

A Study to Evaluate Mercury Cycling in the Hells Canyon Reach of the Snake River, Idaho and Oregon

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Lakes and reservoirs that undergo seasonal stratification have the potential for converting mercury to the more toxic methylmercury form after anoxia develops in the hypolimnion. In the 200-km Hells Canyon Reach of the Snake River along the Idaho and Oregon border, 3 large reservoirs operated for hydropower stratify each year, creating conditions ideal for converting mercury to methylmercury. In this reach, the Snake River is listed as impaired for mercury, and fish-tissue samples collected from the reservoirs regularly exceed Idaho's human health fish tissue criterion of 0.3 mg/kg wet weight.

In 2014, the U. S. Geological Survey, in collaboration with Idaho Power Company, initiated an investigation to determine key processes and factors controlling concentrations of mercury and methylmercury in surface water, sediment, and biota in the Hells Canyon Reach of the Snake River. The study employs an integrated sampling approach combining routine and intensive monitoring to evaluate the temporal and spatial patterns in the production and bioaccumulation of methylmercury. Sampling includes routine water-column profiling of physical characteristics related to stratification, chemical sampling in discrete portions of the water column, reservoir inflow and outflow sampling to evaluate mass balance, and biannual intensive assessments to understand the influence of factors including methylation rates, photo-degradation, volatilization, the role of organic matter, and bioaccumulation through the food chain.

Although many unknowns remain relative to mercury dynamics in the study area, one of the long-term goals of this project is to develop a predictive model for methylmercury production, transport, and bioaccumulation in the Hells Canyon Reach of the Snake River.