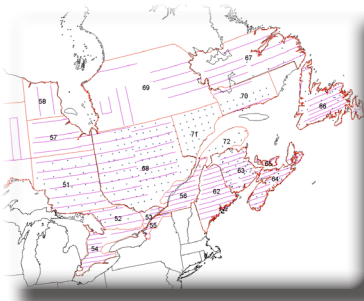
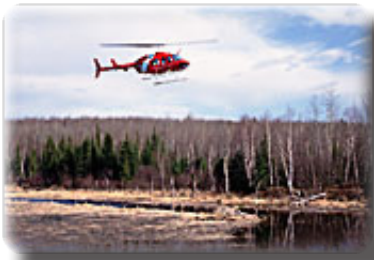


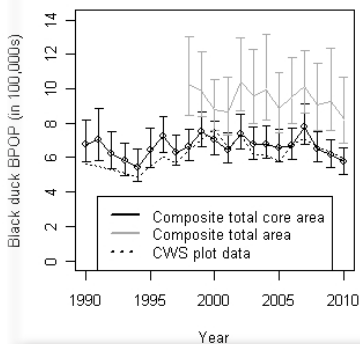
Population Change and Abundance of Black Ducks and Mallards in Eastern North America



- The Challenge:** Over the last half of the 20th century, the breeding range of American black duck (*Anas rubripes*) has contracted from central Canada and the Northeastern United States toward eastern Canada. This reduction in size of the breeding range has been reflected in a steady decline of black ducks counted during winter surveys, both the midwinter Waterfowl Survey conducted by the U. S. Fish and Wildlife Service and the Christmas Bird Count. The causes of the declines are unclear. Hunting regulations have been restricted to decrease the harvest. To improve our understanding of black duck population dynamics and of the role of harvest in population change, a variety of surveys, banding studies, and research activities have been conducted for this economically important species. Patuxent staff have been active participants in these activities, and have served on the Technical Committee and Management Board of the Black Duck Joint Venture of the North American Waterfowl Management Plan. Here, we describe Patuxent's role in assisting with development and analysis of surveys for black ducks in eastern Canada.



- The Science:** After conducting pilot surveys in eastern Canada, the U. S. Fish and Wildlife Service and the Canadian Wildlife Service initiated a range-wide survey of black ducks in 1990. Due to logistical considerations, plot-based surveys were conducted using helicopters in boreal forest regions in central Canada, while fixed-wing surveys were conducted along transects in more open country in southern Ontario and in remote regions of Northern Quebec. To permit comparisons between survey methods, overlap occurred in coverage of both survey methods in several provinces, while in areas only surveyed by fixed wing aircraft subsamples of transects were sampled by helicopters. USGS scientists collaborated with FWS biologists in developing the surveys, and have taken a leadership role in development of methods for analysis of this complicated dataset.



- The Future:** A hierarchical model was developed that estimated yearly total black duck and mallard populations, combining results from both surveys in overlap areas and controlling for differential visibility of ducks from fixed-wing surveys. Spatial models were also developed to facilitate analysis of factors influencing black duck populations. The hierarchical model is presently used to estimate population size for setting harvest regulations, and is used as the primary information source of population status for adaptive management modeling. In 2010, > 822,000 black ducks and >484,000 mallards were estimated to breed in the surveyed area.