

Western Ecological Research Center

Publication Brief for Resource Managers

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Mercury in American Avocets and Black-necked Stilts Breeding in San Francisco Bay

San Francisco Bay supports over half a million wintering and migrating shorebirds annually and is recognized as a site of hemispheric importance to shorebirds. Unfortunately, San Francisco Bay also has a legacy of mercury contamination from both mercury mining and gold extraction, and this pollution is thought to reduce reproductive success of some waterbirds breeding within the estuary. To understand current mercury levels in locally breeding waterbirds, a team of scientists from the U.S. Geological Survey, U.S. Fish and Wildlife Service, Humboldt State University, and PRBO Conservation Science investigated the mercury concentrations of pre-breeding American avocets and black-necked stilts, the two most abundant breeding shorebirds in San Francisco Bay, and used radio telemetry to assess space use and sites of dietary mercury uptake. They reported their results in a recent issue of *Science of the Total Environment*.

The authors tested the effects of species, site, sex, year, and date on total mercury concentrations in blood of pre-breeding adult birds. They collected blood from 373 avocets and 157 stilts from February to April in 2005 and 2006, radio-marked and tracked 115 avocets and 94 stilts, and obtained 2,393 avocet and 1,928 stilt telemetry locations. They found that capture site was the most important factor influencing mercury concentrations in birds, followed by species and sex. Mercury concentrations were higher in stilts than in avocets, and males had higher levels than females. Mercury concentrations were highest for both species at the southern end of San Francisco Bay, especially in salt pond A8. Radio telemetry data showed that birds had strong fidelity to their capture site. Avocets primarily used salt ponds, tidal marshes, tidal flats, and managed marshes, whereas stilts mainly used salt ponds, managed marsh-

Management Implications:

- Current large-scale activities to restore or enhance wetland habitats along San Francisco Bay's margins could increase the contamination of the aquatic biota within the estuary by accelerating microbial conversion of legacy inorganic mercury to methyl mercury, the form which is highly toxic and most bioavailable to wildlife and humans.
- Mercury methylation might be especially problematic for San Francisco Bay waterbirds because a large proportion of the breeding populations of several waterbird species nest in the South Bay where much of the restoration of former salt evaporation ponds into tidal marsh will occur.
- These results show that non-fish-eating waterbirds also are at risk to mercury contamination in San Francisco Bay and should be incorporated into risk-assessment strategies, along with piscivorous birds.
- These data suggest that continued monitoring of mercury levels in breeding waterbirds within San Francisco Bay is warranted.

es, and tidal marshes. Their results suggest that variation in blood mercury concentrations among sites was attributed to differences in foraging areas, and species differences in habitat use and foraging strategies may increase mercury exposure in stilts more than avocets.

Ackerman, J.T., C.A. Eagles-Smith, J.Y. Takekawa, S.A. Demers, T.L. Adelsbach, J.D. Bluso, A.K. Miles, N. Warnock, T.H. Suchanek, and S.E. Schwarzbach. 2007. Mercury concentrations and space use of pre-breeding American avocets and black-necked stilts in San Francisco Bay. Science of the Total Environment 384: 452–466.