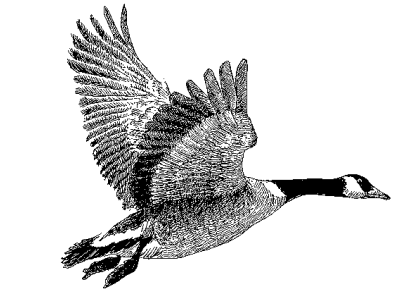
A BREEDING PAIR SURVEY OF CANADA GEESE IN NORTHERN QUÉBEC - 2016



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During the 1960's, aerial surveys identified the Ungava Peninsula in northern Québec as the primary nesting area for Atlantic flyway Canada geese (Kaczynski and Chamberlain 1968). Malecki and Trost (1990) used a more quantitative approach to estimate the number of breeding pairs throughout the boreal forest and Ungava Peninsula. Their findings confirmed that the highest densities were located along the coastal areas of Ungava Bay and Hudson Bay. In 1993, an annual survey was initiated in northern Québec using methods developed by Malecki and Trost (1990) (Bordage and Plante 1993). The objective of this survey is to monitor the status of the Atlantic population by estimating the number of breeding pairs. This report presents the results of the 2016 breeding ground survey.

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SURVEY METHODS

The survey followed the methodology of Malecki and Trost (1990). Aerial transects were flown in a Quest Kodiak on wheels at 30-45 m above ground level and a ground speed of 140 km/h. The survey is timed to cover the mid to late incubation period. Except for 2013 when no survey was flown, the survey has been conducted annually since 1993.

Observers recorded the number of geese observed as singles, pairs, or in groups (3 or more geese) within 200 m of each side of the plane. We occasionally observed multiple pairs of geese in close association (< 10-15 m apart). We classified these geese as grouped birds, since they were unlikely to be associated with a territory. Observers also recorded similar information for other waterfowl species. Coordinates for each location were generated using a global positioning system (GPS) and stored on a lap-top computer. Transect width was calibrated before the survey began.

The number of indicated pairs on a given transect was the sum of the singles and pairs observed by both observers. The total number of geese was the sum of grouped geese plus indicated pairs (x2). The density of breeding pairs and total population density was estimated using a stratified quotient estimator; variance was calculated using the jack-knife procedure (Cochran 1977). Difference in population size between years was

assessed with a z-test, using the sum of the sampling variances for the 2 years being compared. We considered differences to be significant at the 0.10 level. The estimates presented in this report are not adjusted for visibility bias and thus represent an index to the population.

SURVEY STRATIFICATION

The survey area (north of 51º latitude and west of 67º longitude) was originally stratified based on Malecki and Trost's (1990) modification of northern Québec's ecoregions (Gilbert et al. 1985). In 2012, we modified survey strata to better capture differences in goose density by 1) adding a 20-mile buffer to the Hudson Bay coastal zone, 2) adding a 10-mile buffer to the Ungava Bay coastal zone, 3) shifting the portion of the Hudson Bay coastal zone south of Inukjuak and the portion of the Ungava Bay coastal zone northwest of Kangirsuk into the interior stratum, and 4) combining the interior tundra and taiga into a single stratum. This change created 3 strata: 1) Ungava Bay coast, 2) Hudson Bay coast, and 3) interior (Figure 1).

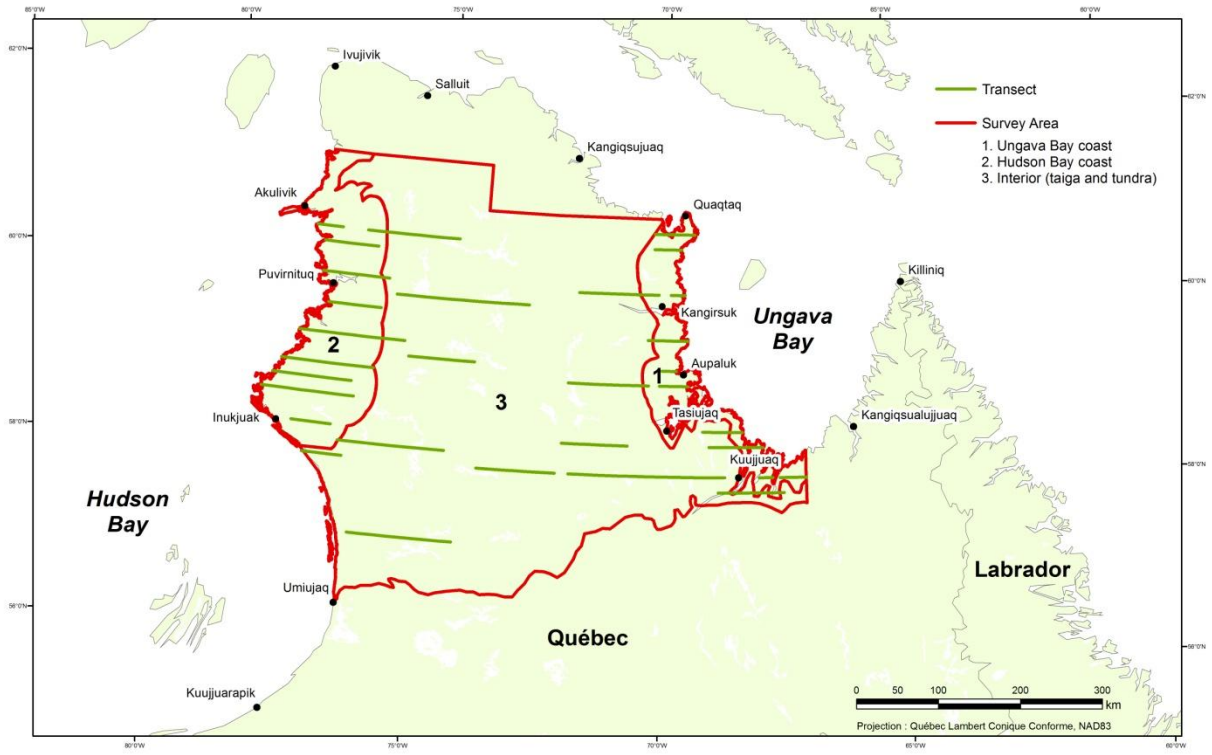


Figure 1. Location of survey strata and aerial transects in northern Quebec.

RESULTS AND DISCUSSION

Habitat Conditions

Transects were surveyed June 11-15. The spring thaw was much less advanced than average. Most lakes and ponds were frozen throughout the survey area and snow covered most ground in the interior (Figure 2) . Small ponds and the margins of larger ponds had melted, especially in coastal areas. The long-term average date of nest initiation is May 28 on the Hudson Bay coast and May 24 on the Ungava coast (Cotter et al. 2013). Snow cover maps from the last week of May, 2016 (Figure 3) suggest poor nesting conditions. Snow cover in 2016 was similar to 2015 (Figure 3), when production was below average.

Figure 2. Photo taken June 14 along Hudson Bay coast between Puvirnituq and Inukjuak (photo by Steve Earsom).

Breeding Pair and Total Population Estimates

The estimated number of breeding pairs on the Ungava Peninsula in 2016 (191,526 pairs; SE = 24,898) was similar to the 2015 estimate of 161,302 pairs (SE = 16,040) (P = 0.308) (Figure 4). The total population estimate

((indicated pairs x 2) + non-breeders) in 2016 (663,494 individuals; SE =80,114) was less than the 2015 estimate of 864,357 individuals (SE = 89,343) (P = 0.095) (Figure 4). The total population estimate includes breeding pairs, non-breeders (i.e., those not of breeding age), failed breeders, and molt migrants from other areas and should therefore be interpreted cautiously. The sharp decline in the total population since 2010 (Figure 4) can likely be attributed in part to earlier survey dates and fewer molt migrants being counted.

Comparison of Survey Strata

From 1993-2000, the estimated density of breeding pairs was similar in the Hudson and Ungava Bay coastal zones (Figure 5). Since 2000, the pair density along Hudson Bay has increased dramatically while the density along Ungava Bay has remained largely stable (Figure 5). Pair density in the interior has remained low and relatively stable. At current densities, the distribution of total breeding pairs within the survey area is 69% on the Hudson Bay coast, 8% on the Ungava Bay coast, and 22% in the interior.

Composition of Indicated Pairs

The number of indicated pairs includes birds recorded as pairs and singles. Single birds are likely to be males associated with an incubating female while pairs include some nesting birds as well as subadult or failed breeders. Therefore, the proportion of indicated pairs observed as singles may provide a more reliable indicator of the proportion of indicated pairs that are actually nesting (see Humburg et al. 1998). The percentage of indicated pairs observed as singles on the Ungava Peninsula was 57% in 2016, above-average for the 22-year history of the survey (mean = 51%, range = 34-63%). However, a model using May temperatures and June snowfall to forecast recruitment predicts slightly below average production (J. Stiller, NY DEC). Our visual assessment of habitat conditions also suggests below-average conditions.

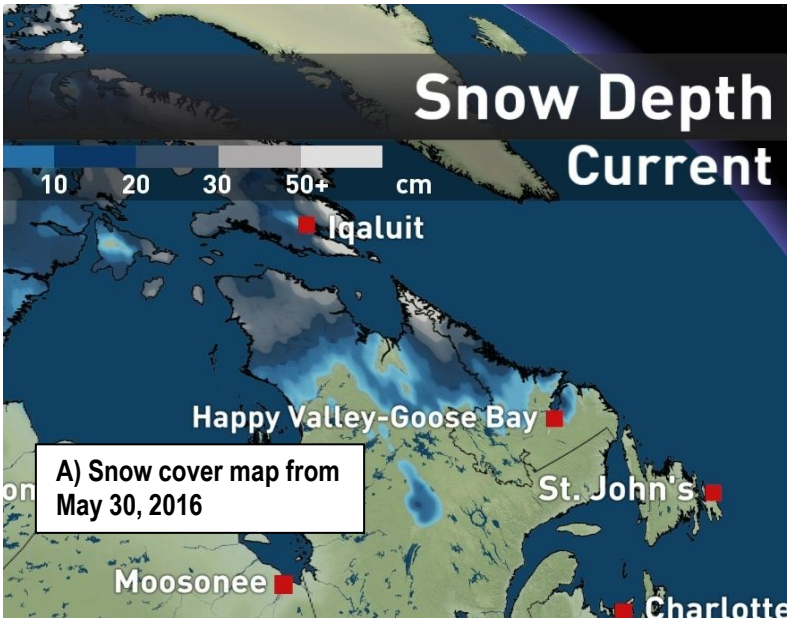
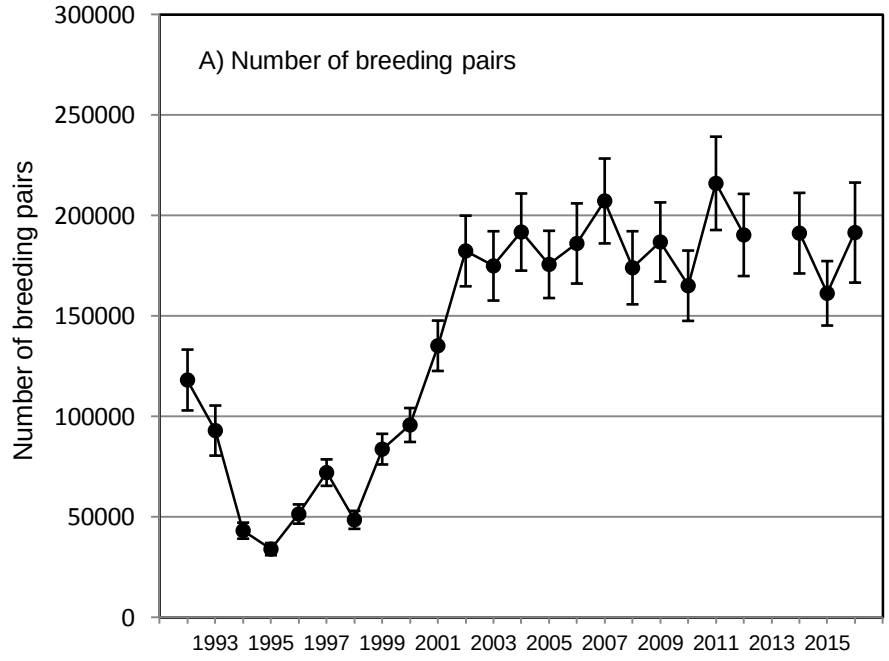


Figure 3. Snow depth maps for northern Quebec from the last week of May in 2016 (A) and 2015 (B).



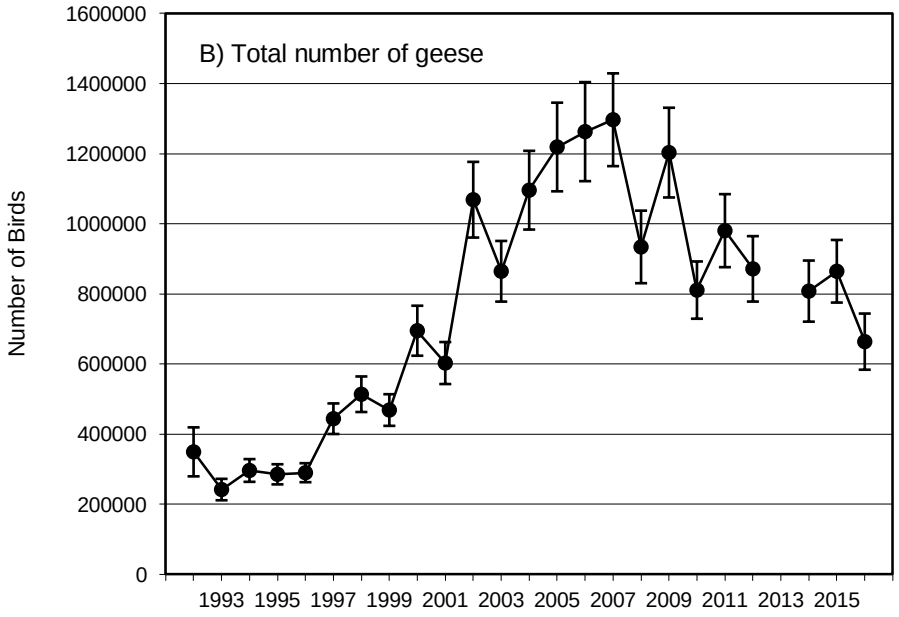


Figure 4. Estimated number (± 1 SE) of Canada goose breeding pairs (A) and total geese (B) on the Ungava Peninsula (No survey was flown in 2013).

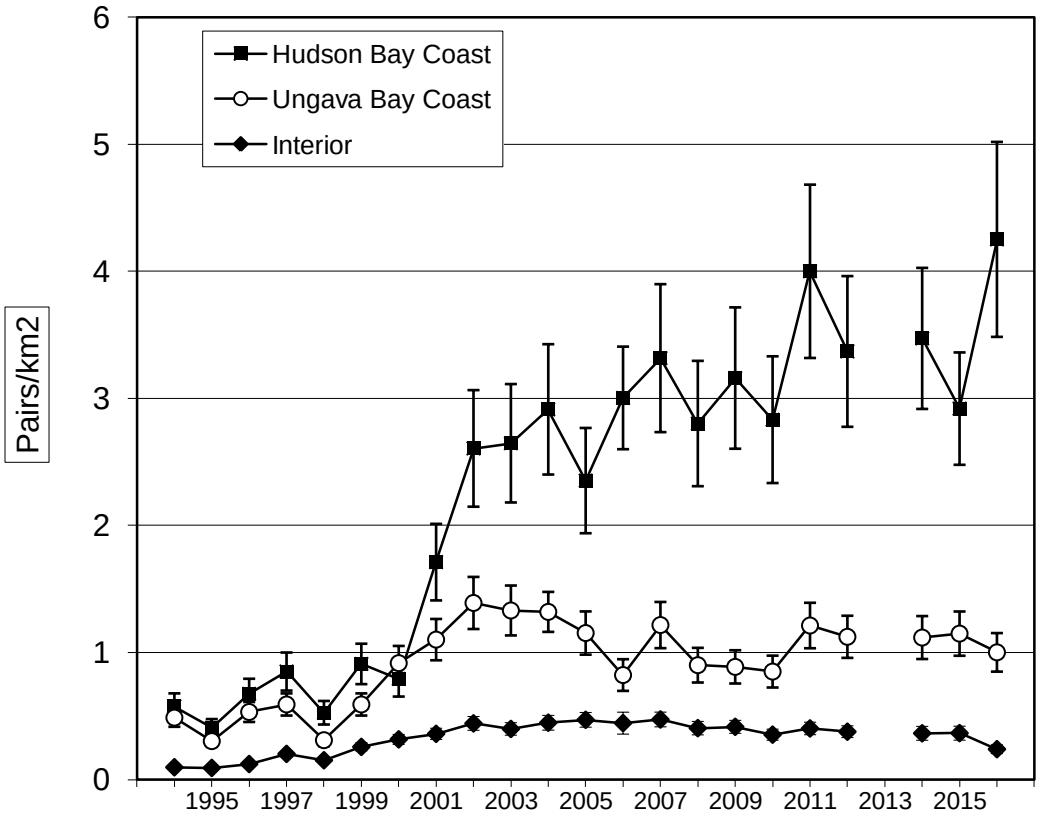


Figure 5. Average density (± 1 SE) of breeding Canada goose pairs for the Hudson Bay coast, Ungava Bay coast, and interior.

LITERATURE CITED

Bordage, D., and N. Plante. 1993. A breeding ground survey of Canada geese in northern Québec-1993. Can. Wildl. Serv., Québec Region. 17pp.

Cochran, W. G. 1977. Sampling techniques, 3rd ed. John Wiley and Sons, Inc. New York. 428pp.

Cotter, R.C., R. J. Hughes, P. May, P. Novalinga, J. Johannes, L. J. Hindman, and P. I. Padding. 2013. Breeding biology of Atlantic population Canada geese in Nunavik, Northern Quebec. Arctic 66(3):301-311.

Gilbert, G., R. G. Helie, and J. M. Mondoux. 1985. Ecosystem sensitivity to acid precipitation for Québec. part a. ecoregions and ecodistricts of Québec. Environment Canada. Ecological Land Classification Series No. 20. 87pp.

Humburg, D. D., F. D. Caswell, D. H. Rusch, and M. M. Gillespie. 1998. Breeding ground surveys for the Eastern

Prairie Population of Canada geese. Pages 9-20 in D. H. Rusch, M. D. Samuel, D. D. Humburg, and B. D. Sullivan, eds. Biology and management of Canada geese. Proceedings of the international Canada goose symposium, Milwaukee, Wisconsin.

Kaczynski, C. F., and E. B. Chamberlain. 1968. Aerial surveys of Canada geese and black ducks in eastern Canada. U. S. Fish and Wildl. Serv. Spec. Sci. Rep., Wildl. 118. 29pp.

Malecki, R. E., and R. A. Trost. 1990. A breeding ground survey of Atlantic flyway Canada geese in northern Québec. Can. Field Nat. 104:575-578