

Soil & Water Conservation Society of Metro Halifax ('SWCS')

(a volunteer scientific stakeholder-group)

310-4 Lakefront Road, Dartmouth, NS, Canada B2Y 3C4

Email: limnos@chebucto.ns.ca

Tel: (902) 463-7777

Homepage: www.chebucto.ns.ca/Science/SWCS/SWCS.html

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To: Dr. Wayne Stobo, Chair, and Members, County & Mainland Watershed Advisory Board, HRM
From: S. M. Mandaville (Professional Lake Manage.), Volunteer Co-Ordinator
Date: December 17, 1998
Subject: For your info- measures to address most pollutants, not just siltation- Basic!

As a professional courtesy, I am herewith enclosing a copy of the submission we made recently to the Provincial Law Amendments Committee w.r.t. the Municipal Government Act. We had made similar submissions on several occasions to the NS Department of the Environment (NSDoE) at various stages as far back as the Minister's Task Force on Clean Water during the time of the Hon. John Leefe. Kindly read and digest the 4 relevant pages as well as peruse the 14 enclosures attached to it. No response is needed, this is for your information only and thank you!

(1) One of our past submissions to the Provincial Environment Act was approx. 100 pages long which included extracts from leading scientific literature in the domain of Limnology, i.e. the science of lakes and running waters, and it took us an year or two to realize that perhaps no one at the NSDoE understood it in total since they have not had a leading *Limnologist* and/or a *certified Lake Manager*. Nevertheless, NSDoE always felt and still feels it is the total responsibility of the Municipalities when it relates to land development problems, and they, i.e. NSDoE are there more or less to "inspect" only. And ofcourse at major public hearings, Municipal Planning/Engineering staff have in turn stated unequivocally that it is the total responsibility of the NSDoE, and having attended select public hearings dealing with large land development projects in all 4 constituent municipalities prior to 1996, and the HRM subsequently, I am quite cognizant of the said sorry scenarios.

This is the reason the submission this time around has been made in a more general fashion rather than scientific though we could not avoid terms like "benthic macroinvertebrates", "trophic states", "predictive modelling", etc.

(2) Generally, with exceptions, local residents rarely realize the problems until they are far advanced, and then most often than not it is either too late or too costly and impractical to restore the lakes to their original splendour. This sad scenario has repeated itself over and over, principally in several urban areas, i.e. those that are serviced with sewers, not only in Dartmouth and Cole Harbour but across North America and as a Lake Manager involved in a few areas of North America, I have attended several Lake Management conferences, both large as well as ad-hoc ones.

(3) I had also given many original members of your Board some extracts during 1996 on different occasions if you recall before I resigned from the Board and had requested Prof. Dr. Jack Burnie to take my place.

(4) Sorry for the seeming divergence but the following case in point will illustrate the above scenario: As far back as 1988, I had pointed to several deficiencies in the opera-

tion of the Landfill (i.e. Dump) at Upper Sackville, made presentations to the County committees and Council at the time as well as to Mr. Mort Jackson of the Landfill Authority and not one person in power paid any pragmatic attention. Since I personally do not live there, it was not NIMBY in my case, I actually pointed to scientific aspects. Finally, out of frustration I "blew the whistle" to a smart reporter, Judy Myrden, at the time (1989) the Environment Reporter for the Halifax Herald Ltd. who wrote a large expose' on the landfill. It was quickly followed by other exposes' with several bureaucratic denials in the Herald as well as the Daily News, copies of most of which are in my scrap book. Then even the Federal DFO's Freshwater Division jumped into the fray and claimed the said dump was actually assisting the ecosystem and this letter was written to me by a Director's level bureaucrat at DFO. It was then that Mr. John Holm, the honourable MLA for Sackville had an unanimous resolution passed in the Legislature (1989) 'ordering' the NSDoE to take action. Finally, the Deputy Minister of NSDoE engaged the services of Prof. Dr. Dandopadhyay Thirumurthy of TUNS in early 1990s to carry out an independant consultants' study and his findings were even more severe than mine, which I carried out incidentally totally **gratis**. That is when NSDoE issued a Ministerial Order on the said Authority and forced major and costly abatements, though some of them have not totally been successful.

The aforementioned musings on the Upper Sackville Dump is just to show all of you that until it is too late, there is very little concern even on the part of the general public. The local political leaders in Upper Sackville did not pay any 'pragmatic attention' either at that time. It was only much later that local committees started forming, but alas, 'after the fact', nevertheless quite gratifying to those of us who went through several 'horrifying' years!

(5) Important Note: It is important that all stormwater from large developments in urban areas like Dartmouth and Sackville not be allowed to be discharged into lakes directly but total stormwater treatment facilities must be required by the regulators, and the entire cost has to be born by the subdividers of the developments and not by the general public. Indeed such laws exist at the Municipal level in some jurisdictions in the U.S., even in cold region areas, where the preferred methodology has been to disperse urban stormwater over large (not small) manmade (or engineered) wetlands prior to discharge into lakes via subsurface groundwater. Natural wetlands will NOT be suitable in removing the typical and varied urban pollutants, they have to be specially constructed wetlands by wetland biologists to remove 'typical urban pollutants'. I had supplied Dr. Tony Blouin as well as Mr. John Sheppard of the HRM select copies of several case histories and I recall I mentioned that aspect at one of your Board's meetings during 1996, and during 1995 as well when we wrote the 'terms of reference' and I had not missed a single meeting until I resigned.

Such a step will not be required generally in areas served by "onsite systems" due principally to lower densities, hence less people, and less urbanization.

(6) Notwithstanding, the current NSDoE health regulations for onsite systems do not address the problem of long term export of phosphorus and other pollutants via groundwater as well as via underground macropores to receiving lakes.

In these cases, the latest regression models should be used from the Ontario Ministry of Environment & Energy, especially in the case of large developments with onsite systems. These models have been tested many times over not only in Ontario but also in New Brunswick and some parts of the U.S., have withstood the test of time and of independent scientific scrutiny. The models can be applied in urban areas as well by the input of urban export coefficients and I have accomplished that.

There are other models as well and when I completed the modelling of approx. 700 urban as well as suburban and rural lakes within HRM and Hants/Chester municipalities to date, I used a combination of the Ontario as well as the international OECD models. The Ontario models are spearheaded by Dr. Peter J. Dillon, formerly of Environment Canada and for a long time with the Province of Ontario, and the OECD research was headed by Dr. Richard Vollenweider, now retired from the Lakes Research Branch, Environment Canada, Burlington, Ontario.

As it relates to local consulting work, I found varied errors in the modelling carried out for HRM and have notified Dr. Tony Blouin, the HRM ecologist in detail. I had also mentioned it in several e-mails to the senior planners as well as engineers at HRM and at NSDoE.

In the case of the so-called Kings County Model, it is far superior to the 5-lakes approx. \$120,000 Shubie Headwaters Model (1991-94) for the County but there was a severe shortcoming there as regards using Chlorophyll-a (Ch-a) as a development objective (in both the said studies). The 5-lake County Shubie study also used trophic status as a development objective and this involves Ch-a, and it is based on an outdated approach and NOT 'in sync' with modern published scientific literature in Applied Limnology.

The said Ch-a development objectives were originally the outcome of a 1974-75 scientific paper by Dillon & Rigler in the ASLO Journal, but Dr. Dillon has rejected that approach several years back, and his Ontario Ministry of Environment has been advising against it during the 1990s atleast, perhaps even earlier. In 1990, they developed the concept of "**Proportional Phosphorus increase over Natural Background Values**", have adopted it as their internal policy lately, and I had given extracts from same to the original members of your Board during 1996 as well!

I had also given a copy of the entire Fact Sheet from the Ontario Ministry of Environment on the dangers of using Ch-a as a development tool to Dr. Wayne Stobo during 1996 as well. I have written several more files on the said topic on the internet and kindly take the time to read them. I have received e-mail compliments worldwide on them not only from post-grad students but also from senior researchers in Limnology from Ontario, parts of the US and as far away as Australia.

Best wishes to Dr. Wayne Stobo and all Members!

PS: Kindly also note with great care the need to carry out `benthic macroinvertebrate' surveys pre- and post- development, even in the case of large standard residential projects, not just industrial projects. Benthic macroinvertebrates identified to even "family level" will tell lot more than snapshot chemical sampling and there is a host of scientific literature on it. I have placed summarized info on same on the internet and as time passes I will be writing more.

We have commenced sampling littoral benthic macroinvertebrates in some areas of HRM. The lakes we completed to date are Wrights (Tantallon), McGraths (Brookside), Kearney (Halifax), Springfield-Big (Middle Sackville), Morris (Dartmouth), Dollar (Middle Musquodoboit), Russell (Dartmouth), Stillwater (Tantallon), Papermill (Bedford) and Kinsac (Windsor Junction). While the field sampling and Lab analyses are carried out by freshwater biologists, local volunteers assist them with their boats, etc., and sometimes offer them hot meals as the Federal EMAN Protocol advises on late Fall and/or early Spring as the preferred sampling times. We are also donating the major samples to the NS Museum of Natural History and retaining just "reference collections" for future.

Our analyses to date has been upto "family" levels, and in future we may take it down to "genus", but "species" levels are next to impossible for many freshwater taxa and we know of a consultant in Toronto, formerly with DFO's Freshwater Division in Manitoba who can do that reliably for several taxa except for chironomids (and a few other rare taxa). When DFO conducted an advanced study of Lake Winnipeg, they had to enlist the services of Dr. Ole Saether of Norway since there are only a handful of taxonomists in the world capable of identifying chironomids to "species" level reliably. Leading related classic literature in Limnology is totally based on chironomids and note the pioneering work of stalwarts like Dr. August Thienemann of Germany and Dr. Ed Deevey of the U.S. In addition, we found even Fall sampling during 1997 and 1998 yielded quite tiny specimens unlike one sees in taxonomic handbooks. It is quite possible the combined effects of acid deposition and the abnormal weather patterns may be having an effect on the size distributions, but time will only tell if we continue to carry out studies over decades, and urbanizing of watersheds has ofcourse severe impacts on "biodiversity" as extensively documented in other Provinces and States.

Ladies and Gentlemen! studying `benthic macroinvertebrates' is like literally studying a whole universe indeed! Our expertise at the present time is in freshwater benthos! We have not conducted any surveys of the profundal lake benthos as it is quite a task, in addition being an independant volunteer group, we do not have Lab space to sort out all the sediment. Further, most modern Government protocols for RBP (Rapid Bioassessment Protocols) are indeed based actually on stream benthos, and only lately take into account littoral benthos of lakes.

I am so excited with the progress in this benthic domain that there will (hopefully) be several students also carrying out such surveys, not in lakes but in streams all over HRM, and it will be based on a combination of the Ontario Min. of Env. Protocol (1998 or later), the Izaak Walton League of America handbooks and the Ohio Dept. of Natural Resources biological monitoring, and all these protocols are/were developed for the general public. In this case, the public will identify to the "order level", and some of us will take it down to "family", perhaps even to "genus" levels if time and opportunity permit. Even "order levels" are not too bad as I have seen some Masters Degree theses at Dalhousie University for streams elsewhere which identified only to "order levels" and did not even develop the various simple as well as the multivariate indices. Federal

Governments on both sides of the border strongly encourage the general public to get involved in such surveys, and Ontario has an active program supported by both their Province as well as by Environment Canada. In the U.S., such programs are officially sanctioned (and funded) to various depths in several states.

Note: If you are interested in chemical and biological data, I have placed detailed info of most data, not just ours but also from a host of sources on the internet and anybody in the world can download them. These cover lakes all over Nova Scotia and I have also written separate HTML files on pristine lakes data, though the downloadable Excel files also contain them. Most of the historic Nova Scotia data from Environment Canada, DFO as well as from various Dalhousie researchers, CWRS, and NSDoE are all included. I have also included the theoretical modelled P-data I carried out on approx. 700 lakes including the models in their entirety as they existed during mid summer of 1998 on the internet. I have conducted more modelling but it will take another 12 months before I place them on the internet but my first priority is **Lake Benthic Surveys!**

Cc: Hon. Michel Samson LL.B., Minister, NSDoE
Ken Meech, CAO, HRM
Dr. Tony Blouin PhD., Ecologist, Planning Services, HRM
Donna Davis Lohnes MCIP, General Manager, Planning Services, HRM
Kulvinder Dhillon PEng., Director, Engineering, HRM
Maureen Ryan MCIP, Senior Planner, Central Region, HRM
Kate Moir, Manager, Ecosystems, NSDoE
(rev) John Sheppard PEng., Manager- Environmental & Subdvn Servs., HRM
(rev) Mr. Don Chard, Opposition Environment Critic, NS

Because I see these mountains
they are brought low,
Because I drink these waters
they are bitter,
Because I tread these black rocks
they are barren,
Because I have found these islands
they are lost;
Upon seal and seabird dreaming their
innocent world
My shadow has fallen.

Kathleen Raine
(as quoted in the National Geographic)