

Western Ecological Research Center

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Contacts:

Dr. Collin Eagles-Smith

Phone:

530-754-8130

Email and web page:

ceagles-smith@usgs.gov

<http://www.werc.usgs.gov/products/personinfo.asp?PerPK=2115>

Davis Field Station, USGS Western Ecological Research Center, One Shields Avenue, University of California, Davis, CA 95616

Mercury Correlations Among Six Tissue Types in Waterbirds in San Francisco Bay

Mercury is a contaminant of significant concern in waterbirds because it can accumulate to high concentrations in their tissues and cause deleterious effects such as impaired reproduction. Numerous studies and monitoring programs have evaluated concentrations of mercury in waterbird tissues as an index of risk to exposure. Despite this effort no single tissue has been commonly used to assess mercury exposure, hampering the ability to compare results across studies. It is also unclear how mercury concentrations in one tissue type relate to concentrations in other tissues. To understand how mercury distributes through waterbird tissues, U. S. Geological Survey scientists Dr. Collin Eagles-Smith, Dr. Josh Ackerman, Dr. John Takekawa, Dr. Keith Miles, Robin Keister, and U. S. Fish and Wildlife Service scientist Terry Adelsbach investigated the relationships between mercury concentrations in six different tissues of four waterbird species, and provide equations to predict concentrations in one tissue from those in another. They reported their results in a recent issue of *Environmental Toxicology and Chemistry*.

The authors analyzed total mercury in blood, liver, kidney, muscle, head feathers and breast feathers, and methylmercury in liver and kidney of adult and chick American avocets, black-necked stilts, Caspian terns, and Forster's terns from the San Francisco Bay. Mercury concentrations were highly correlated among all internal tissues, indicating that levels in any given internal tissue could be mathematically predicted from concentrations in other internal tissues. Conversely, the relationships between mercury in feathers and internal tissues were not very strong, suggesting that feathers are a poor predictor of internal recent mercury exposure. Although there were minor differences in the tis-

Management Implications:

- These results will allow for direct comparisons of data across mercury studies that have not measured mercury the same waterbird tissues.
- Mercury concentrations in tissues that can be collected non-lethally, such as blood, can be used to estimate concentrations in more toxicologically relevant tissues, such as liver.

sue prediction equations among species and lifestages, they found good agreement between predictions made using a general tissue-prediction equation and more specific equations for each species and lifestage. Overall, their work shows that blood is an excellent, non-lethal predictor of mercury concentrations in internal tissues but that feathers are relatively poor indicators of mercury concentrations in internal tissues.

Eagles-Smith, C. A., J. T. Ackerman, T. L. Adelsbach, J. Y. Takekawa, A. K. Miles, R. A. Keister. 2008. Mercury correlations among six tissues for four waterbird species breeding in San Francisco Bay, California, USA. Environmental Toxicology and Chemistry 27:2136–2153.