

Backgrounder: Contaminant Burdens in Lesser and Greater Scaup

Since the mid 1980s, the continental population of Lesser and Greater Scaup (hereafter scaup) has declined substantially. Breeding and wintering ground surveys suggest that the bulk of the decline can be attributed to those populations that breed east of the Continental Divide and winter in the Atlantic and Mississippi Flyways. However, it is unknown if this decline is attributed to events on wintering, staging and/or breeding areas. Several theories for the decline have been proposed, and a number of them are presently being tested.

One cause for concern has been the substantial increase in the number of scaup staging on portions of the lower Great Lakes and the fact that these birds have switched to a diet dominated by zebra mussels. At Long Point, we have found that both Lesser and Greater scaup consistently include zebra mussels in their diets. Further, waterfowl days (an index of waterfowl use of an area) for scaup at Long Point rapidly increased from 58,000 in 1987, prior to the zebra mussel colonization of Long Point, to over 5 million in 1999.

The zebra mussel is a non-native bivalve that was introduced to Lake St. Clair in 1986, probably through the dumping of ship ballast water. In the absence of natural predators and with limited competition, zebra mussels rapidly increased in numbers and expanded their range throughout the Great Lakes. Studies have since reported densities in excess of 200,000 individuals per square metre in some portions of Lake Erie and Lake St. Clair. Meanwhile, native bivalves, which averaged 10 individuals per square metre prior to zebra mussel colonization, have been almost completely displaced by this highly competitive species. Consequently, zebra mussels now dominate the benthic community and they have substantially increased the bivalve availability to staging waterfowl.

This may be problematic, because zebra mussels are filter feeders and they accumulate sediment and contaminants [e.g. polychlorinated biphenyls (PCBs) and polynuclear aromatic hydrocarbons (PAHs)] into their tissue more readily than native bivalves. These contaminants can then be passed up the food chain to the waterfowl that consume them. For instance, when fed contaminated zebra mussels, the closely related Tufted Duck has been shown to lay fewer and smaller eggs, with reduced hatchability and increased organochlorine levels. Smaller ducklings were also produced, and adult female mortality increased. Therefore, the consumption of large quantities of zebra mussels on the lower Great Lakes may be contributing to the continental scaup decline. The number of juveniles as well as adult female Lesser Scaup have declined in the United States duck hunt, suggesting that adult female survival and/or reproductive rates have declined.

In response to this concern, the Long Point Waterfowl and Wetlands Research Fund collected scaup from hunters on lakes Ontario, Erie and St. Clair during fall 1999 and spring 2000. These birds are presently being analysed for 1) types and levels of contaminants and heavy metals within liver tissue; 2) body condition (levels of fat, protein and calcium); and 3) dietary intake. Zebra mussels themselves will also be analysed for contaminants and heavy metals. Results of this work will answer a key question pertaining to the continental decline of scaup. We also hope to make a substantial contribution to the science of waterfowl ecology through an increased understanding of the spring and fall staging ecology of scaup on the lower Great Lakes.