

Mercury in Aquatic Ecosystems – Assessments by the U.S. Geological Survey, Idaho Water Science Center

Terry Maret and Dorene MacCoy
U.S. Geological Survey, Idaho Water Science Center
230 Collins Road, Boise, Idaho 83702
208-387-1328 or trmaret@usgs.gov

Mercury is a cause of impairment in the Nation's estuaries and lakes; it was cited in nearly 80 percent of fish-consumption advisories (2,436 of 3,080) reported by 48 states in 2006. Mercury contamination is widespread globally due to atmospheric transport from natural and human-related sources, such as volcanoes, coal combustion, waste incineration, and mining. Inorganic mercury (the form emitted to the environment) is generally not a health concern—it is poorly absorbed by the digestive system. However, methylmercury (the organic form) is highly toxic. Methylmercury is produced by methylation, a microbial process that is controlled by certain bacteria and enhanced by chemical and environmental variables, such as the presence of organic matter and oxygen. Methylmercury is readily incorporated by aquatic organisms and is not eliminated quickly. As a result, more than 95 percent of all mercury found in fish is methylmercury, and this form of mercury biomagnifies to high concentrations at the top of the food chain. Since 1992, the USGS Idaho Water Science Center has assessed the extent and magnitude of mercury contamination in fish tissue and sediment at more than 50 stream and reservoir sites throughout Idaho and surrounding states. These assessments have been funded primarily by the USGS National Water-Quality Assessment Program (NAWQA) and Idaho's Statewide Surface-Water-Quality Trend Network, which is cooperatively supported by the USGS and the Idaho Department of Environmental Quality. The data collected from these ongoing assessments have identified elevated mercury concentrations in trout when compared to U.S. Environmental Protection Agency (USEPA) fish tissue criteria and benchmark concentrations for western waters. About 75 percent of brown trout filets (total length 305-582 mm, n = 20) from Silver Creek, Idaho exceeded the USEPA's 0.3 ppm fish tissue wet weight criterion for protection of human health. Mercury concentrations were also related to brown trout size expressed as total length ($R^2 = 0.59$). Continued monitoring will help to identify contaminated and high-priority areas for restoration and protection.