

Dry Deposition of Atmospheric Mercury to the Great Salt Lake

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The Great Salt Lake (GSL) in the western United States has been identified as the most mercury-laden body of water in the United States with a median water mercury concentration of 42 ng L^{-1} . When Hg enters an aquatic ecosystem it can be converted to methylmercury which bioaccumulates up the food chain. Methylmercury contamination has resulted in many consumption advisories for game fish in lakes and rivers throughout the Intermountain West. In 2005, the Utah Department of Health and the Fish and Wildlife Service placed a similar consumption advisory on waterfowl on the GSL. The primary goal of this study is to identify the pathway of greatest influx of Hg pollution to the GSL to give insight toward the source and an eventual solution to the Hg pollution problem.

Speciated atmospheric mercury measurements were collected at the UT96 field site on the eastern shore of the GSL from July 1, 2009 to June 30, 2012. The atmospheric mercury concentrations, along with high-frequency atmospheric turbulence measurements, were used as input to a resistance-in-series dry deposition model (based on *Wesley and Hicks 1977*). The dry deposition flux of mercury was determined from the modeled dry deposition velocity and the measured concentrations. This dry deposition flux was compared to the wet deposition flux measured by the National Deposition Network and the riverine influx measured by the USGS. Over this three-year study an average of 10.5 g m^{-2} of Hg was deposited into the GSL by dry deposition from the atmosphere.

Dry deposition of mercury into the GSL is the most significant pathway of mercury into the GSL, accounting for 57.5% of all the Hg deposited in the lake. Wet deposition accounts for 33% and riverine influx accounts for only 9.5%. The measurements of mercury from wet deposition, riverine influx, and the output from this dry deposition

resistance-in-series model collectively account for a flux of about $23.6 \text{ } \mu\text{g m}^{-2} \text{ yr}^{-1}$ of mercury. Multiplying by the average surface area of the lake during the measurement period would suggest about 108.5 kg of mercury is deposited into the GSL each year.

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