FACT SHEET
HUDSON RIVER
Avian Injury Publication

The Hudson River Natural Resource Trustees - the National Oceanic and Atmospheric Administration (NOAA), the U.S. Department of the Interior (DOI), and New York State (the Trustees) - are continuing to determine how polychlorinated biphenyls (PCBs) released from the General Electric Company (GE) plants at Fort Edward and Hudson Falls, New York harm the natural resources of the Hudson River and the surrounding ecosystem.

The Hudson River and its shoreline habitats support more than 150 species of birds, including species of waterfowl, wading birds, shorebirds, protected species such as the bald eagle and osprey, and various songbirds. Trustees have collected PCB exposure data in multiple species of Hudson River birds, and conducted studies to determine the impact of PCBs on birds.

The journal *Environmental Toxicology and Chemistry* has published the results of a peer reviewed study entitled, "Comparative Lethality of *In ovo* Exposure to PCB 126, PCB 77 and Two Environmentally Relevant PCB Mixtures in Japanese Quail (*Coturnix japonica)*." The publication is available online.

**Summary of Publication**

The study directly compared the toxicity of PCB 126, PCB 77, and two environmentally relevant PCB mixtures over specified dose ranges. The two environmentally relevant mixtures, developed from analyses of spotted sandpiper (SPSA) and tree swallow (TRSW) eggs from the Hudson River PCBs Superfund Site, were used to assess potential differences in toxicity in the Japanese quail. Japanese quail are a standard test species and good laboratory model for studying *in ovo* (in the egg) development and toxicity due to the well understood physiology, short generation time and cost-effective management. For embryo mortality, results showed clear dose-response relationships for PCB 126 and the two PCB mixtures; no dose-dependent increase in embryo mortality was observed with PCB 77 treatment, and no dose-dependent relationships were found between any doses and embryo deformities. Complex mixtures of PCBs were lethal in a dose-related manner, with sublethal effects from exposure to PCB 77.

**Why are we studying avian embryo mortality?**

Previous studies in birds have examined how PCB exposure may influence reproductive, behavioral and developmental abnormalities; embryo mortality; endocrine disruption; behavioral alterations and impaired immune response. While laboratory studies have assessed the toxicity of individual congeners and Aroclors, fewer studies have focused on environmentally relevant mixtures for ecological risk assessments.
What did we find?

Data Collection: Eggs were injected with specific doses of these compounds prior to incubation; one of the endpoints assessed was death of the avian embryo (embryo mortality), the other endpoint assessed was deformities in the embryo.

Results: This study demonstrates the utility of the Japanese quail embryo as a bioassay providing the basis for assessing potential impact to field exposures to PCBs in birds. A longer exposure duration and higher injected dose of PCB 126, SPSA-, and TRSW-PCB mixtures resulted in increased mortality of Japanese quail embryos. PCB 126 was the most toxic, at all exposure durations, followed by the SPSA- and the TRSW-PCB mixtures. The Japanese quail egg bioassay proved to be an excellent model for comparison of the embryonic lethality of PCB 126 and the two PCB mixes studied.

Relevance to Injury: The concentrations of PCB mixtures tested in this study spanned field observed concentrations as well as higher concentrations. This embryonic model provides the basis for assessing potential impact to field exposures in birds. The Trustees are assessing how birds breeding along the Hudson River may be injured from their past, present, and future exposure to PCBs. These data on impacts of PCBs to Japanese quail -- a model species -- will facilitate the Trustees' assessment of injury to Hudson River birds.

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