WATERBIRD ABUNDANCE AND DISTRIBUTION ON YUKON DELTA NATIONAL WILDLIFE REFUGE, ALASKA

by

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Data and conclusions presented here are preliminary and are not for publication or citation without permission from the authors.

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ABSTRACT

We flew aerial surveys to estimate abundance and delineate distribution of waterbirds in early June 1989-1992 on Yukon Delta National Wildlife Refuge (YDNWR), Alaska. We estimated an average of 1,083,100 ± 95,570 ducks, 112,824 ± 34,461 geese and 40,163 ± 5,501 loons (mean ± 95% CI) were present on YDNWR, 1989-1992. Northern pintails were the most numerous ducks each year comprising 31% of the duck population and 17% of the North American continental pintail population. Coefficients of variation for population indices of abundant species were 7-15%.

We used a computerized geographic information system (GIS) to map waterbird densities. Higher densities for dabbling ducks occurred on coastal areas between the Askinuk Mountains and Nelson Island and on the deltas of the Yukon and Kuskokwim rivers, than on inland areas. Scaup, scoters and oldsquaw were densest farther inland, particularly in the region with large lakes north and south of Baird Inlet. Waterbird densities on federal versus non-federal land were calculated and displayed using the GIS. Higher densities of pintails, scaup and shovelers occurred on non-federal land than federal land. Non-federal land also had a higher density for combined duck species.

Our aerial survey design and GIS analyses provide detailed waterbird abundance and distribution information over large geographic areas. Results can be compared to those from existing North American Waterfowl Breeding Population Survey design on YDNWR to evaluate both designs and create subsequent surveys to meet specific objectives. Waterbird density maps are used for prioritizing land acquisitions, creating stratified survey designs and examining relationships between remotely sensed habitat data and waterbird distribution.

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INTRODUCTION

The importance of the Yukon-Kuskokwim Delta to breeding waterbirds has been recognized since the late 1880's. Aerial surveys flown in 1949 provided the first information on abundance and distribution of waterfowl species (Spencer et al. 1951). Subsequent studies have focused primarily on important coastal species such as spectacled eiders (Dau 1974), cackling Canada geese (Mickelson 1975), emperor geese (Eisenhauer and Kirkpatrick 1977), northern pintails (Kirchoff 1978), and white-fronted geese (Ely 1979).

An aerial waterfowl breeding population survey was initiated in 1957 and has been conducted annually on Yukon Delta National Wildlife Refuge (YDNWR) as part of the North American Waterfowl Breeding Population Survey (NAWBPS) (Conant and Groves 1992). The purpose of the NAWBPS is to provide population indices for use in developing waterfowl harvest regulations. Intensity of coverage on YDNWR by this survey is limited since it is only one of 12 strata surveyed annually by one crew in Alaska and the Yukon Territory. On YDNWR, the survey consists of 8 transects totaling 1,673 km. NAWBPS transects are approximately systematically spaced although they may under-sample important coastal habitat and consequently underestimate population size. Also, because NAWBPS data are recorded by 16 mile segments along each transect, the data provide only broad scale information on waterbird distribution.

Other aerial surveys using different designs have been flown on YDNWR. Experimental aerial surveys in selected areas of coastal habitat were conducted by Lensink (1985) in June 1968-1970 to delineate distributions of major species for stratification of ground census efforts. An intensive systematic aerial survey in the coastal zone was initiated in 1985 (Butler et al. 1988) to monitor declining geese populations. Since 1988, ducks have also been counted during this coastal zone survey.

None of these survey designs provided waterbird abundance and distribution information over the entire YDNWR and at sufficient precision and resolution for management at the refuge level. Therefore, we designed an expanded breeding population survey to provide waterbird abundance and distribution information and data to evaluate and redesign the NAWBPS on YDNWR. We used a standard survey design with systematically spaced transects following suggestions of Caughley (1977). We developed or incorporated several new techniques and technologies, including a geographic information system (GIS), to design and map survey transects, and capture, analyze and display data. Use of this system and similar survey design on Yukon Flats National Wildlife Refuge resulted in increased precision in population indices, greater resolution in density distribution maps, and calculation of population indices on federal versus non-federal land (Platte and Butler 1992).

The objectives for the expanded aerial breeding population survey on YDNWR were as follows:

1. Estimate the abundance of waterbirds.

2. Delineate the density distribution of waterbirds.

3. Determine the relative density of waterbirds on federal versus non-federal land.

4. Illustrate the management applications of aerial survey-GIS data.