

EXECUTIVE SUMMARY

In June 2000, the Eagles Mere Lake and Watershed Committee contracted with BL Companies to conduct an ecological and hydrological study of the natural glacial lake known as Eagles Mere Lake. The lake study was designed to address three primary issues and was thus divided into three parts. The first part of the study addressed "internal lake" features, such as water chemistry, aquatic biology, physical lake characteristics, potential impact on the lake posed by adjacent land uses, and the presence of exotic plant or animal species within the lake. The second part of the study addressed the "external lake" features including a description of the important geologic, climatic, and hydrologic characteristics of the watershed in which the lake is located. The third part of the study addressed the potential use of the lake as a public water supply and the possible effects such usage would have on the overall "health" or ecological balance of the lake.

The results of the internal lake study indicated that the chemical characteristics of the lake water are remarkably positive. The lake lacks any of the common contaminants associated with adjacent residential use (nitrates, phosphates, algal blooms, etc.) and appears to be devoid of exotic aquatic plants and waterborne organisms that would threaten the long-term health and recreational/aesthetic values of the lake. The lake also has favorable pH, temperature, and dissolved oxygen profiles throughout the year. In addition, the lake has a relatively high alkalinity level for a natural body of water located in northcentral Pennsylvania. These positive chemical characteristics help maintain what appears to be a very healthy and well-balanced fishery that is complemented by periodic trout stocking practices.

The results of the external lake study indicate that sandstone bedrock belonging to the Burgoon Formation underlies both the Borough and the lake. This sandstone contains a naturally occurring carbonate-rich material that is believed to be at least partially responsible for the very beneficial natural alkalinity present in the lake water. It is this natural alkalinity level of the lake which acts as a buffer to the effects of acid precipitation. In addition, the external lake study determined that a shallow ground water system originating primarily from the northern and northeastern sides of the lake, including the wetland areas, are critically important sources of recharge or inflow water to the lake. Other sources of inflow water to the lake include seasonal surface water carried by the small tributaries leading into the lake and by direct catchment of precipitation by the lake surface itself.

Based upon water level measurements taken in 26 municipal and domestic wells located around the perimeter of the lake, the lake appears to be losing water to a deeper ground water system lying beneath the lake. This deeper ground water outflow is believed to leave the lake primarily in northwestern, southern, and eastern directions. Several wells located near Prospect Hill suggest that some very limited amount of deep ground water may be entering the lake from the west, presumably from beneath or near Prospect Hill. However, far too little information exists on the general characteristics of the local deep ground water system to be certain about the magnitude of deep ground water flows into or out of the lake.

The public water supply study was based in large part upon the combined results of the internal and external lake studies. In general, the supply study results suggest that the biologic and hydrologic balances of the lake, and thus, its recreational and aesthetic values, could be at risk should the lake be used as a public water supply. If the lake were designated as a public supply, water would have to be drawn from the lake on a constant basis to serve the ongoing needs of the community. This constant withdrawal would have to take place during severe droughts when insufficient amounts of recharge may be received by the lake to maintain adequate recreational levels. During these drought periods, diminished recharge together with added withdrawals would also lengthen the amount of time it normally takes to exchange (freshen) the volume of water contained within the lake basin itself.

The deep regional ground water system lying beneath and to the south of the Borough may provide an alternative to the lake as a future public water supply. The withdrawal of this ground water resource via municipally-owned wells would have no hydrologic or ecological impact on the lake. This opinion of no hydrologic impact is based upon the fact that the deep ground water system, including that portion located to the south of the Borough, flows away from and not toward the lake. Therefore, no deep ground water destined to flow into the lake would be intercepted by these wells. The comprehensive evaluation of the regional deep ground water system as a viable public supply was not part of the current study.

It is recommended that no water supply wells be installed in either the shallow or deep ground water systems located along the northern or eastern sides of the lake. These areas are believed to play very important roles in supplying water to the lake, and any withdrawal of ground water from these areas will likely diminish or disrupt this important recharge to the lake.

Dear Eagles Mere Residents:

December 14, 2001

Please find attached the executive summary of the lake study completed by BL Companies. In June of 1999, the Eagles Mere Lake and Watershed Committee was created to determine the current and future health of the lake and our surrounding watershed.

Over the years, there have been many unanswered questions pertaining to the lake and the watershed area of Eagles Mere; therefore, the Eagles Mere Lake and Watershed Committee was established to study various aspects of the lake. It was initiated by Bob Zelten, who was then President of the Lake Association, with members of the community who have all been interested or active in various Eagles Mere organizations. The members are: Bill Gruver, Mayor of Eagles Mere; Bill Feese as President of the Borough Council; Charlie Gardner who then served on the Conservancy Board; Bob Zelten, as then President of the Lake Association; Bob Ryan with legal, zoning, and community expertise; and Lucy Stitzer serving as Chairman. We also had Joan Sattler and John Leo from the Department of Environmental Protection as ad hoc committee members.

The committee sent a request for a proposal to various hydrologists to bid on the project. We chose BL Companies for their intelligent and thorough attention to both the ecological and hydrological aspects of the study. The total cost was \$70,000.00. The Growing Greener Grant Program from the DEP contributed \$50,000. The Borough and the Lake Association each contributed \$8,000. The Conservancy and The Eagles Mere Country Club each contributed \$2,000.

The study was comprised of three parts: 1. a study of the lake's internal composition; 2. the external watershed area of the lake; and 3. the potential use of the lake as a public water supply.

Several of the Report highlights are summarized below:

- The lake covers 120 acres and reaches a maximum depth of 50 feet. The deepest spot is out from Gypsy's Landing and perpendicular to the beach.
- The lake is very clean and has no contamination issues.
- Each spring and fall the lake experiences a complete turnover; where the water at the bottom of the lake rises and the water at the top falls to the bottom. This occurs when the water temperature is no longer stratified and the density is even throughout. The turnover takes place in one day.

- The lake is buffered from the impact of acid rain because of two differentiating features.

(1) The likely major source of alkalinity is water coming in from the western watershed region. When wells were tested on the Prospect Hill area, they showed very high alkalinity levels. It is interesting to note that this is the only source of deep ground water to the lake.

(2) There is also a unique calcium deposit, which was formed at the bottom when the ice age carved into the Burgoon Geological Formation. Tiny plankton organisms absorb this calcium carbonate to make their shells. When these organisms die, they sink to the bottom and decay. This releases the calcium into the water. As the lake turnover occurs, the calcium spreads throughout and negates the effect of acid rain.

- There are three different water feeds to the lake: surface water, shallow ground water, and deep ground water. To our surprise, underground springs, the Great Lakes, or springs from North Mountain do not feed the lake. The majority of the water comes from the shallow ground water underneath the Park and the north/northeast wetlands area. The water is filtered through the mossy wetlands and the clay deposits over a period of many years before it enters the lake in the vicinity of the dock area. The deep ground water enters the lake on the western side over toward Prospect Hill.

- Here are some statistics:

INFLOWS

- Direct catchment of precipitation on the 120 acres is 130mm gallons per year
- Overland surface flow from the 240 acre watershed is 50 mm gallons per year
- Shallow ground water inflow from adjacent wetlands and surrounding watershed of 600 acres is 170 mm gallons per year
- Deep ground water gain from western side of lake exists but not currently quantifiable
- Total annual inflow to lake of approximately 350mm gallons per year.

OUTFLOWS

- Evaporation is 90mm gallons per year
- Losses through lake bottom to deep ground water system in the northern, eastern, and southern directions, 90mm gallons per year
- Surface water flow from outlet pond, 165mm gallons per year
- Water withdrawn for golf course, maximum of 6mm gallons per year
- Total annual outflow from the lake of approximately 350mm gallons per year

- The ideal level of the lake is high enough so water can flow under the bridge to the outlet pond; high enough so a boat can easily go through. This allows the lake to maintain its slight current to the outlet pond and refresh itself every three years. The hydrology balance is critical to the overall health of the lake.

- Our situation is unusual in that the lake is higher than the surrounding deep ground water and deep ground water actually flows away from the lake. Normally, the surrounding surface water down to the deep ground water flows into a lake. The study has found this is not the case due to the testing of several wells in the area. With the exception of those near Prospect Hill, the water levels of the wells are lower than the surface of the lake!
- The outlet pond contributes to the overall health of the lake as it performs functions much like those associated with wetlands. The water lilies in the pond actually assist the spawning and breeding of the fish who then migrate to the larger lake. The lilies are beneficial to a wide variety of water-life. However, occasional controlling of the water lilies, to allow boats to enter for fishing, is not harmful.
- The freshwater jellyfish are a natural organism to a clean lake. Also, the blue-green algae seen in August at the southern end of the lake is a natural occurring bacteria and its amount is not harmful to the lake.
- BL Companies recommended that we not use the lake as a public water supply source because it could disturb the healthy ecological and hydrological balances of the lake.
- There is a lag period that can be upwards of 35 years between what occurs in the watershed area and how it affects the lake. This brings us to the last point.

We are eternally grateful to our forefathers who established systems that allowed the lake to flourish.

- Captain Chase was an engineer and it was he that re-directed the flow of the lake to go from the beach to the outlet pond rather than from the south end of the lake to the beach. He actually created the outlet pond specifically for this reason. This has allowed the important refreshing of the lake.
- Installing sewage systems was the key to keeping the lake from becoming too nutrient oriented – and cleaner for swimming.
- Eagles Mere Lake Association ownership of the path area, 100 feet, around the entire shoreline, has eliminated housing right on the lakeshore and prevented the 'Pocono' look to the lake. It has also been quite fortuitous that the Lake Association has owned and prevented development along the forest and the wetlands of the eastern shore.

The complete analysis with all data will be available for your review at the Borough Hall. Please do not hesitate to contact any one of us if you have further questions.

Sincerely Yours,



The Eagles Mere Lake and Watershed Committee
 Bill Feese, Charlie Gardner, Bill Gruver, Bob Ryan, Lucy Stitzer, Bob Zelten