The Pulse of the Estuary

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Monitoring and Managing Water Quality in the San Francisco Estuary

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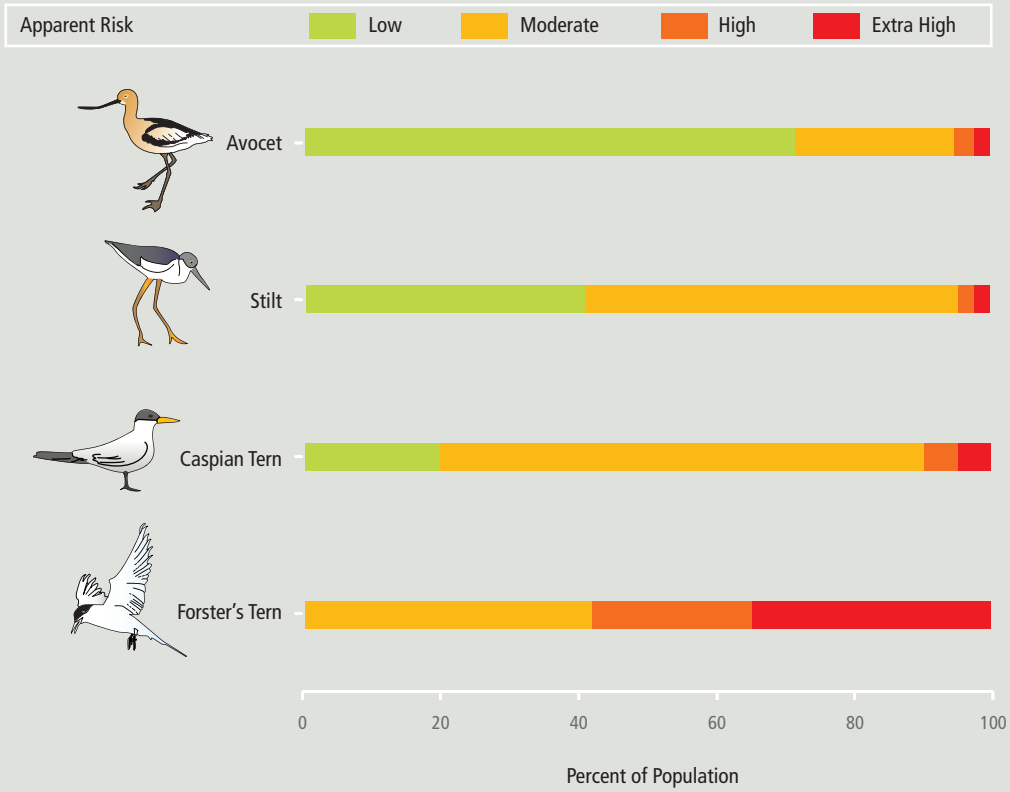

Footnote: Risk categories are based on blood concentrations and derived from the sensitivity of common loons.

From: Ackerman et al. 2007. Mercury in birds of the San Francisco Bay-Delta: trophic pathways, bioaccumulation, and ecotoxicological risk to avian reproduction. 2006 Annual Administrative Report. http://www.delta.dfg.ca.gov/erp/docs/wq_mercuryissues/Mercury%20in%20Birds%20of%20the%20SF%20Bay%20Delta_Apr07.pdf

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Methylmercury may pose substantial risks to breeding birds in San Francisco Bay. Widespread mercury contamination of San Francisco Bay has resulted in potentially harmful concentrations of methylmercury in fish and wildlife, yet it remains unclear what ecological effects are actually occurring. To better understand the impact that mercury contamination may be having on local wildlife populations, scientists from the U.S. Fish and Wildlife Service and U.S. Geological Survey have examined four species of waterbirds that commonly breed within the Estuary: American avocets, black-necked stilts, Caspian terns, and Forster's terns. Mercury concentrations in bird blood and eggs were compared to available thresholds. Blood mercury concentrations were lowest in avocets and stilts, which feed mainly on invertebrates, and highest in Caspian terns and Forster's terns, which feed on fish. The study found that 6% of avocets, 5% of stilts, 10% of Caspian terns, and 57% of Forster's terns were at high to extra-high risk of reproductive impairment due to their blood mercury levels (>3.0 parts per million or ppm). A similar pattern was found for egg mercury concentrations, where 0% of avocet, 10% of stilt, and 46% of Forster's tern eggs had mercury concentrations (>1.8 ppm) placing them at high to extra high risk of potentially reduced hatching success and subsequent chick survival.

These results indicate that wetland-dependent wildlife, particularly fish-eating birds, may be at substantial risk from mercury contamination within the Bay. However, the findings should be interpreted with caution. Due to the general lack of data on the sensitivity of birds to mercury contamination, especially in San Francisco Bay, the interpretation is based on risk thresholds developed for loons (blood and eggs) and mallards (eggs) from other areas in North America. It is currently unknown whether these species are appropriate surrogates for the Bay shorebird and tern species that were studied. Indeed, there may be substantial variability in the susceptibility of different species to methylmercury toxicity. Better information on waterbird sensitivities to methylmercury exposure is needed to better characterize the risk to Estuary birds.

Tern eggs. Photograph by Joel Shinn.