

WATERSHED ANALYSIS OF LONG POND SOUTH EXECUTIVE SUMMARY

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December 6, 2007

The water quality of the South Basin of Long Pond, located in the Belgrade Lakes region of Maine, was investigated by the Colby Environmental Assessment Team (CEAT) from May to September of 2007. The physical, chemical, and biological characteristics of water quality were analyzed to evaluate the current health of the lake. The Long Pond South watershed was examined to investigate the effect of land-use patterns, including residential and commercial development, on the lake water quality. Data were also collected from road and shoreline surveys to produce maps highlighting areas that could potentially contribute to the degradation of water quality. Data collected during the summer and fall were compared with data from previous years to study the historic water quality trends.

The water quality trends show that the lake transparency of Long Pond South has decreased by roughly one meter over the past 30 years, suggesting greater productivity. The trophic status of Long Pond South is oligotrophic, but the decreasing trend in transparency could indicate the acceleration of eutrophication. This possibility is supported by the trend of increasing pH over the past 30 years, which is linked to increased algal growth. In late summer, Long Pond South has very low oxygen levels in the temperature-defined metalimnion and near the bottom of the water column. More research is needed to determine the cause of the low-oxygen concentration in the metalimnion, but the lack of oxygen on the bottom during the summer months is likely due to stratification of the water column preventing the addition of oxygen from the surface. Existing oxygen on the bottom is then used up by the large populations of decomposers that develop because of the increased availability of sediment organic matter in aging lakes.

The amount of aquatic plant productivity in a lake is limited by the amount of phosphorus in the water. The increasing productivity trend in Long Pond South indicates increasing levels of phosphorus, and if the phosphorus levels exceed 12-15 ppm an algal bloom may result. Algal

blooms can be detrimental to the health of other organisms in the lake, such as fish, can decrease the aesthetic value, and can reduce the value of shoreline homes. Although the phosphorus levels in Long Pond South are not yet high enough to cause algal blooms, the increasing trend is a cause for concern.

Following is a brief summary of findings from the study of Long Pond South and its watershed carried out by Colby Environmental Assessment Team:

- Long Pond South has a volume of 46.2 million cubic meters and a surface area of 540 hectares (MDEP 2007b). It has two deep basins, with the deepest point reaching 94 ft. 39% of Long Pond South has a depth of less than 16 ft. These areas are at risk for the colonization and establishment of invasive plants, since these species prefer shallow water.
- The total phosphorus concentration of Long Pond South was 9.1 ± 3.0 ppb, up from the Long Pond North concentration of 7.6 ± 1.7 ppb in 2006 (CEAT 2007). The largest external sources of phosphorus are agricultural land (22%), mixed forest (13%), successional land (12%) and atmospheric input (12%) based on the phosphorus budget.
- Long Pond South has a flushing rate of 3.52 flushes per year, with 79% of the water input coming from Long Pond North, 12% from runoff, 6% from Ingham Pond, and 3% from precipitation.
- Fishing is an important recreational activity in Long Pond South but the cold water fishery may be threatened by decreasing DO levels resulting from accelerating eutrophication. Fisheries should continue to be managed through fish stocking, control of invasive species, and habitat preservation.
- Land-use has undergone several changes in the period between 1966 and 2003:
 - Residential area has increased from 0.3% in 1966 to 2.3% in 2003, especially along previously developed roadways and along the shoreline. However, compared to surrounding watersheds, the Long Pond South watershed has a lower density of residential areas.
 - Agricultural land has decreased 4.3% since 1966, which is consistent with trends in surrounding watersheds and throughout southern suburban Maine.
 - There has been a 4.3% increase in successional land since 1966, an amount proportional to the amount of agricultural land that is being reverted.

- Residential development has occurred primarily in forested areas, so forested land has decreased from 78% to 72% since 1966, even with the decrease in agricultural land.
- High impact development, such as commercial, cleared land, and parks, has seen only a 1% increase since 1966.
- Wetland areas continue to comprise 11.2% of the Long Pond South watershed. The wetlands have important ecosystem functions for the water body by acting as nutrient sinks that filter the water and capture sediment, and by providing habitat for numerous species.
- Over 40% of the roads in the watershed are camp roads, which are more likely to contribute to water pollution because of the presence of erodible materials and less frequent maintenance than roads servicing year-round homes.
- Just under half of the camp roads are in fair (16.7%) or poor (31%) condition based on our survey and are likely contributors of phosphorus into the lake. These roads will continue to pose problems, if they are not repaired and maintained. Likewise, degradation of roads currently in good or acceptable condition could increase phosphorus loading.
- Overall, roads in the Long Pond South watershed are in worse condition (16.7% good) than roads in the Long Pond North watershed (53.7% good)(CEAT 2007). Many roads in poor condition in the Long Pond South watershed are in areas undergoing development with few or no residents living there to maintain the roads.
- The shoreline of Long Pond South has experienced significantly less development than Long Pond North, with only 126 shoreline homes versus 239 homes in Long Pond North (CEAT 2007). Development has been limited by the amount of land suitable for building and by the recent downturn of the housing market.
- Septic systems installed before 1974 may contribute more phosphorus to the lake because they are not required to meet the current strict standards. As residents improve their homes for greater intensity of use, many grandfathered septic systems will be replaced. The installation of new, more efficient septic systems will accompany new construction as the population increases over the next 20 years. Both old and new septic systems should be maintained to minimize the amount of phosphorus entering the lake and affecting water quality.

- The Maine State Planning Office estimates that the population of the three towns (Belgrade, Mount Vernon, and Rome) that make up the Long Pond South watershed will increase 65% from 2000 to 2030. The Belgrade Lakes area is becoming increasingly popular as people move into the area upon retirement. CEAT established that there are approximately 50 shoreline lots that could be developed, as well as other areas of potential development within the watershed. Limits to development include mandated resource setbacks, drainage problems, availability of access roads, and the current housing market.

As development in the watershed increases so will phosphorus levels in the lake.

Development around the shoreline should be limited and regulated, and development around wetlands and off shore should be done prudently. Roads and shoreline buffers should also be maintained to minimize erosion and to help prevent nutrients from entering the lake with sediment runoff. Educating the public regarding the impact of their actions on lake water quality is important. Awareness of proper maintenance and remediation techniques should also be addressed. Long Pond South is part of a chain of Belgrade Lakes. Long Pond North provides 79% of the water to Long Pond South, so water quality in Long Pond North has a large impact on Long Pond South. The water quality of upstream lakes must also be maintained to ensure good water quality in Long Pond South. CEAT recommends close collaboration with neighboring lake associations to protect the water quality of all the lakes in the region.