

Patuxent Wildlife Research Center

Contaminant Exposure, Food Web Transfer and Potential Health Effects on Chesapeake Bay Waterbirds



The Challenge: Agricultural, industrial and urban activities have had major effects on waterbird populations in Chesapeake Bay. Pharmaceuticals, personal care products, and endocrine disrupting compounds have been detected in the water column and fish tissue, yet knowledge of their occurrence and effects in wildlife is limited. Some legacy pollutants (PCBs, organochlorine pesticides, and metals) continue to pose a potential threat to wildlife in some locations. To date no studies have examined the bioaccumulation of pharmaceuticals and their fate in the water-fish-osprey food web.



The Science: Measurement of contaminants in water, and their biomagnification to higher trophic level species (predatory fish, ospreys), will enhance our understanding of the fate, effects, and food web transfer of emerging and legacy contaminants. As laid out in the Chesapeake Bay Executive Order, this integrated effort will focus on the Potomac, Susquehanna and James Rivers, and Regions of Concern (Anacostia/middle Potomac, Baltimore Harbor/Patapsco and Elizabeth Rivers). Out of a suite of 24 pharmaceuticals and the artificial sweetener diltiazem, 18 analytes were detected in water, 8 in fish plasma but only one was detected in osprey nestling plasma. The antihypertensive drug diltiazem was detected in osprey nestling plasma samples in this study, but levels were below the human therapeutic concentration. Effect thresholds for diltiazem are unknown in ospreys at this time, and there is no evidence to suggest adverse effects. In addition, we measured molecular and genetic endpoints, condition indices, and osprey reproductive success. We are continuing to summarize data on PCBs, organochlorine pesticides and PBDE flame retardants to look at spatial and temporal patterns in contaminants in osprey eggs.



The Future: This study will expand the geographic scope of our knowledge, document spatial and temporal trends of contaminant exposure in fish and wildlife, and may have implications for human health. These data will be used by regulatory and resource management agencies to prioritize contaminants of concern, and develop management actions to mitigate pollution. Even though empirical concentrations of drugs in the present study are below therapeutic levels for humans, there are limited threshold data which makes interpretation challenging. Ultimately, findings will contribute to the improvement of environmental quality, ecosystem integrity, and sustainability of the Chesapeake Bay.