Great Lakes Regional Mercury Synthesis and proposed National Mercury Monitoring Network

Jim Wiener, University of Wisconsin-La Crosse

David Evers, BioDiversityResearch Institute, Gorham, ME

Great Lakes Mercury Project

Synthesis and Integration of Multimedia Measurements of Mercury in the Great Lakes Region

Principal Investigators:

David Evers (BioDiversityResearch Institute, Gorham, ME)

Jim Wiener (University of Wisconsin-La Crosse)

For more information:

http://www.briloon.org/about/staff/MercuryintheGreatLakesRegion.php

Great Lakes Mercury Project

- Acommunity-based, bi-national scientific effort (172 participants)
- Funded by Great Lakes Commission (GLAD program)
- Compiled multi-media data on Hg in Great Lakes region
- Developing informational products, addressing key scientific questions regardingHg contamination and its effects in Great Lakes region
- Geographic coverage: Ontario, New York, Pennsylvania, Ohio, Michigan, Indiana, Illinois, Wisconsin, Minnesota, all Great Lakes.
- Two workshops convened (2008 in La Crosse, 2010 in Ann Arbor)
- Work groups: air & atmospheric deposition (David Gay, leader), waters and watersheds, sediment cores, lower food web, sport fish, wildlife, policy

Informational products in preparation

- Two special issues of refereed international scientific journals with ~40 full research articles
  - *Environmental Pollution* will focus on spatio-temporal patterns in Hg contamination (air, wet & dry deposition, water, watersheds, sediment cores, some biota)
  - *Ecotoxicology* will focus on bioaccumulation in food webs, fish & wildlife; MeHg exposure and adverse effects on fish and wildlife; and policy
- Special session proposed for international mercury conference (Halifax, Nova Scotia; July 2011)

Environmental Pollution - Atmospheric Papers

Spatial patterns and statistical trends in mercury concentrations, precipitation, and mercury wet deposition in the North American Great Lakes region, 2002-2008, *Martin Risch, David Gay et al.*

Analysis of modeled mercury dry deposition over the Great Lakes region, *LeimingZhang et al.*

Mercury in litterfall at selected National Atmospheric Deposition Program Mercury Deposition Network sites in the eastern United States, 2007-2009, *Martin Rischet al.*

Mercury speciation in air, foliar accumulation, and wash-off in urban and rural forest canopies, *G.W. Stupple&Brian Branfireun*

A synthesis of rates and controls on elemental mercury evasion, *Joseph Denkenberger& Charles Driscoll*

Goal of proposed National Mercury Monitoring Network:

"To establish an integrated, national network to systematically monitor, assess, and report

on policy-relevant indicators of atmospheric mercury concentrations and deposition,

and mercury levels in land, water, and biota in terrestrial, freshwater, and coastal ecosystems

in response to changing mercury emissions over time."

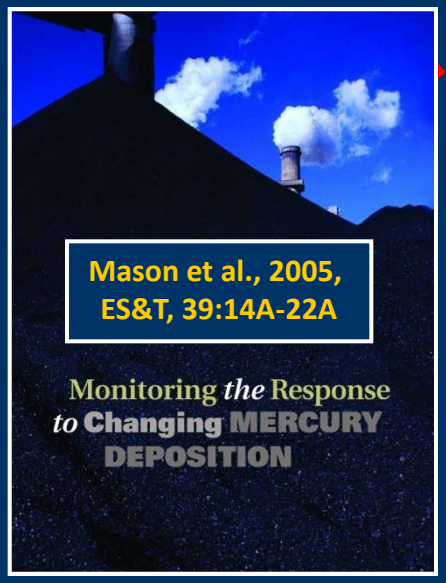
Milestones for the National Mercury Monitoring Network: Meetings and Methods Publications

Workshop on Mercury Monitoring and Assessment, Sept. 2003, Pensacola, FL

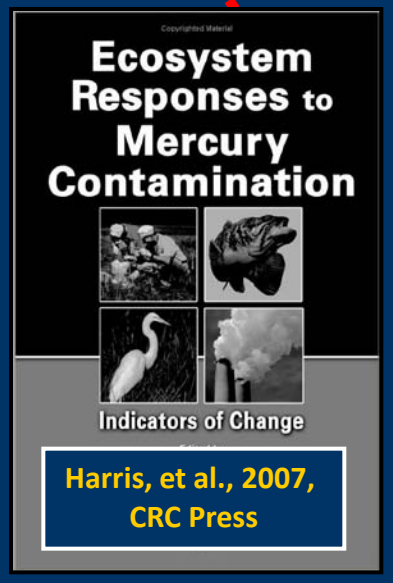
National Mercury MONITORING WORKSHOP
Tracking mercury concentrations in air, land, water, and biota

May 2008, Annapolis, MD

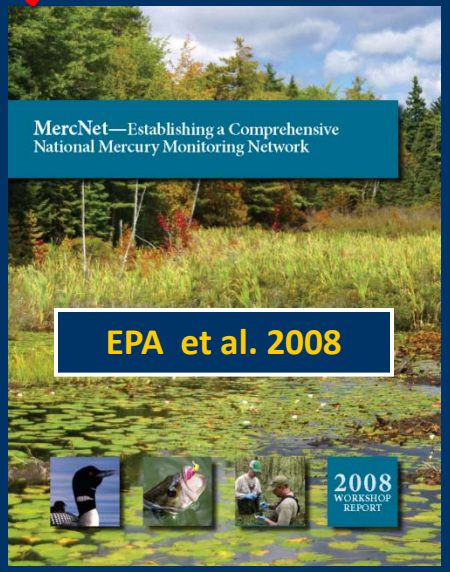
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013



Mason et al., 2005, ES&T, 39:14A-22A



Harris, et al., 2007, CRC Press



EPA et al. 2008

The Indicators

Air & Deposition

- Continuous speciated atmospheric concentrations
- Total wet and dry Hg deposition & flux
- Total Hg weekly wet deposition/flux
- Total and MeHg in throughfall
- Total and MeHg in litterfall
- Total Hg in snowpack
- Mercury evasion/flux
- Watershed inputs/yields

Water & Sediment

- Total and MeHg in soil
- Forest floor surveys
- Total and MeHg, %MeHg in sediments (seasonal)
- Instantaneous sediment methylation/demethylation rate
- Total and MeHg accumulation in cores
- Total and MeHg in surface water (seasonal)
- Water column Hg & MeHg profiles

Based on Mason et al. (2005), Harris et al. (2007)

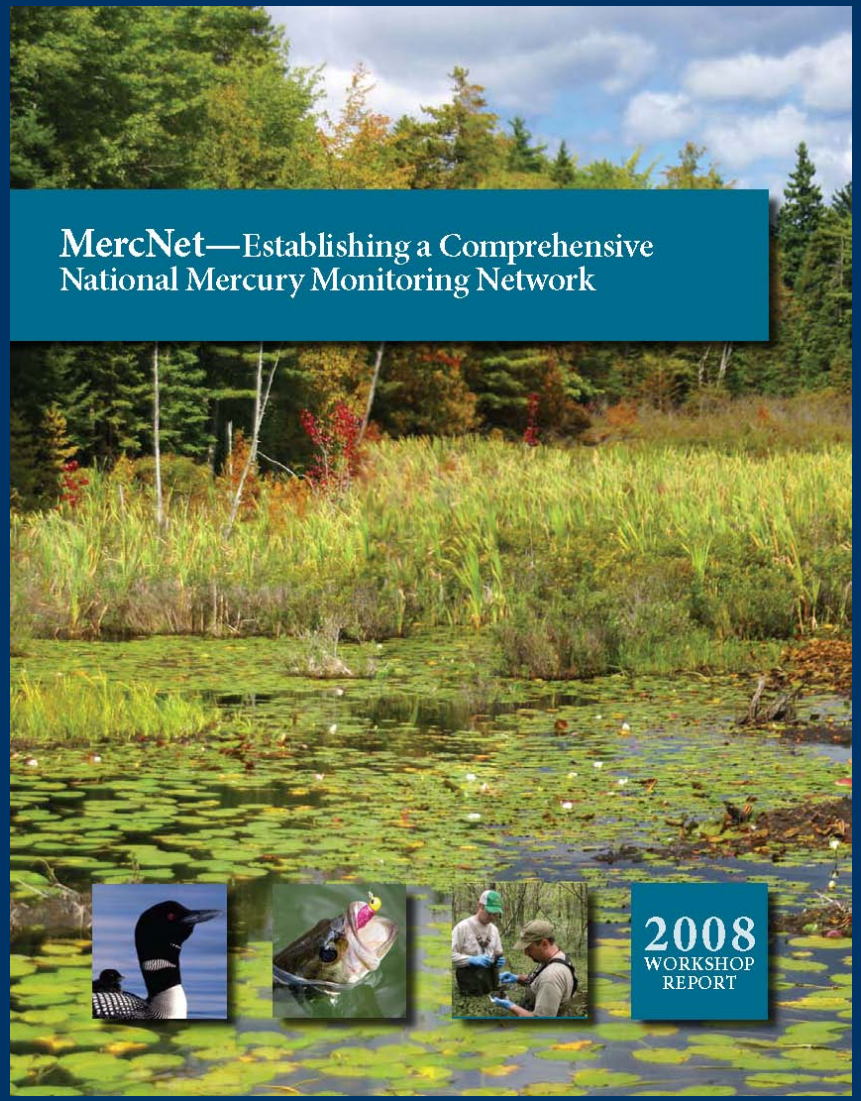
Indicators in yellow would be monitored at intensive sites only. Those in black would be monitored at cluster sites, when feasible

Mercury Monitoring Workshop Report

Workshop participants included federal, state, and tribalrepresentatives; academic scientists; representatives of research and monitoring programs

Report summarized goal, objectives, key design elements, and highlighted areas of agreement for a national mercury monitoring network

Posted on the NADP Website
http://nadp.sws.uiuc.edu/mercnet/MercNetFinalReport.pdf



Keydesign elements of proposed network

- A network of nationally distributed sites
- About20 intensive sites, each with ~10 cluster sites
- Multi-media monitoring of Hg (e.g., air, atmospheric deposition, water, fish, wildlife)
- Network should operate for an extended period (decades) to assess the range of responses (rates of recovery) expected among ecosystems and landscapes
- Network should build on existing monitoring efforts, where possible
- Ancillary information will be crucial for defensible interpretation of Hg data

Comprehensive National Mercury Monitoring Act

- Legislative bill includes USEPA to administer network in collaboration with USFWS, USGS, NPS, and NOAA
- Legislation includes the structure and methodologies recommended in peer-reviewed publications
- Legislation first introduced in March 2007
  - Collins, Lieberman, Clinton – Environment&Public Works
  - Allen and Walsh – Energy& Commerce
- Legislation introduced – December 2009
  - Collins and Carper – Environmental&Public Works
  - Pingree (anticipated) – Energy& Commerce
- Legislation calls for $95 million for 3 years