OBSERVATIONS & RECOMMENDATIONS

After reviewing data collected from **CRYSTAL LAKE, MANCHESTER** the program coordinators recommend the following actions.

We are pleased to welcome the Manchester Urban Ponds Restoration Project to the New Hampshire Volunteer Lake Assessment Program. Manchester's volunteers collected a lot of samples this summer and we applaud them for their efforts. Although it takes a few years to establish lake quality trends, we hope that this project will encourage the citizens of the city to continue their active participation in sampling and help to reverse the degraded conditions of the ponds. We encourage the Project Coordinator to establish a wet weather sampling program in the future. Samples collected during rain events allow us to determine non-point sources of pollution to the lake. Since the project's goals include restoring the quality of the urban ponds and reducing pollutant loads data collected from wet weather sampling allows biologists to better evaluate phosphorus loading to the lake.

FIGURE INTERPRETATION

- Figure 1: These graphs illustrate concentrations of chlorophyll-a in the water column, which also is a measure of algal abundance. Algae are microscopic plants that are a natural part of lake ecosystems. Algae contain chlorophyll-a, a pigment necessary for photosynthesis. A measure of chlorophyll-a can indicate the abundance of algae in a lake. The historical data (the bottom graph) show an *improving* in-lake chlorophyll-a trend, meaning concentrations are decreasing. The concentration of chlorophyll-a was slightly increased in August, when two species of blue-green algae were some of the most dominant. While algae are present in all lakes, an excess amount of any type is not welcomed. Concentrations can increase when there are external sources of phosphorus, which is the nutrient algae and plants depend upon for growth. It's important to continue the education process and keep residents aware of the sources of phosphorus and how it influences lake quality.

- Figure 2: Water clarity is measured by using a Secchi disk. Clarity, or transparency, can be influenced by such things as algae, sediments from erosion, and natural colors of the water. The graphs on this page show historical and current year data. The lower graph shows a *stable*

trend in lake transparency. The 2000 sampling season saw the return of rain and, typically, average transparency readings are expected to be slightly lower than last year's readings. Higher amounts of rainfall usually cause more eroding of sediments into lakes and streams, thus decreasing clarity. In some cases, as with Crystal Lake, the rain may have increased flushing rates. Higher clarity readings during the 2000 season at Crystal Lake were a pleasant surprise. Crystal Lake achieved its highest mean transparency since 1995.

➢ Figure 3: These figures 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 plants and algae in New Hampshire waters. Too much phosphorus in a lake can mean excess plant and algae growth, neither of which is appealing to most lake residents! These graphs show a *stable* trend for the epilimnion, but a *worsening* trend in the hypolimnion, which means levels are increasing. Mean epilimnetic phosphorus increased in the epilimnion, while the mean hypolimnetic phosphorus was affected by a high reading in August. This was likely due to sediment that was observed in the sample. One of the most important approaches to reducing phosphorus levels is educating the public. Humans introduce phosphorus to lakes by several means: fertilizing lawns, septic system failures, and detergents containing phosphates are just a few. Keeping the public aware of ways to reduce the input of phosphorus to lakes means less productivity. Please feel free to contact the VLAP coordinator for tips on educating your lake residents or for ideas on testing your watershed for phosphorus inputs.

OTHER COMMENTS

➢ The blue-green algae *Microcystis* and *Coelosphaerium* were observed in the plankton sample (Table 2). Blue-green algae can become a nuisance species when sufficient nutrients and favorable environmental conditions are present. While overall algae abundance continues to be moderate in the lake, the presence of these indicator species should serve as a reminder of the lake's delicate balance. Continued care to protect the watershed by limiting or eliminating fertilizer use on lawns, keeping the lake shoreline natural, and properly maintaining septic systems and roads will limit phosphorus and keep algae populations in balance.

➢ The StormTreat System at Crystal Lake received some repairs this past summer. Ecocycle, who now owns the marketing and distribution rights for StormTreat, determined that the wetland plant/rice stone area of the system was not properly sealed when it was installed. This resulted in the stormwater "short circuiting" the tertiary treatment capabilities of StormTreat. Despite the fact that Ecocycle did not improperly install the Crystal Lake units, they invested a considerable amount of funds and time to repair the StormTreat system.

Despite last year's efforts, there are a few other problems that need to be addressed before the StormTreat units are running at 100%. The planting of wetland plants and minor modifications to the pre-StormTreat sediment box should be completed by late spring.

- The proposal for the residential subdivision at the southwest end of Crystal Lake was rejected, due mainly to the efforts of the Crystal Lake Preservation Association and the Manchester Conservation Commission. The City is now trying to acquire the property to prevent it from being developed.

NOTES

- Monitor's Note (5/30/00): Great blue heron visits everyday. Beaver(s) at outlet. No DO/temp profile; Hydrolab battery dead.

- Monitor's Note (8/24/00): City has no lifeguard at beach, 10 swimmers present.

- Biologist's Note (8/24/00): Lots of sediment in hypolimnion sample.

- Monitor's Note (9/25/00): No chain. Since water column was isothermic, we just took a grab sample for deep spot samples and chlorophyll-a.

USEFUL READING

Soil Erosion and Sediment Control on Construction Sites, WD-WEB-12, NHDES Fact Sheet, (603) 271-3503 or www.state.nh.us

Vegetated Phosphorus Buffer Strips, NH Lakes Association pamphlet, (603) 226-0299 or www.nhlakes.org

Handle With Care: Your Guide to Preventing Water Pollution. Terrene Institute, 1991. (703) 661-1582.

Best Management Practices to Control Nonpoint Source Pollution: A Guide for Citizens and Town Officials, NHDES-WD 97-8, NHDES Booklet, (603) 271-3503