Distribution and Habitat Requirements of Scoters in the Mackenzie Delta Region

by Shannon L. Haszard

SEVERAL YEARS AGO, Gwich'in hunters and elders began to wonder why "black ducks" (the local name for white-winged scoters *Melanitta fusca* and surf scoters *M. perspicallata*) were less common than they had been previously. Wildlife biologists across North America have voiced similar concerns. Questions raised about the status of scoters provided a great opportunity for me to study these sea duck species as part of my Master's research in Biology at the University of Saskatchewan. For instance, ecologists would like to understand why animal abundance varies in space and time and identify the mechanisms responsible for producing these patterns. Determining habitat requirements of scoters and relating these patterns to variation in reproductive success can be an important step toward understanding the causes and consequences of animal distribution and population dynamics and developing conservation initiatives.

SCOTER POPULATION DECLINE AND PROJECT ORIGIN

Combined white-winged and surf scoter populations have experienced apparent long-term declines across the continent, and those populations in the boreal forest of northern Alberta, British Columbia, and the Northwest Territories (NT) may have declined by as much as 75% in the past 50 years (CWS, 2000). Reasons for the decline are not well understood because so little previous research has been conducted on scoters, particularly in northern portions of their breeding range, and to my knowledge none has attempted to determine why scoters use specific areas or wetlands, but do not use others. This study addresses this last deficiency by examining how specific wetland characteristics affect the abundance, distribution, and productivity of white-winged and surf scoters in part of their core breeding range near Inuvik, NT. In particular, I designed my research to look for evidence of habitat selection by these species. Do female scoters select wetlands that are more productive and have a greater abundance of key food items, or are better suited to providing physical protection for ducklings? Are these types of preferred wetlands widely distributed and available for use by scoters, or are they not very abundant—perhaps limiting scoter productivity?

The most reliable evidence available indicates that production of young scoters has decreased (Krementz et al., 1997), raising concern about conditions on breeding areas. Habitat changes on breeding grounds could adversely affect key food sources that breeding females and their broods depend on, and therefore have a deleterious effect on productivity (Brown and Fredrickson, 1986). Additionally, the particular life-history traits displayed by scoters (see Haszard, 2001) may accentuate sensitivity of these species to habitat alteration and disturbance. It may be cause for concern that the Mackenzie Delta region is expected to experience significant industrial development in the near future as demand for natural gas increases.

Upland unburned habitat.

Furthermore, we have limited understanding of effects associated with the dramatic warming this region has experienced during the last 50 years. Some models predict greater forest fire frequency if warming continues (Hartley and Marshall, 1997). The last point raises questions about the effect of forest fire on wetlands in general and on scoter use of wetland habitat in particular. To address these issues, I expanded the scope of my research in 2002 to contrast patterns of wetland use by scoters in burned and unburned upland habitat.

METHODS

My study area is located about 75 km south of Inuvik, Northwest Territories, and encompasses approximately 6200 km^2 of the southern Mackenzie Delta (Delta) and surrounding upland area (see Haszard, 2001, for a description of the Delta and upland habitat). Study plots were randomly selected from each region: 16 from the Delta and 15 from the upland habitat in 2001, and 11 Delta and 18 upland plots in 2002. Overall, 13 upland plots had been burned in a 1999 forest fire. Standing dead timber is present throughout burned plots, and small, scattered patches of unburned forest remain. To assess annual

Upland burned habitat, the result of a 1999 forest fire.

Sampling an upland wetland.

variation in scoter abundance and wetland occupancy, in 2002 I revisited 10 of the 31 plots surveyed in 2001 (five in each region), as well as visiting 29 new plots. Because road access is so limited, a helicopter was used to survey 379 wetlands in or bordering the 60 unique study plots. In both years, wetlands were surveyed for pairs in mid to late June and for broods in late July or early August. Survey data were used to assign each wetland to a "use" category (separately for each species): (1) used by pairs, (2) used by broods, or (3) not used by either species. Digital data acquired from Landsat imagery and digital topographic maps were used to classify all wetlands and all plots. I revisited a sub-sample of 101 wetlands from each use category in mid-August of both years to collect data on wetland productivity, relative abundance of invertebrate prey, and types of shoreline and upland vegetation present.

PRELIMINARY AND ANTICIPATED RESULTS

To date, I have analyzed only the 2001 data, so results discussed below are preliminary. Before I can determine how specific wetland characteristics affect abundance, distribution, and productivity of scoters, I must first attempt to identify patterns in the distribution of scoter pairs and broods. In 2001, white-winged scoter pairs occupied more lakes than surf scoter pairs in both Delta and upland regions, although pairs of both species occupied upland lakes more often than Delta lakes. White-winged and surf scoter broods were observed no more often in Delta lakes than in upland lakes, and there was remarkably little overlap in the number of wetlands occupied by both pairs and broods of either species in either region. This means that pairs and broods may require different conditions. Spatial data indicate that the spatial morphology of wetlands in the Delta differs from that of upland wetlands; those in the Delta tended to be elongated, probably because many were old river channels. All of the very large wetlands surveyed were located in the upland and were used consistently by both species of scoters and their broods.

My results to date indicate where scoters are found during the breeding and brood-rearing periods of the summer. Further analyses of spatial and habitat data from both years must be conducted to contrast characteristics and occupancy of burned and unburned areas and to evaluate whether or not a habitat selection pattern exists. I hope the analyses will allow me to determine what habitat characteristics scoters require to breed successfully in this part of their range. This information, used in conjunction with that for other species, could be used to help mitigate future impacts of proposed developments. It will also provide a baseline from which causes of future changes in scoter abundance and distribution could be determined more easily.

ACKNOWLEDGEMENTS

I am grateful to the Arctic Institute of North America for awarding me the Lorraine Allison Scholarship. I received additional funding and in-kind support for this project from the Arctic Institute of North America Grants-in-Aid; the Aurora Research Institute; Ducks Unlimited Canada's Western Boreal Forest Initiative; the Canadian Wildlife Service; Environment Canada; the Gwich'in Renewable Resource Board; the Institute of Wetland and Waterfowl Research; the Natural Sciences and Engineering Research Council (grant to R. Clark); the Northern Scientific Training Program; the Polar Continental Shelf Project; and the Department of Biology, University of Saskatchewan. I thank John Edwards, Jim Hines, Keith Patton, and Dave Prescott for their sharp eyes and strong stomachs as they endured hours of circling in a helicopter to assist me with aerial surveys. The cooperation, logistical support, and camaraderie from the Ducks Unlimited "crew" working in and around Inuvik helped the project run smoothly—and also made it that much more fun! A special thank-you to Peter Clarkson and the staff at the Gwich'in Renewable Resource Board, who welcomed me back into the office and made me feel part of the gang again. Last, but certainly not least, I must thank Bob Clark, my advisor, for his continued support and encouragement, and for taking time out of his summer plans to assist me with field work in Inuvik.

Bob Clark sampling for benthic macroinvertebrates.

Shannan Haszard sampling for amphipods.

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Shannon Haszard has been awarded the Lorraine Allison Scholarship for the second year in a row. She is completing a Master's degree in Biology at the University of Saskatchewan.