Current MITHE-SN Projects Metadata

A8 Dr. Jim McGeer (P.I.) – Department of Biology, Wilfrid Laurier University

The applicability of Biotic Ligand and Critical Residue Approaches to Canadian Shield conditions (Aquatic Ecosystems)

Objectives being Investigated

One of the main focal points of this research project is to test whether the currently developed BLMs are predictive of effects for sensitive native species in the relatively soft and slightly acidic waters of the Canadian shield. Part of this will be to make comparisons of the sensitivity of native fish relative to standard fish species (e.g. rainbow trout and fathead minnow). The research will also test the applicability of geochemical speciation models for predicting metal-NOM interactions. In terms of chronic toxicity it is expected that data will contribute towards understanding the CBR approach and its relevance in the context of native species in Shield waters. Whether in the context of site specific assessments, ecoregional assessments, setting of water quality guidelines and/or criteria, or setting of industrial discharge objectives, the results will contribute directly to ecological risk assessment.

Study/Sampling Design

In the initial stages of the project, the focusing will be on laboratory measurements of bioaccumulation in metal mixtures. For example, the role of a second trace metal (Pb, Cu, Zn, Cd/Ni) on Cd or Ni biouptake in binary mixtures is being examined. In parallel, key parameters are being identified that will be measured in in situ assessments of metal effects that will take place in the final two years of the project. Both genomic (Cd/Ni specific induction) and proteomic (phytochelatin) indicators are being assessed. In collaboration with the group of P.G.C. Campbell, analytical techniques are being developed for in situ measurements of free ion concentrations using an ion exchange resin. Field studies are in the initial stages of development. Speciation, bioaccumulation and trace metal effects will be measured at a number of carefully chosen field sites.

Number of projects providing material for study: 0

Location of Field Site(s)

Preliminary choices of lakes in the regions of:

1. Rouyn-Noranda, Quebec
   Dasserat (48°13’ N, 79°22’ W)
   Dufault (48°17’ N, 79°00’ W)
2. Sudbury, Ontario
   Laurentian (46°27’ N, 80°57’ W)
   Ramsey (49°29’N, 80°57’W)

Human Studies

Outcome or Process Studied
--- none provided ---

Exposure Medium, and Metals/Substances Quantified
--- none provided ---

Biological Endpoint(s) Monitored
--- none provided ---

Biota Studied

Species
Chlamydomonas reinhardtii

Metals, etc. Quantified
Cd, Ni

Biological Endpoint(s)
Cd and Ni biomarkers (ca. 10 specific to low level exposures to Cd and to Ni, genes currently unidentified, phytochelatin induction)

Physical Material(s) Studied

Medium/Media
Surface waters

Metals, etc. Quantified
Cd (Cd2+), Ni (Ni2+)

Bibliographic References on-file with Secretariat: No

Data Available: No

Data Archived with MITHE-SN: No

Collaborators

Dr. Scott Smith (Co-Inv.) – Department of Chemistry, Wilfred Laurier University
Bernard Vigneault (Co-Inv.) –
Dr. Michael Wilkie (Co-Inv.) – Department of Biology, Wilfred Laurier University

Metals in the Human Environment Strategic Network
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