

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>

Ref.: WAB0012 (total= 4 pages)
To: Chairman Dr. Wayne Stobo and Members,
Halifax/Halifax County Watershed Advisory Board (WAB), HRM
From: S. M. Mandaville (Professional Lake Manage.), Chairman and Volunteer
Exec. Director
Date: May 17, 2000
Subject: **Our recommendations w.r.t. the Princes Lodge Master Plan Area**

Our recommendations for this major project, especially the portion which is within the watershed of 'almost pristine' Kearney Lake are as follows and we will be pleased to provide scientific justification if asked to. We have conducted relatively extensive Chemical and Biological Limnology (e.g., chemistry, phytoplankton, sublittoral benthic macroinvertebrate studies) of Kearney Lake among many other lakes. I have conducted the Predictive P-Modelling of the Papermill Lake watershed which includes Kearney Lake. Further, I have also documented historical data from other sources as well, some of which are available for downloading from our web space.

Our recommendations in this case will fall principally under two categories, firstly, the post-development contribution of TP (total phosphorus) via the streams, and secondly, the **Diversity** and the **Richness** of the Benthic Macroinvertebrates in the outlet streams draining into Kearney Lake from the subject lands.

1. We request that TP (total phosphorus) be measured in the outlet streams monthly during a minimum period of 12 months, preferably for 24-months, prior to any further development. The HRM/proponents should carry out monthly sampling during the Fall, Winter and Spring seasons, and a bi-weekly sampling during the Summer season for TP.

1.1. TP is to be measured to a minimum accuracy of 1 µg/l expressed as 'phosphorus'.

1.2.  **HRM is to ensure that yearly mean TP value for a period of atleast three (3) years post-development in the outlet streams does NOT exceed 50% of the mean pre-development TP value.**

2. **Benthic macroinvertebrate surveys should be carried out in the significant outlet streams from the subject lands, within the Kearney Lake watershed, every year, prior to development, during development, and for atleast three (3) years after development.**
 - 2.1. A basic RBP (Rapid Bioassessment Protocol) as enunciated in the Canadian Federal EMAN protocol (Rosenberg et al., 1998) is sufficient.
 - 2.2. For this purpose, once-a-year sampling is sufficient. It is preferable to sample in late Fall after most species have mated and the immatures have had a chance to develop throughout the summer in preparation for over-wintering. Ofcourse, if funds and talent allow, more frequent sampling can be followed.
 - 2.2.1. Although some researchers prefer spring sampling, as a result of global warming and related aspects, Fall sampling should be preferred over Spring sampling if funds are minimal. Ideally, both times are recommended.
 - 2.3. The RBP methodology is a combination of qualitative and quantitative approaches.
 - 2.4. It is important to send representative, identified material to qualified systematists for verification or get the systematists directly involved in the study.
 - 2.4.1. A voucher collection of identified/verified material should be prepared (and curated) for future reference. Curation is important because vials containing alcohol will dry out over time. Voucher collections often prove invaluable in rechecking data, and in taxonomic references.
 - 2.5. All specimens are to be identified to the lowest possible taxon.
 - 2.6. **Statistical analyses:**
 - 2.6.1. The univariate, mulitmetric as well as the multivariate methodologies are all preferable and impart various scientific conclusions (Synopsis-13 in Mandaville, 2000a).

2.6.2. **It is strongly advised to develop the following indices for each data set (Kirsch, 1999): H (Shannon-Wiener Diversity Index); BI (Hilsenhoff's Biotic Index); BMWP (Biological Monitoring Working Party); ASPT (Average Score Per Taxon); PSC (Percent Similarity Comparisons); CLI (Community Loss Index); PMA (Percent Model Affinity); scr/f-c (scraper and filtering collector index); % DF (Percent contribution of Dominant Family); EPT (Ephemeroptera, Plecoptera, and Trichoptera Index); EPT/C (ratio of EPT and Chironomidae); % EPT; % oligochaetes; % amphipods; % insects; % dipteran insects; % gastropods; and % pelecypods.**

2.6.2.1. Classifications based on the analysis of several indices would decrease the probability of misclassification due to the inaccuracy of any one index.

Epilogue: There are compelling reasons for the apparent popularity of freshwater macroinvertebrates in current biomonitoring practice; they offer a number of advantages:

- 1) they are ubiquitous, so they are affected by perturbations in many different habitats,
- 2) they are species rich, so the large number of species produces a range of responses,
- 3) they are sedentary, so they stay put, which allows determination of the spatial extent of a perturbation,
- 4) they are long-lived, which allows temporal changes in abundance and age structure to be followed, and
- 5) they integrate conditions temporally, so like any biotic group, they provide evidence of conditions over long periods of time (the videotape).

References

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Cc:

Dr. Wayne Stobo PhD, Chairman, WAB, HRM
Paul Morgan MCIP, Planner, HRM
Lynne LeBoutillier, Clerk for the WAB, HRM