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Assessing contaminant loads in nonbreeding migratory shorebirds

Migratory shorebirds face ongoing population declines. One potential driver of population change is exposure to environmental contaminants and pollutants. Migratory shorebirds frequently forage and roost in agricultural habitats where they may be exposed to organophosphorus and carbamate pesticides, collectively known as cholinesterase-inhibitors. Exposure to these chemicals inhibits nervous system function and sometimes results in death.

In a paper published in *The Condor*, we collaborated with colleagues from Kansas State University, Texas Tech University, Southern Illinois University Edwardsville, the US Fish and Wildlife Service, and Instituto Nacional de Tecnología Agropecuaria in Argentina to evaluate nonbreeding migratory shorebird exposure to cholinesterase-inhibitors in the Western Hemisphere.

The study was conducted at rice fields, turf grass farms (agricultural sites) and natural areas (reference sites) in three states in the United States (Nebraska, Kansas, and Texas) and three countries in South America (Paraguay, Argentina, and Uruguay). Samples in North America were collected during spring and fall migration in 2006 and spring migration 2007. In South America, samples were collected from September through December 2006.

Comparisons between agricultural sites and reference sites were made for five shorebird species. One species, the Buff-breasted Sandpiper, had lower cholinesterase activity at agricultural sites than at reference sites in Argentina, indicating recent exposure to anti-cholinesterase chemicals.

The large negative effect size provided further evidence for exposure, although foot wash extractions and tests for cholinesterase activity reactivation were inconclusive. Additional research is needed to understand how pesticides are affecting shorebird behavior and survival.

Baseline values of cholinesterase activity were reported for 12 species of shorebirds, including 2 species endemic to South America. These values can be used as reference values in future studies to assess shorebird exposure to cholinesterase inhibitors.

Main Points

- This is the first study to evaluate exposure to cholinesterase-inhibitors in migratory shorebirds
- Results suggest that Buff-breasted Sandpipers were exposed to cholinesterase-inhibitors in South America
- Additional sampling at other potential sites of exposure in South America is needed
- Baseline values of cholinesterase activity provided in this paper can be used in future studies of shorebird exposure to pesticides

Paper citation:

Strum K. M., Hooper, M. J., Johnson K. A., Lanctot, R. B., Zaccagnini M. E., Sandercock B. K. 2010. Exposure of nonbreeding migratory shorebirds to cholinesterase-inhibiting contaminants in the western hemisphere. *Condor* 112:15-28.