

Western Ecological Research Center

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Survival of Postfledging Forster's Terns in San Francisco Bay

Methylmercury biomagnifies through aquatic food chains, and elevated levels are common in wildlife foraging at high trophic positions in contaminated environments. Dietary exposure to methylmercury is problematic because it is a potent neurotoxin, and toxic effects on reproduction can occur at relatively low levels. Toxic endpoints for reproductive impairment mainly have been developed for egg hatchability, but reduced chick survival due to mercury exposure also can be an important component contributing to reproductive impairment. However, few studies have been able to detect effects of mercury on chick survival in the wild.

In a recent issue of *Ecotoxicology*, USGS scientists Dr. Josh Ackerman, Dr. Collin Eagles-Smith, Dr. John Takekawa, and Sam Iverson examined factors influencing mercury concentrations in 90 fledgling Forster's terns and evaluated whether mercury influenced postfledging survival in San Francisco Bay, California. Mercury concentrations (\pm SE) in chicks 21-29 days old (just before fledging) were $0.33 \pm 0.01 \mu\text{g g}^{-1}$ ww for blood and $6.44 \pm 0.28 \mu\text{g g}^{-1}$ fw for breast feathers. Colony site had an overriding influence on fledgling contamination, however hatching date and age also affected blood, but not feather, mercury concentrations. Blood mercury concentrations decreased by 28% during the 50-day hatching period and increased with chick age by 30% during the last week prior to fledging. Using radio-telemetry, the scientists calculated that cumulative survival during the 35-day postfledging time period was $81 \pm 9\%$ (SE). Postfledging survival rates increased with size-adjusted mass, and cumulative survival probability was 61% lower for terns with the

Management Implications:

- Survival of postfledging Forster's terns was similar to the few other tern species that have been studied.
- Size-adjusted mass affected postfledging survival of Forster's terns, indicating that parental investment and feeding of chicks has a large influence on future survival.
- Although mercury was not related to postfledging Forster's tern survival, it may influence chicks earlier in life. The lead author's future research will examine effects of mercury on growth and survival of Forster's tern chicks from hatching to fledging.

lowest, compared to the highest, observed masses. Conversely, survival was not influenced by blood mercury concentration, time since fledging, sex, or hatch date. Mercury concentrations in breast feathers of fledglings found dead at nesting colonies also were no different than those in live chicks. These results indicate that colony site, hatching date, and age influenced mercury concentrations in fledgling Forster's terns, but that mercury did not influence postfledging survival.

Ackerman, J.T., C.A. Eagles-Smith, J.Y. Takekawa, and S.A. Iverson. 2008. Survival of postfledging Forster's terns in relation to mercury exposure in San Francisco Bay. Ecotoxicology 17:789-801.