
News Release

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Editors: Photographs are available at <http://sd.water.usgs.gov/pressrelease/press.html>

USGS Study Finds Pesticides and Mercury in Charles Mix County Wetlands

The pesticides atrazine and de-ethyl atrazine were found in each water sample collected from 19 wetlands in Charles Mix County sampled during a 2005 study by the U.S. Geological Survey (USGS) and Yankton Sioux Tribe. Samples from 10 of these wetlands were also analyzed for mercury and it was detected in each of the samples. The pesticides and mercury were found in small amounts that are below the U.S. Environmental Protection Agency's Maximum Contaminant Level for drinking water.

Although atrazine was frequently detected, none of the atrazine concentrations were greater than three parts per billion, which is the EPA's Maximum Contaminant Level for atrazine for drinking water. The maximum atrazine concentration found in the wetlands was about 0.6 part per billion. Field and laboratory studies have shown that atrazine may be associated with endocrine-disruption in aquatic organisms. Atrazine exposure in frogs has resulted in reproductive abnormalities at concentrations as small as 0.1 part per billion, but reported effect levels for fish are substantially larger.

Some of the pesticides that are applied in Charles Mix County, including atrazine, alachlor, and trifluralin, are known endocrine disruptors. Others, including glyphosate and 2,4-D, have various levels of toxicity to aquatic organisms. In addition to atrazine and de-ethyl atrazine, 11 other pesticides were detected in water samples from one or more of the wetlands. Mixtures of three to eight pesticides were detected in samples from the 19 wetlands.

“The atrazine concentrations found in water samples from the wetlands are smaller than those generally suspected of affecting the development of fish, but could have some effect on the reproduction of some aquatic organisms,” said USGS scientist Roy Bartholomay. “Further research is needed to fully assess the potential for endocrine disruption of aquatic organisms.”

Mercury has long been known to be a health hazard, and recent research has determined that it is commonly found in natural waters, including wetlands. In addition to local sources of mercury, atmospheric mercury emissions from volcanoes and the burning of coal can be transported long distances to make almost all aquatic systems potentially susceptible to mercury contamination. Atmospheric mercury that is introduced to aquatic ecosystems typically occurs in a form that is not particularly toxic to aquatic organisms. However, under certain conditions that are restricted to aquatic environments, mercury can be converted to methylmercury, which is a potent neurotoxin and endocrine disruptor. Methylmercury can then be taken in by aquatic organisms and accumulated in the food chain.

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Maximum mercury concentrations in water samples from the wetlands were about 30 parts per trillion for total mercury and 14 parts per trillion for methylmercury. The total mercury concentrations in the water samples were all much less than 2,000 parts per trillion, which is the U.S. Environmental Protection Agency's Maximum Contaminant Level for mercury in drinking water. However, water samples from four of the wetlands had total mercury concentrations larger than 12 parts per trillion, which is the State of South Dakota's chronic standard for surface waters, including wetlands. Maximum methylmercury concentrations in the wetlands in Charles Mix County were larger than reported concentrations for wetlands in North Dakota and concentrations reported for the Cheyenne River Indian Reservation in South Dakota.

A copy of the USGS report describing the results of the sampling can be accessed at <http://pubs.usgs.gov/sir/2006/5132/>.

Additional information about the USGS water-resources studies in South Dakota can be obtained by visiting the USGS South Dakota Water Science Center home page at <http://sd.water.usgs.gov/>.

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