

## Western Ecological Research Center

# Publication Brief for Resource Managers

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## Mercury Contamination and Effects on Avocet and Stilt Chick Survival

Avian reproduction is one of the most sensitive endpoints of mercury toxicity and methylmercury exposure can reduce reproductive success. Several laboratory egg-injection and controlled-feeding studies have demonstrated that environmentally relevant mercury exposure reduces egg hatchability and duckling survival. Yet, few field studies have been able to detect effects of mercury on chick survival in the wild. To understand the effects of mercury exposure in waterbirds in San Francisco Bay, USGS scientists Dr. Josh Ackerman, Dr. John Takekawa, Dr. Collin Eagles-Smith, and Sam Iverson examined factors influencing mercury concentrations in shorebird chicks hatched there and determined whether these environmental mercury concentrations impaired survival of free-ranging chicks from hatching to fledging. They reported their results in a recent issue of *Ecotoxicology* that summarized globally important findings presented at the 8<sup>th</sup> International Conference on Mercury as a Global Pollutant.

The authors evaluated whether mercury influenced survival of free-ranging American avocet and black-necked stilt chicks in San Francisco Bay, California. In 2005 and 2006, using radio telemetry, they radio-marked 158 avocet and 79 stilt chicks at hatching and tracked them daily until their fate was determined. They did not find strong support for an influence of within-egg mercury exposure on chick survival, despite observing a wide range of mercury concentrations in chick down feathers at hatching. They estimated that chick survival rates were reduced by  $\leq 3\%$  over the range of observed mercury concentrations during the 28-day period from hatching to fledging. The authors also salvaged newly-hatched chicks that were found dead during routine nest monitoring.

### Management Implications:

- Survival of free-ranging avocet and stilt chicks from hatching to fledging was reduced by only  $\leq 3\%$  due to mercury contamination.
- However, chicks found dead on colonies had higher mercury concentrations than live and apparently healthy chicks, indicating that mercury may be causing mortality immediately after hatching when mercury levels are still elevated due to high mercury concentrations in the egg.
- These data suggest that mercury may exert its greatest effects on chick survival soon after hatching.
- Continued monitoring of mercury levels in waterbird eggs and chicks within San Francisco Bay to assess risk to populations is warranted.

In contrast to the telemetry results, they found that mercury concentrations in down feathers of dead chicks were higher than those in randomly-sampled live chicks of similar age. However, capture site was the most important variable influencing mercury concentrations, followed by year, species, and hatching date. Although laboratory studies have demonstrated negative effects of environmentally relevant mercury concentrations on chick survival, the authors' results concur with the small number of previous field studies that have not been able to detect reduced survival in the wild.

Ackerman, J.T., J.Y. Takekawa, C.A. Eagles-Smith, and S.A. Iverson. 2008. Mercury contamination and effects on survival of American avocet and black-necked stilt chicks in San Francisco Bay. *Ecotoxicology* 17:103–116.