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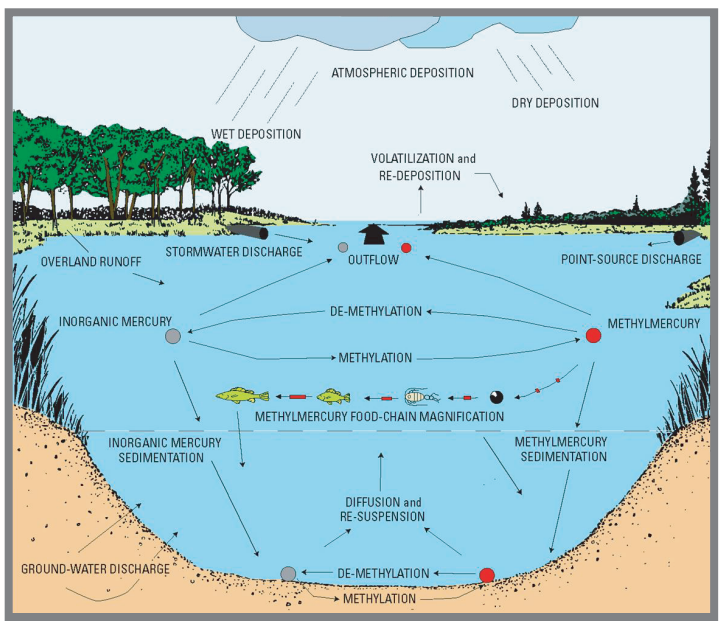
INVESTIGATIONS AND MONITORING OF MERCURY IN INDIANA BY THE U.S. GEOLOGICAL SURVEY

Mercury in the Environment

Mercury is a persistent toxic pollutant that poses a risk to humans and wildlife, primarily through fish consumption. Small concentrations of inorganic mercury in precipitation, dry atmospheric deposition, and wastewater discharges that enter aquatic ecosystems can be converted to organic methylmercury. Methylmercury accumulates in the food chains of aquatic ecosystems and magnifies in concentration so that mammals (including humans) and birds at the top of the food chain can be exposed to methylmercury concentrations that pose a health risk. The primary health risks are to the brain and nervous systems, especially for the young and unborn.

Mercury has been detected in nearly all fish-tissue samples collected in Indiana since 1983. Concentrations of mercury in some tissue samples from fish caught in Indiana waters have prompted State health officials to issue advisories that warn about human consumption of these fish. These advisories apply statewide to certain sizes and species of fish and include additional warnings for specific streams and lakes.

In 2004, mercury advisories affected 3,033 mi of streams, 57,999 acres of lakes, and 59 mi of Great Lakes shoreline in Indiana. Each year, some 833,000 resident anglers 16 years and older, spend 15.5 million days and $469 million for fishing as ,recreation. An estimated 286,000 more resident anglers are 6 to 15 years old. Based on these numbers, fish-consumption advisories affect approximately 1 of 6 Indiana residents.



(Modified from U.S. Geological Survey Fact Sheet FS-216-95)

The Mercury Cycle in Aquatic Ecosystems

Methylmercury is produced from inorganic mercury by a microbial process that occurs under certain conditions in aquatic ecosystems. Fish living in aquatic ecosystems with low concentrations of inorganic mercury are known to accumulate methylmercury in their tissue. Concentrations of methylmercury can increase up the food chain so that higher-level organisms tend to accumulate the highest levels of methylmercury.

Monitoring of Mercury in Indiana

The U.S. Geological Survey (USGS) in a partnership with the Indiana Department of Environmental Management (IDEM) operates two statewide monitoring networks for mercury in Indiana. One network measures mercury concentrations in precipitation to compute wet deposition of atmospheric mercury. The other network determines mercury concentrations in streams to calculate mercury loads that are transported through watersheds in the state.

Mercury in Precipitation in Indiana

Photographs (left to right): automated precipitation sampler, weekly precipitation sample, digital recording rain gage

Mercury in precipitation has been monitored by USGS since 2001. Weekly precipitation samples are collected at five stations across Indiana, using an automated precipitation sampler. The precipitation amount is measured with a digital recording rain gage inside a wind shield. Samples are analyzed for total mercury with methods which quantify concentrations less than a part per trillion. These five monitoring stations are part of the National Atmospheric Deposition Program Mercury Deposition Network, which coordinated 110 monitoring stations in North America in 2008.

Mercury in Precipitation in Indiana, January 2004--December 2005, U.S. Geological Survey Scientific Investigations Report 2008-5148 by Martin R. Risch and Kathleen K. Fowler

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Mercury in Precipitation in Indiana, January 2001--December 2003, U.S. Geological Survey Scientific Investigations Report 2007-5063 by Martin R. Risch

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Data Summary for January 2001 through December 2007

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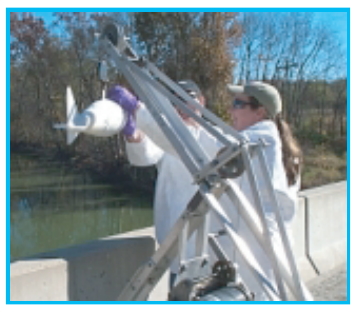
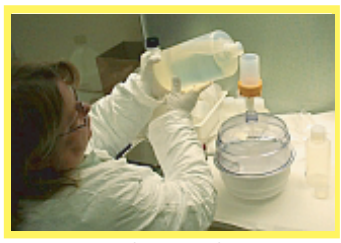
Mercury in Indiana Streams





Photographs (left to right): isokinetic sampler on bridge crane, sample processing in laboratory, stream sample collected while wading

Mercury in streams of Indiana has been monitored by the USGS since 2004. The monitoring network includes 25 stations near USGS streamgages. The monitoring stations are located on streams with watersheds draining more than 80 percent of the land area in the state. Water and samples are collected on a seasonal schedule using ultra-clean methods. Sample processing is done in controlled laboratory conditions. Mercury is analyzed with methods which quantify concentrations less than a part per trillion. Streamflow data enable calculations of mercury loads transported in the streams.

Total Mercury and Methylmercury in Indiana Streams, August 2004-- September 2006, U.S. Geological Survey Scientific Investigations Report 2008-5176 by Amanda L. Ulberg and Martin R. Risch

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Mercury in the Grand Calumet River/Indiana Harbor Canal and Lake Michigan, Lake County, Indiana, August 2001 and May 2002, U.S. Geological Survey Scientific Investigations Report 2005-5034 by Martin R. Risch

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Program Description for Mercury in Streams Monitoring 2007--2009 by Martin Risch

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More Information

IDEM
INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
EST. 1986

Monitoring of mercury in precipitation and streams in cooperation with the Indiana Department of Environmental Management

Mercury in precipitation monitoring is coordinated through the National Atmospheric Deposition Program

National Atmospheric Deposition Program

More mercury information from the USGS at http://www.usgs.gov/mercury/
More mercury information from the IDEM at http://www.in.gov/idem/4149.htm
More mercury information from the NADP at http://nadp.sws.uiuc.edu/

Investigations of Mercury in Indiana

Measurement of Atmospheric Mercury Species with Manual Sampling and Analysis Methods in a Case Study in Indiana by Martin R. Risch, Eric M. Prestbo, and Lucas Hawkins
(Leave the USGS Indiana Water Science Center Web Page and go to journal web page)

An Alternate Method for Creating a Statewide Isopleth Map of Total Mercury Wet Deposition with an Example for Indiana by Martin Risch, Kathleen Fowler, and Nancy Baker
(Leave the USGS Indiana Water Science Center Web Page and go to the NADP web page)

USGS Pilot Study of Mercury in Litterfall at National Atmospheric Deposition Program Mercury Deposition Network Sites, 2007--2008 by Martin Risch

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