

Contaminants Affecting Productivity of Bald Eagles

Indicator #8135

This indicator report was last updated in 2005.

Overall Assessment

Status: Mixed
Trend: Improving

Lake-by-Lake Assessment

<i>Separate lake assessments were not included in the last update of this report.</i>

Purpose

- To assess the number of territorial pairs, success rate of nesting attempts, and number of fledged young per territorial pair as well as the number of developmental deformities in young bald eagles
- To measure concentrations of persistent organic pollutants and selected heavy metals in unhatched bald eagle eggs and in nestling blood and feathers
- To infer the potential for harm to other wildlife caused by eating contaminated prey items

Ecosystem Objectives

This indicator supports annexes 2, 12, and 17 of the Great Lakes Water Quality Agreement.

State of the Ecosystem

As the top avian predator in the nearshore and tributary areas of the Great Lakes, the bald eagle integrates contaminant stresses, food availability, and the availability of relatively undeveloped habitat areas over most portions of the Great Lakes shoreline. It serves as an indicator of both habitat quantity and quality.

Concentrations of organochlorine chemicals are decreasing or stable but still above No Observable Adverse Effect Concentrations (NOAECs) for the primary organic contaminants, dichlorodiphenyl-dichloroethene (DDE) and polychlorinated biphenyls (PCBs). Bald eagles are now distributed extensively along the shoreline of the Great Lakes (Figure 1). The number of active bald eagle territories has increased markedly from the depths of the population decline caused by DDE (Figure 2). Similarly, the percentage of nests producing one or more fledglings (Figure 3) and the number of young produced per territory (Figure 4) have risen. The recovery of reproductive output at the population level has followed similar patterns in each of the lakes, but the timing has differed between the various lakes. Lake Superior recovered first, followed by Erie and



Figure 1. Approximate nesting locations of bald eagles (in red) along the Great Lakes shorelines, 2000.

Source: W. Bowerman, Clemson University, Lake Superior LaMPs, and for Lake Ontario, Peter Nye, and N.Y. Department of Environmental Conservation

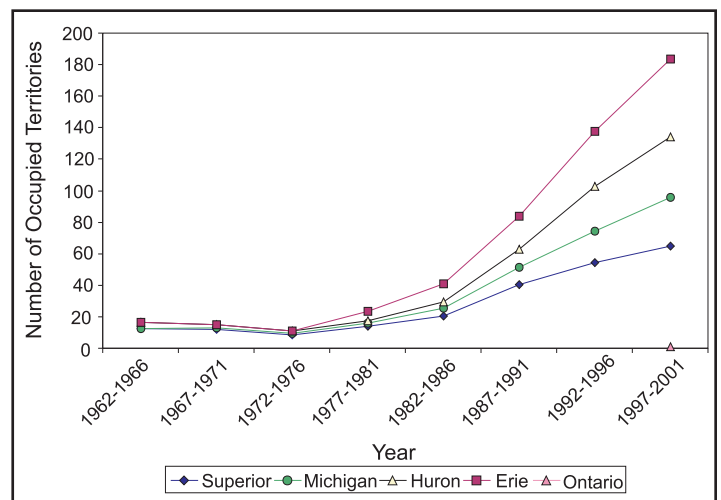


Figure 2. Average number of occupied bald eagle territories per year by lake.

Source: David Best, U.S. Fish and Wildlife Service; Pamela Martin, Canadian Wildlife Service; and Michael Meyer, Wisconsin Department of Natural Resources

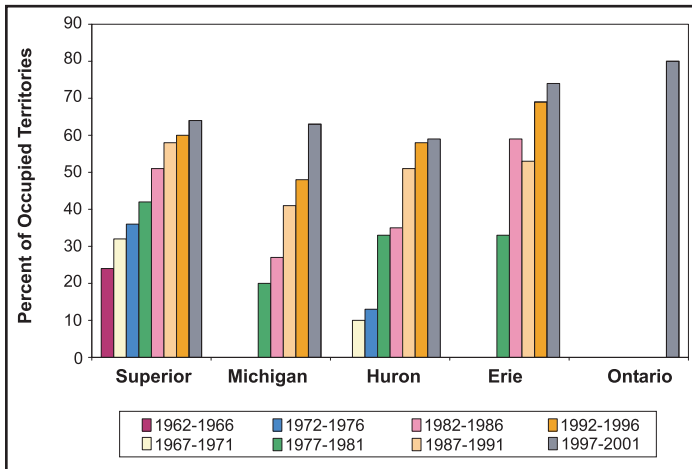


Figure 3. Average percentage of occupied territories fledging at least one young.

Source: David Best, U.S. Fish and Wildlife Service; Pamela Martin, Canadian Wildlife Service; and Michael Meyer, Wisconsin Department of Natural Resources

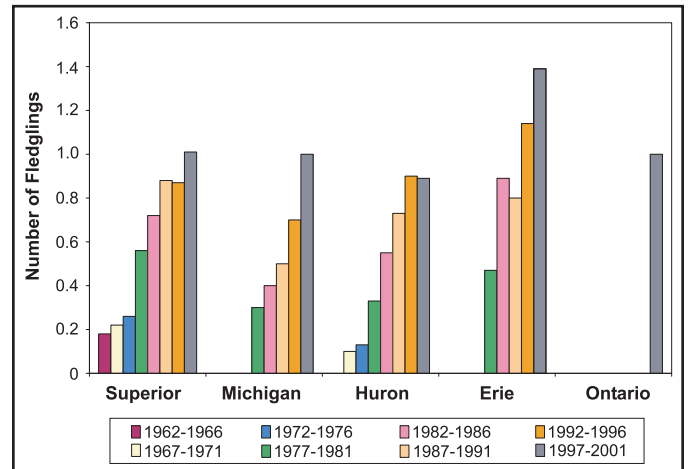


Figure 4. Average number of young fledged per occupied territory per year.

Source: David Best, U.S. Fish and Wildlife Service; Pamela Martin, Canadian Wildlife Service; and Michael Meyer, Wisconsin Department of Natural Resources

Huron, and most recently, Lake Michigan. An active territory has been reported from Lake Ontario. Established territories in most areas are now producing one or more young per territory indicating that the population is healthy and capable of growing. Eleven developmental deformities have been reported in bald eagles within the Great Lakes watershed; five of these were from territories potentially influenced by the Great Lakes.

Pressures

High levels of persistent contaminants in bald eagles continue to be a concern for two reasons. Eagles are relatively rare and contaminant effects on individuals can be important to the well-being of local populations. In addition, relatively large habitat units are necessary to support eagles and continued development pressures along the shorelines of the Great Lakes constitute a concern. The interactions of contaminant pressures and habitat limitations are unknown at present. There are still several large portions of the Great Lakes shoreline, particularly around Lake Ontario, where the bald eagle has not recovered to its pre-DDE status despite what appears to be adequate habitat in many areas.

Management Implications

The data on reproductive rates in the shoreline populations of Great Lakes bald eagles imply that widespread effects of persistent organic pollutants have decreased. However, there are still gaps in this pattern of reproductive recovery that should be explored and appropriate corrective actions taken. In addition, information on the genetic structure of these shoreline populations is still lacking. It is possible that further monitoring will reveal that these populations are being maintained from surplus production from inland sources rather than from the productivity of the shoreline birds themselves. Continued expansion of these populations into previously unoccupied areas is encouraging and might indicate several things; there is still suitably undeveloped habitat available, or bald eagles are adapting to increasing alteration of the available habitat.

Comments from the author(s)

Monitoring the health and contaminant status of Great Lakes bald eagles should continue across the Great Lakes basin. Even though the worst effects of persistent bioaccumulative pollutants seem to have passed, the bald eagle is a prominent indicator species that integrates effects that operate at a variety of levels within the ecosystem. Symbols such as the bald eagle are valuable for communicating with the public.

Many agencies continue to accomplish the work of reproductive monitoring that results in compatible data for basin-wide assessment. However, the Wisconsin Department of Natural Resources and Ohio Department of Natural Resources programs are diminished as the result of budgetary constraints, while the Michigan Department of Environmental Quality, New York State Department of Environmental Conservation and Ontario Ministry of Natural Resources programs will continue for the near future.

In the very near future, when the bald eagle is removed from the list of threatened species in the United States, existing monitoring efforts may be severely curtailed. Without the required field monitoring data, overall assessments of indicators like the bald eagle will be impossible. Part of the problem with a lessened emphasis on wildlife monitoring by governmental agencies is the failure of initiatives such as the State of the Lakes Ecosystem Conference (SOLEC) process to identify and designate programs that are essential in order to ensure that data continuity is maintained.

Two particular needs for additional data also exist. There is no basin-wide effort directed toward assessing habitat suitability of shoreline areas for bald eagles. Further, it is not known to what degree the shoreline populations depend on recruiting surplus young from healthy inland populations to maintain the current rate of expansion or whether shoreline populations are self-sustaining.

Acknowledgments

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