



Mercury in Wetland Ecosystems

U.S. EPA | SCIENCE AT THE EPA NEW ENGLAND REGIONAL OFFICE

SCIENCE lies at the heart of the mission of the U.S. Environmental Protection Agency (EPA). The Agency must rely on cutting edge research, accurate measurements and effective technology to implement its programs to protect the environment and human health. Without sound science and credible data, EPA can not wisely set environmental and health standards, clean up contaminated sites, measure ambient air and water quality conditions, or identify the new technologies or practices that will reduce releases to the environment. These fact sheets share with you some of our EPA New England's laboratory capabilities and exemplify some of the very best science we do to meet our agency mission.

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GOAL:

EPA New England, in collaboration with EPA's Office of Research and Development and academic scientists, is conducting research on mercury bioaccumulation patterns in wetland vegetation, insects, amphibians, mammals and birds in the Great Meadows National Wildlife Refuge in Sudbury, Massachusetts. This state-of-the-art field evaluation will help determine the impact of mercury from a nearby Superfund site on both the aquatic and terrestrial biological food web. While bioaccumulation of mercury in the food chains of lakes and rivers has been well-studied, this project breaks new ground in documenting mercury bioaccumulation in wetlands-based ecosystems. The study will also help determine appropriate cleanup standards for the Superfund site.

PROGRESS:

Starting in 2005, EPA New England, in partnership with scientists from EPA Office of Research and Development in Athens, Georgia, initiated a research study that focused on understanding the impact of mercury exposure from a Superfund waste site and how that exposure results in mercury bioaccumulation in wildlife. The study site is a 26-mile stretch of riverine ecosystem downstream from the Nyanza Waste Dump Superfund Site in Sudbury, Massachusetts. Of particular interest is the Great Meadows National Wildlife Refuge, where the Sudbury River is bordered by extensive floodplain wetlands. Relatively little has been known about the movement of mercury in this type of wetlands habitat.

In earlier studies, EPA characterized the extent of mercury contamination downstream of the Nyanza site, focusing its work almost entirely on aquatic ecosystem contamination. More recent assessments analyzed the movement pattern of mercury (as methyl mercury) into bird and mammal carnivores at the middle and top of the food chain, such as kingfishers, waterfowl and minks, which feed on fish and invertebrates. Using findings from the earlier studies, including blood-mercury data from insect-eating birds and mammals that inhabit the Sudbury River floodplain, EPA researchers refocused their investigations on the movement of mercury from

lower links in the food chain to the predators that inhabit the floodplain wetlands. Scientists now are testing for mercury contamination in vegetation, insect herbivores and scavengers, avian insectivores, bats, shrews, mice and free-flying insect predators, such as damselflies and dragonflies. Scientists are analyzing a subset of these samples for methyl and inorganic mercury to establish possible relationships between these different contaminants. In addition, they are testing samples of the various animals and plants for isotopes that identify the status of the organisms within the food chain of the wetland ecosystem. This information is critical in understanding how wetland mercury methylation and biomagnification of methyl mercury in the wetland foodweb may accumulate in higher level predators.

BENEFITS:

The study provides cutting-edge information on the potential role insects play in biomagnifying mercury in food webs along river banks and creates a scientific bridge between biomagnification processes of mercury in the riverine and wetlands ecosystems. It also provides key information for decision-makers to help them determine what steps can and should be taken to mitigate mercury contamination in the Sudbury River and Great Meadows National Wildlife Refuge.



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