

**Reproductive success and breeding ground banding of Atlantic Population
Canada Geese in northern Québec – 2007**



Atlantic Population Canada Geese awaiting 'capture' and banding in Nunavik, northern Québec. 2007 was one of the poorest years in terms of nesting effort and production. In addition to monitoring recruitment, 4227 AP geese were captured and banded this year.

**A Progress Report Presented to the
Atlantic Flyway Council & Migratory Bird Technical Section**

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SUMMARY

From 13 to 15 June 2007, a nest survey was conducted at 5 sites located along the coastal lowlands of southwestern Ungava Bay. On the Ungava Peninsula in 2007 snow melt was very late (Aliva Tulugak, Puvirnituk, and Jimmy Johannes, Kuujjuaq, pers. comm.), and at the time of the nest survey most nests were in early incubation. The mean nest initiation date (average of all 5 sites) in 2007 was 12 June, which is 3 weeks later than last year and 15 days later than the long-term average for the Ungava Bay region. The total number of nests found and the mean clutch size for all 5 sites were 64 and 3.20, respectively. Clutch size in 2007 was considerably lower than the long-term yearly average of 3.89. Nesting success of Canada Geese along Ungava Bay was very low in 2007, with only 22% of all nests initiated hatching. Between 31 July and 14 August, three crews captured and banded a total of 4227 Canada Geese along the coastal lowlands of Hudson Bay and Ungava Bay. The ratio of goslings to adult females with brood patches (I:BP) per catch, a good productivity index, was the lowest since 2000 for both Hudson Bay (2.75:1 in 2007) and Ungava Bay (2.83:1 in 2007) regions. Combining both regions, the overall Immature:Adult ratio in 2007 was also the lowest since 2000, 1.21:1 in 2007 vs 1.05:1 in 2000.

INTRODUCTION

The recruitment study of Atlantic Population Canada Geese (*Branta canadensis interior*) breeding in Nunavik, northern Québec, was initiated in 1996 to measure reproductive effort and success. The study has focused on two areas of tundra habitat known to harbour the majority of the breeding population (Malecki and Trost 1990, Harvey and Rodrigue 2007): one along the northern coast of Hudson Bay between the Inuit communities of Inukjuak and Akulivik (1996-2005) and the other along Ungava Bay between Kangiqsualujjuaq and Kangirsuk (1996-ongoing). Bases of operation for work at Hudson Bay sites was Puvirnituk and while for Ungava Bay sites work is carried out from Kuujjuaq. Each year, several sites with concentrations of nesting geese are visited: once in June to locate and mark a sample of nests and again in late July-early August to check on their fate and calculate nesting success.

In addition to the study of reproductive success begun in 1996, a program of breeding ground banding was initiated in 1997. Large numbers of Canada Geese have been banded in the Ungava region of northern Québec in the past: 13,069 in the 1960's and 5,662 in the late 1980's. However, only about 200 of those banded in the 1980's were banded in the Hudson Bay coastal zone which harbours over 40% of the entire Ungava breeding population (Harvey and Rodrigue 2007). Thus, there have not been large numbers of geese banded in the principal breeding area in over thirty years. The present program of breeding ground banding includes both the Hudson Bay and Ungava Bay portions of the breeding range. The main objective of the banding program is to create a marked population of geese from representative portions of the breeding range for studies of adult and juvenile survival, harvest rate, timing and distribution of harvest and population delineation.

WORK CONDUCTED IN 2007

Every year since 1996 a crew of biologists and wildlife technicians visit in early to mid-June several sites, most smaller than 1 km² in size, along Hudson Bay and Ungava Bay with the objective of locating all Canada Goose nests within each site. As of 2006, due to fiscal constraints, only sites along Ungava Bay are visited each year. For each nest found, the status (active, depredated, abandoned), stage (laying, incubating), and clutch size are recorded. In 2007, five sites along Ungava Bay were visited between 13 and 15 June. These sites, from north to south, were Tryon, Aupaluk, Qikirtajuaq Island, Dry Bay, and Big Island. These are 5 of the 6 sites visited in 2006; the sixth site, Ragged Point, was flown over in a helicopter but there were no geese sighted thus it was decided not to survey the site. All sites were revisited after hatch during the banding operations in early August. At this second visit each active nest that was found during the June visit was checked to determine if it hatched successfully or not.

We banded brood flocks of Canada Geese along the northern Hudson Bay coast (2 crews) and along the south and west coasts of Ungava Bay (1 crew) between 31 July and 14 August. Helicopters (two Bell 206L Long Rangers in H. Bay and an ASTAR 350D in U. Bay) were used to round up and help drive flightless geese toward funnel-shaped traps. When conditions were favourable, each crew conducted 4-5 catches per day.

RESULTS

BREEDING PHENOLOGY

For the 5 recruitment study sites, I used an egg density index [$DI = mass/(length \times width^2)$] to determine the number of days of incubation (Hughes et al. 2000). The mean nest initiation date was 12 June, which is 3 weeks later than last year (21 May) and 15 days later than the long-term average (1997-2007) for Ungava Bay (Table 1). Among the five sites, mean nest initiation ranged from 9 to 13 June (Table 2).

NESTING EFFORT AND SUCCESS

Along Ungava Bay, 64 nests were found at the 5 sites visited in June. Nest density in 2007 was the same as the the long-term average for Ungava Bay, 32 nests/km² (Table 1). The mean apparent nest success of these sites, which includes nests that had already failed before the June visit, was only 22%. This is the third lowest annual success rate since the study began in 1996. Nesting success of the individual sites ranged from 50% and 41% at the two northernmost sites, Tryon and Aupaluk respectively, to 0% (complete nesting failure) at the southernmost two sites of Dry Bay and Big Island (Table 2). Mean clutch size in 2007 was 3.20, over an egg smaller than in 2005 (4.34) and considerably smaller than the 1997-2007 average of 3.89 (Table 1, Figure 1).

Table 1. Productivity data for AP Canada Geese in the Ungava Bay region, 1997-2007.

| | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | Average |
|-----------------------------------|------|------|------|------|------|------|------|------|------|------|-------------|---------|
| No. Nests | 28 | 61 | 113 | 80 | 181 | 185 | 225 | 59 | 116 | 126 | 64 | 113 |
| Nest Density (n/km ²) | 14.2 | 21.2 | 67.1 | 38.4 | 40.7 | 19.4 | 16.7 | 24.5 | 43.3 | 34.1 | 32.4 | 32.0 |
| Mean Nest Initiation Date | 25 | 24 | 25 | 2 | 20 | 11 | 18 | 8 | 24 | 21 | 12 | 29 |
| | May | May | May | June | May | June | May | June | May | May | June | May |
| Mean Clutch Size | 4.36 | 4.22 | 4.07 | 3.73 | 4.13 | 3.43 | 4.31 | 3.04 | 4.34 | 3.99 | 3.20 | 3.89 |
| % Nest Success | 65 | 82 | 64 | 42 | 51 | 29 | 59 | 21 | 52 | 47 | 22 | 49 |

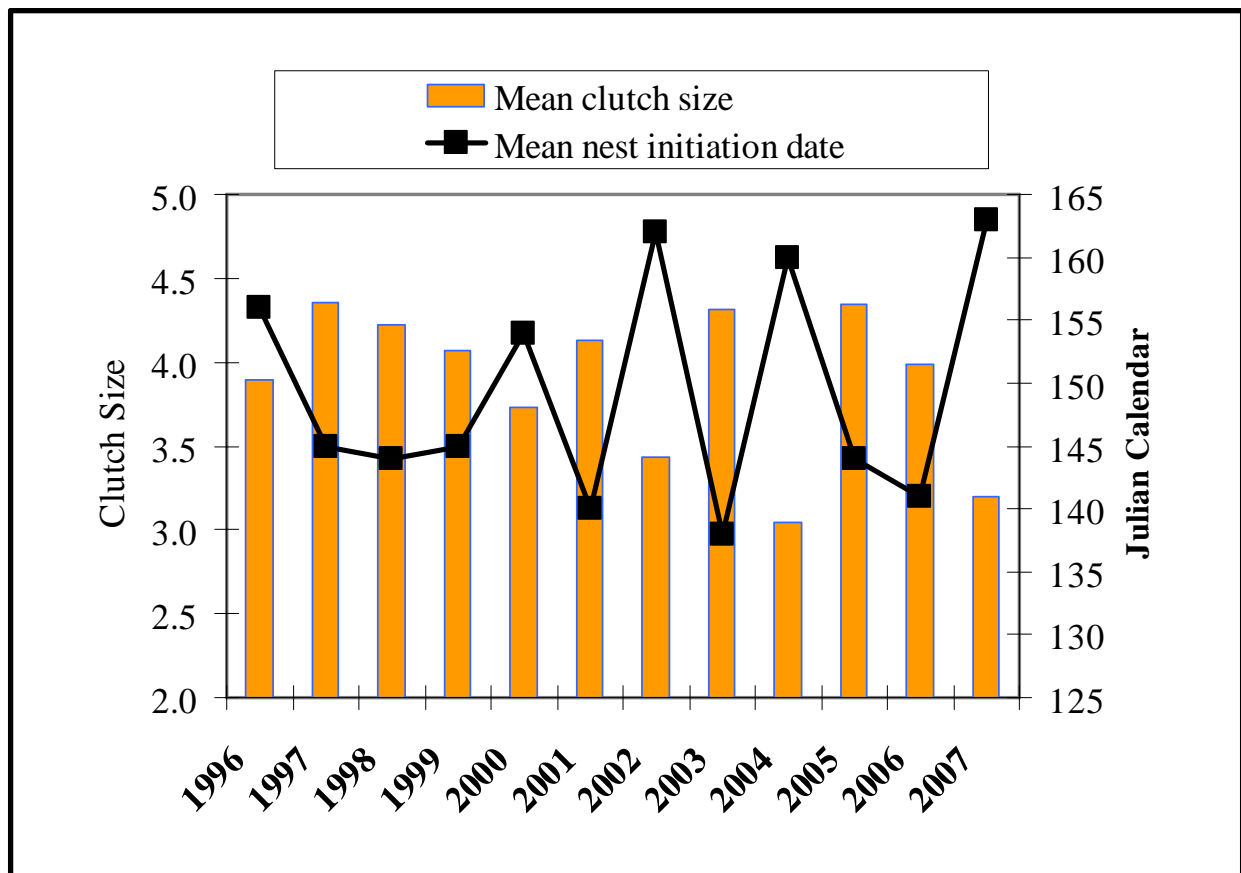


Figure 1. Annual mean nest initiation date and clutch size of AP Canada Geese in the Ungava Bay region. (Note: in the Julian calendar day 152 = June 1 in non-leap years)

Table 2. Productivity data for AP Canada Geese at recruitment study sites in the Ungava Bay region in 2007.

| Site | Number of nests | Area searched (km ²) | Nest density (no./km ²) | Mean clutch size | Mean Nest Initiation Date | Mean Hatch Date | Apparent Nest success (%) |
|------------------------|-----------------|----------------------------------|-------------------------------------|------------------|---------------------------|-----------------|---------------------------|
| (north → south) | | | | | | | |
| Tyron | 16 | 0.58 | 27.8 | 3.36 | 11 June | 11 July | 50 |
| Aupaluk | 22 | 0.94 | 23.3 | 3.05 | 13 June | 12 July | 41 |
| Qikirtajuaq Island | 14 | 0.74 | 19.0 | 3.57 | 12 June | 11 July | 21 |
| Dry Bay | 5 | 0.06 | 82.1 | 3.00 | 13 June | 12 July | 0 |
| Big Island | 7 | 0.71 | 9.9 | 3.00 | 9 June | 8 July | 0 |
| Average: | 64 | 3.02 | 32.4 | 3.20 | 12 June | 11 July | 22 |

Table 3. Long-term and 2007 productivity data for AP Canada Geese at recruitment study sites in the Ungava Bay region.

| Site (north → south) | Clutch Size | | Nest Initiation Date | | Apparent Nest Success (%) | |
|--------------------------------|-------------|-------------------|----------------------|-------------------|---------------------------|-------------------|
| | 2007 | Long-term Average | 2007 | Long-term Average | 2007 | Long-term Average |
| Tryon | 3.36 | 3.63 | 11 June | 1 June | 50 | 52 |
| Aupaluk | 3.05 | 3.98 | 13 June | 26 May | 41 | 63 |
| Qikirtajuaq Island | 3.57 | 3.92 | 12 June | 29 May | 21 | 48 |
| Dry Bay | 3.00 | 3.86 | 13 June | 30 May | 0 | 43 |
| Big Island | 3.00 | 3.88 | 9 June | 29 May | 0 | 38 |
| Average: | 3.20 | 3.89 | 12 June | 29 May | 22 | 49 |

BANDING

In 2007 three crews captured and banded a total of 4227 Canada Geese, 10 adult Cackling Geese, and 28 Lesser Snow Geese on the Ungava Peninsula in northern Québec. This brings the total number of AP geese banded since the current program in northern Québec started in 1997 to 69,263 birds (Table 4). It should be noted that based on skull measurements 11 Canadas could be considered “giant/resident”.

Hudson Bay

Between 6 and 14 August 2,259 Canada Geese were banded along the Hudson Bay coast (Table 4). Of this total, 1,043 were adults; the pre-season objective of a minimum of 2,000 adults was, therefore, not met. From 1998 to 2006, the total number of birds banded by two crews along Hudson Bay varied between 2,619 (2000) and 5,948 (2001). In addition to these adults captured and banded in 2007, there were 82 recaptures, of which all were originally banded between 1997 and 2006 in northern Québec. A total of 82 catches were made by the two banding crews with an average, including recaptures, of 29 geese (range: 9-62) per catch (Table 4). All catches contained goslings. Skull measurements were taken on a sample of adults and on most recaptures; for the latter group culmen and 9th primary measurements were also made.

All catches were made in an area extending approximately 185 km along the Hudson Bay coast and extending 35 km inland. Specifically, banding sites extended from the Sorehead River (situated 30 km south of Akulivik) in the north to just south of the Mariet River (75 km north of Inukjuak) in the south.

Weather conditions were generally good over the banding period, and temperatures were cool (maximum 12-18 °C) most days. There were no days when we were unable to band due to inclement weather.

Table 4. Atlantic Population Canada Geese banded in northern Québec, 1997-2007.

| | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | Total |
|------------------------|----------------|----------------|----------------|----------------|-----------------|-------------------|----------------|----------------|----------------|-----------------|-----------------|-------------------|
| HUDSON BAY | | | | | | | | | | | | |
| Young | 793 | 2461 | 3314 | 1334 | 4103 | 2547 | 3736 | 1662 | 2022 | 3296 | 1216 | 26484 |
| Adults | 355 | 1360 | 2018 | 1285 | 1845 | 2011 | 2092 | 1226 | 1209 | 1675 | 1043 | 16119 |
| <i>Subtotal</i> | 1148 | 3821 | 5332 | 2619 | 5948 | 4560 ¹ | 5828 | 2888 | 3231 | 4971 | 2259 | 42605 |
| Imm:Adult ² | 1.94 | 1.72 | 1.45 | 1.00 | 1.89 | 1.21 | 1.71 | 1.23 | 1.34 | 1.65 | 1.14 | 1.48 |
| No. recaptures | 6 | 69 | 146 | 90 | 232 | 141 | 283 | 139 | 76 | 124 | 82 | 1382 |
| Banding Dates | 28/07 -9/08 | 29/07 -8/08 | 30/07 -9/08 | 5/08 -15/08 | 1/08 -11/08 | 7/08 -18/08 | 2/08 -11/08 | 6/08 -15/08 | 1/08 -11/08 | 31/07 -13/08 | 6/08 -14/08 | 28/07 -18/08 |
| No. of catches | 32 | 63 | 133 | 80 | 83 | 110 | 88 | 68 | 91 | 96 | 82 | 926 |
| Mean no. geese/catch | 36 | 62 | 41 | 34 | 74 | 43 | 69 | 45 | 36 | 53 | 29 | 48 |
| UNGAVA BAY | | | | | | | | | | | | |
| Young | 1081 | 1332 | 1200 | 896 | 1568 | 1541 | 2713 | 766 | 1888 | 1377 | 918 | 15280 |
| Adults | 917 | 675 | 1039 | 1032 | 943 | 1103 | 1451 | 928 | 1006 | 1234 | 1050 | 11378 |
| <i>Subtotal</i> | 1998 | 2007 | 2239 | 1928 | 2511 | 2644 | 4164 | 1694 | 2894 | 2611 | 1968 | 26658 |
| Imm:Adult | 1.17 | 1.67 | 1.15 | 1.16 | 1.88 | 1.40 | 1.77 | 1.08 | 1.94 | 1.40 | 1.46 | 1.46 |
| No. recaptures | 44 | 84 | 185 | 67 | 35 | 61 | 182 | 98 | 90 | 96 | 101 | 1043 |
| Banding Dates | 30/07 -5/08 | 26/07 -3/08 | 27/07 -5/08 | 28/07 -5/08 | 31/07 -10/08 | 30/07 -8/08 | 29/07 -8/08 | 29/07 -8/08 | 1/08 -11/08 | 27/08 -5/08 | 31/07 -10/08 | 26/07 -11/08 |
| No. of catches | 22 | 23 | 28 | 37 | 43 | 37 | 49 | 31 | 34 | 37 | 27 | 368 |
| Mean no. geese/catch | 93 | 91 | 87 | 54 | 59 | 73 | 89 | 58 | 88 | 73 | 77 | 75 |
| TOTAL BANDED: | | | | | | | | | | | | |
| Young | 1874 | 3793 | 4514 | 2230 | 5671 | 4088 | 6449 | 2428 | 3910 | 4673 | 2134 | 41764 |
| Adults | 1272 | 2035 | 3057 | 2317 | 2788 | 3114 | 3543 | 2154 | 2215 | 2909 | 2093 | 27497 |
| TOTAL | 3146 | 5828 | 7571 | 4547 | 8459 | 7204 ¹ | 9992 | 4582 | 6125 | 7582 | 4227 | 69263 |
| Imm:Adult | 1.53 | 1.71 | 1.40 | 1.05 | 1.89 | 1.26 | 1.73 | 1.19 | 1.58 | 1.58 | 1.21 | 1.47 ⁴ |
| ± SE | ± 0.13 | ± 0.08 | ± 0.04 | ± 0.05 | ± 0.09 | ± 0.04 | ± 0.07 | ± 0.05 | ± 0.08 | ± 0.06 | ± 0.06 | ± 0.08 |
| Imm:BP ³ | 3.28 | 3.96 | 3.44 | 2.69 | 3.44 | 3.02 | 3.81 | 3.86 | 3.57 | 3.74 | 2.77 | 3.42 ⁴ |
| ± SE | ± 0.28 | ± 0.21 | ± 0.17 | ± 0.22 | ± 0.22 | ± 0.13 | ± 0.17 | ± 0.32 | ± 0.19 | ± 0.17 | ± 0.12 | ± 0.13 |

¹ Includes 2 whose age were not recorded; ² Immature (gosling) to adult ratio; ³ Immature (gosling) to adult female with brood patch ratio; ⁴ Total is average across years (n=11 years).

Ungava Bay

Between 31 July and 10 August 1,968 Canada Geese were banded in the Ungava Bay region of northern Quebec, of which 918 were goslings and 1,050 were adults (Table 4). Each year the pre-season banding objectives are 1,000 individuals for each age cohort. This year marked the third lowest number of banded birds from the Ungava Bay region. Total bandings have ranged from 1,694 (2004) to 4,164 (2003) birds. An additional 101 previously banded adults were captured, of which all but three were originally banded between 1997 and 2006 in northern Québec. The exceptions were all females: one was originally banded as a juvenile near Groveton, VT, in 2006; another was banded as an adult again near Groveton, VT, but in 2005; and the third was originally banded as a juvenile near Kuujjuaq in 1989 (it would therefore have been 18 years old at time of capture in 2007). A total of 27 captures were made for a mean of 77 geese (new and recaptures) trapped per catch (range: 24-188 geese) (Table 4). Skull measurements were taken on a sample of adults and recaptures; for the latter group culmen and 9th primary measurements were also made. All captured flocks contained goslings and few non-breeding geese were captured.

All work was done by helicopter out of Kuujjuaq. The distribution of the banded sample spanned 370 km of tundra and boreal forest within 50 km of the western and southern coastline of Ungava Bay. All bandings were done between Lake Moraine, 250 km north of Kuujjuaq to Tuttutuq River, 110 km east of Kuujjuaq. We lost a significant amount of helicopter time due to inclement weather, more than any year since the banding program began (in 1997). We lost three entire days and three partial days due to rain.

We expected significant difficulty in finding brood flocks for banding given the late spring and reported low nest densities. Perhaps counter intuitively, productivity in the Ungava Bay region was better in the north and worse in the south. Based on observations during banding, gosling production seemed at least fair (albeit, late) north of Leaf River, and a near bust in most areas south of Leaf River. This concurred with observations from Rodrigue and Harvey who observed more favorable nesting conditions in northern Ungava Bay transects during the June pair survey. In total, 85% of the banded birds were marked north of Leaf River. Although recruitment was not good in 2007, it was much better than during 2004. Areas east of Kuujjuaq were very poor with

the exception of Mucalic River where we made a good capture. We observed only one brood flock of less than 10 geese on Big Island. In addition, we were surprised at the lack of subadults molting on Big Island.

Plumage characteristics of captured goslings suggested that most hatched during early to mid-July, about three weeks later than average. 21% of goslings were younger than about 12 days and were released without bands ($n=241$); this impacted considerably on banding accomplishments. In addition, brood flocks were not well aggregated due to the lower mobility of younger goslings. Given the predicted late hatch dates, we attempted to delay the helicopter contract about one week but were unable due to other commitments of the helicopter contractor.

PRODUCTIVITY

I examined the Immature:Adult (I:A) ratio in the flocks we captured to evaluate productivity. In several cases, a few birds in a flock escaped capture. When the number of escaped adults and goslings were known, they were included in the totals for the catch; otherwise, these flocks were excluded from the analysis. Flocks containing no goslings (captures and escapees; there were none in 2007) were also excluded. The mean I:A ratio at the time of banding was 1.14:1 for Hudson Bay flocks ($n=82$) and 1.46:1 for Ungava Bay flocks ($n=22$) (Table 4). The mean I:A ratio was not significantly different in Hudson Bay versus Ungava Bay flocks (t-test, $P=0.10$). Although only flocks with goslings were captured, a number of non-breeding adult geese were included in most flocks. In order to correct for this potential source of bias, we differentiated between breeding and non-breeding females by the presence or absence of a brood patch (BP). By comparing the number of young to the number of BP-females (I:BP), we were able to obtain a relatively un-biased estimate of productivity at the time of banding. However to do this, all of the adult females in a flock had to be examined. Thus, flocks in which any number of adult geese escaped capture (except those able to fly which were assumed to be sub-adults or moult-migrants) were excluded. The mean I:BP ratio at Hudson Bay was 2.75:1 ($n=80$ flocks) and at Ungava Bay, 2.83:1 ($n=25$); the ratio was not significantly different between the two locations (t-test, $P=0.75$).

Band Returns

Since 1997, 69,263 adult and juvenile Canada Geese have been captured and banded on the Ungava Peninsula breeding grounds in northern Québec. Of these 7,861 geese (Table 5), or 11.3%, have been shot and reported by hunters. Regular hunting seasons were closed in 1995 in known migration corridors and wintering areas of migrant AP Canada Geese. From 1997 to 1999, some geese were harvested during early (September) Resident goose seasons or during regular and late seasons in areas not thought to be frequented by wintering migrant geese. A small number of banded birds were also shot and reported by Aboriginal subsistence hunters in northern Canada. Limited regular hunting seasons were re-instated in most Atlantic Flyway jurisdictions in 1999-2000 and in all jurisdictions in 2001-2002. Recoveries of hunter-shot birds (Table 5) have steadily increased as regular seasons have been re-instated and hunting regulations have been liberalised. Nonetheless, direct recovery rates (Table 6) were still relatively low in the 2007-2008 season (as of 15 February 2008).

Table 5. Recoveries of AP Canada Geese banded in northern Québec between 1997¹ and 2006 and shot out of season (applies to geese harvested by Aboriginal hunters in northern Canada), during early Resident Canada Goose seasons, and during regular/late seasons from 1997/98 to 2007/08 (recoveries as of 15 February 2008).

| State/ Province | Season Unknown | Out of Season (March – August) | | | | | | | | Early Season (September) | | | | | | | | Regular Season (October – February) | | | | | | | | Grand Total |
|--------------------|-------------------|--------------------------------|----|----|----|----|----|----|-------|--------------------------|----|----|----|----|----|----|-------|-------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-------|-------------------|
| | | 01 | 02 | 03 | 04 | 05 | 06 | 07 | total | 01 | 02 | 03 | 04 | 05 | 06 | 07 | total | 01- 02 | 02- 03 | 03- 04 | 04- 05 | 05- 06 | 06- 07 | 07- 08 | total | |
| NU ² | | 2 | | | | | | | | | | | | | | | | | | | | | | | | 2 |
| LB | 1 | 1 1 1 2 | | | | | | | | 1 | | | | | | | | | | | | | | | | 7 |
| PQN ³ | 25 | 20 42 27 60 50 50 34 | | | | | | | | 2 1 1 2 | | | | | | | | 1 13 4 5 2 | | | | | | | | 401 |
| ONN ³ | | 2 1 | | | | | | | | | | | | | | | | | | | | | | | | 3 |
| NB | | | | | | | | | | | | | | | | | | 1 | | | | | | | | 4 |
| PE | | | | | | | | | | | | | | | | | | | | | | | | | | 2 |
| PQ | 17 | 4 6 12 6 3 14 | | | | | | | | 13 7 12 22 19 38 47 | | | | | | | | 58 113 185 131 166 144 115 | | | | | | | | 1246 |
| ON | 9 | 1 2 1 | | | | | | | | 19 7 2 7 5 14 8 | | | | | | | | 32 61 51 53 82 86 39 | | | | | | | | 537 |
| ME | | | | | | | | | | | | | | | | | | 1 1 1 1 | | | | | | | | 8 |
| NH | | | | | | | | | | | | | | | | | | 3 2 2 1 3 4 | | | | | | | | 26 |
| VT | | | | | | | | | | 1 | | | | | | | | 3 9 1 11 11 8 | | | | | | | | 58 |
| MA | | | | | | | | | | 1 | | | | | | | | 2 3 1 3 2 4 | | | | | | | | 19 |
| CT | 1 | | | | | | | | | | | | | | | | | 3 8 4 2 2 3 2 | | | | | | | | 39 |
| RI | | | | | | | | | | | | | | | | | | 1 1 1 1 | | | | | | | | 5 |
| NY | 4 | 1 | | | | | | | | 4 6 3 17 14 17 7 | | | | | | | | 87 67 84 105 110 125 75 | | | | | | | | 782 |
| PA | 4 | | | | | | | | | 4 1 4 2 | | | | | | | | 62 87 54 66 100 90 82 | | | | | | | | 602 |
| NJ | 1 | 1 | | | | | | | | 1 2 3 1 | | | | | | | | 35 35 52 48 60 50 36 | | | | | | | | 355 |
| DE | 3 | | | | | | | | | 2 4 2 | | | | | | | | 27 36 38 37 62 35 50 | | | | | | | | 286 |
| MD | 15 | 1 | | | | | | | | 2 3 1 2 1 | | | | | | | | 292 388 332 486 532 422 340 | | | | | | | | 2837 |
| VA | 4 | | | | | | | | | 4 1 1 | | | | | | | | 61 72 32 45 83 61 33 | | | | | | | | 447 |
| NC | | 1 | | | | | | | | | | | | | | | | 2 2 1 1 | | | | | | | | 12 |
| SC | | | | | | | | | | | | | | | | | | 1 1 | | | | | | | | 2 |
| WV | | | | | | | | | | | | | | | | | | 1 | | | | | | | | 1 |
| AF total | 84 | 24 46 37 74 58 56 50 | | | | | | | | 42 24 20 59 47 80 67 | | | | | | | | 668 885 853 994 1217 1038 788 | | | | | | | | 7698 |
| MF total | 2 | | | | | | | | | 6 4 2 2 2 4 5 | | | | | | | | 9 10 15 17 15 22 9 | | | | | | | | 152 |
| TOTAL | 86 | 24 46 37 74 58 56 50 | | | | | | | | 48 28 22 61 49 84 72 | | | | | | | | 677 895 868 1011 1232 1060 797 | | | | | | | | 7861 ⁴ |

Canada
NORTH 413
SOUTH 1789
MF 2
TOTAL 2204
U.S.A.
AF 5496
MF 150
TOTAL 5646

¹ 1997-98, 1998-99, 1999-00, and 2000-01 recoveries are not presented but are included in the **total** columns

² Akimiski Island, James Bay

³ North of 50° latitude in Québec (PQN) or Ontario (ONN)

⁴ Includes 11 geese recovered in Central (n=5) and Pacific (n=4) Flyways in Canada and the USA and two geese whose recovery state/province are unknown

Table 6. Direct recoveries and direct recovery rate (%) of Canada Geese banded in northern Québec, 2001-2007¹
(recoveries as of 15 February 2008).

| | 2001-2002 | | 2002-2003 | | 2003-2004 | | 2004-2005 | | 2005-2006 | | 2006-2007 | | 2007-2008 ² | |
|------------------|-------------|----------|-------------|----------|-------------|----------|-------------|----------|-------------|----------|-------------|----------|------------------------|----------|
| ADULTS | | | | | | | | | | | | | | |
| <i>n banded</i> | 2788 | | 3114 | | 3543 | | 2154 | | 2215 | | 2909 | | 2093 | |
| | <i>n</i> | <i>%</i> | <i>n</i> | <i>%</i> | <i>n</i> | <i>%</i> | <i>n</i> | <i>%</i> | <i>n</i> | <i>%</i> | <i>n</i> | <i>%</i> | <i>n</i> | <i>%</i> |
| Canada | 11 | 0.39 | 28 | 0.90 | 45 | 1.27 | 38 | 1.76 | 31 | 1.40 | 35 | 1.20 | 59 | 2.82 |
| USA | 68 | 2.44 | 102 | 3.28 | 115 | 3.25 | 98 | 4.55 | 92 | 4.15 | 81 | 2.78 | 60 | 2.87 |
| Total | 79 | 2.83 | 130 | 4.17 | 160 | 4.52 | 136 | 6.31 | 123 | 5.55 | 116 | 3.99 | 119 | 5.69 |
| JUVENILES | | | | | | | | | | | | | | |
| <i>n banded</i> | 5671 | | 4088 | | 6449 | | 2428 | | 3910 | | 4673 | | 2134 | |
| | <i>n</i> | <i>%</i> | <i>n</i> | <i>%</i> | <i>n</i> | <i>%</i> | <i>n</i> | <i>%</i> | <i>n</i> | <i>%</i> | <i>n</i> | <i>%</i> | <i>n</i> | <i>%</i> |
| Canada | 50 | 0.88 | 47 | 1.15 | 76 | 1.18 | 35 | 1.44 | 94 | 2.40 | 84 | 1.80 | 50 | 2.34 |
| USA | 195 | 3.44 | 126 | 3.08 | 114 | 1.77 | 133 | 5.48 | 231 | 5.91 | 230 | 4.92 | 71 | 3.33 |
| Total | 245 | 4.32 | 173 | 4.23 | 190 | 2.95 | 168 | 6.92 | 325 | 8.31 | 314 | 6.72 | 121 | 5.67 |

¹ Table excludes native harvest from northern Québec, northern Ontario, Labrador, and Nunavut.

² Data for 2007/2008 hunting season are incomplete.

CONCLUSIONS AND PLANS FOR 2008

Despite a sizable increase (22%) in 2007 in the number of breeding pairs present on the Ungava Peninsula in mid-June from 2006 (Harvey and Rodrigue 2007), productivity was very poor (smaller clutches and lower nesting success) in 2007 (Table 7). This was due in large part to the very late snow-melt, a consequence of which was a very late start of nest initiation and smaller than average clutches being laid (see Figure 1).

Table 7. Summary of reproductive parameters of AP Canada Geese in northern Québec in 2007 and the 1997-2007 average.

| <i>Reproductive Variable</i> | <u>Ungava Bay</u> | | <u>Hudson Bay</u> | | |
|---|-------------------|-----------------------|-------------------|-----------|-----------------------|
| | 2007 | Average: 1997-2007 | 2007 | 1997-2005 | Average: 1997-2007 |
| <i>number of breeding pairs¹</i> | 195,709 | 130,674 | – | – | – |
| nest density (n/km ²) | 32.4 | 32.0 | – | 89.3 | – |
| nest initiation date | 12 June | 29 May | – | 29 May | – |
| clutch size | 3.20 | 3.89 | – | 4.09 | – |
| nesting success (%) | 22 | 49 | – | 77 | – |
| immature:adult ratio | 1.46 | 1.46 | 1.14 | – | 1.48 |
| immature:brood-patch female | 2.83 | 3.28 | 2.75 | – | 3.46 |
| mean no. geese per catch | 77 | 75 | 29 | – | 48 |

¹ annual fixed-winged survey estimate for the entire Ungava Peninsula (Harvey and Rodrigue 2007)

Our knowledge of this population has expanded dramatically since the work began in 1996 and in the past six field seasons we've witnessed three years of low recruitment and three years with moderate or good productivity. In addition to our studies of recruitment, we also conducted breeding ground banding over the past ten years, including participating in a band return-rate study for AP Canada Geese in 2003-2005. The banding program has been very successful with over 69,000 geese banded to date. The banding operations and reproductive studies have neatly dove-tailed enabling us to reduce costs and to obtain data on productivity over a broad geographic area and on growth and survival of goslings.

With the 2001 season, we completed the five years of intensive studies on reproductive success that were called for in the Atlantic Flyway Council's original Co-operative Research Program for Atlantic Population Canada Geese. At the end of 2001, a new five-year research and monitoring program was approved by the Atlantic Flyway Council and called for continued full funding for the intensive recruitment study for two additional years (2002/03 and 2003/04) as well as funding for the following 3 years (2004 through to the 2006 field season) for the recruitment surveys and the banding program. The recruitment and banding programs were renewed in 2007 for an additional five years by the Atlantic Flyway Council (2007-2011). In 2007 we successfully carried out the recruitment surveys as well as the banding program, and in 2008 we will repeat the recruitment surveys (visit the same sites along Ungava Bay) and continue with the banding program (three crews) along both Hudson and Ungava Bays.

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Nest searches at the secondary nesting sites were carried out by Diane Dauphin (CWS), Tom Early (MA), and Makivik Corporation (Nunavik Research Centre) wildlife technicians Sandy Suppa and Peter May. At Hudson Bay, banding in 2007 was undertaken by two crews, each working with a Bell 206L helicopter. The Coast Guard (CG) helicopter banding crew was comprised of Daniel Dubé, the pilot, and Richard Cotter, Shirley Orichefsky, and Simon Bourbeau (all 3 from CWS). The Ontario Ministry of Natural Resources (OMNR) helicopter banding crew consisted of Doug Holtby, the pilot, Dan Berndt (OMNR), Dany Héon (CWS), Gary Costanzo (VA), and Jay Osenkowski (RI). At Ungava Bay, Dominic Simoneau (pilot; Nunavik Rotors), Ted Nichols (NJ), Rob Hossler (DE), Pierre Brousseau (CWS), and Peter May (Makivik) comprised the primary banding crew. Sandy Suppa (Makivik) also assisted on a few days.

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