

Invited Abstract

## Canadian Trends in Lake Erie Colonial Waterbird Populations

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Fish-eating birds are an integral part of the Lake Erie ecosystem. In this paper, we discuss recent research findings regarding two species: the double-crested cormorant (*Phalacrocorax auritus*) and the herring gull (*Larus argentatus*). We also discuss future trends and research needs.

Populations of cormorants on Lake Erie have increased greatly during the last 30 years (Figure 1).

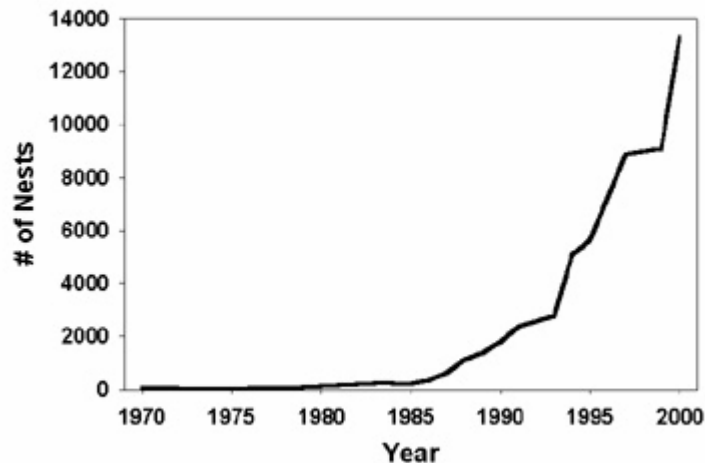


Figure 1. Temporal trends in Lake Erie double-crested cormorant populations, 1970-2000.

This increase was probably the result of a number of factors. Laws prevented human persecution of the species, reductions in the levels and effects of toxic chemicals in the Great Lakes allowed reproductive success to improve, declines in native predator fish as a result of human over-fishing and lamprey predation lead to an abundant supply of prey fish. In recent years, cormorant populations in eastern North America may have also benefited from the expansion of commercial fish farms in the southern United States.

Coinciding with the increase in cormorant populations has been the perception that cormorants are responsible for the decline in many Great Lakes fisheries. To assess the impact of cormorants on individual fish species we modified a model initially designed to estimate total fish consumption by waterbirds in the western basin of Lake Erie (Madenjian and Gabrey 1995). Using this model, the consumption by cormorants of three species of fish (walleye (*Stizostedion vitreum*), yellow perch (*Perca flavescens*), rainbow

smelt (*Osmerus mordax*) was estimated. Cormorant census information from both 1991 and 1999 were used to examine changes in predation pressure through time. To put the fish consumption estimates into context, we compared the cormorant consumption estimates to fish harvest statistics for Canadian waters of Lake Erie. In 1991, cormorants were estimated to have consumed 193,723 kg of walleye, 54,766 kg of yellow perch, and 3,809 kg of rainbow smelt. When compared with the 1991 commercial harvests of these species, cormorants consumed the following equivalent percentages: walleye 6.9%, yellow perch 2.7%, smelt 0.04%. In 1999, consumption estimates increased to 726,168 kg for walleye, 204,136 kg for perch, and 35,283 kg for smelt. Compared to the 1998 commercial harvests of walleye, yellow perch, and smelt, cormorants consumed equivalent percentages of 15.5%, 11.5%, and 0.6%, respectively. These results indicate that cormorant consumption of commercially important fish species has increased but the significance of this predation on commercial fish stocks remains to be determined.

The expanding cormorant population also poses a threat to other ecosystem components. In the western basin of Lake Erie, cormorants nest on islands that contain some of the most unique plant communities in Canada. Cormorant populations on many of these islands have increased greatly during the 1990s. Recent surveys of East Sister Island (ESI) have noted detrimental effects of cormorant guano on native vegetation. The apparent effect of cormorant nesting on the ESI plant community is cause for concern. Other islands in the western basin archipelago have similarly unique plant communities and may suffer as cormorant populations on those islands increase.

Long-term declines in the most abundant pelagic prey fish in the eastern basin of the lake, the rainbow smelt, have been documented. Given the importance of smelt to piscivorous predators in Lake Erie, smelt population trends may have important ramifications for fish-eating birds. Analysis of stable nitrogen and carbon isotopes in herring gull eggs indicate that the diet of Lake Erie herring gulls has changed through time (Figure 2).