

## **Soil & Water Conservation Society of Metro Halifax (SWCSMH')**

*(a volunteer scientific stakeholder-group)*

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

Email: limnos@chebucto.ns.ca

Tel: (902) 463-7777

Homepage: <http://www.chebucto.ns.ca/Science/SWCS/SWCS.html>

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**Ref.:** WRMP01 (11 pages)  
**To:** **Water Resources Management Policy**  
**Environmental Services, HRM, Halifax, NS**  
**From:** S. M. Mandaville (Professional Lake Manage.), Chairman and Volunteer Exec. Director  
**Date:** November 05, 2000  
**Subject:** **Comprehensive Water Resources Management Policy- Response to the public invitation by the HRM**

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We congratulate your staff team for having developed a good set of terms-of-reference (T-o-R) for the consultants. We made a handful of recommendations via the Halifax/Halifax County Watershed Advisory Board (WAB) of which we have been the founding members among other groups. We found our preliminary comments/submissions were included in your T-o-R for the study in a 'generalized format'. But there is never enough time for delving into scientific details at the WAB meetings since, as it is, the meetings extend late into the early nights.

**Following are additional summary recommendations and we will be thrilled to expand on them with supporting 'scientific documentation' in overhead formats as well as with 'taped audio discussions' with extensively published world-class scientists from across North America if invited to do so!** Basic rationale and justification is included where appropriate:----

1. We respectfully request HRM and its two consulting firms to not only read this submission in detail but also study every single scientific reference that we have enunciated (under 'References'). Some of us have studied all of them in addition to numerous others in considerable detail, in addition some of the world-class authors referenced there are either part of our Scientific Directors and/or we have consulted them in considerable depth! We can assure you all of the references have direct and important relevance to Limnology, i.e., fresh waters!
2. Since the HRM Policy is expected to be a standard-setting study for HRM for many years to come, we prefer to see the name of the credible theoretical/applied Limnologist and/or certified Lake Manager who has been engaged by the two winning firms in any of the reports to be prepared by the consultants/HRM. This is because some of the requirements of the T-o-R as well as our following suggestions can only be addressed properly by a genuine researcher in Limnology, and not by a professional engineer or by

- a planner or by a terrestrial ecologist. **LIMNOLOGY is the profession which has the sole credibility in the aspects we are mostly addressing**, in the same fashion that only professional civil engineers are qualified in designing sewers, manholes, etc.
- 2.1. Some of the consultants' studies carried out to date for HRM, its predecessor municipalities, and for various provincial agencies at considerable expense to the public had 'severe shortcomings'. We surmise that this could have occurred perhaps because no Limnologist and/or certified Lake Manager was involved! We do not know what else the reason could have been!
  3. We respectfully ask that the HRM adopt the trophic guidelines which resulted from approximately twenty (20) years of painstaking research by some of the world's top experts in Limnology headed by Dr. Richard Vollenweider Ph.D. of Burlington, Ontario. Dr. Vollenweider is now retired from Environment Canada, Burlington, and the said research was a part of the multi-nation OECD, Organisation for Economic Co-Operation and Development. OECD is composed of all the nations of the 'north', i.e., the wealthier nations.
    - 3.1. **We request especially that HRM officially adopt the four Probability Distribution Curves of the OECD (Janus and Vollenweider, 1981; Vollenweider and Kerekes, 1982)** as the proper way of carrying out 'trophic analyses'. The four probability curves are based on yearly mean TP (total phosphorus), yearly mean Ch-a (chlorophyll-a), yearly peak Ch-a, and yearly mean SD (Secchi disc) value.
    - 3.2. In this regard kindly also study other reports/papers by Vollenweider in the 'References' section here.
  4. In any future compliance monitoring for HRM, every effort should be made to utilize only laboratories which have received accreditation from the SCC (Standards Council of Canada).

5. **Incorporate a mandatory narrative requiring `benthic macroinvertebrate surveys' before major developments receive approvals. These should be conducted by competent biologists PRIOR to the development as well as POST-development.** This requirement applies to major developments only, especially those serviced by central sewerage (with storm sewers discharging into lakes and streams); to significant proposed golf courses; and to other major projects.

In the case of serviced developments, the definition of a `major development' has to be ascertained in terms of the percentage it occupies in the local watersheds. In most unserved developments, i.e., those with onsite septic systems, this may not be required mainly due to lower densities, but a case-by-case analysis should be conducted to ascertain if such benthic surveys are needed even in unserved areas.

5.1. Biomonitoring is the systematic use of living organisms or their responses to determine the quality of the environment. Water pollution is essentially a biological problem. Chemical measurements are like taking snapshots of the ecosystem, whereas biological measurements are like making a videotape. The ultimate purpose of environmental assessment and regulation is the maintenance of biological integrity .....

..... Rosenberg, University of Manitoba and the DFO, Winnipeg. (cf. Bull. Entomol. Soc. Can. 1998. 30(4):144-152)

- 5.2. There are compelling reasons for the apparent popularity of freshwater macroinvertebrates in current biomonitoring practice; they offer a number of advantages:
- 5.2.1. they are ubiquitous, so they are affected by perturbations in many different habitats,
  - 5.2.2. they are species rich, so the large number of species produces a range of responses,
  - 5.2.3. they are sedentary, so they stay put, which allows determination of the spatial extent of a perturbation,
  - 5.2.4. they are long-lived, which allows temporal changes in abundance and age structure to be followed, and
  - 5.2.5. they integrate conditions temporally, so like any biotic group, they provide evidence of conditions over long periods of time (the videotape referred to above).
- 5.3. Post-development surveys have to be conducted in two phases at the minimum:
- 5.3.1. The first phase would be after the installation of all the infrastructure is complete.

- 5.3.2. The second phase would be after around 70% or more of the development is occupied by the end-user(s). This could entail waiting for as long as six (6) years in some cases. In order to ensure compliance, the HRM may have to require a bond of sufficient value in case the proponent fails to conform, not unlike a 'peace bond' or other such bonds levied routinely by courts in the case of certain 'offenses'!
- 5.4. In a recent (1998) consultant study for HRM in the Dartmouth area, there were numerous significant shortcomings in the benthic survey. No established Government sampling protocols were followed. No taxa of the predominant Superphylum Arthropoda (insects, mites, crustaceans) were sampled for, neither were the other important Phyla, Annelida (aquatic worms, leeches) and Platyhelminthes (planarians) were sampled for. Absolutely no analyses were performed using published organic enrichment indices (e.g., the widely used Hilsenhoff indices), and no biodiversity indices (e.g., Shannon Wiener index, Simpsons Diversity index) were calculated either.
- 5.4.1. No multimetric as well as the multivariate methodologies were followed either, and these are very important as recommended by Environment Canada's leading benthologists in Ontario and their worldwide partners, Reynoldson *et al.* (1995 and 1997).

**5.5. To avoid such severe shortcomings from hereon, we suggest the following references (listing is under `References` section here):**

- 5.5.1. Study the Canadian Federal EMAN (Ecological Monitoring and Assessment Network) Protocols for Measuring Biodiversity: Benthic Macroinvertebrates in Fresh Waters (Rosenberg *et al.*, 1997).
- 5.5.2. Study the latest handbook for streams published by the USEPA, United States Environmental Protection Agency (Barbour *et al.*, 1999).
- 5.5.3. Study the latest handbook for lake and reservoir assessment of the USEPA (Gerritsen *et al.*, 1998).
- 5.5.4. Study the report from the New York State Department of Environmental Conservation (Bode *et al.*, 1996).
- 5.5.5. Study Reynoldson *et al.*, 1995 and 1997; (Reynoldson is a leading benthologist with Environment Canada, and he and his co-authors can be considered among the leading freshwater benthologists from Canada, USA and Australia).
- 5.5.6. Study Rosenberg, 1998. (Prof. Dr. David Rosenberg of Manitoba is the scientist who headed the Federal DFO/Environment Canada Task Force on Fresh Water Benthic Macroinvertebrate Biodiversity).
- 5.5.7. For chironomid mentum deformities caused by synergistic effects of post-development post-human occupation derived pollutants, study the following at the minimum:
  - 5.5.7.1. Diggins and Stewart, 1998.
  - 5.5.7.2. Janssens de Bisthoven *et al.*, 1998.
  - 5.5.7.3. Maltby *et al.*, 1995.

5.5.8. Also see a selection of the reports we have publicly made available and these can be borrowed at no cost from the local NovaNet library system. A select number are:

5.5.8.1. Hynes, 1998.

5.5.8.2. Mandaville, 1999; (this report has extracts from the above Government reports as well as from other published papers in peer reviewed journals).

5.5.8.3. Gaertner, 1999.

5.5.8.4. Kirsch, 1999.

5.5.8.5. Mandaville, 2000 (April); (this includes select extracts from peer reviewed research papers on chironomid mentum deformities, the multimetric as well as the multivariate analyses comparisons).

5.5.8.6. Mandaville, 2000 (May).

5.5.8.7. Mandaville. .... (soon to be finalized synopsis as an update to the 1999 report above enunciating genus and species tolerance levels).

## **References (as quoted above as well as other related ones):**

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Cc: Ken Meech, CAO, HRM

Dr. Tony Blouin Ph.D., Manager, Planning Issues, HRM

Kulvinder Dhillon M.Eng., P.Eng., Director, Regional Operations and  
Transportation Services, HRM

Paul Dunphy MCIP, Director, Planning and Development, HRM

Renee Roberge P.Eng., Stormwater and Wastewater Engineer, HRM

Roger Wells MCIP, Co-Ordinator, Planning Services, HRM

Catriona Moir, Manager, Ecosystems Risk Management, NSDoE&L

Susan Corser MCIP, Planner, Eastern Region, HRM