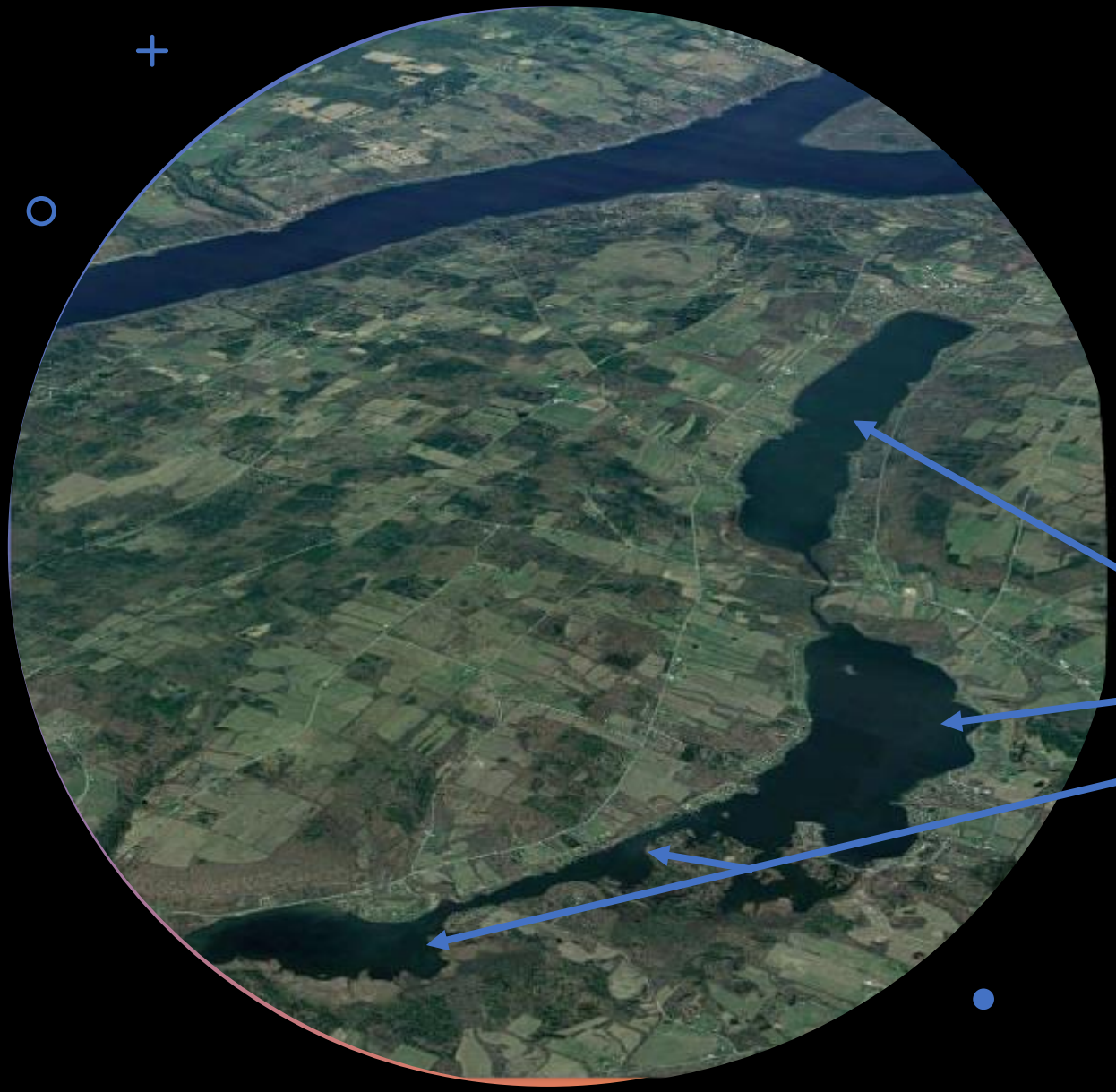
Lamoka – Waneta Lake Management Comprehensive Plan

October 2023

LWLA Lake Management Team

Comprehensive Plan for Long Term Sustainability of our Lakes

1. Problem Definition
2. Goals and Objectives
3. Supporting Data
4. Mitigation Strategies (with priority actions/projects)
5. Lake Action Advocacy Strategies
6. Schedule and Key Events
7. Funding and Sources



What is the Lake System?

Lake System includes:

Waneta Lake (North) – 780 Acres

Lamoka Lake (Central) – 588 Acres

Mill Pond and channel (South) – 238 Acres

Bradford Dam - downstream of Mill Pond

Small channels connect the bodies of water

Historical Significance

- 4500 Years Ago, the Lamoka Culture located on the East side of the Lamoka-Waneta Channel. Residents here until about 1300 BC.
- Listed on the National Register of Historic Places, this site is the first evidence of a hunting/gathering community in North America.
- The site is currently owned by The Archaeological Conservancy.
- This site places limits on maintenance activities on the east side of the channel.

The overall goal of the Lamoka-Waneta Lake Management Plan is the protection, restoration, and enhancement of water quality and living resources in the Lamoka-Waneta Watershed.

The specific objectives are:

1. To improve the water quality of Lamoka and Waneta Lakes
2. To improve the quality of water resources in the Lamoka-Waneta Lakes Watershed
3. To protect the Lamoka and Waneta Lakes Watershed's natural resources
4. To identify challenges and barriers to water quality protection and to suggest means to overcome them
5. To protect the high quality of life enjoyed by residents of the Lamoka-Waneta Watershed
6. To improve water-dependent recreational opportunities
7. To retain and attract business and improve local economic development opportunities
8. To consider economic, social, and other incentives for water quality protection

Lamoka & Waneta Lakes are facing considerable challenges for maintaining & improving water quality

Lamoka-Waneta Facts

- Clarity Worsening
- Phosphorus Content Increasing
- FP/BG Chlorophyll-a Increasing
- Both lakes are identified as threatened by DEC

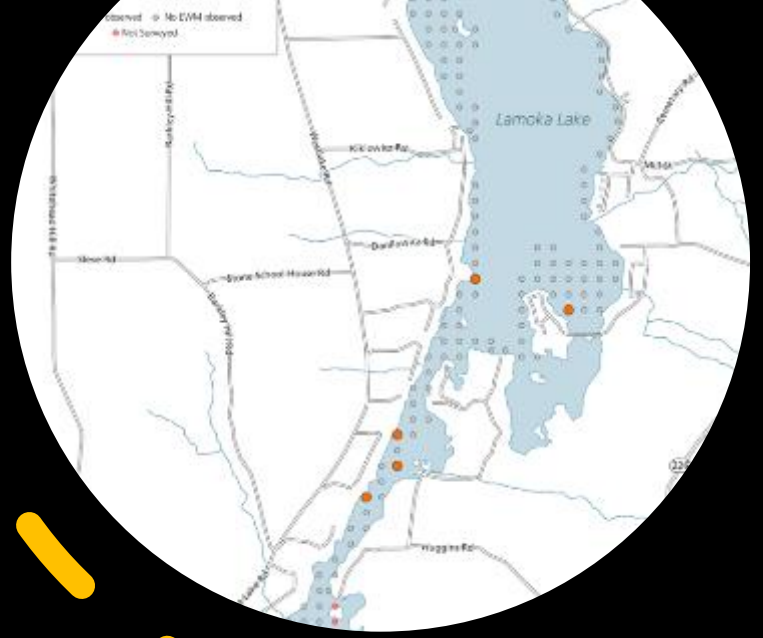
Our lakes are at highest priority at the planning level in New York State.

Without additional action, we are heading towards a future ecological and economic disaster

Lamoka-Waneta Facts

- Number of Properties = 984
- Number of Visitors >10,000
- Annual Tax Revenues = $3M
  - Weekend boaters
  - Leisure fishing
  - Fishing tournaments
  - Restaurants
  - Lodging

Citizens Statewide Lake Assessment Program (CSLAP) Data 2022 Updates



Terry Fisk
Patrick O’Shaughnessy
August 2023

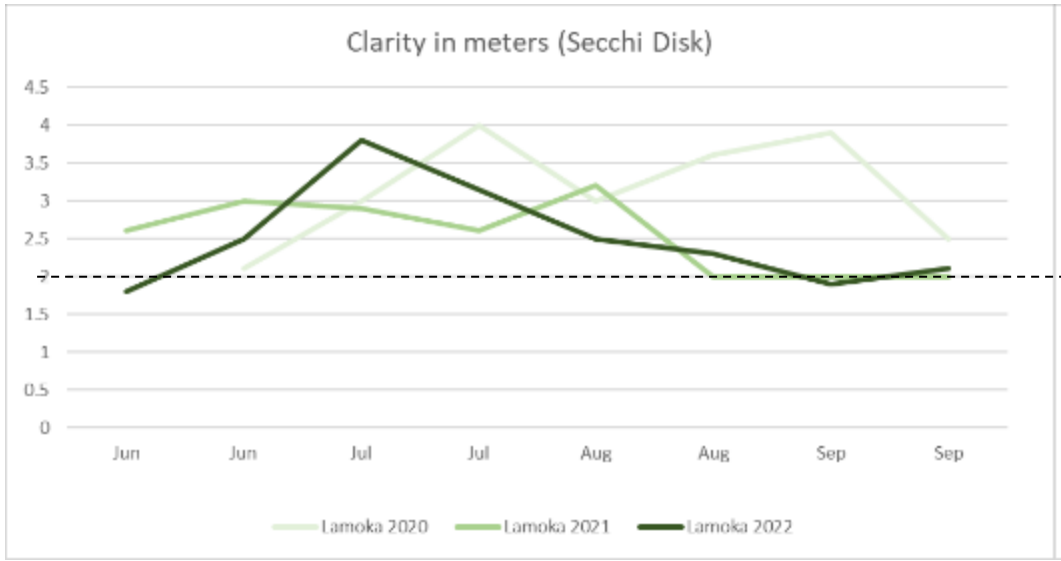
Overall Characteristics

- Not much has changed with 2022 Data
- Comparisons to other NY lakes
  - Waneta: higher chlorophyll-a, total phosphorus, pH, conductivity, calcium and chloride = less favorable to recreation
  - Lamoka: higher conductivity and calcium
- Water turnover
  - Waneta = 3.66 years
  - Lamoka = 0.8 years
- Watershed/Lake Ratio
  - Waneta = 8
  - Lamoka = 22 – water can backflow into Waneta after heavy rain

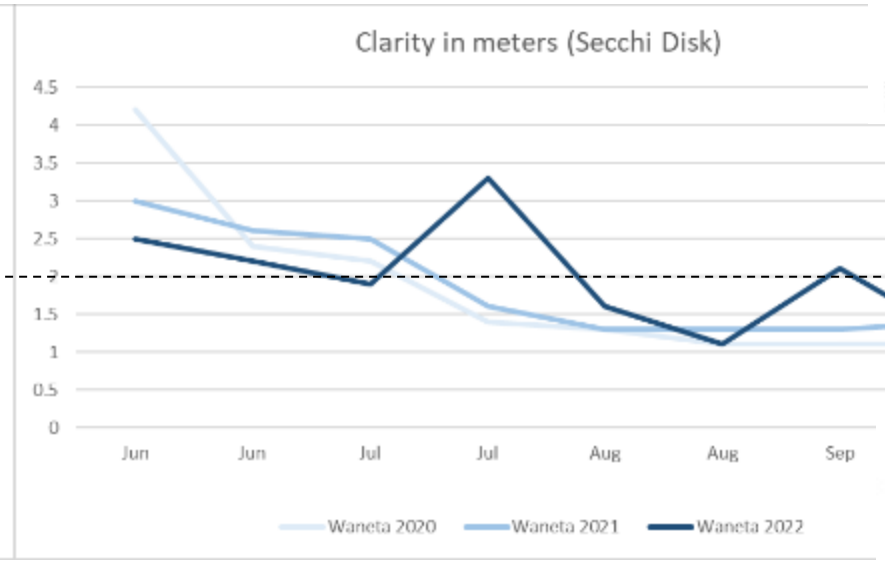
Lake Water Clarity

Mesotrophic range is 2.0 - 5.0

Lamoka



Waneta



Eutrophic range is < 2.0

Conclusion: Not much change since 2021; Lamoka slightly better clarity

Clarity	2020	2021	2022
Lamoka	3.2	2.5	2.4
Waneta	1.9	1.9	2.0

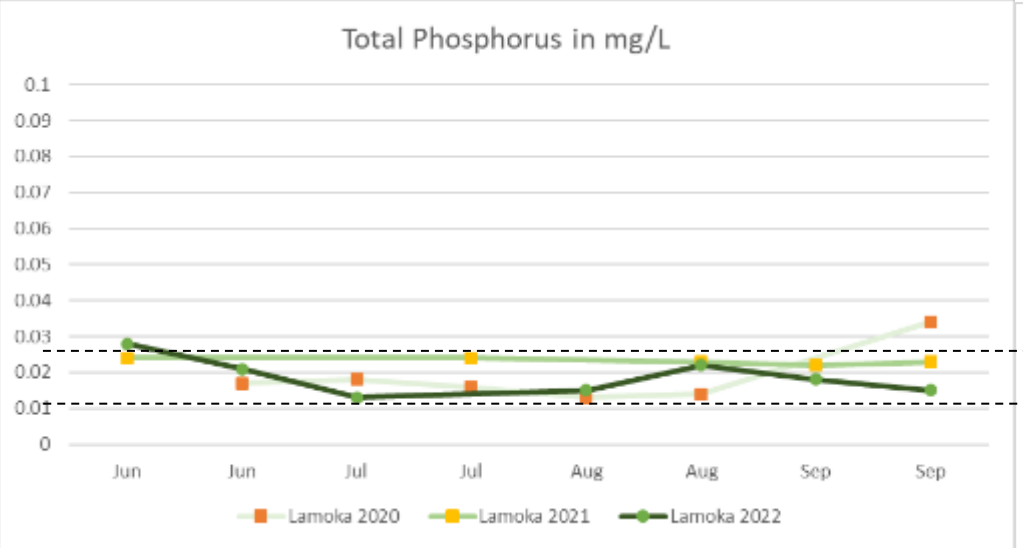
**numbers are yearly average values*

Darkest Lines are 2022, Lightest Lines are 2020

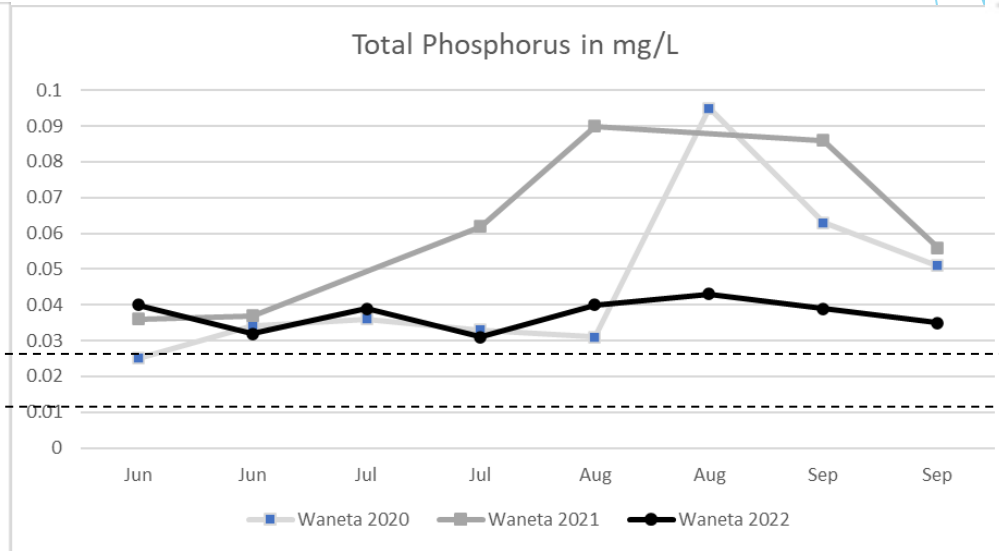
Total Phosphorus

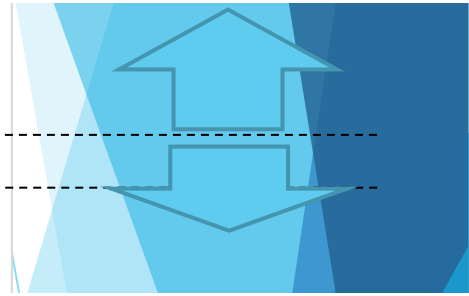
Eutrophic > 0.025 mg/L

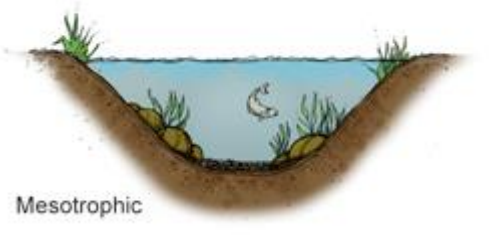
Lamoka



Waneta







- Waneta shows remarkable improvement (about 38% reduction.)
- Waneta has 95% higher phosphorus than Lamoka in 2022; was 165% higher in 2021, and 142% higher in 2020

Phosphorous	2020	2021	2022
Lamoka	0.019	0.023	0.019
Waneta	0.046	0.061	0.037

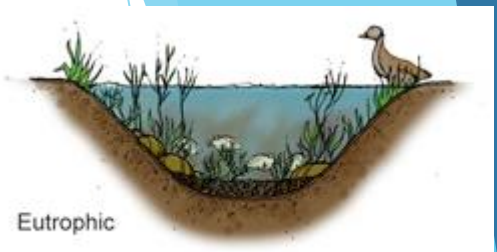
**numbers are yearly average values*

Mesotrophic is 0.01 – 0.025

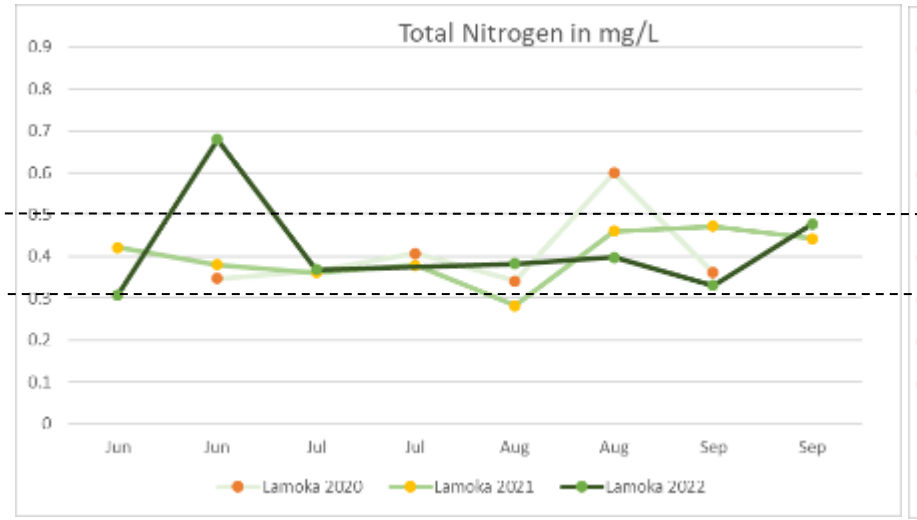
Darkest Lines are 2022, Lightest Lines are 2020

Total Nitrogen

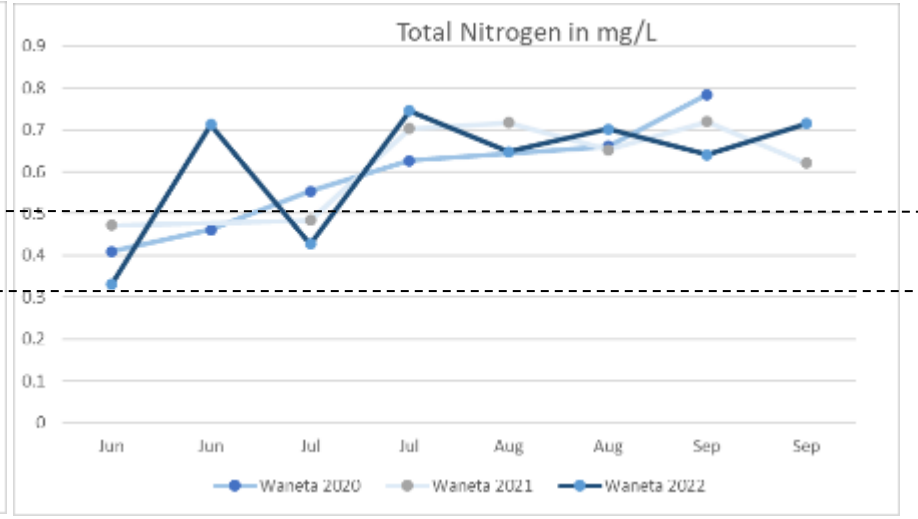
Eutrophic is > 0.5 mg/L

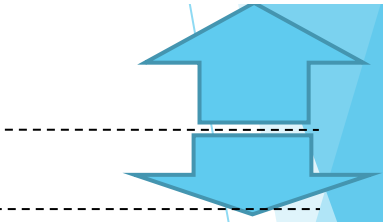


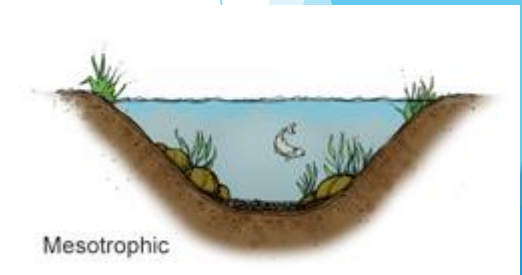
Lamoka



Waneta







- No significant changes on either lake
- Waneta is 45% higher than Lamoka

Nitrogen	2020	2021	2022
Lamoka	0.403	0.4	0.421
Waneta	0.583	0.624	0.615

**numbers are yearly average values*

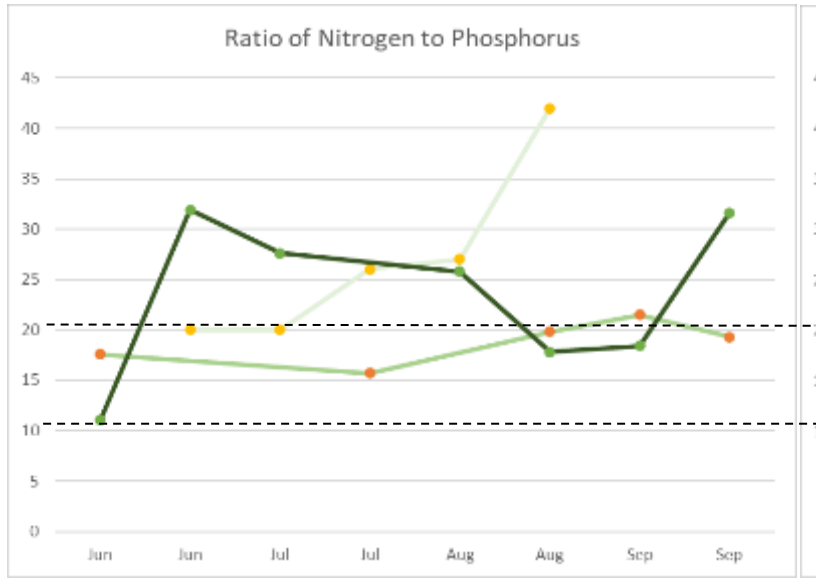
Mesotrophic range is 0.3 – 0.5 mg/L

Oligotrophic is < 0.3 mg/L

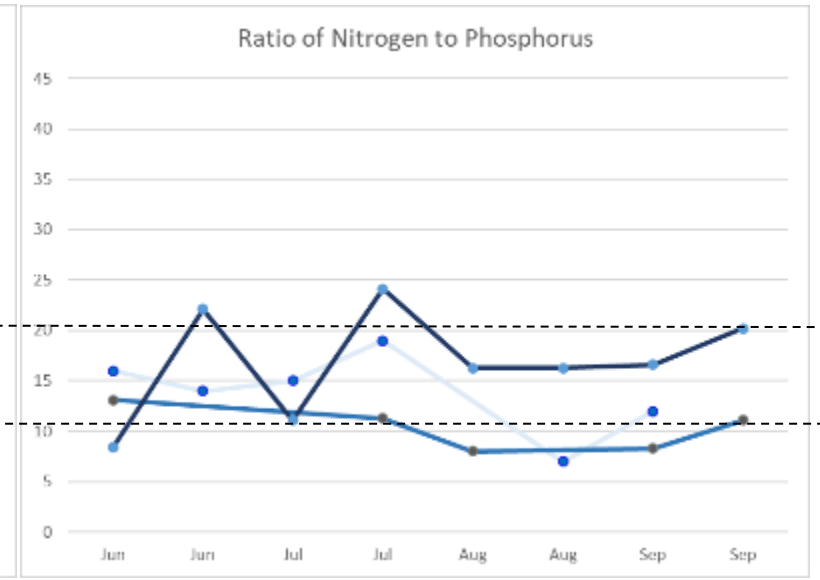
Darkest Lines are 2022, Lightest Lines are 2020

Ratio Nitrogen : Phosphorus

Lamoka



Waneta



- This reveals major difference between lakes. We must reduce phosphorus in both lakes to reduce the Cyano-HABS

N:P Ratio	2020	2021	2022
Lamoka	27	18.8	23.5
Waneta	13.8	10.4	16.9

**numbers are yearly average values*

HABs Reported	2020	2021	2022	2023 TD
Lamoka	0	0	7	12
Waneta	1	6	26	18

TN : TP ratios > 20 are favorable for green algae and diatom populations.

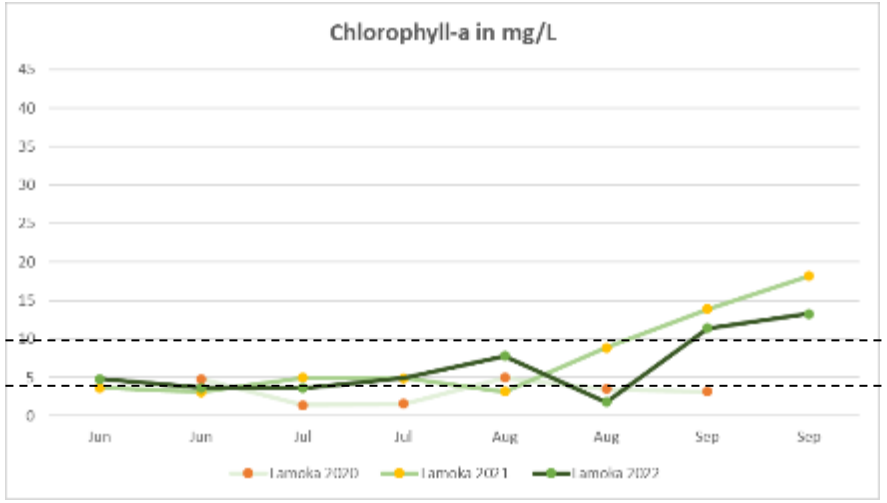
TN : TP ratios that are between 10 - 20 are more ideal for the cyanobacterial species and inhibit the growth of green algae and diatoms populations.

TN : TP ratios below 10 are especially “bad” indicators for cyanobacterial blooms.

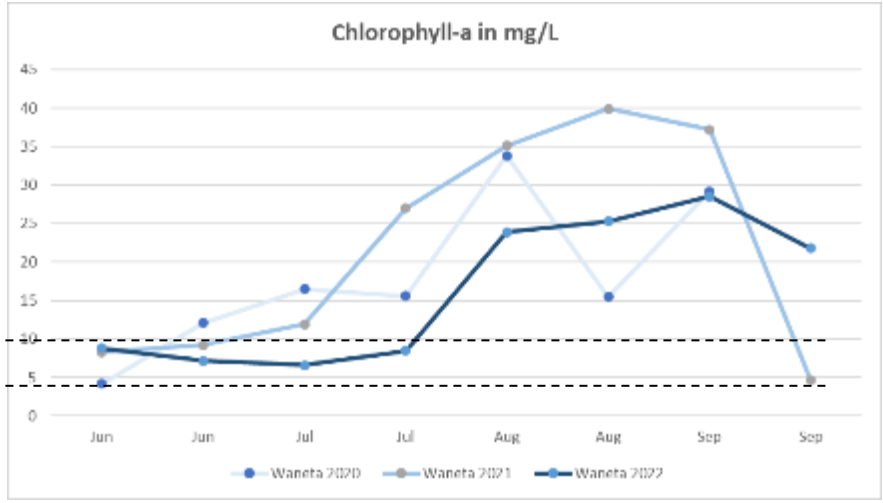
Darkest Lines are 2022, Lightest Lines are 2020; HAB Report as of 10/9/2023

Chlorophyll-a

Lamoka



Waneta



Chlorophyll-a is tested in lakes to determine how much algae is in the lake. Algae is important in lakes because it adds oxygen to the water as a by-product of photosynthesis. On the other hand, if there is too much algae in a lake it can produce a foul odor and be unpleasant for swimming. We can compare annual mean chlorophyll-a values to see if the amount of algae in the lake per year is increasing, decreasing, or staying the same.

- This number represents the concentration of all algae and cyanobacterial organisms living in the open water near the surface with samples taken from the deepest part of each lake.
- The populations increase July-Sept with warming water temps.
- ***Over-abundant chlorophyll-a from suspended algae makes the water murky, blocks sunlight to rooted plants, causes decreased oxygen production, which causes fish to leave or die, and algal blooms become more likely to occur.***

Darkest Lines are 2022, Lightest Lines are 2020

Eutrophic is > 10 µg/L

Mesotrophic is 5 – 10 µg/L

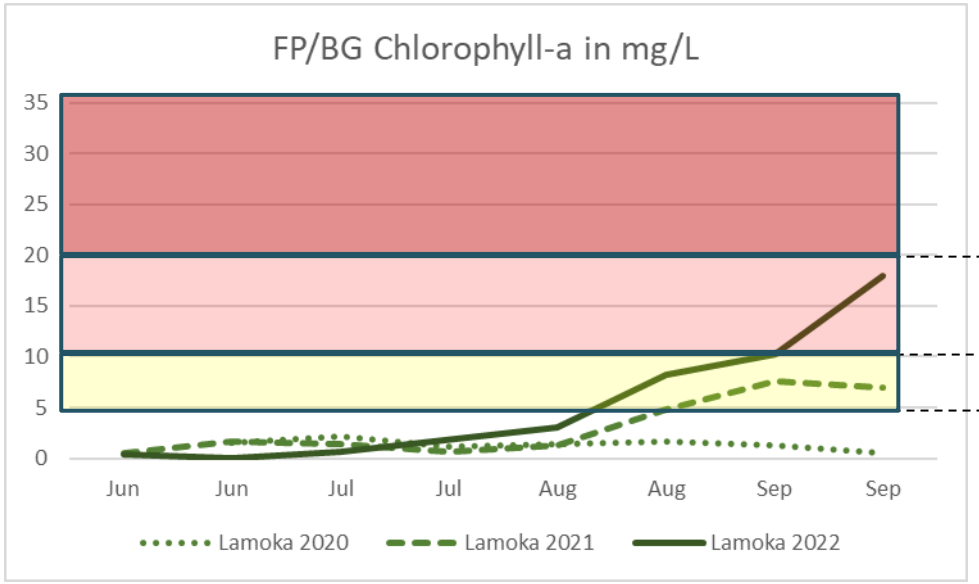
Oligotrophic is < 5 µg/L

Chlorophyll-a	2020	2021	2022
Lamoka	3.3	7.6	6.6
Waneta	18.1	21.6	16.3

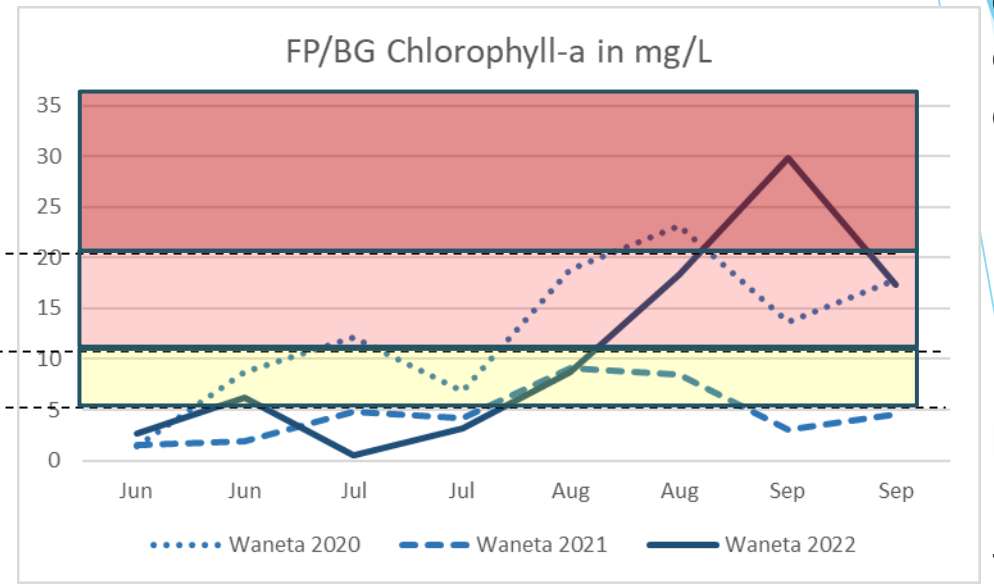
**numbers are yearly average values*

FP/BG Chlorophyll-a

Lamoka



Waneta



This represents the chlorophyll-a that is contributed by cyanobacteria only.

< 5 mg/L is GOOD

5-10 mg/L is CONCERN

10-20 mg/L is POTENTIAL RISK for health effects

> 20 mg/L is HIGH RISK for health effects

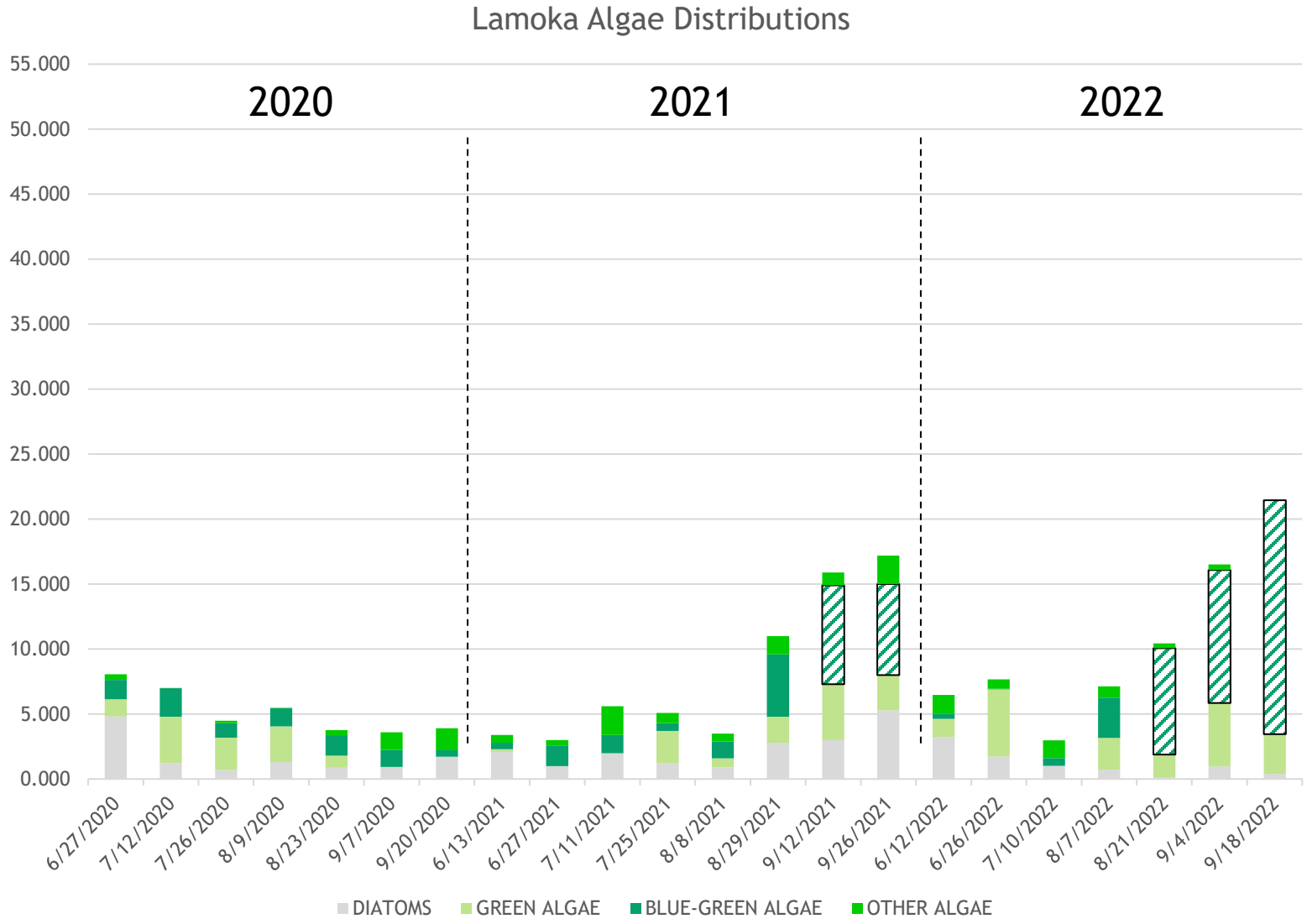
- Lamoka Lake's cyanobacteria population is definitely rising year over year.
- Waneta Lake's cyanobacteria population is in the potential risk and high-risk zone.

FP/BG Chlorophyll-a	2020	2021	2022
Lamoka	1.4	3.1	5.8
Waneta	12.8	4.7	10.9

**numbers are yearly average values*

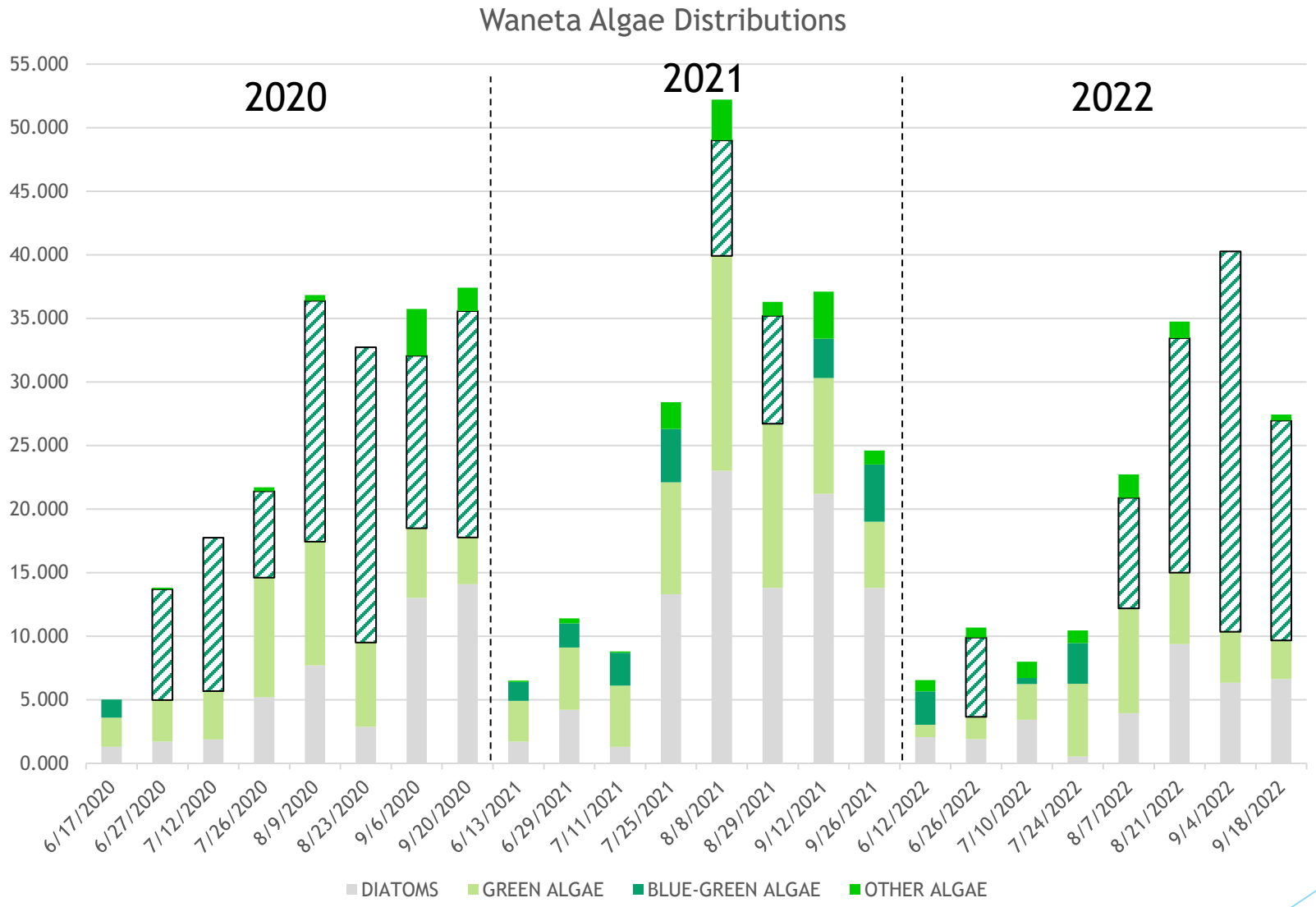
Darkest Lines are 2022, Lightest Lines are 2020

Lamoka Lake Algae Distribution by type 2020-2022



The cross-hatch symbol shows Blue-Green algae ≥ 5 µg/L in an open water sample is the trigger point for microcystin toxins analysis. For these cases, the results were 0.3 µg/L which is below the human hazard level of 10 µg/L.

Waneta Lake Algae Distribution by type 2020-2022



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Conclusions based on latest 2022 Data

- Current mitigation activities appear to be contributing to stabilizing several key metrics such as clarity and nitrogen content.
- Improvements have been seen on with phosphorus content and chlorophyll-a however, ratios indicative of cyanobacteria population show concerning increases backed up with significant increases in reported HABs on the lakes.
- Data indicates additional mitigations are required to reduce our nitrogen and phosphorus content which will stabilize and eventually improve harmful indicators.

Comprehensive Plan: Mitigation Strategies

1. Reducing Sediment, Pollution, and Nutrients
2. Decreasing HABs
3. Reducing Biomass
4. Addressing Septic & Pure Water Shortcomings
5. Dam Regulation
6. Implementing Vigilance & Monitoring Programs
7. Expanding Lake User Education, Ownership and Teamwork

1. Reducing Sediment, Pollution, and Nutrients

Process

- Identify key inflows of sediment, pollution and nutrients
- Prioritize largest contributors to the problem
- Target abatement projects upstream for reduction

Implementation

- Schuyler County Soil and Water District Leads Projects
- LWLA will identify priority targets, supply matching funds and work with S&W to implement

Next Step

- Determine top 3 “offenders” from Spring survey

2. Decrease HABs

Process

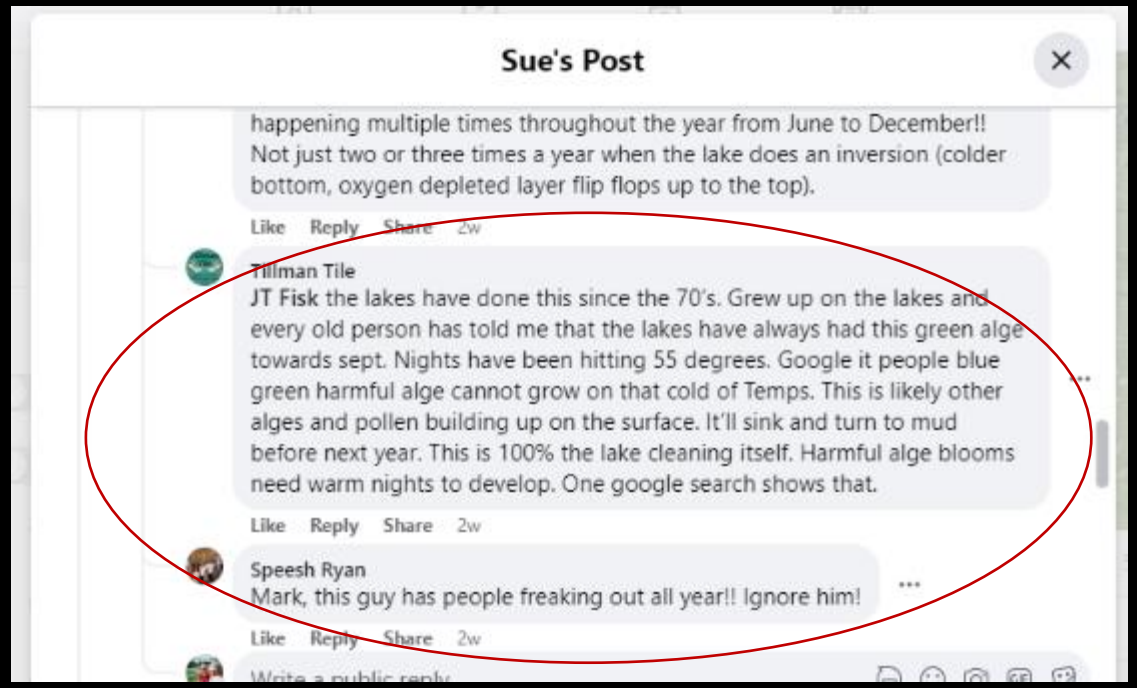
- Reduction in phosphorus needed; increase in dissolved oxygen

Implementation

- Pollution reduction will help this
- Current alert system (Facebook page) for bloom events; improvement needed
- Encouragement of oxygenation systems (fountains and aerators)

Next Step

- Alert and education program



Challenges with educating our lake users with Social Media

3. Fighting Eurasian Milfoil

Eurasian Milfoil is an invasive weed introduced to lake system in 1990s

Process

- Targeted lake treatments to eradicate in problem areas

Implementation

- Three herbicides used since 2003, currently using ProCELLacor
- Annual lake survey (rake toss) done to identify target areas
- Although it is safe to use and is only active in the water for 24 hours, we have been reducing the amount of chemicals put into the lake over time

Next Step

- Continue as planned

3. Reducing Biomass Content in Lake

Process

- Reduce weed masses and invasive species

Implementation

- Encouragement of weed removal in front of properties
- Weed mats
- Mechanical harvesting

Next Step

- Investigate potential of mechanical implementation – need guarantee of not spreading the problem

4. Addressing Septic and Pure Water Shortcomings

Process

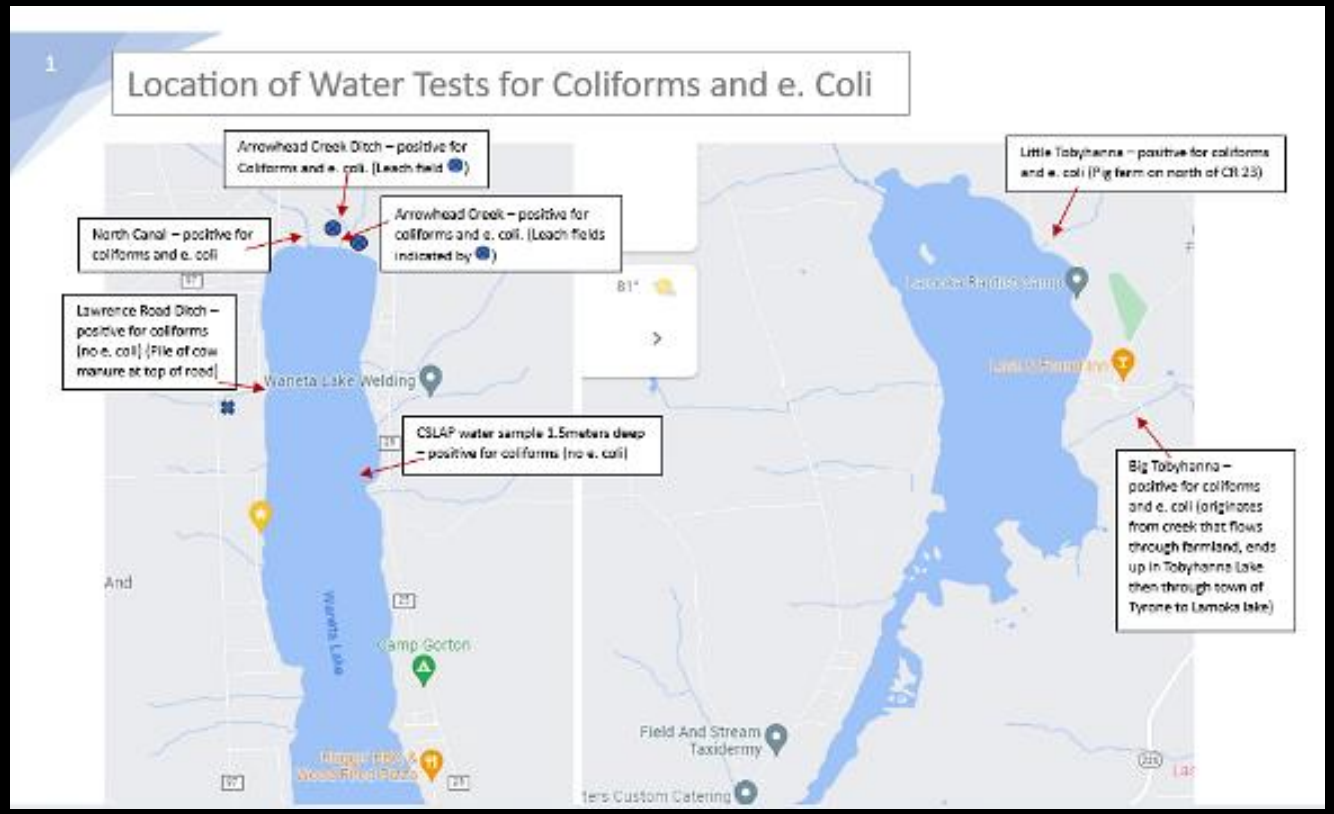
- Other lakes have had significant contribution of septic problems to poor water quality

Implementation

- Bacterial Measurements
- Removal of outhouses and other non-compliant waste generators
- Potential public sewer (resident survey being conducted)

Next Step

- Pilot measurement program – share results



5. Dam Regulation

Located in Bradford at the south end of Lamoka Lake. Owned and operated by NYSEG, the dam has two gates and one overflow notch.

Process

- LWLA Lake level team monitors lake levels from gauge mounted on bridge abutment between the lakes
- Interface with NYSEG to open or close gates downstream

Implementation

- During summer when lake level increases past 1098.8, we call NYSEG to open gates (Top of dam is 1099.0', Flood level is ≥1099.0)
- When lake level decreases to 1098.6 we call NYSEG to close gates
- Response time is usually 24 hours
- Every third year, lake level is lowered late October to November to enable shorefront maintenance

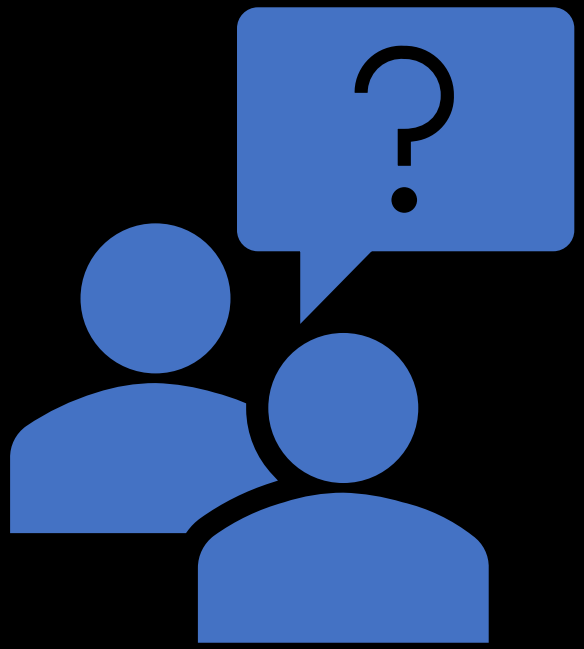
Next Step

- Working with NYSEG and DEC to revise Lake Level Control plan

6 & 7 -- Lake Action Advocacy

1. Lake Community
2. DEC
3. Soil & Water County Districts
4. Chesapeake Watershed
5. Towns & Municipalities
6. Volunteers

Build a strategy for education, adoption, and ownership of key actions and activities across the spectrum of shareholders in our lake system for water quality improvement.



THANK YOU!
Questions?

Lake Management Committee

- Terry Fisk
- Patrick O’Shaughnessy
- Steve Tressler
- Jay White
- Kevin Morris
- Cartha Conklin
- Mary Tucker
- Bill Hassoldt