Indian Lake Borough

Nutrient Loading Analysis Supporting Lake Discharge
for the Correction of Malfunctioning On-Lot Systems
April 2, 2014

From the 2007 DEP Lake Study:

> *The average Trophic State index (TSI) on total phosphorus for 2007 calculated to 36.55 for Indian Lake and 40.59 for Stonycreek Lake. The average TSI score for chlorophyll a calculated to 47.37 for Indian Lake and 47.56 for Stonycreek Lake and the average TSI on secchi scored 40.12 for Indian Lake and 45.74 for Stonycreek Lake. These TSI results when reviewed together indicate that both lakes are mesotrophic (scores ranging between 40 and 50).*

Analysis: On Phosphorous alone, Indian Lake (IL) is oligotrophic (poorly nourished) or borderline oligotrophic (under 40). All tests considered, IL is mesotrophic (moderately nourished) and perhaps on the low side. IL is lower than Lake Stonycreek (LS), so our outflow actually make LS better on all counts.

> *In addition to the lake data collected, the average TSI on phosphorus of Clear Run and Calendar Run combined, calculated to 48.21 (See Attachment C). This TSI score indicates mesotrophic influence.*

Analysis: This says IL is better than its tributaries; this implies that our aquatic life absorbs the nourishment from these tributaries and/or our sources, other than these tributaries, are even cleaner. We have good margin to a eutrophic (well nourished) state, and are far from hypereutrophic (over-nourished).

> *The water chemistry profiles collected throughout the year showed mostly normal lake stratification and indicated some evidence of eutrophication with lower dissolved oxygen and higher specific conductivity at bottom depths. All Trophic State Index scores calculated for Indian Lake, Stonycreek Lake, and the streams Clear Run and Calendar Run in 2007 range between 40 and 50. Indian Lake and Stonycreek Lake are presently mesotrophic. Indian Lake is one of the best scoring lakes in the Commonwealth of Pennsylvania.*

Analysis: Given the variety of uses for the Lake, ranging from fishing to swimming to boating (aggressive, high-HP power watersports), IL does not appear to be at risk due to nutrients and if anything is borderline poorly nourished with respect to sustained fishing/fish population and growth. As a result of these margins the Borough feels comfortable with our established strategy of reserving lake discharge for correction of malfunctioning systems.

From the 2010/2011 Follow-up Study:

> *After reviewing the data from each of the sampling events and calculating the trophic state indices, the results show that Indian Lake is a lake with low to moderate nutrients, lower plant growth and good clarity. The lowest trophic state was 22.1 for chlorophyll a at station one during February and the highest trophic state was 55.4 for total phosphorus at station three during October. Overall the average trophic state for all four months at all three stations was as follows: Total Phosphorus was 42.5; Secchi Depth was 43.2 and Chlorophyll a had an average of 32.5 for all values. The total phosphorus and Secchi trophic states would fall into the mesotrophic category and chlorophyll a would be considered oligotrophic.*

Analysis: Four years after the DEP study the Lake is still low to moderate in terms of nutrients; there has been no substantive negative change.

In 2012 the Borough, Service Corp and Anglers Club had a Fish Study performed since, if anything, the nutrient results might be limiting our fish population/growth. Additionally, the Lake had been lowered ~25 feet for dam maintenance sparking concern over fish/fishing. This Fish Study yielded the following recommendations:

> *- Aggressively harvest largemouth bass from 10 to 15 inches from the lake.*
> *- No harvest of largemouth bass over 15 inches and under 20 inches.*
> *- Stock 2,000 to 3,000, 6 to 8 inch walleye on an annual basis.*
> *- No harvest of walleye under 20 inches.*
> *- No stocking of any largemouth bass.*
> *- Survey the fish population in September 2015.*
> *- The water quality parameters that were tested during the survey indicate that there is good water quality for fish production and other recreational activities. The greatest concern that you should have at this time is preventing nutrients from entering the lake. The faster nutrients enter a lake, the faster it will age, resulting in more management problems. Management of nutrients entering Indian Lake should be one of your greatest concerns for the long-term management of the lake.*

Analysis: Fishing is good. We have too many small largemouth bass; harvest them and save the bigger ones. Stock walleye and let them get big on the smaller bass. Keep our eye on the nutrients, which we are doing regularly. We have an aggressive goose management program as well.

Recommendation: Stay the course. The strategy of reserving discharges for remediation remains sound. Consider another Follow-up Lake Study in 2015/2016.