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Contaminant Exposure and Potential Effects on Reproduction of Ospreys Nesting in Chesapeake Bay Regions of Concern

The Chesapeake Bay provides critical habitat for many species of waterbirds, including one of the largest breeding populations of ospreys (*Pandion haliaetus*) in the world. The decline of the mid-Atlantic osprey population during the post-World War II era is one of several well-documented instances in which DDT exposure was linked to impaired reproductive success. With restrictions on the use of DDT and other organochlorine pesticides, reproductive performance of Chesapeake Bay ospreys has markedly improved, and the size of the population had more than doubled to an estimated 3473 nesting pairs by 1995/1996. Coincident with this recovery, ospreys are now nesting in the most highly polluted tributaries of Chesapeake Bay. These regions of concern include Baltimore Harbor, and the Anacostia and Elizabeth Rivers, all of which exhibit ambient water quality conditions that are toxic to several species of invertebrates and finfish larvae. Human health advisories are in effect for the consumption of some shellfish and finfish species in all three regions of concern. The present study was undertaken to document exposure to traditional contaminants (e.g., pesticides, total PCB and toxic PCB congeners, mercury) and contemporary pollutants (e.g., surfactants including alkylphenols and ethoxylates and flame retardants including brominated diphenyl ethers) and to examine potential adverse effects of environmental contaminants on reproduction of this highly valued species.



Progress to Date:

In 2000 and 2001, ospreys nesting on navigational markers, duck blinds and other structures were studied over the course of the breeding season in Chesapeake Bay regions of concern (Baltimore Harbor/Patapsco River, Anacostia/Middle Potomac River, and the Elizabeth River) and a presumed reference site, the South, West and Rhode Rivers near Annapolis, Maryland. From 14-16 nests at each study site, a single egg was collected for contaminant analysis, and blood and feather samples were collected from near fledging young for metal analysis. Nest success (hatching of eggs, and fledging of young) was monitored to determine potential relationships between contaminant exposure and reproductive success.

Nesting density of ospreys was greatest in the reference site compared to regions of concern. There were no differences in the number of eggs laid in active nests, thickness of eggshells, percent of active nests with hatched eggs, and percent of successful nests (i.e., one or more young fledged) among study areas. Overall productivity was more than adequate to sustain the population. Preliminary findings suggest that the concentrations of DDT metabolites, several other organochlorine pesticides, total PCBs, and brominated flame retardants in sample eggs were generally greater in regions of concern compared to the reference site, but below levels that adversely affect reproductive success in ospreys.

Management Implications:

The Chesapeake Bay contains one of the largest breeding populations of ospreys in the world. The population has expanded so dramatically that ospreys are now nesting in highly polluted regions of concern. Although contaminants in these regions appear to be affecting aquatic invertebrates and fish, there is little evidence to suggest they are adversely affecting ospreys. Contaminant levels in osprey eggs and other tissues may assist in monitoring remediation of Baltimore Harbor, and the Anacostia and Elizabeth Rivers. Further research to identify the cause of low osprey nesting density on the Anacostia and Elizabeth Rivers is warranted.

