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| **Ref.:** | HEMDCC_Dec2015minutes (total=2 pages) |
| **To:** | **Harbour East - Marine Drive Community Council (HEMDCC), Halifax** |
| **From:** | S. M. Mandaville Post-Grad Dips.<br>Chairman and Scientific Director |
| **Cc:** | Energy & Environment, and Planning Department |
| **Date:** | March 10, 2016 |
| **Subject:** | Errors in your minutes (pg. 7) of December 03, 2015-Clarification/info |

Dear Chair and members (Cc'd Mr. Cameron Deacoff of Energy & Environment Dept., as well as the Planning Dept.): Kindly pardon any typos/grammar. This is being sent to set the record straight. I am also adding further clarification/info.

**(1) MicMac Lake, Dartmouth:**
I never mentioned that MicMac Lake was pristine contrary to what was stated in your referenced minutes of December, 2015. Indeed, the lake was `stressed' even during the year-1990 when we first sampled it (per our Stage-I protocol), and then subsequently carried out some basic analyses of the phytoplankton, the latter being part of our biological studies. I had indeed sent a summary facsimile on it to the then Director of the Dartmouth Engineering Department, Mr. Russell Fougere P.Eng. Emails and internet were not common in those days.

Still, prior to amalgamation, I gave a whole hour presentation to Mr. Don Rix P.Eng., of the Dartmouth Engineering Dept., and to Mr. Roger Wells MCIP of the Dartmouth Planning Dept., a meeting kindly arranged for by Mr. Wells. I presented a range of data and analyses to them. I did not present the pre-cultural (natural background) phosphorus values though since we had developed our models at a later date.

Most of our work falls under the **specialty of limnology** which is a biological specialty. With rare exceptions, most engineers would not be familiar with it since they never study limnology at the university level. I found the same issues with select engineers employed by the present Halifax municipality, some of whom transferred to Halifax Water.

Indeed, the present day problems with MicMac Lake were evident back in 1990 as well. Even then, aquatic plants (commonly referred to as `weeds') were present mostly as `submersed macrophytes', hence probably not obvious to the casual onlooker.

**(2) Removal of phosphorus by STPs:**
The 95% removal that I had mentioned is only for enhanced tertiary treatment plants under ideal conditions. Most STPs, especially package plants, do not fall under this scenario. Even 95% may not be sufficient in the case of lakes which are at the natural background levels. Though as lakes get more eutrophic, they can take more phosphorus and are not as sensitive. This is somewhat diametrically opposite to what perhaps a non-limnologist thinks. There is a plethora of published literature on this, some of which we summarized in our numerous web pages.

**(3) Numerous shortcomings in studies conducted for Halifax by `paid consultants', e.g., for the Energy & Environment, and the Planning Departments (lessons to be learnt with the present issues at Lakes Banook and MicMac among many other lakes across Halifax):**

This critique also applies to even analyses conducted by many biologists who may not be quite proficient in the specialty of limnology. We had already made a written submission to the Environment & Sustainability Standing Committee (ESSC) during the year 2012 but nothing seems to have improved.

Here, I will emphasize just one important aspect, which is the determination of **trophic status:** Per leading literature,
"Trophy of a lake refers to the rate at which organic matter is supplied by or to the lake per unit time." Trophy, then, is an expression of the combined effects of organic matter to the lake. As developed originally and as largely used today, the trophic concept (e.g., TP, Ch*a*, SD, and TN) refers to the pelagic-zone-planktonic portion of the lake ecosystem. The littoral flora and its often dominating supply of autochthonous organic matter to the system, was, and usually still is, ignored.

Conventional criteria for classifying trophic state emphasize conditions in the open water and ignore the nutrients, plant biomass, and production associated with macrophytes (commonly known as `weeds'). A potential water column nutrient concentration can be determined through adding the nutrients contained in macrophytes to those in the water. Potential nutrient concentrations can be used in existing indices to classify lake trophic status.

There are several peer reviewed published methodologies available to anyone on this important aspect.