

Milestones, Monitoring and Tracking Strategy

1. Milestones

1.1 Bundled Projects

Completion of BMP installations or other lake-protective actions in designated project areas will be considered milestones.

Milestones to be completed by the Town of Antrim include:

- 🔗 Brimstone Corner Rd
- 🔗 White Birch Point Rd
- 🔗 Holt Hill Rd
- 🔗 Craig Rd
- 🔗 Gregg Lake Rd causeway & bridge
- 🔗 Gregg Lake Rd undercut (lowering lake, marking channel rocks)
- 🔗 Town beach & boat launch
- 🔗 Boater education, information
- 🔗 Beaver management installations

Milestones to be achieved by private lake management efforts include:

- 🔗 Private stormwater management, landscaping efforts at erosion hotspots (combined projects for an estimated total TP load reduction of 1.5 lb/yr will be considered a milestone)
- 🔗 Private septic upgrades, coordinated septic maintenance efforts
- 🔗 Conservation easements

Milestones in lake-protective ordinances and regulation changes include:

- 🔗 Approval of lower lake level
- 🔗 Fines and remediation requirements for infractions of Shoreland Water Quality Protection Act
- 🔗 Lowering horsepower limit
- 🔗 Increasing no-wake zone

1.2 Erosion Hotspots and Offsets

A spreadsheet will be maintained to follow BMP installations and other measures taken to reduce or offset TP loading. The spreadsheet will document each of the 63 identified erosion hotspots, along with their estimated TP loads and completion dates. Reductions attributable to septic renovations and offsets due to conservation easements and new town ordinances will also be recorded to keep a running tally of progress toward the ten-year goal of reducing TP loading to the lake by 44 lb/yr and offsetting TP loading by 15 lb/yr (Table 1).

Table 1. Remediation progress toward reduction of phosphorus load to Gregg Lake, as of January 2020. BC, Brimstone Corner

Hotspot/Other	TP Load (lb/yr)	Responsible	Remediation Target Date	Remediation Completion	Description
1	2.5	TOA	2020	2019	Lower BC Rd
6	0.1	TOA	2020	2019	Craig Rd bridge
27	0.6	TOA	2020	2019	BC Rd shoulder & ditch erosion
Septic	0.5	Private	2020	2019	Osler septic replacement
Septic	0.5	Private	2020		Renda septic approved
Total Reduction	4.3				
Offset	5.2	Private	2020	2019	Caughey Woods Conservation Easement
Offset	6.4	TOA	2020	2019	Wind Farm Conservation Easement
Total Offset	11.6				

2. Evaluation and Success Indicators

2.1 Chl-*a*, TP, DO, Turbidity

Although Gregg Lake does not appear to show a strong direct correlation between Chl-*a* and TP, reducing TP loading is the most obvious place to start to try to reduce algal growth and restore lake water quality. The goal of reducing Chl-*a* levels in Gregg Lake by 23%, to 3.3 µg/L from the 2018 mean of 4.3 µg/L, suggests the need to reduce TP also by 23%, to 5.1 µg/L from the recent mean of 6.7 µg/L in the epilimnion (Table 2). The goal for DO is to increase oxygen concentrations in bottom waters to levels that support aquatic life (5 mg/L or greater). TP load reduction should have a major impact on DO levels. Turbidity levels, which show a statistically significant increase over time, will also be closely monitored, and lake management efforts will be directed towards reducing suspended particles.

Table 2. Calculations of final specific reductions needed to achieve the goal of removing Gregg Lake's impaired status for supporting aquatic life due to high Chl-*a* and low DO in bottom waters, based on the assumption of a direct correlation between TP as the driver and Chl-*a* as the response.

Water Quality Measure	Final Goal (µg/L)	Recent Mean Value ^a (µg/L)	Reduction Needed (µg/L)	Reduction Needed ^b (%)
Chl-<i>a</i>	3.3	4.3	1.0	23
TP (Epilimnion)	5.1	6.7	1.6	23
DO (9 m)	5000	1400	-3600	-257

^aThe recent mean value for Chl-*a* is considerably higher than the recent median value, and is easier to directly compare to single measured values or seasonal means; recent mean and median values for TP are nearly the same.

^bThe % reduction needed for Chl-*a* defines the % reduction needed for TP.

Progress towards the set final goals of 23% reductions in Chl-*a* and epilimnion TP will be assessed using interim goals of achieving 25% of the final goal by 2020, 50% of the final goal by 2023 and 100% of the final goal by 2028 (Table 3). In addition, we will look for improved DO in bottom waters as indicated by increases in the mean seasonal DO at a depth of 9 meters (1–2 meters above the bottom at the Deep Spot).

Table 3. Interim goals for the purpose of assessing progress toward the goal of reducing Chl-*a* to a level that removes Gregg Lake from impaired status, with resulting goals for TP reduction and improvements in bottom DO levels.

Year	% of Final Goal	Epi TP Goal (µg/L)	Chl- <i>a</i> Goal (µg/L)	9 m DO Goal (mg/L)
2020	25	6.3	4.1	2.3
2023	50	5.9	3.8	3.2
2028	100	5.1	3.3	5.0

2.2 Algal Bloom Assessment

To facilitate quantification of algal blooms, the extent of algal bloom will be assessed through shoreline surveys in July, August and September of each year, with scoring based on the following scale:

Score	Criteria
0	No algal clumps detected lake-wide
1	Widely scattered clumps <1 ft in diameter
2	Scattered clumps <3 ft in diameter and/or clumps around <10% of shoreline
3	Masses 3–5 ft in diameter and/or clumps around 10–25% of the shoreline
4	Masses >5 ft in diameter and/or clumps around >25% of shoreline

Lake residents and users will also be asked to give qualitative assessments of the algal blooms they've encountered. The goal will be to achieve a reduction in algal blooms over the time span of the WMP.

2.3 Cyanobacteria Assessment

Phytoplankton sampling has been performed through biennial sampling during VLAP state biologist visits. We will initiate sampling by volunteer monitors in off years to improve assessment of cyanobacteria levels. Lake residents will also be educated to recognize and report a suspected cyanobacteria bloom.

2.4 Success Indicators

Indicators of success will be:

- 🔗 Reduced Chl-*a* levels
- 🔗 Reduced epilimnetic TP
- 🔗 Reduced turbidity
- 🔗 Increased hypolimnetic DO
- 🔗 Reduced algal blooms
- 🔗 Reduced cyanobacteria detection

3. Monitoring

It will be critical to monitor progress toward the goals in order to assess whether the plan has to be modified to achieve the desired final reduction in Chl-*a*. Monitoring steps will include:

VLAP sampling. Gregg Lake water quality will continue to be monitored annually, three times a summer, in June, July and August. Temperature and DO profiling will be completed with each sampling, and sampling will continue at the four recently-added upstream sites. If goals are not being met, we will consider adding analysis for other water quality parameters, such as total nitrogen, total and dissolved organic carbon and iron.

Phytoplankton sampling. Through VLAP, annual phytoplankton sampling will be implemented. If interim WMP goals are not being met, we will consider completing a zooplankton analysis. With the decision by NH Fish & Game to discontinue managing Gregg Lake for trophy bass, it is possible that zooplankton populations will readjust over the next few years.

Algal bloom surveys. Lake residents will implement annual algal bloom surveys to quantify the extent of summer algal blooms.

Compilation of water quality data. Following receipt of final VLAP data at the end of each season, current data will be assessed and compared with previous data and WMP goals.

BMP completion and TP offsets. The late-summer GLA meeting will be used to gather data annually on BMPs, septic upgrades and other measures taken by private homeowners to address WMP goals. Projects addressing identified erosion hotspots will be entered into the completed projects spreadsheet. Other projects will be entered as TP offsets or TP load reductions, as appropriate. Similarly, BMP projects completed by the Town of Antrim will be monitored and tracked.

Lake Hosts and Weed Watchers. Lake Hosts will continue to provide the first line of defense against invasives at the public boat launch. Weed Watchers will continue to survey for invasives.

Boating practices. Changes in boating practices will be qualitatively observed, with the goal being greater compliance with current regulations. Reductions in turbidity will be used as a more quantitative indicator of success. If we are not achieving interim goals for TP, we will consider petitioning the state legislature to lower the horsepower limit and increase the no-wake zone.

Report to GLA. Progress reports will be given at spring and late-summer Gregg Lake Association meetings—in spring to report on the past year's progress, in late summer to touch base with residents and find out what was accomplished on private properties, as well as what assistance might be needed for the coming year.

Report to TOA. Following annual assessment of water quality data, a progress report will be made to the Town of Antrim and posted on the WMP website and linked to the TOA website.

Report to NHDES. Periodic progress reports will be filed with NHDES as required.