

Part V

EVALUATION OF THE ARCTIC GOOSE MANAGEMENT INITIATIVE

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INTRODUCTION

The aim of the monitoring program for the Arctic geese and habitats is to provide the means for evaluating progress toward habitat protection and goose population goals. Our current model of goose-habitat interaction supposes that low harvest rates of geese lead to high adult survival which leads to population growth which in turn causes habitat degradation. We propose to monitor each of these four important components of the interaction model; i.e., harvests, adult survival, goose populations, and status of the tundra habitats. The present proposal deals primarily with white geese but monitoring of other goose species is also required. Populations of large geese breeding in the States and southern parts of the provinces are growing even faster than white geese, provide more hunting opportunity and have the potential to cause ever greater conflicts. The mix of Giant Canadas with other wintering populations requires intensive harvest management (Rusch et al 1996). Annual banding and populations estimates are crucial parts of the derivation process used to estimate harvests of the large Canadas.

HARVEST

Harvests of geese are monitored in Canada and the United States by questionnaires to hunters and analysis of tail fan collections. Reasonable estimates of white goose harvests can be obtained from these surveys, but colony-specific estimates are not feasible at this time.

Colony-specific harvest estimates could be obtained by derivation analysis (weighted band recovery methods). These require that all breeding colonies are banded and their numbers are estimated. These conditions are not currently being met on any breeding colonies.

The parameter that influences goose survival is harvest rate (HR). Harvest rate can be estimated from the direct band recovery rate (DBRR) and the presumed reporting rate ($HR1 = DBRR/RR - see H-f/\Phi$, pp 94-96) or from the quotient of harvest and fall flight estimates ($HR2 = Harvest/Fall Flight$). An increase in goose harvest rates is the primary and most important management strategy. We recommend that both HR1 and HR2 be estimated: 1) for snow geese at the metapopulation level (i.e., Western, Central and Eastern Arctic).

SURVIVAL

We believe that adult survival of snow geese is primarily a function of harvest rate, and that increase HRs will lead to reduced adult survival. Alternatively, increased harvest rates may be

compensatory rather than additive. Adaptive management requires knowledge of the harvest rate-survival relationship.

Banding

From the standpoint of demographic analysis of goose populations, sufficient geese should be banded or marked to provide precise survival estimates for young and adult geese of each colony or population. Ideally banding would be conducted annually to generate year-specific recovery and survival rates and information on distribution and derivation or harvest. Because of costs and the long-term nature of the initiative, we therefore propose that Arctic banding should be conducted and coordinated with population surveys, and that monitoring efforts should rotate among sites over a period of three years. In the eastern Arctic, for example, snow geese would be estimated and banded at McConnell River, Southhampton Island and Baffin Island on a three-year rotation. We recommend annual banding and surveys of white geese at Cape Henrietta Maria and La Perouse Bay. Banding goals would be 5,000 adults per year.

Large sample sizes would allow estimation of annual survival rates for adults at the metapopulation level (i.e., Eastern Arctic, etc.) Direct recovery rates and survival rates of young would be also estimated at the metapopulation level.

Enhanced Reporting

We believe a program to enhance the reporting rate of harvested bands is an important part of any Arctic banding program. At present, the cost of banding at a colony in the Arctic ranges between \$50,000 and \$100,000 depending on the remoteness of the location. If 1000 geese were banded at a remote colony, costs could be as high as \$100 per goose. If the average direct band recovery rate is 3%, about 15% of the bands are eventually recovered; thus each recovery would cost about \$750. Rewards of up to \$200 per band or other similar expenditures to enhance reporting are cost effective for Arctic geese.

POPULATION INDICES AND ESTIMATES

Midwinter Index

The midwinter index is the primary historic and current method of monitoring numbers of snow geese. These indices should continue because they provide valuable long-term trend data at the continental level. Midwinter indices suffer because 1) counts are imprecise due to difficulty counting large numbers and in achieving complete coverage of all areas; and 2) geese counted in winter are aggregations of birds from many colonies, populations and flyways.

Spring and Summer Surveys

We believe that numbers of geese should be estimated on the breeding areas wherever possible. We propose that numbers of snow geese in each colony be estimated once every 3 years from aerial photography or from helicopters flown on stratified transects. Due to lack of consistent funding, only a few helicopter surveys have been flown and aerial photography has been sporadic. Some eastern Arctic colonies have not been surveyed since 1978. Surveys conducted with banding are an option to consider for remote colonies. August helicopter transects can provide estimates of breeding geese, nonbreeding geese, proportion with young and young per successful adult. Stratified transects flown from helicopters also provide opportunities for banding random samples. Coordination of August surveys and banding would eliminate one or two additional expeditions to remote Arctic colonies.

COASTAL TUNDRA HABITAT

Protection of coastal tundra habitats is the ultimate goal of the proposed goose management strategy, and some habitat monitoring is essential. We propose that the permanent plots established around James and Hudson Bays be expanded throughout the Arctic in coastal tundra habitats. These plots should be monitored on an annual schedule to detect vegetation trends, to elucidate goose vegetation-weather-climate relationships and to provide ground-truth data to permit development and maintenance of habitat signatures for interpretation of satellite imagery.

Satellite imagery of about 20% of all coastal tundra should be obtained and analyzed every year; thus each area would be "revisited" every five years.

EVALUATION

Progress toward program goals should be evaluated annually. The annual evaluation report should describe objectives, strategies and activities and provide preliminary description of progress toward goals. A comprehensive analysis of harvest rates, survival rates, population trends and habitat condition should be conducted every five years.

The five year evaluation should provide detailed quantitative analyses of harvest, survival, population and habitats; and the interactions among these estimates and other environmental variables.

LITERATURE CITED

Rusch, D., F. D. Caswell, M. M. Gillespie and J. O. Leafloor. 1966. Research contributions to management of Canada geese in the Mississippi Flyway. Pp. 161-173 in Transactions of the 61st North American Wildlife and Natural Resources Conference.