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## Mercury Exposure Suppresses Stress Response in Juvenile Birds

Few studies have examined whether mercury can have negative impacts on the stress response of bird chicks. In a study published in *Environmental Science & Technology*, USGS scientists Garth Herring, Josh Ackerman and Mark Herzog document the correlation between mercury concentrations and stress response hormone concentrations in hatchling Forster's terns (*Sterna forsteri*).

The hypothalamic-pituitary-adrenal (HPA) axis regulates circulating concentrations of corticosterone hormones in birds during periods of stress. The temporary increase in corticosterone concentrations would provide the ability for chicks to respond to stressful situations such as inclement weather or threats of predation.

Researchers sampled recently hatched Forster's tern chicks from colonies at the Don Edwards National Wildlife Refuge in south San Francisco Bay, where recent studies have found elevated concentrations of mercury in breeding waterbirds. Feathers from younger chicks and blood from older chicks were collected for mercury concentration measurements, and fecal matter was collected for fecal corticosterone metabolite concentrations.

In recently hatched chicks, fecal corticosterone metabolite concentrations were weakly negatively correlated with mercury concentrations in down feathers. But in older chicks, fecal corticosterone metabolite concentrations were definitively negatively correlated with mercury concentrations in blood.

These results indicate that chronic mercury exposure may suppress baseline corticosterone concentrations in tern chicks and suggests that a juvenile bird's ability to respond to stress may be reduced.

### Management Implications

- Chronic mercury exposure may suppress baseline stress hormone production in bird chicks, possibly reducing a bird's ability to respond to stress.
- Waterbird colonies with chronic mercury exposure may be subjected to impacts beyond reproductive and cognitive impairment, such as impaired stress response.
- Corticosterone concentrations also were positively related to other environmental factors such as colony size, chick age, and date.

#### THIS BRIEF REFERS TO:

Herring, G, JT Ackerman, MP Herzog. 2012. Mercury exposure may suppress baseline corticosterone levels in juvenile birds. *Environmental Science & Technology* 46: 6339-6346. doi: 10.1021/es300668c

<http://www.werc.usgs.gov/ProductDetails.aspx?ID=4729>

<http://www.werc.usgs.gov/ackerman>

<http://www.werc.usgs.gov/southbayrestoration>



Juvenile Forster's terns are sampled for down feathers and feces.