



## USDA

### Northeastern Ecosystem Research Cooperative Northeast Mercury Research Group

Assessing the depositional, geological, geographical and biological factors that control mercury distribution in aquatic ecosystems of northeastern North America

#### Project Objectives

The main purpose of the study is to document the extent of mercury (Hg) distribution in northeastern North American surface waters, sediments and key biota and to relate that distribution to depositional gradients, land cover and topography as well as land use. To achieve this goal, the work will be divided between geochemists who will deal with the issue of natural and unnatural abundances and biologists who will address the problem of biological importance of the issue and who will relate geochemical, hydrological, and watershed factors to its uptake by the biota.

#### NERC Program

The Northeastern Ecosystem Research Cooperative (NERC) is an initiative to promote collaboration among ecosystem research scientists in the northeastern U.S and eastern Canada. NERC facilitates regional-scale research, monitoring and assessment activities by: (1) initiating joint research projects, (2) sharing data and results, (3) participating in analysis and synthesis of regional environmental issues, and (4) increasing the level of communication among researchers, resource managers, and policy-makers interested in the results of regional environmental research. ([www.ecostudies.org/nerc](http://www.ecostudies.org/nerc))

#### Why is Mercury a Problem?

Mercury deposition has increased since the turn of the century, and now threatens fish, wildlife, and people that depend on aquatic systems. In freshwater systems, mercury bioaccumulates in the biota after it has been methylated by bacteria. Many factors contribute to the bioaccumulation rate, including water pH, DOC, watershed size, vegetation type, wetland size, and food web complexity. Research indicates that extra high mercury levels reduce productivity, adult survival, and alters behavior of Common Loons as well as reducing productivity of other top level avian and mammalian predators.

#### Year One Products

- Organize a workshop that brings scientists together with existing mercury databases
- Gather mercury databases
- Publish database on a CD-ROM

#### A Three Year Project

**Year One** will involve assembling existing data provided by the collaborators into one coherent, georeferenced data set. This step will also require the acquisition of digital terrain maps for northeastern North America, which will be standardized into a common coordinate system in Arc View.

**Year Two** will involve data analysis, which will initially take the form of isopleths of Hg distribution in waters, sediments, fish and piscivorous birds. We will then analyze the relationship between Hg exposure and availability patterns that are influenced by hydrological features (e.g., fluctuating water levels), biological components (e.g., food web complexity), geochemical aspects (e.g., parent material inputs) and watershed parameters such as forest and wetland types and land-use factors. Preliminary analyses of the data will be on-going at this stage.

**Year Three** will involve the assessment, and writing up of the data in two intensive workshops. The reports produced will provide scientists with valid, properly documented information and decision makers with sound scientific information upon which to base public policy.

#### Project Leaders

##### *Geochemistry:*

Dr. Thomas Clair, Environment Canada - Atlantic Region, P.O. Box 6227, Sackville, NB, E4L1G6, Canada; 506-364-5070/5062 tel/fax, [tom.clair@ec.gc.ca](mailto:tom.clair@ec.gc.ca)

##### *Biology:*

Dr. David Evers, BioDiversity Research Institute, 411 Rt. 1, Suite 1, Falmouth, Maine 04105, USA, 207-781-3324/2804 tel/fax, [david.evers@BRILoon.org](mailto:david.evers@BRILoon.org)



### Each mercury layer will be assimilated by the following Group Leaders

- *Air/Deposition:* Alan Vanarsdale & Steve Beauchamps
- *Water & Watershed:* Tom Clair & Jamie Shanley
- *Sediments:* Steve Norton, Andy Rencz & Neil Kamman
- *Algae:* Celia Chen
- *Invertebrates:* Celia Chen & Chris Pennunto
- *Fish:* Neil Burgess, Greg Mierle, & Neil Kamman
- *Birds:* David Evers, Louise Champoux
- *Mammals:* Doug Evans & Drew Major
- *Data base management and GIS mapping:* Marc Bernier, & Wing Goodale



### Current Action

- Locating existing mercury data
- Standardizing and Assembling all existing mercury databases
- Obtaining GIS coverages
- Creating risk categories for top predators (already complete for Common Loon, Belted Kingfisher)
- Expanding the Northeastern Mercury Research Group

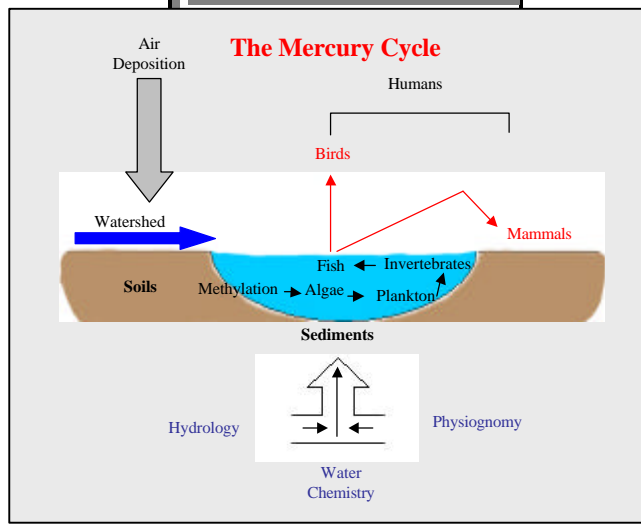
### Northeastern Hg Research Group

*Geo-Chemistry:* Dr. Tom Clair  
Leader

- Dr. Paul Arp Univ. of NB
- Ann Chalmers, USGS
- Dr. Peter Dillon, Trent Univ.
- Dr. Charles Driscoll, Syracuse Univ.
- Dr. Eric K. Miller, Dartmouth College
- Dr. Steve Norton Univ. of Maine
- Dr. Andy Rencz, Natural Resources Canada

*Biology—*Dr. David Evers, Leader

- Mark Brennan, Univ. NH
- Neil Burgess, CWS
- Louise Champoux, CWS
- Dr. Celia Chen, Dartmouth College
- Dr. Doug Evans, Trent Univ.
- Wing Goodale, BRI
- Neil Kamman, VT DEC



### Other Mercury Working Groups

- Collaborative Mercury Research Network (COMERN)
- EPA - ORD Atlantic Ecology Division National Health and Envir. Effects Research Laboratory
- New England Governors and Eastern Premiers (NEC-ECP)
- Northeast States for Coordinated Air Use Management (NESCAUM)
- New England Interstate Water Pollution Control Commission (NEIWPCC)

- Drew Major, USFWS,
- Barry Mower, ME DEP
- Dr. Diane Nacci, EPA
- Dr. Chris Pennuto, USM
- Dr. Mark Pokras, Tufts Univ.
- Dr. Bob Poppenga, Univ. of Penn
- Keith Robinson, USGS
- Nina Schoch, Adirondack Cooperative Loon Program



