

October 6, 2024, MRI AGM Lake Management Report addendum

Lake Science Overview

Re: the Lake Health discussion, and for those who are not as familiar with the lake testing that our lake scientist, George Knoecklein, started doing in 2007, here is some background that will, hopefully, help everyone who is not close to the lake science, better understand the urgency we are facing:

1. George runs Northeast Aquatic Research, a company that he started 30 plus years ago to service lake communities and owners in the tri-state area. NEAR is widely respected as one of the foremost authorities on lake health and the environmental challenges facing lakes in the Northeast. NEAR has been instrumental in helping CT DEEP, Salisbury, Twin Lakes Association, LWA and numerous other lake associations across CT to address lake health and hydrilla issues.
2. Five years ago, NEAR started to educate and train the MRI community on how best to monitor and test our lakes. Currently, we have over 25 Citizen Scientists who have helped manage testing on both lakes. Initially, and as we learned how to test effectively, the testing was limited to once a month at the deep point of each lake. As we have become more proficient, our testing has expanded to include monthly tests on all inlets (where we are looking for unusual nutrient levels), an additional deep point on the Lower Lake, temperature data loggers on each lake. Also, we are testing the deep points on each lake once a month; April through November, which is critically important data to provide to NEAR because October is the month that has traditionally been the month where NE lakes have the lowest oxygen levels as well as the highest Phosphorous and Nitrogen levels. More recently, and as NE lakes no longer regularly freeze in the winter, November is now the month with the most issues. The deep-water testing consists of:
 - A water clarity test
 - Using an electronic sensor to test oxygen levels
 - Collecting water samples at three different depths
3. The remote temperature sensors set up at the deep points of both lakes. The automatic loggers record temperatures at various depths and help NEAR better understand a range of lake health issues over the course of a full season (April through November)
4. The Citizen Scientist Team has made significant progress this year by testing all inlets to assess their impact on the lakes. This is the first time that we have been able to test all the inlets and has added five additional tests to be done each month. If the inlet results show any negative effects, this could provide valuable data to NEAR in the effort to understand if there are natural causes for the increases in phosphorous and other nutrients that we have seen over the past four summers.
5. With temperatures rising across the region, lakes in the tri-state area very rarely freeze over. This ice-free situation allows lakes to stay warmer which creates a longer growing season for aquatic plants, which in turn reduces oxygen and sunlight levels. As the last two winters

were pretty much ice free on our lakes, this may have been a contributing factor to some of our issues.

6. Warning signs:

- The algae bloom detected by NEAR in August “23 on the Upper Lake. Since testing began 17 years ago. NEAR has never seen an algae bloom in our lakes and was shocked to find it last summer. Algae blooms happen when lakes stratify in late summer; warmer water and low oxygen at the lake bottom lead to Phosphorous being released from the lake which in turn increases algae growth. Algae blooms are a key indicator that there is excessive algae growth and that nutrient levels are high. Algae blooms can also quickly become cyna-bacteria which can be dangerous to drink or even swim in.
- The poor water clarity results from this past April and May also indicate that there was higher than desired growth and nutrient levels, and nutrient levels, and that oxygen levels are lower.
- The fuzzy, slime like growth on stones and rocks in the lakes. NEAR has never seen this amount of growth before; this is another early sign of eutrophication.

7. What is the root cause of these warning signs? NEAR has never seen such a rapid decline in lake health. From 2007, when our lakes were pristine, to this summer - when we are actively discussing causes of eutrophication, is unprecedented in NEAR’s experience. Equally puzzling is that there is now obvious smoking gun. Hence, NEAR’s request for MRI to provide more data on the:

- Inlets as being possible sources (which will have April through November tests)
- Upper Lake forest die off (Curtis was consulted, did a fly over and does not believe there is forest die off that would cause increased nutrient flow into the lake)
- Human impact on our lakes. The LMC has developed a proposed Human Impact Survey and data gathering process that will be presented to the Board. The sooner we determine if our wastewater is causing issues the better, as remediation costs are much lower than more extensive and expensive measures - like Alum treatment for the entire lake (for more on Alum treatments see

As we all want to protect our lakes for our children and their children, we need to help NEAR solve the mystery of why our lake health is declining so quickly. My fellow Citizen Scientists and I have done dozens of deep point and inlet tests over the past five years. We have tested in cold temps, bitter winds and when our hands are frozen. In a few months we will know how the inlets are impacting lake health. The last missing - and significant - data point we can provide to NEAR is human impact data.