RESOLUTION PROPOSAL

DATE: August 20, 2009

SUBJECT: Lake Health Action Items

SPONSOR: Joy Bauserman

BACKGROUND INFORMATION: Concerns regarding water quality testing:

Background
Nitrogen and phosphorus are the two key nutrients that determine the "trophic state of the lake", the amount of weed and plant growth. When one nutrient is not as readily available as other nutrients, it is called the limiting nutrient because it determines the amount of plant growth. Since phosphorus is normally present in low concentrations in freshwater systems, it is the limiting nutrient. In other words, once the supply of phosphorus is used up, plants can no longer grow. Phosphorus occurs naturally in igneous, metamorphic and sedimentary rocks. Most of the phosphorus in soils is adsorbed to soil particles or incorporated into organic matter (Smith, 1990; Craig et al., 1988; Holtan et al., 1988).

Although phosphorus is present in relatively low concentrations, human sources such as fertilizer, sewage, and eroded soil can cause nutrient overload in lakes. Over half the phosphates found in lakes, streams and rivers come from human activities. Large concentrations of phosphorus can trigger algal blooms and excessive plant growth. The increased plant life eventually dies and settles to the bottom. With large amounts of decaying plant matter to eat, the bacteria that consume it also increase and use up the available dissolved oxygen. The depleted oxygen levels can cause certain species of fish, macroinvertebrates, and other aquatic organisms to die.
For many years we have been measuring the total P. It has been in the range of 20 to 50 ppb or 0.020 to 0.050 mg/L. Other parameters such as pH, specific conductivity, alkalinity, turbidity, temperature, and secchi depth are measured and show small differences between various locations in the lake, therefore the lake seems fairly homogeneous. Through 2006 the numbers for P have been in that reasonable range. The lab went out of business, and from 2007 on we have not had consistent and meaningful P readings.

Testing results
- In 2005, the total phosphates in the lake ranged from 0.014 mg/L to 0.082 mg/L.
- In 2007, a new lab performed the phosphate testing giving results that all areas of the lake had less than 0.05 mg/L of total phosphates. This means the method of the new lab was not sensitive enough to detect any P. These readings were useless for calculating the N/P ratio, which is a good measure for the trophic state of the lake, which has been mildly eutrophic so far, a good condition for a multipurpose lake. The lab that had been doing the testing went out of business, and a new lab was used. For 2008, at another lab which claimed a normal

sensitivity of 10 ppb (0.010 mg/L) we got a lot of values at less than 10 ppb, again meaning not detectable. The same for 2009 so far, May and July (not June).

- Either the lake has a much lower P than in previous years, or the analysis is not reliable. In case of doubt, duplicates should be done. Since some locations still show measurable P levels of 35, 48 and 53 ppb, there is reason to question the reliability of the analysis.
- The May 2008 results from Analytics Lab ranged from less than 0.010mg/L to 0.043mg/L. The June and September 2008 results were all less than 0.010mg/L with the exception of 2 test sites giving 0.012 mg/L and 0.014 mg/L. With the amount of sediments flowing into the lake, these phosphate levels do not seem to be accurate.
- I contacted the Lab and questioned the results. Their reply was what were the events before testing (i.e. rain events)?
- The results of May 2009 tests showed all areas < than 0.010 mg/L except Monroe Cove (0.035mg/L) and Jackson Cove (0.053 mg/L). I attributed the results of Monroe and Jackson Coves to fertilization and runoff from the golf course, but couldn't understand the rest of the results being less than 0.010 mg/L.
- The results from June 2009 showed all areas to be less than 0.010 mg/L except at the 10 m level (0.035 mg/L) and the outlet (0.048 mg/L). Water samples were taken at the 10 m level and 1 m level. These samples at the 10 m and 1 m levels were taken in very close proximity of each other, therefore I don't understand how the 10 m level could show 0.035 mg/L and at the 1 m level less than 0.010 mg/L.

Summary and conclusion

- In 2007, a new lab performed the phosphate testing giving results that all areas of the lake had less than 0.05 mg/L of total phosphates. This means the method of the new lab was not sensitive enough to detect any P. These readings were useless for calculating the N/P ratio, which is a good measure for the trophic state of the lake, which has been mildly eutrophic so far, a good condition for a multipurpose lake. The lab that had been doing the testing went out of business, and a new lab was used. For 2008, at another lab which claimed a normal sensitivity of 10 ppb (0.010 mg/L) for phosphates many of the values were less than 10 ppb, again meaning not detectable. The same for 2009 so far, May and July (not June).
- From the results in 2008 and current 2009 results either the lake has a much lower P than in previous years or the analysis is not reliable. In case of doubt, duplicates should be done. Since some locations still show measurable P levels of 35, 48 and 53 ppb, there is reason to question the reliability of the analysis. I have duplicate samples and have been in touch with the lab to get phosphate testing performed.
- While the lake has not experienced algae bloom due to excessive phosphates, there have been low levels of phosphates but the levels have never been as low as 0.010 mg/L. Furthermore, with the amount of sediment entering the lake we would expect to see phosphate levels of greater than 0.010 mg/L. The June 2009 water sampling trip also identified areas of hydrilla and algae growth which could indicate higher phosphate levels.

- The main goal of having reliable P measurements is to follow the development of the lake over the long run, as it is aging.

Proposal
Lake Health presently tests water quality for all factors except E. coli, organic nitrogen and total phosphates. I propose that we buy the equipment to test the organic nitrogen, total phosphates, and E. coli. The cost of the equipment would be approximately $4000.00 initially. After the initial cost the annual cost would be $500.00. We currently pay out $3500.00 per year for these tests. Reserve funds of $500.00/ year would be set aside for replacement.

STAFF RECOMMENDATION: Concur.

PROPOSED FINANCIAL IMPACT: Initial cost $4000.00. Annual costs $500.00

PROPOSED SOURCE OF FUNDING: Lake Health Funds

STRATEGIC PLAN REFERENCE:
2.1 Protect and improve the lakes and ponds through ecologically sound measures implemented by the Association and individual property owners

POSSIBLE MOTION:
Move that the Board of Directors authorize staff to purchase equipment to test organic nitrogen, total phosphates, and E. coli in the community's lakes in an amount not to exceed $_____.

PERSON RESPONSIBLE FOR FOLLOW-UP: General Manager