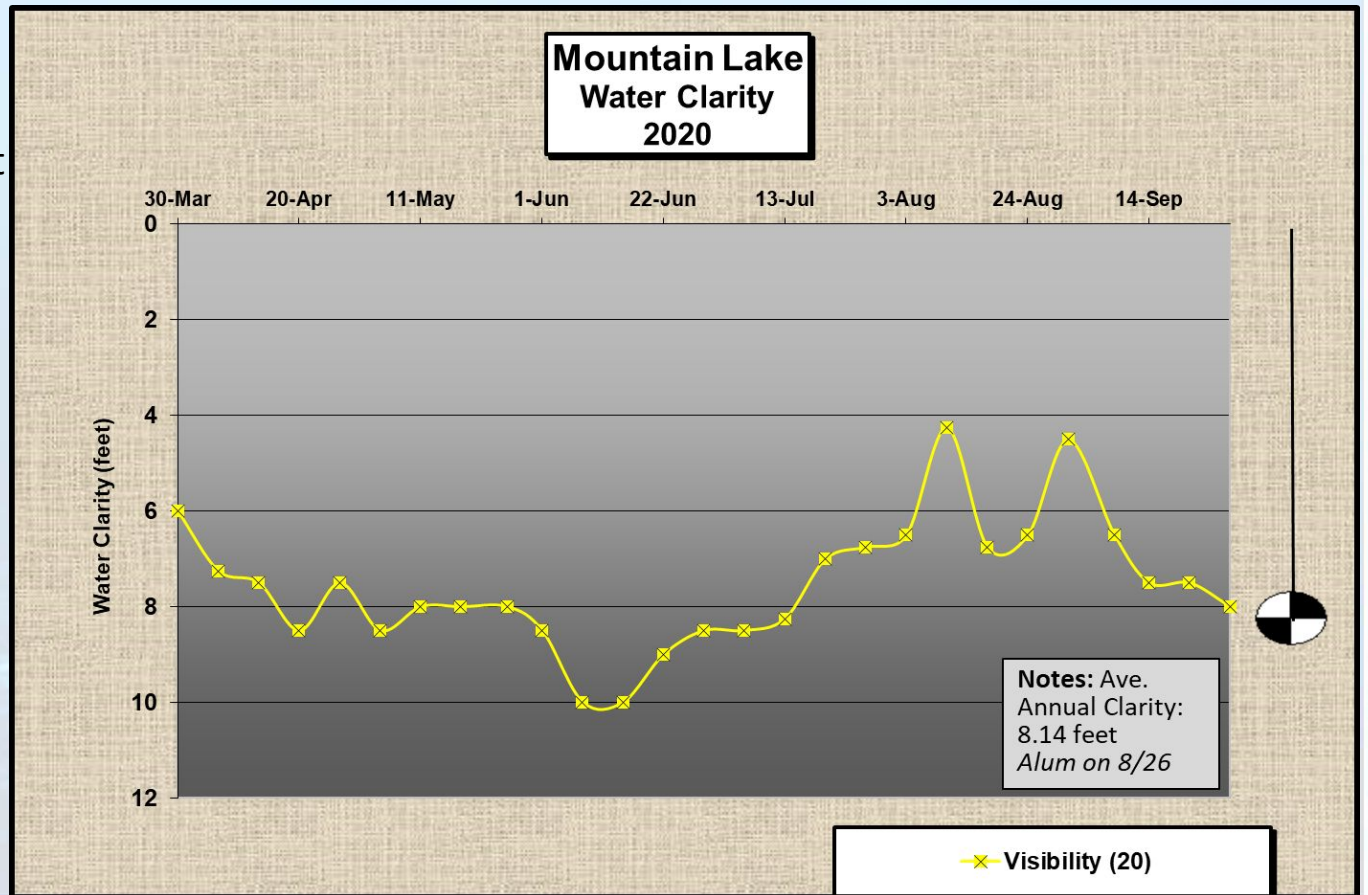
2015: 9.94 feet

2016: 6.18 feet

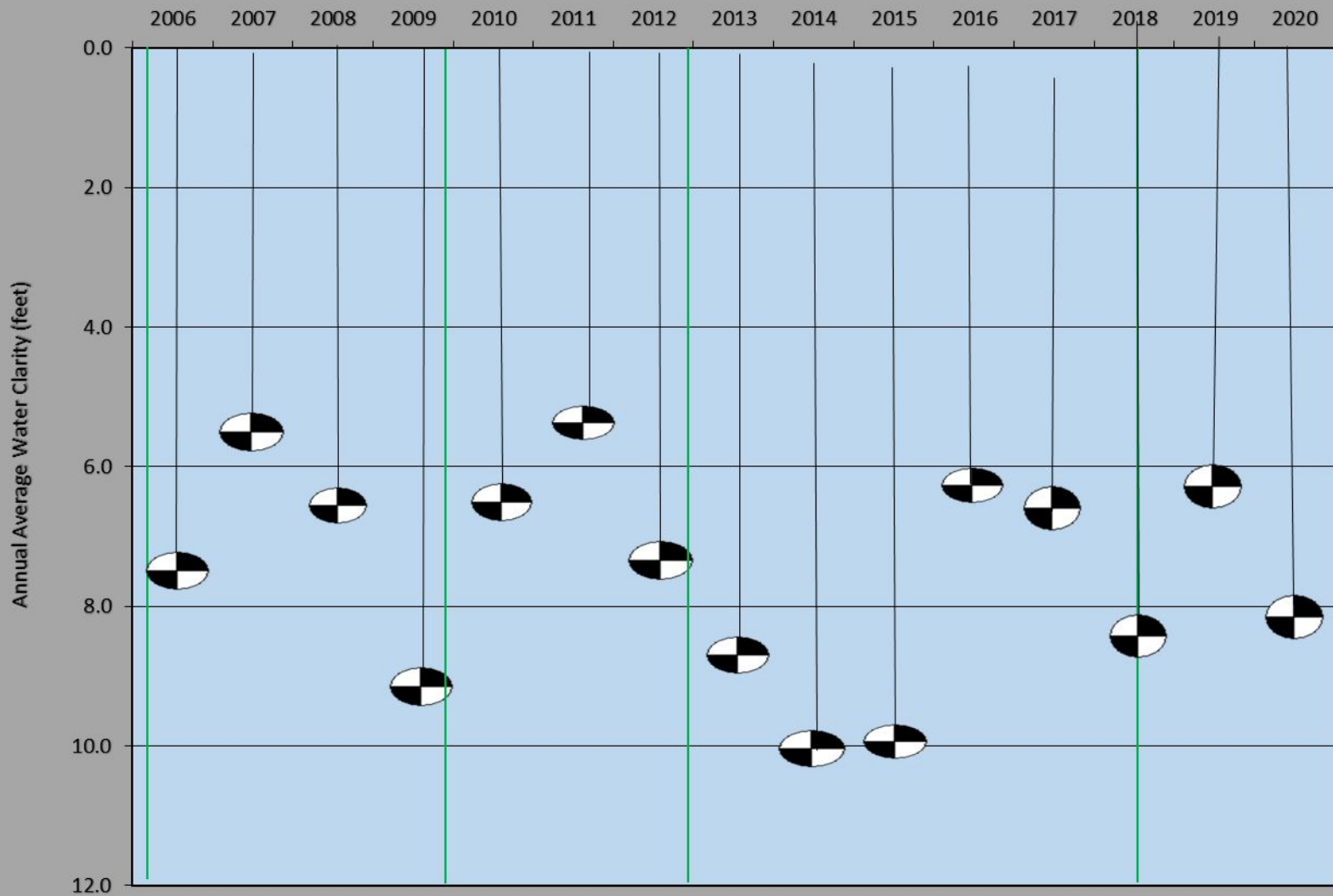
2018: 8.34 feet

2019: 6.32 feet

2020: 8.14 feet



Mountain Lake Annual Average Water Clarity

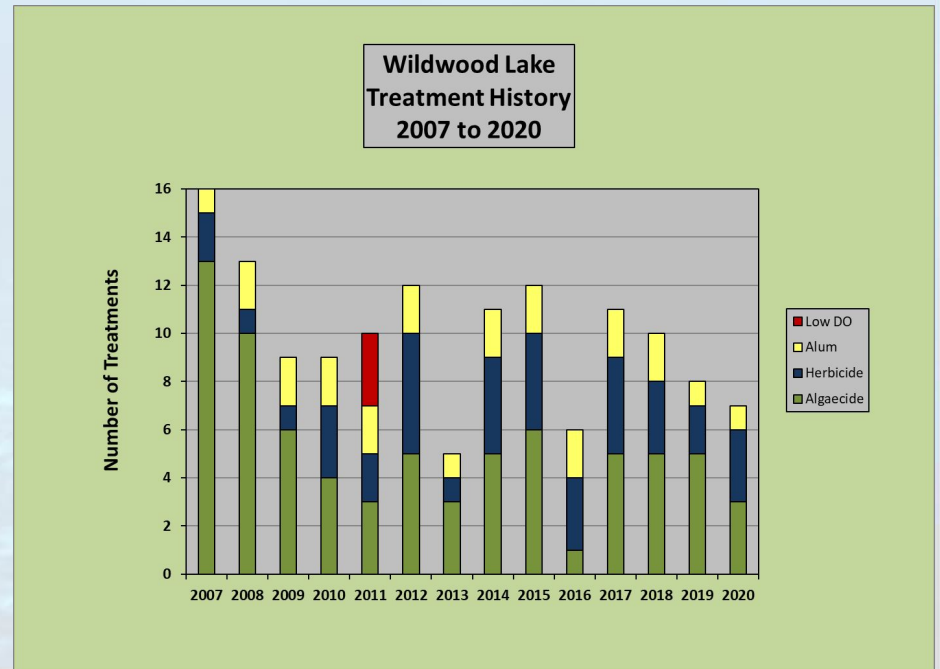


Wildwood Lake

Wildwood Lake			
Date	Product Applied	Acres Treated	Target Species
4/15/2020	Aluminum Sulfate	15.7	Nutrients
5/20/2020	Tribune	5	Curly-leaf Pondweed
	Copper Sulfate	5	Filamentous algae
6/17/2020	Copper Sulfate	7.5	Filamentous Algae
7/16/2020	Aquastrike	2.25	Naiad
	Copper Sulfate	7.5	Filamentous algae
10/12/2020	Rodeo	0.1	Water primrose

Wildwood Lake Control Notes

- **Three Herbicide Applications**
 - Early curly-leaf pondweed
 - Mid-summer naiad
 - Shoreline water primrose
- **Three Algaecide Application**
 - All Filamentous algae
 - Average Year: 4
- **Alum Use (1x)**
 - Reduced from 2 - comparisons
 - Late April
 - Inc. clarity = inc. plants

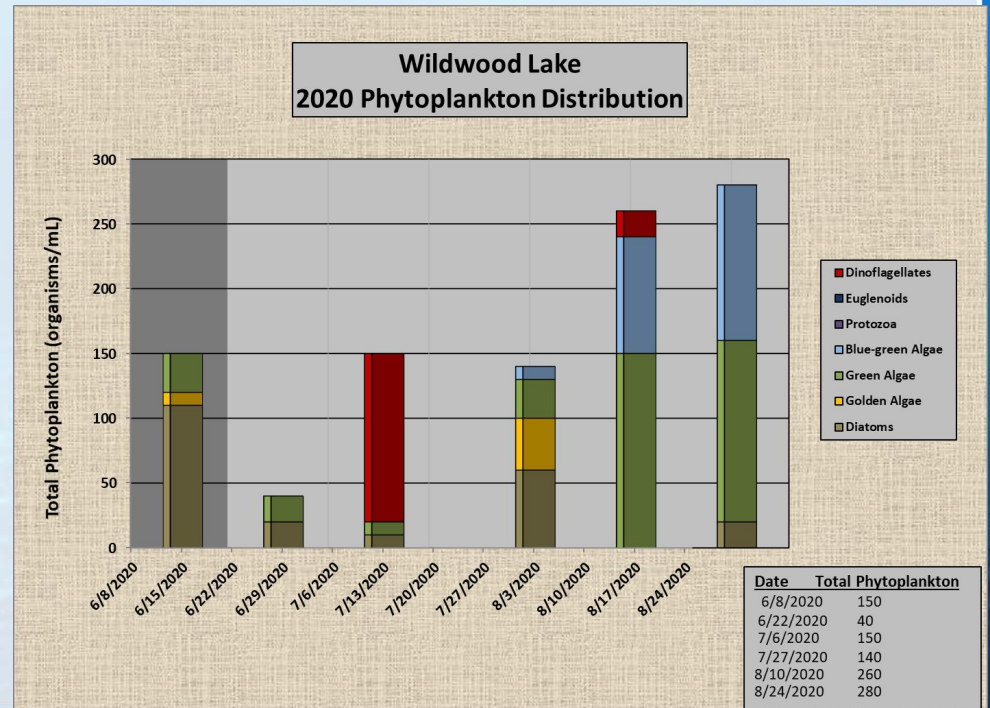


Wildwood Lake-Water Quality

Wildwood Lake	units	6/8/2020	7/13/2020	8/24/2020
Temperature	°C	25.9	29.5	29.8
Dissolved Oxygen	mg/L	8.97	6.58	7.82
Alkalinity	mg/L	80	72	76
pH	SU	7.25	7.5	7.5
Nitrate	mg/L	ND	ND	ND
Total Phosphorus	mg/L	0.032	0.022	0.013
Turbidity	NTU	3.2	1.9	1.4
Water Clarity	feet	8	9	10

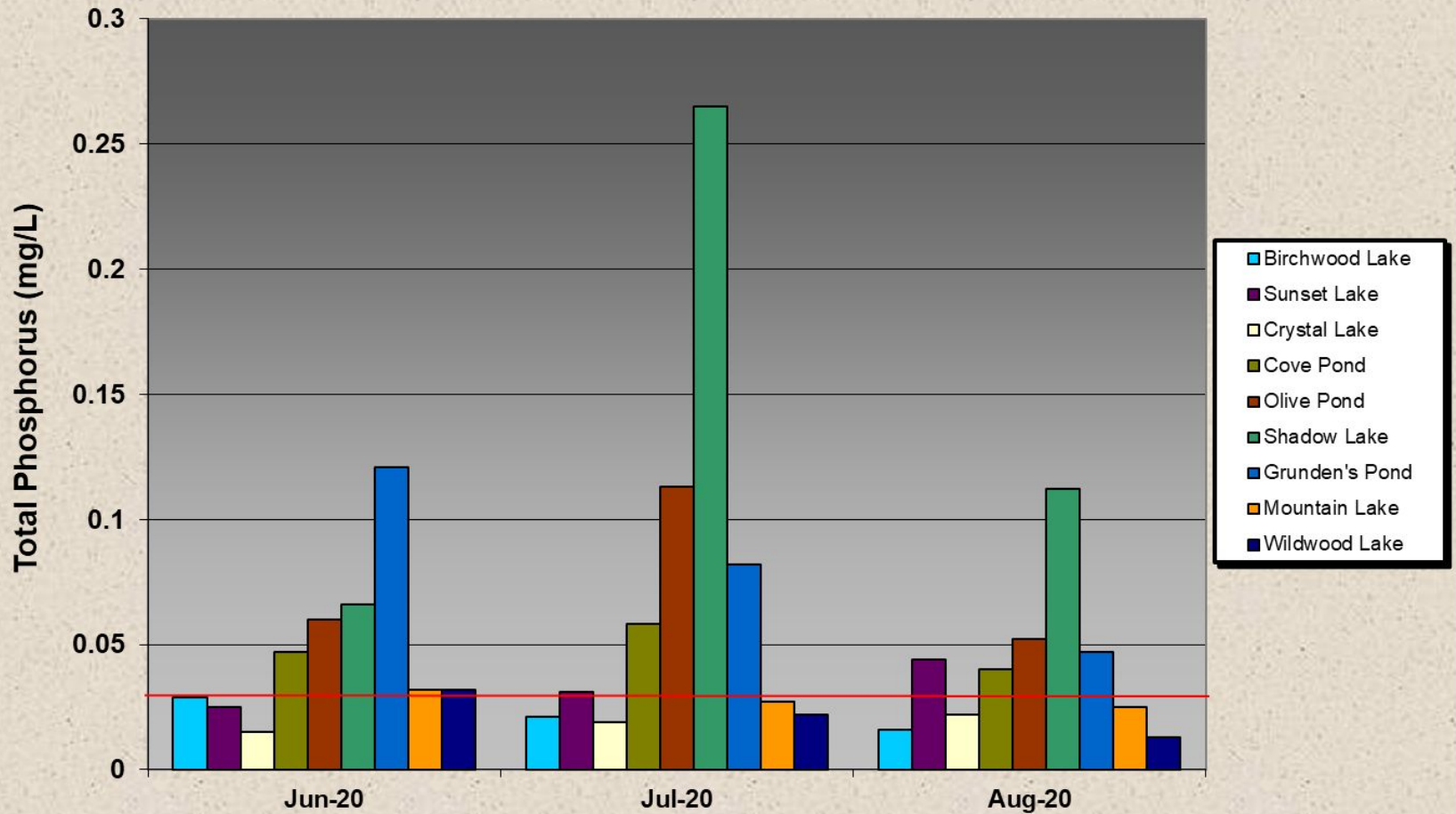
Wildwood Lake WQ Notes

- TPO4 managed all season
 - Slightly elevated in June
 - Alum Use / plant growth
- Phytoplankton
 - Light and favorable June/July
 - Trace BGA late July/August
 - No unicellular treatments
 - No “blooms”

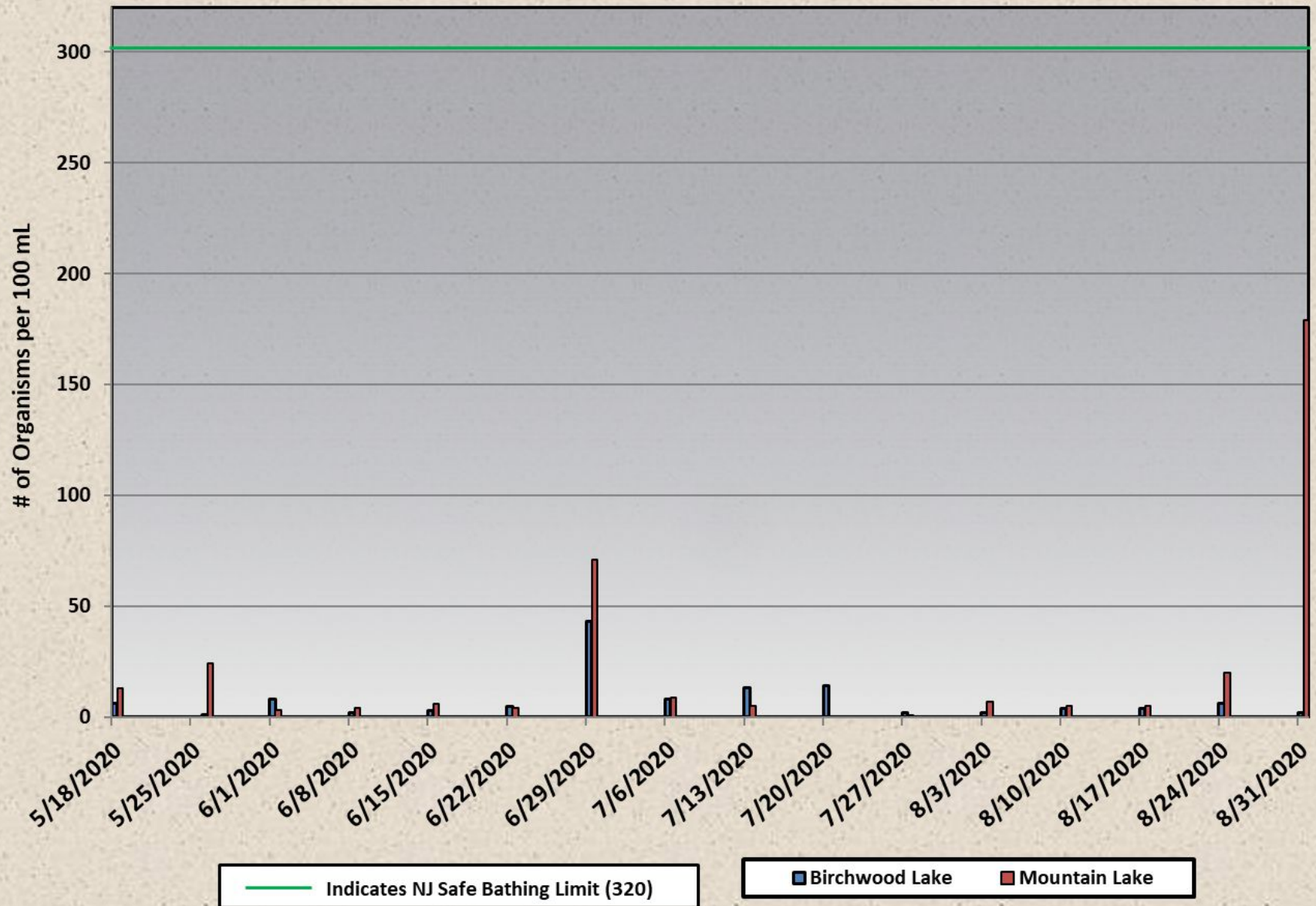


Mountain Lakes 2020 Total Phosphorus

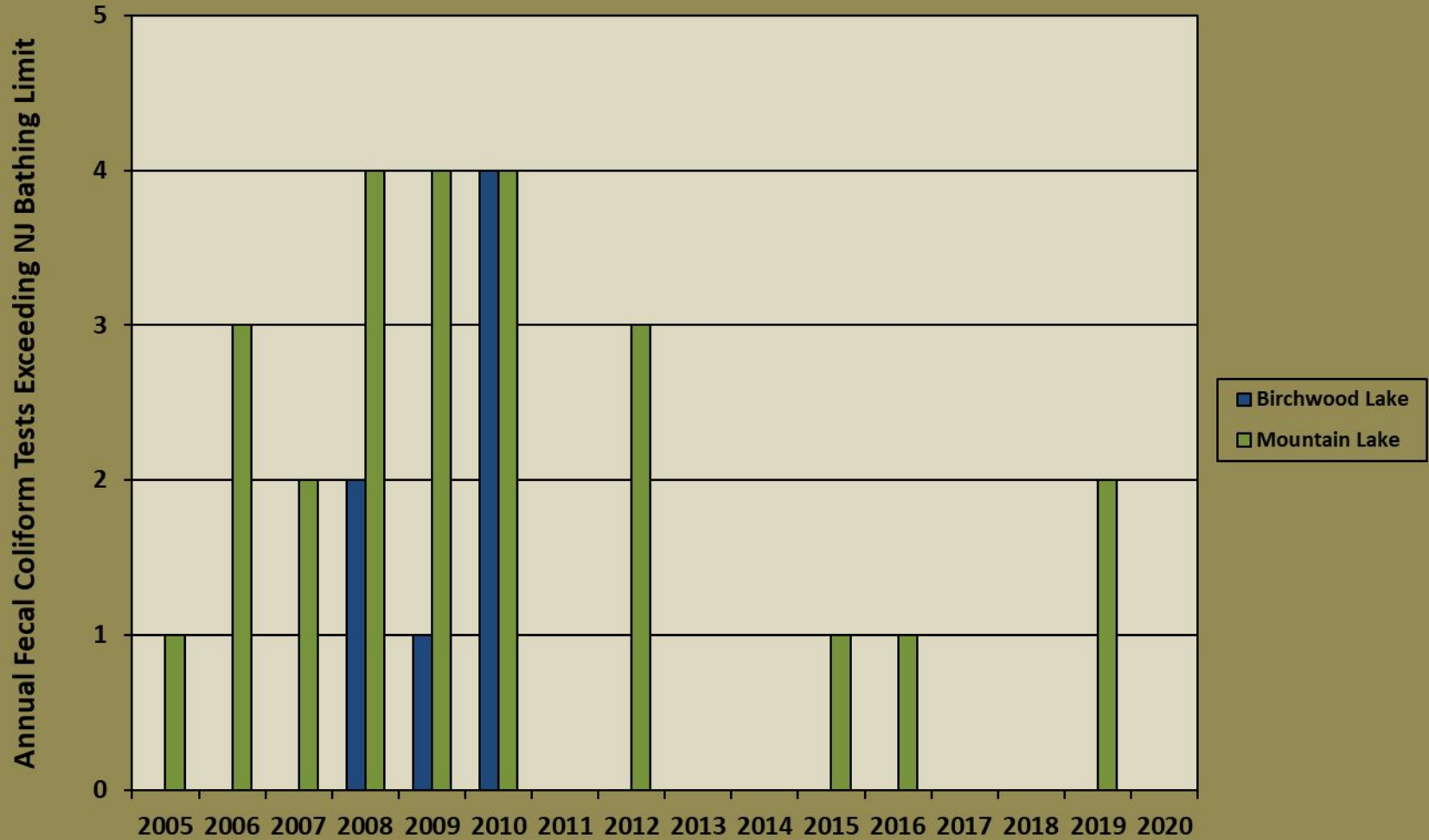
TPO4 Threshold 



Mountain Lakes 2020 Escherichia coli Data



Annual Escherichia coli Test Failures 2005 to 2020



Lakes Cleaning-2020

**2019 Birchwood Raking Initiated
Planned to be 3-5 year Program**

2019:

Two weeks in October

Hydro rake + harvester

Based on Productivity – on schedule

2020 – Two Weeks to be completed at Birchwood in December

SOLitude / Borough will work with Engineers to finalize permitting plan



Fanwort: Early Detection/Rapid Response (EDRR)

Discovered during Canal Survey

- **August 22, 2016 (Monday)**
 - Routine Biological Monthly Survey
 - Increased plant growth following dredging
 - Creeping Water Primrose (invasive)
- **Treatment: August 25, 2016 (Thursday)**
 - Needed to amend the permit
 - Clipper (high dose)
 - Installed Erosion Barriers
 - Reduce Water Flow
 - Restrict Resident Movement
- **2018 – no Fanwort observed**
- **2019 – no Fanwort observed**
- **2020 – no Fanwort observed**



2017/2018 Procedures

Increased Canal Surveys
Inc. Mountain/Wildwood Surveys
Aggressive herbicide Use
(Wildw.)
Educational Outreach

- Mt. Lakes Plant Guide

2020 Recommended Lake Management

- **Continue WQ Program**
 - Weekly Surveys
- **Continue Birchwood Rake Cleaning**
 - Pursue Dredging permits for 2021 and beyond
- **Birchwood Lake Limited Herbicide Use**
 - Add'l Lily Control Lakewide
 - Explore Aeration System Upgrades
 - Maintain suitable recreational areas
 - Bacterial Enhancement?
- **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



2019 Recommended Lake Management (con't)

- **Mountain Lake**
 - Milfoil observations in 2019 – Sonar in 2020
 - Early Season Low Dose Alum Use
 - Bacterial Enhancement test site
- **Wildwood Lake**
 - Continued Aggressive Herbicide Use
 - Late season naiad growth
 - Alum: 1x
- **Canal**
 - Monthly (at least) surveys
 - Treat as needed
- **Sediment Depth Probing Survey (Outfalls)**
- **Mt. Lakes Plant Guide (March)**



Thank you! Questions?

By Bob Schindler

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January 26, 2021