

## **CONTAMINANTS IN EGGS OF MARINE AND ESTUARINE BIRDS COMPARED TO BIRDS IN LACUSTRINE, RIVERINE, TERRESTRIAL HABITATS, MAINE U.S.A.**

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In order to evaluate levels of emerging and historical contaminants of concern, in 2007 we measured 192 contaminants in eggs of 23 species of Maine birds from marine, estuarine, riverine, lacustrine, and terrestrial ecosystems. We collected eggs from seabirds, shorebirds, wading birds, waterfowl, kingfishers, songbirds, and raptors, which were analyzed for mercury (Hg), polychlorinated biphenyls (PCB), polybrominated diphenyl ethers (PBDE), perfluorinated compounds (PFCs), and organochlorine pesticides (OCs). To evaluate geographic differences along the coast, we collected samples from six seabird colonies close to major river outlets. To evaluate habitat differences, we collected samples from multiple species in the greater Portland area and from tree swallows (*Tachycineta bicolor*) feeding in all habitat types.

We detected contaminants in all samples and report the first records of PFCs in Maine bird eggs. Out of the 23 species tested, Virginia rail (*Rallus limicola*), and willet (*Catoptrophorus semipalmatus*) had the lowest overall contaminant levels, while bald eagles (*Haliaeetus leucocephalus*) and peregrine falcons (*Falco peregrines*) had the highest levels. DecaBDE was found in eight species; gulls and peregrine falcon had the highest levels. Some egg samples had concentrations above suggested adverse effects thresholds for Hg, PCBs, and PFCs. Levels of PCBs, PBDEs, PFCs, and OCs are positively correlated, indicating that birds with high levels of one compound tend to have high levels of the others. PBDEs and PCB have the strongest relationship. Stable nitrogen and carbon isotope analysis suggests that trophic level is primarily responsible for contaminant level.

Generally, samples collected closer to developed areas in southern Maine had higher organic pollutant levels, while Hg levels were elevated in previously identified established hotspots. There was no clear trend of contaminant egg concentrations among habitat types, but Hg levels were higher in lakes while organics tended to be lower in estuaries. At the Isle of Shoals, common eider (*Somateria mollissima*) and herring gull (*Larus argentatus*) PCB levels were

seven fold lower than samples analyzed in the late 1970's. Our results indicate that historical contaminants are persistent and that emerging contaminants are pervasive across ecosystems.

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