

On March 25, 2019, Dr. George Knoecklein of North East Aquatic Research) NEAR) gave a status report on his study of the Lower Bolton Lake at Bolton Town Hall. This first of two status report contained many graphs and data summaries. His report will be posted on the Bolton Town web site in the near future. His study is not complete, and he will give a second status which he intends to present more conclusions rather than data summaries at the next meeting which will be in roughly 2 months. He admits that he does not yet completely understand why the Lower Bolton lake has had repeated blue green (cyano-bacteria) algae blooms since 2012. Dr. Knoecklein believes that the heavy rainfall in June, July and August contributed to the September 2018 cyano-bacteria bloom and lake closure.

In my opinion, the meeting was poorly attended – only 15 people present with more Middle lake residents there than Lower Lake residents. To me, it was surprising that more Bolton residents did not show as the Lower Lake was closed for swimming for several weeks last September due to the cyano-bacteria bloom. Representative Robin Green and Sandra Pierog were present. Emily Brindley from the Journal Inquirer attended and will write an article on the meeting. Pam Sawyer asked the Friends of Bolton Lakes to do something for the 300th anniversary of the Town of Bolton in 2020. Her committee wants to have an event every month in 2020 and a parade will be scheduled for October 3, 2020.

Dr. Knoecklein reported that the former weed problem in the Lower Bolton Lake (LBL) was well controlled in 2018. No southern naiad (a native plant) was found in LBL in 2018. In 2012 and in prior years, the southern naiad had explosive growth which resulted in many acre size floating weed masses. No invasive fanwort or variable leaf milfoil was found in LBL in 2018. Curly Leaf Pondweed was found in many different small patches in many places around the LBL perimeter but not enough to lead him to do a chemical treatment for the curly leaf pondweed in LBL in 2018. No invasive mudmat was found in LBL in 2018 . He said that mudmat, although a very small plant which grows on the bottom of shallow areas (and covers it like a mat), is a concern because it has a potentially habitat altering capability of covering shallow sandy areas and crowding out native plants and covering fish spawning beds.

Dr. Knoecklein reported that the Upper Bolton Lake is filling in and basically swampy areas of the Upper Lake are in the process of turning into land. This could result in more nutrients flowing into LBL when there is runoff from a rain storm. This could have a negative effect on water quality as a large amount of the watershed flows into the Upper Lake and then ultimately into LBL.

Dr. Knoecklein discussed rainfall, water temperature anoxic conditions on the lake bottom, high concentration of iron and phosphorous as contributors to the cyano-bacteria bloom and 2018 September LBL lake closure. In retrospect, he wishes he had called for copper sulphate treatment for LBL in light of declining water clarity/increasing cyano-bacteria concentrations in late August. Early August had a low reading, but it was followed by a quick bloom. The wet season from mid-July through August into September contributed to the decline in water clarity and the bloom. Kim Welch and Peter Van Dine discussed the heavy wet season in 2018 and that there was a continuous inflow into LBL from the Middle lake and an outflow from LBL from late June through September which rarely occurs.

Dr. Knoecklein mentioned that the anoxic conditions at the bottom of LBL increases during the end of summer in high temperatures. This results in the release of iron and phosphorous into the water column as oxygen is no longer present to combine with them and keep them on the bottom of the lake. Ammonia coming from the bottom of the lake contributes to the cyano-

bacteria bloom. His testing showed more phosphorous in 2018 (probably due to heavy rain runoff- he is still studying it) , higher surface water iron concentrations and nitrogen in LBL in 2018. He also recorded more phosphorous, iron and nitrogen from the spillway from the Middle Lake dam.

When asked why LBL had a bloom in 2018 and has had 4 blooms since 2012, Dr. Knoecklein said he didn't know but expected to present some conclusions when he gave his next status report in 2 months. Heavy rain years probably are a factor. He said that the 3 years of 6-foot drawdowns might have somehow contributed by affecting lake chemistry. A few years ago, at a meeting, Dr. Knoecklein said he did not believe that the drawdowns were the cause of the blooms although that was his original hypothesis. When asked why the Lower Lake has suffered these outbreaks while the Middle Lake, with similar conditions has not, he said he had no explanation at this time. He mentioned the high iron concentration in LBL as being a possible source of the problem. He mentioned the iron and phosphorous concentration in the dam rip rap as being a possible source of the high iron concentrations in LBL. However, Dam riprap has been there since the early to mid-1990's and no cyano-bacteria bloom occurred in LBL until 2012 many years later. The Upper and Middle lakes also have high iron concentrations.

Peter Van Dine pointed out that major dam reconstruction began in the winter of 1987/1988 with a major 8 foot draw down. This is when Peter suspects most of the dam construction/ rip rap placement would have occurred.

Dr. Knoecklein briefly discussed the recent Middle Bolton lake report prepared by his associate Hillary Kenyon. This report was based on data supplied by the Friends of Bolton Lakes. Dr. Knoecklein asked if the Friends of Bolton Lake would continue to provide NEAR with data from the Middle Lake especially from the spillway and also from the inflow pipe from the Upper Lake into the Middle lake as he wants to track the nutrients/ iron coming from the Upper Lake.

Dr. Knoecklein also reported that no fanwort was found in the Middle lake in NEAR's October 2018 survey which included searching in spots where the fanwort had been found and treated or removed in 2017.

Stay tuned until Dr. Knoecklein's second status report with conclusions in late May or June of 2019.