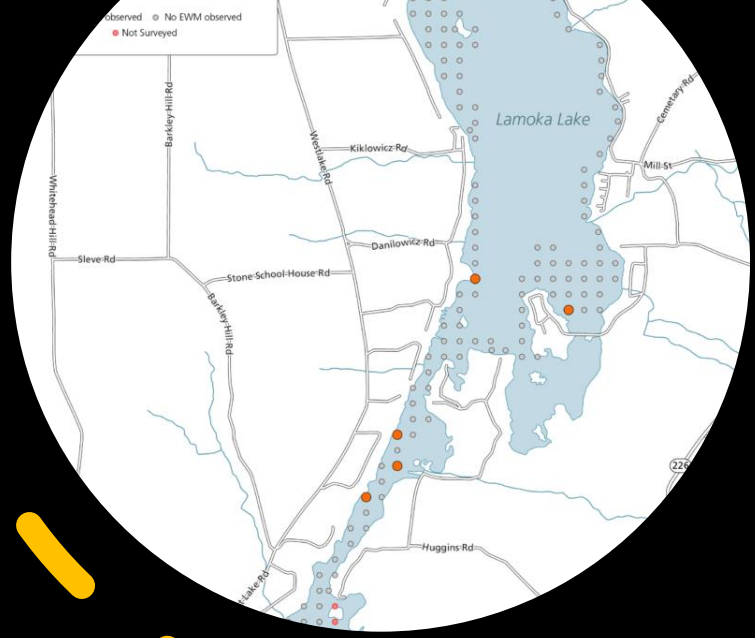
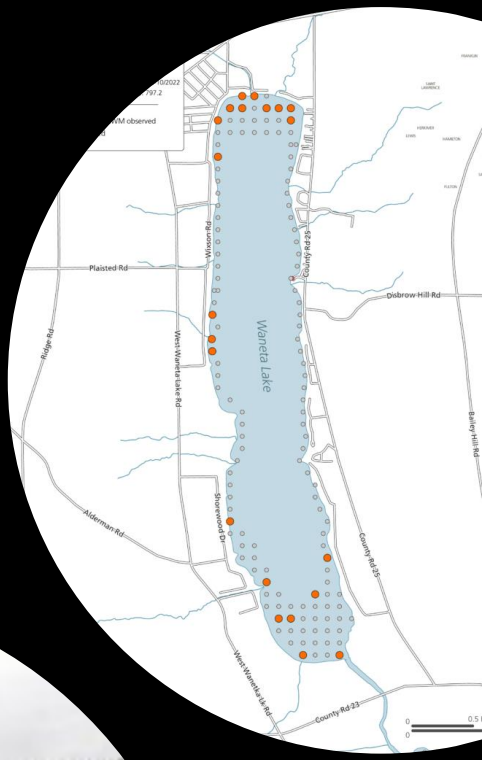
Citizens Statewide Lake Assessment Program (CSLAP) Data 2022 Updates





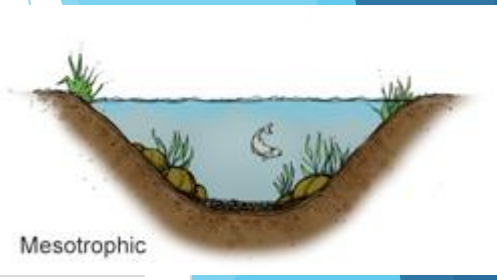
Terry Fisk
Patrick O’Shaughnessy
August 2023

Overall Characteristics

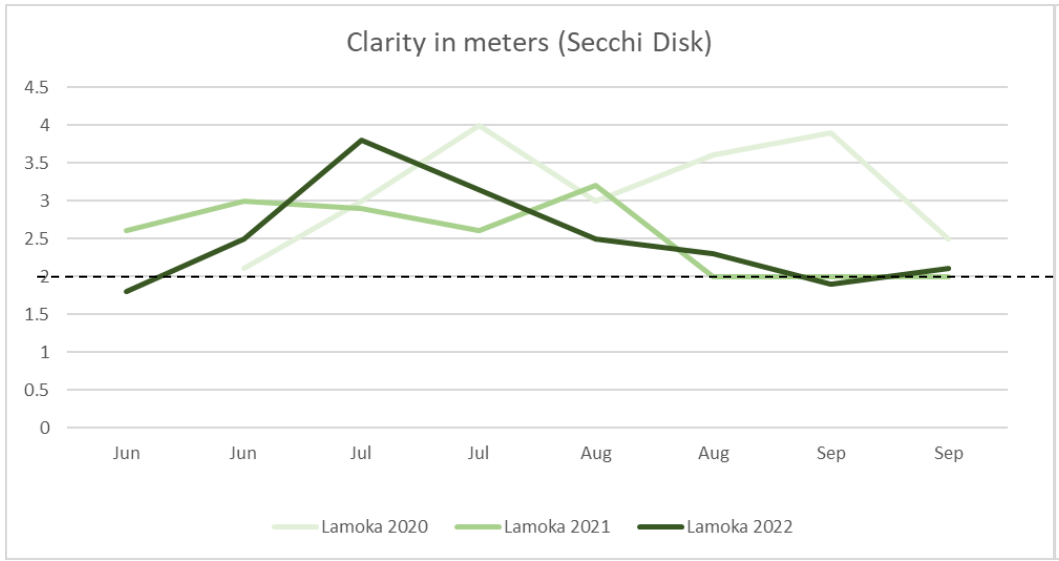
- Not much has changed with 2022 Data
- Comparisons to other NY lakes
  - Waneta: higher chlorophyll-a, total phosphorus, pH, conductivity, calcium and chloride = less favorable to recreation
  - Lamoka: higher conductivity and calcium
- Water turnover
  - Waneta = 3.66 years
  - Lamoka = 0.8 years
-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

Lake Water Clarity

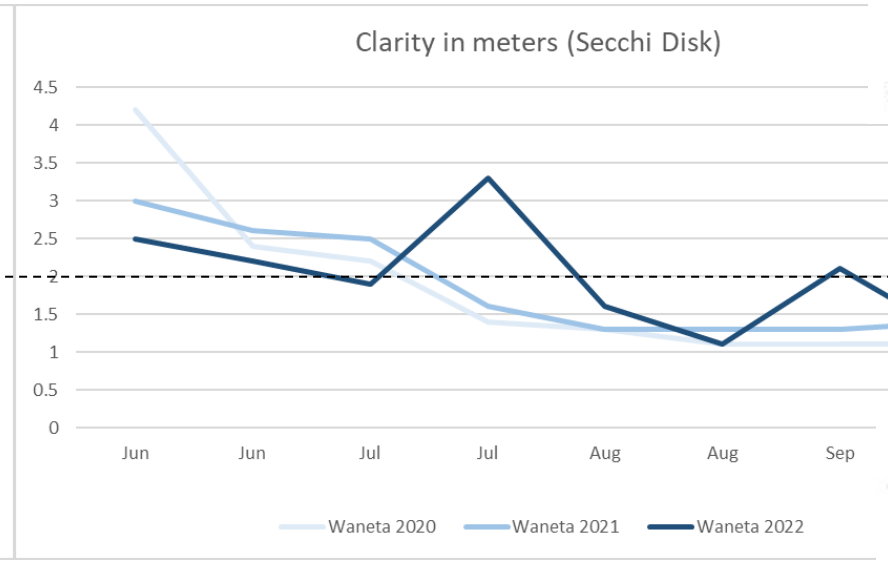
Mesotrophic range is 2.0 - 5.0



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

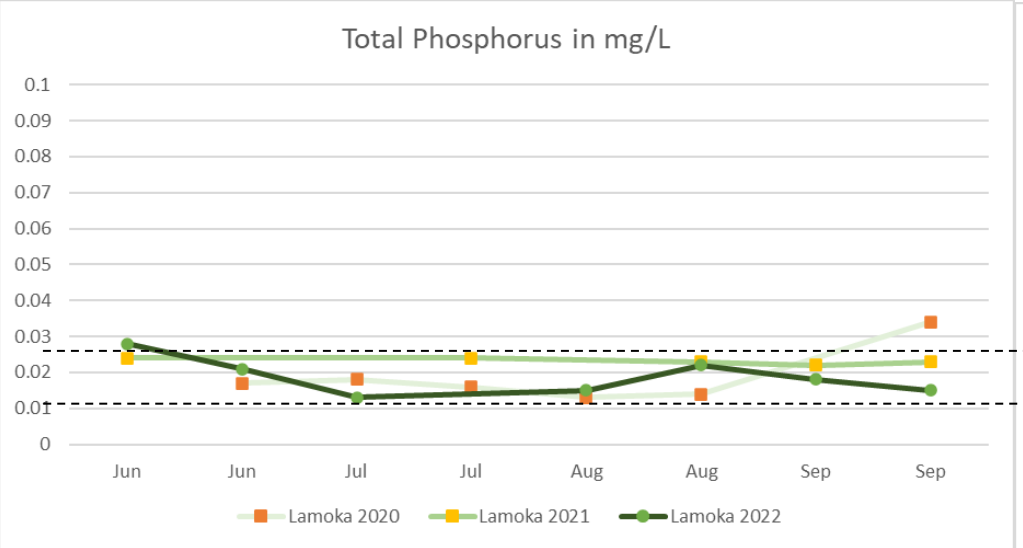
**numbers are yearly average values*

Darkest Lines are 2022, Lightest Lines are 2020

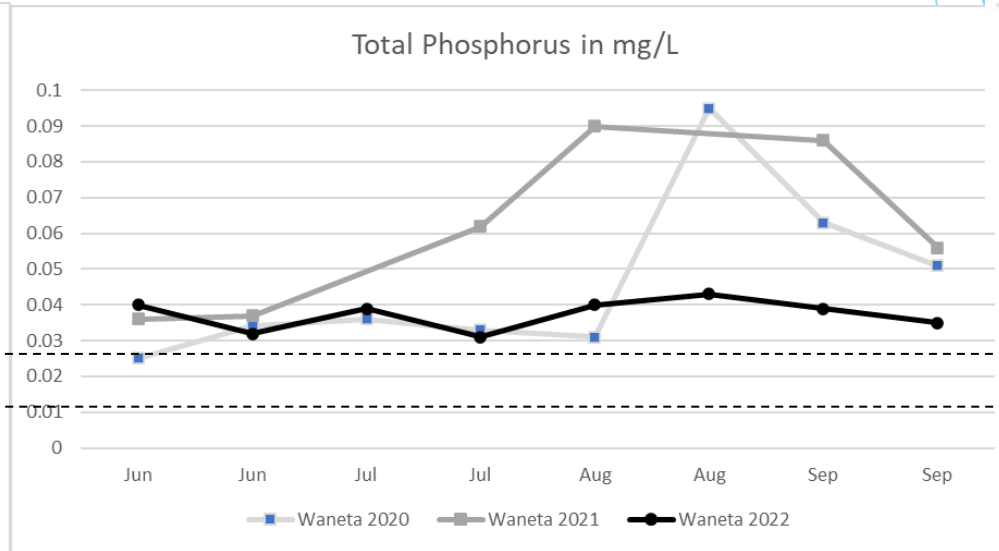
Total Phosphorous

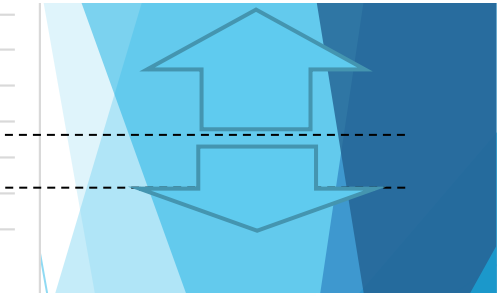
Eutrophic > 0.025 mg/L

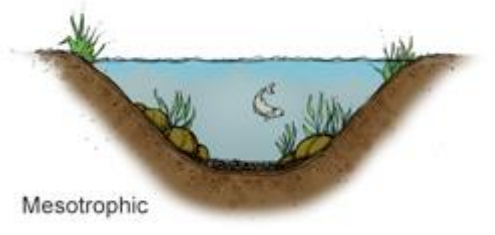
Lamoka



Waneta







- Waneta shows remarkable improvement (about 38% reduction.)
- Waneta has 95% higher phosphorous 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

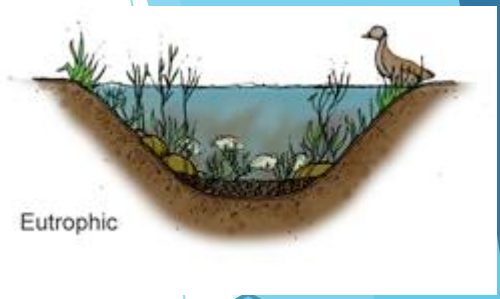
**numbers are yearly average values*

Mesotrophic is 0.01 – 0.025

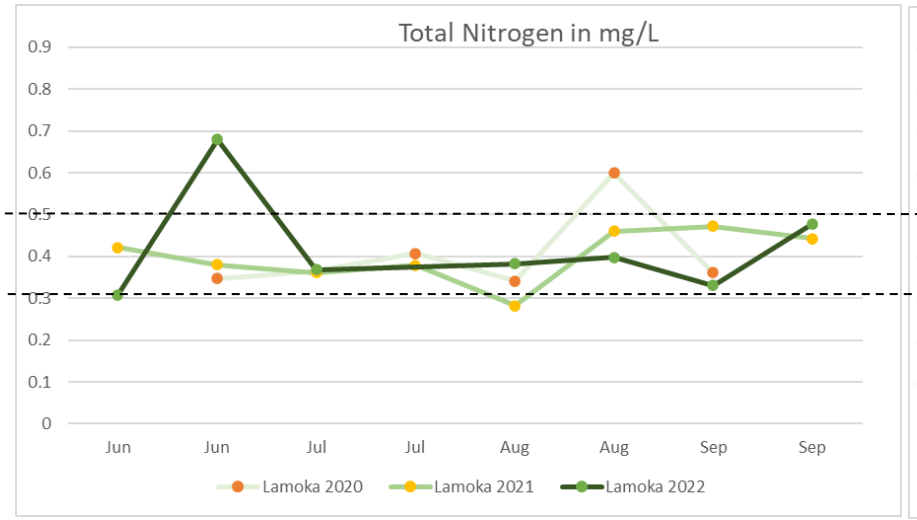
Darkest Lines are 2022, Lightest Lines are 2020

Total Nitrogen

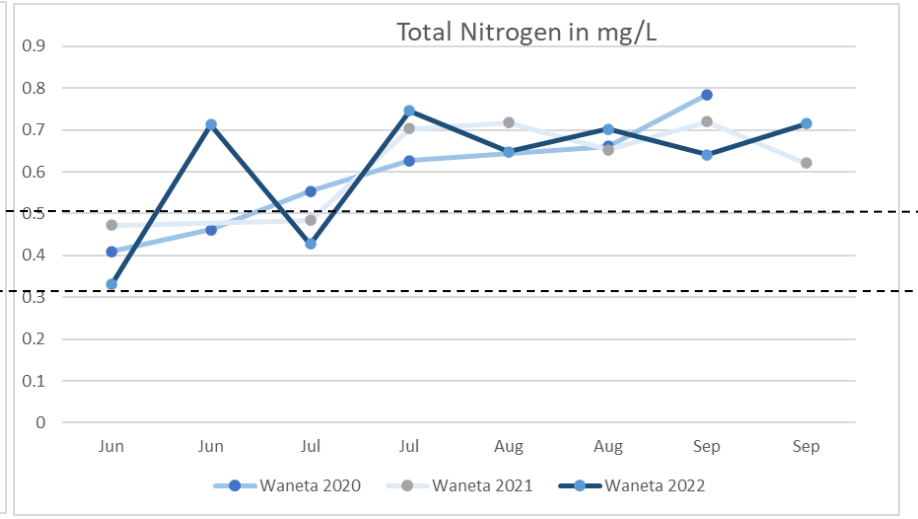
Eutrophic is > 0.5 mg/L

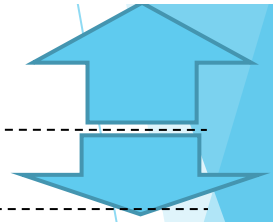


Lamoka



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*

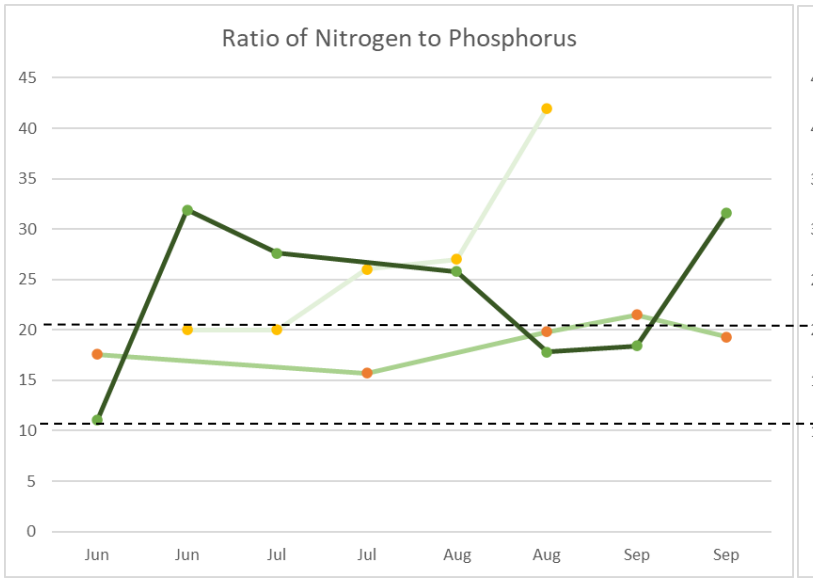
Mesotrophic range is 0.3 – 0.5 mg/L

Oligotrophic is < 0.3 mg/L

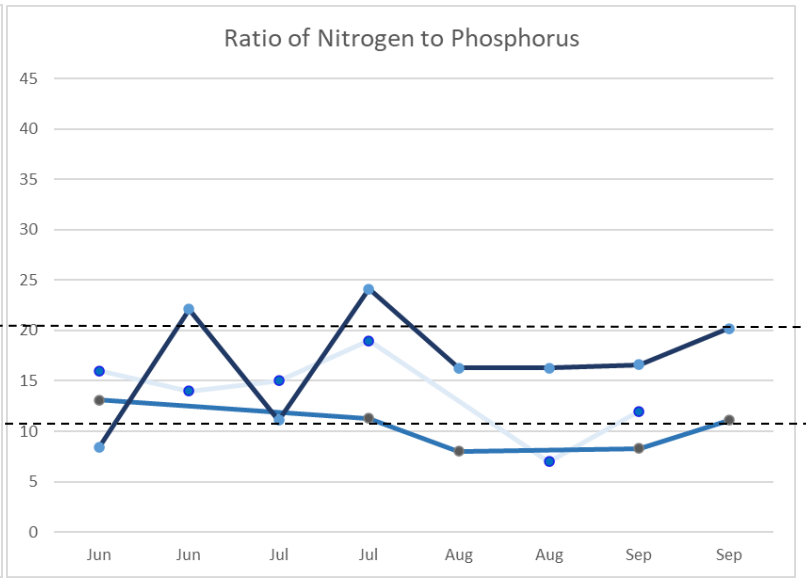
Darkest Lines are 2022, Lightest Lines are 2020

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	6
Waneta	1	6	26	6

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

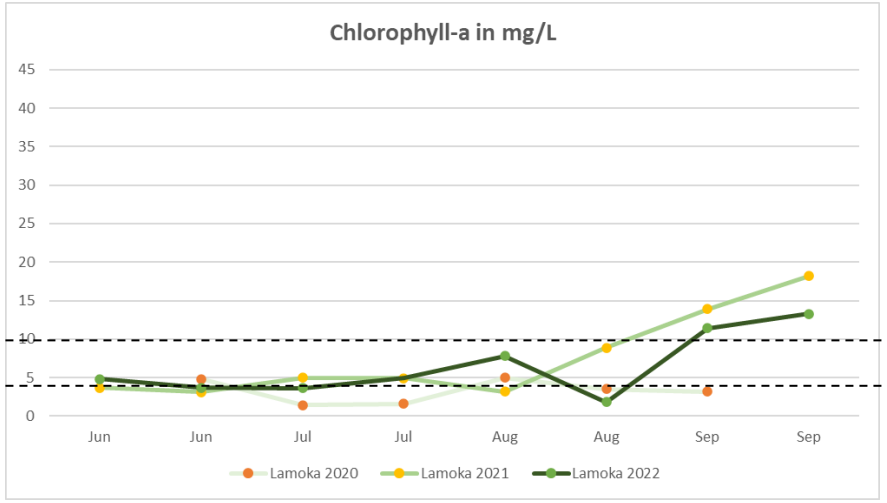
TN : TP ratios that are between 10 - 20 are more ideal for the cyanobacterial species and inhibit the growth of green algae and diatoms populations.

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

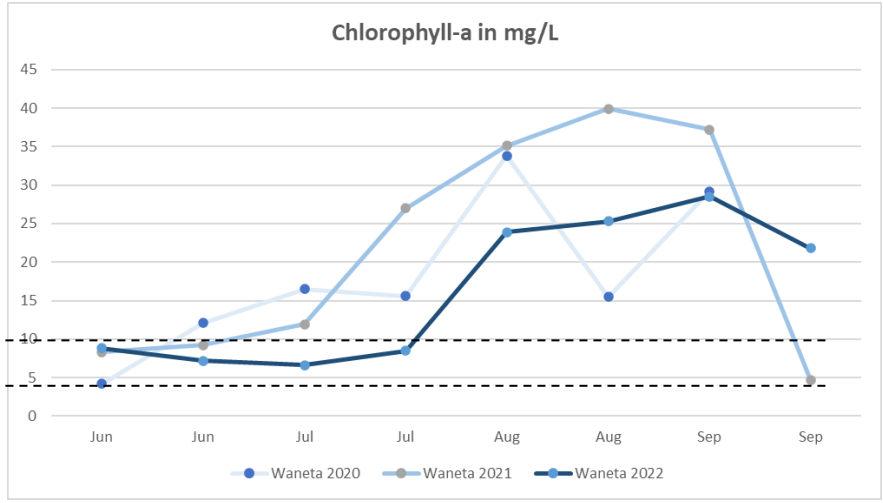
Darkest Lines are 2022, Lightest Lines are 2020; HAB Report as of 8/9/2023

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.***

Eutrophic is > 10 µg/L

Mesotrophic is 5 – 10 µg/L

Oligotrophic is < 5 µg/L

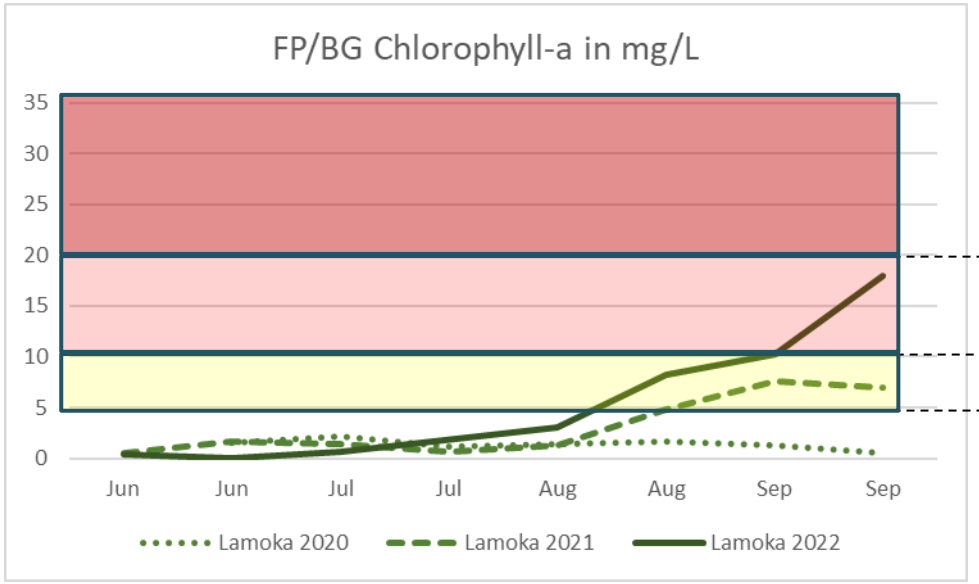
Chlorophyll-a	2020	2021	2022
Lamoka	3.3	7.6	6.6
Waneta	18.1	21.6	16.3

**numbers are yearly average values*

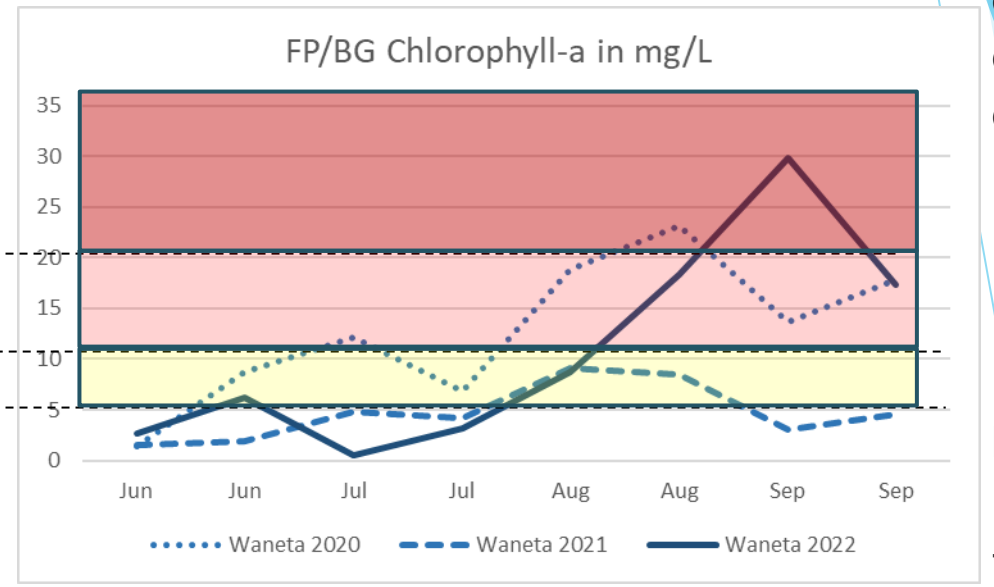
Darkest Lines are 2022, Lightest Lines are 2020

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

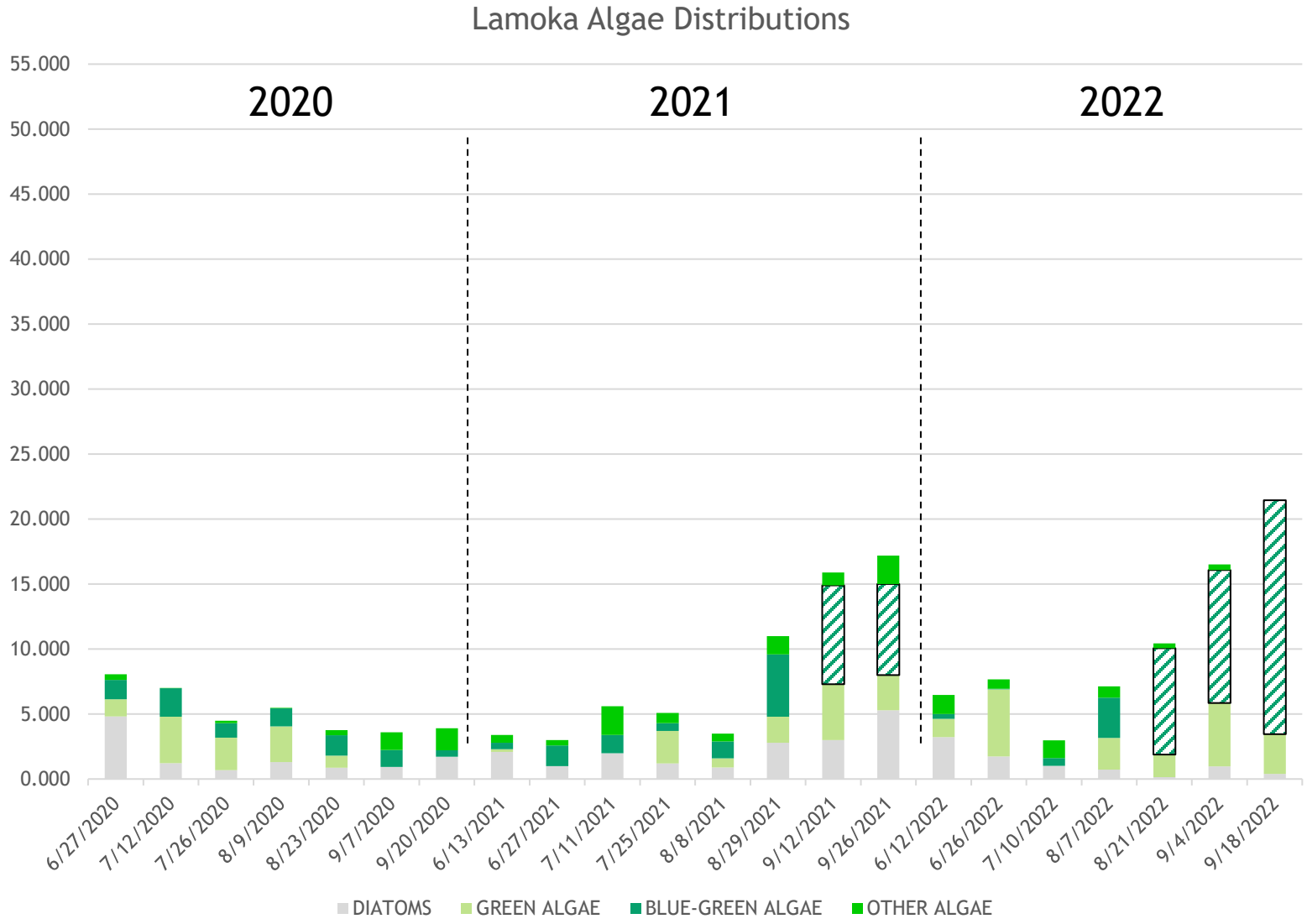
- Lamoka Lake's cyanobacteria population is definitely rising year over year.
- Waneta Lake's cyanobacteria population is in the potential risk and high risk zone.

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*

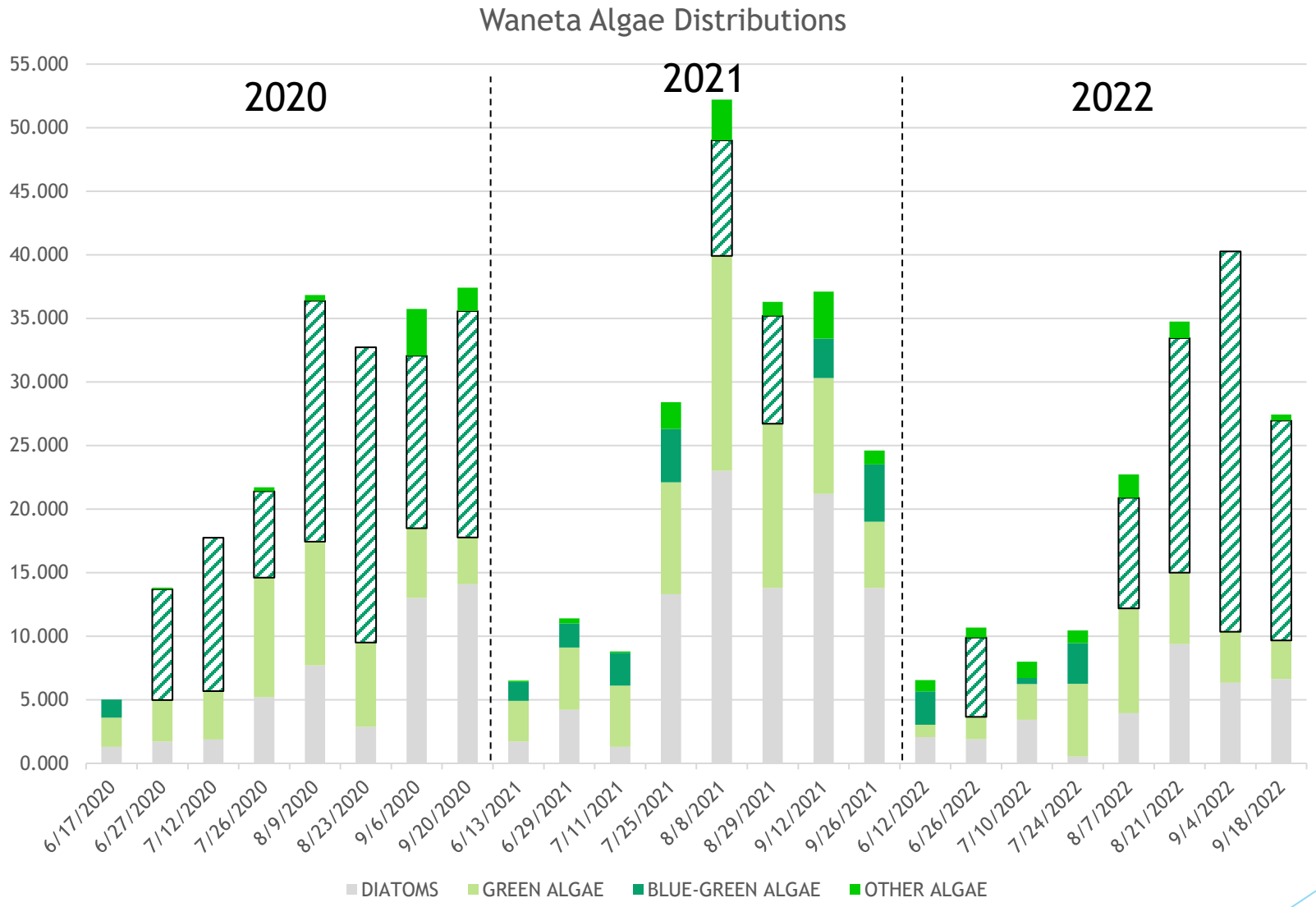
Darkest Lines are 2022, Lightest Lines are 2020

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



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 -1.3 µg/L which is below the human hazard level of 10 µg/L.

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 phosphorous 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.

Mitigation Strategies

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