2001

OBSERVATIONS & RECOMMENDATIONS

We would like to recognize the Manchester Urban Ponds Restoration Project volunteers for their second year of participation in the New Hampshire Volunteer Lake Assessment Program. Manchester's volunteers collected a large number of samples this summer and we applaud them for their efforts! While many of the results again this year indicate that the Manchester ponds are degraded, we hope that this project will continue to encourage the citizens of the city to participate in water quality sampling. Through sampling, education, and various water quality improvement projects initiated by the City of Manchester, we ultimately expect that the degraded conditions of the ponds will be improved!

After reviewing data collected from **McQUESTEN POND,** the program coordinators recommend the following actions.

FIGURE INTERPRETATION

- **Figure 1:** These graphs show the historical and current year chlorophyll-a concentration in the water column. Chlorophyll-a, a pigment naturally found in plants, is an indicator of the algal abundance. Because algae are microscopic plants that contain chlorophyll-a and are naturally found in lake ecosystems, the chlorophyll-a concentration found in the water gives an estimation of the concentration of algae or lake productivity.

  The summer of 2001 was filled with many warm and sunny days and there was a lack of significant rain events during the latter-half of the summer. The combination of these factors resulted in relatively warm surface waters throughout the state. The lack of fresh water to the lakes/ponds reduced the rate of flushing which may have resulted in water stagnation. Due to these conditions, many lakes and ponds experienced increased algae growth, including filamentous green algae (the billowy clouds of green algae typically seen floating near shore) and nuisance blue-green algae (Cyanobacteria) blooms.

  Thank you for taking grab samples for chlorophyll-a analysis this season! As your association continues to collect grab

samples, we will be able to detect changes in chlorophyll-a concentration in the pond.

The current year data (the top graph) show that the chlorophyll-a concentration *decreased* from May to July, and then *stabilized* from July to September. The chlorophyll-a concentration in May was *slightly less than* the state median, while the concentration in July and September was *below* the state mean.

A plankton sample was not collected this season. As recommended last year, we suggest collecting a horizontal plankton haul.

While algae is naturally present in all lakes, an excessive or increasing amount of any type is not welcomed. In freshwater lakes, phosphorus is the nutrient that algae depend upon for growth. Therefore, algal concentrations may increase when there is an increase in nonpoint sources of nutrient loading from the watershed, or in-lake sources of phosphorus loading (such as phosphorus releases from the lake sediments). It is important to continue to educate residents about how activities within your lake's watershed can affect phosphorus loading and lake quality.

- **Figure 2:** No data are available for transparency, as the pond is too shallow for this test.

  Typically, high intensity rainfall causes erosion of sediments into the lake and streams, thus decreasing clarity. Efforts should be made to stabilize stream banks, lake shorelines, and disturbed soils within the watershed and especially dirt roads located immediately adjacent to the edge of the waterbody. In addition, catch basins should be cleaned out and street-sweeping measures should be implemented on a regular basis throughout the watershed. Guides to Best Management Practices are available from NHDES upon request.

- **Figure 3:** These graphs show the amounts of phosphorus in the epilimnion (the upper layer in the lake) and the hypolimnion (the lower layer); the inset graphs show current year data. Phosphorus is the limiting nutrient for plant and algae growth in New Hampshire freshwater lakes and ponds. Too much phosphorus in a lake can lead to increases in plant and algal growth over time.

  The current year data for the upper layer (the top inset graph) show that the total phosphorus concentration *increased very slightly* from May to July, and then *increased by an extremely large amount* from July to September. The total phosphorus concentration in June, July, and particularly in August, was

***greater than* the state median. Specifically, the total phosphorus concentration in August was approximately 80mg/m³, which is an "*excessive*" amount that would likely support an algal bloom. The turbidity of the August sample was elevated (8.2 NTUs), which suggests that the lake bottom was disturbed while sampling. When the lake bottom is disturbed, sediment, which typically contains attached phosphorus, is released into the water column. When collecting the grab sample, please check to make sure that there is no sediment in the bottle.**

The historical data for the upper layer show that the 2001 total phosphorus mean is *much greater than* the 2000 mean and *well above* the state median. As you continue to collect samples each season, we will be able to discern long-term water quality trends with increasing accuracy and confidence.

One of the most important approaches to reducing phosphorus loading to a waterbody is to educate the public. Phosphorus sources within a lake's watershed typically include septic systems, animal waste, lawn fertilizer, road and construction erosion, and natural wetlands. Contact the VLAP coordinator for tips on educating your lake residents or for ideas on testing your watershed for phosphorus inputs.

OTHER COMMENTS

- The Acid Neutralizing Capacity (ANC) of the surface waters of the pond continue to remain *high*, with the mean being *much greater than* the state mean (Table 5). This indicates that the pond is "*not vulnerable*" to acidic inputs (such as acid precipitation) and has a greater ability than most lakes and ponds in the state to buffer against acidic inputs. While this may seem like a positive condition in the pond, the high ANC is likely due to the degraded conditions of the pond. We suspect that there is a high concentration of pollutants and ions (such as salts) that account for the elevated ANC in the pond.

- The conductivity continues to be very high in the pond, in the inlets, and in the outlet (Table 6). Typically, sources of increased conductivity are due to human activity. These activities include septic systems that fail and leak leachate into the groundwater (and eventually into the tributaries and the lake), agricultural runoff, and road runoff (which typically contains road salt during the spring snow melt). In addition, natural sources, such as iron deposits in bedrock, can influence conductivity. It is recommended that the inlets be sampled using the bracketing technique next season so that we can determine what may be causing the elevated levels. In addition, as

recommended for the majority of the Manchester Ponds, it would be useful to conduct wet weather sampling within the watershed.

- The *E. coli* concentration at **McQuesten Brook** was slightly elevated in ***September*** (Table 12). The concentration was ***not above*** the state standard of 406 counts per 100 mL designated for Class B waters. If you are concerned about *E. coli* levels at this station, you may want to conduct a more intensive sampling regime in this area using the bracketing technique to determine the source(s) of the high readings.

NOTES

- Monitor's Note (5/3/01): 19.8^{o}C; Inlet and outlet samples taken.
- Monitor's Note (7/2/01): Rain in previous 24 hours; lots of little fish observed; female mallard with 4 ducklings observed.
- Monitor's Note (9/5/01): Resident mallards observed; 24.7^{o}C and 15.2mg/l Dissolved oxygen >200% supersaturated?

USEFUL RESOURCES

Combined Sewer Overflows (CSO's), WD-WEB-9, NHDES Fact Sheet, (603) 271-3503 or www.des.state.nh.us/factsheets/wwt/web-9.htm

Impacts of Development Upon Stormwater Runoff, WD-WQE-7, NHDES Fact Sheet, (603) 271-3503, or www.des.state.nh.us/factsheets/wqe/wqe-7.htm

Stormwater Management and Erosion and Sediment Control Handbook. NHDES, Rockingham County Conservation District, USDA Natural Resource Conservation Service, 1992. (603) 679-2790.

Road Salt and Water Quality, WD-WMB-4, NHDES Fact Sheet, (603) 271-3503 or www.des.state.nh.us/factsheets/wmb/wmb-4.htm

Bacteria in Surface Waters, WD-BB-14, NHDES Fact Sheet, (603) 271-3503 or www.des.state.nh.us/factsheets/bb/bb-14.htm

Use of Lakes or Streams for Domestic Water Supply, WD-WSEB-1-11, NHDES Fact Sheet, (603) 271-3503 or www.des.state.nh.us/factsheets/ws/ws-1-11.htm

Soil Erosion and Sediment Control on Construction Sites, WD-WQE-12, NHDES Fact Sheet, (603) 271-3503 or www.des.state.nh.us/factsheets/wqe/wqe-6.htm