

**Breeding ground banding of Atlantic Population Canada Geese
in northern Québec – 2014**



A round-up of family groups of Canada Geese near Virgin Lake (Ungava Bay) for banding on August 8, 2014. In all, 1420 and 2698 Canada Geese were banded along Hudson Bay and Ungava Bay, respectively, in 2014.

**A Progress Report Prepared for the
Atlantic Flyway Council & Migratory Bird Technical Section**

Supported by:

**Arctic Goose Joint Venture
Atlantic Flyway Council & Migratory Bird Technical Section
CWS, USFWS, Ducks Unlimited Inc.
Nunavik Hunting, Fishing & Trapping Association
Makivik Corporation**

INTRODUCTION

After a sharp decline in the size of the Atlantic Population of Canada Geese in the early 1990s, a program of breeding ground banding was initiated in 1997. Canada Geese were banded in the Ungava region of northern Québec in the 1960's (13,069) and late 1980's (5,662). Only about 200 of those banded in the 1980's, however, were banded in the Hudson Bay coastal zone which harbours over half of the entire Ungava Peninsula breeding population (Harvey, Rodrigue and Earsom 2014). The present program of breeding ground banding includes both the Hudson Bay and Ungava Bay portions of the breeding range. The 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.

SUMMARY OF WORK CONDUCTED IN 2014

We banded brood flocks of Canada Geese along the northern Hudson Bay coast (1 crew) and along the south and west coasts of Ungava Bay (1 crew) between 5 and 16 August. Helicopters were used to round up and help drive flightless geese toward funnel-shaped traps. When conditions were favourable, each crew conducted 5-6 catches per day. Banding operations went very well for both crews; one full day and 2 half days were lost for the Ungava Bay crew and Hudson Bay crew, respectively, due to inclement weather. In total, 1420 and 2698 Canada Geese were banded along Hudson Bay and Ungava bay respectively. The immature:adult (I:A) ratio in 2014 for Hudson Bay was considerably lower than its long-term average (1.02 vs 1.36)—but higher than the 0.95 obtained in 2013—while for Ungava Bay it was slightly above its long-term average (1.57 vs 1.52); in 2014 the I:A ratio was significantly higher ($P < 0.01$) along Ungava Bay than along Hudson Bay. Combining both regions, in 2014 the ratio of goslings to adult females with brood patches (I:BP) per catch, a good productivity index, as well as the I:A ratio were below their long-term averages (I:BP: 2.89 vs 3.25; I:A: 1.32 vs 1.42). In conclusion, productivity of AP Canada Geese from the Ungava Peninsula in 2014 was similar to that in 2013, that is, good for Ungava Bay but below average for Hudson Bay.

RESULTS

Hudson Bay

From 7 to 16 August, 1420 Canada Geese were captured and banded along Hudson Bay (Table 1). Of this total, there were 710 adults and 710 goslings. The weather was good throughout the banding period with only 2 half days lost due to inclement weather. An additional 57 previously banded adults were recaptured, and all but three were originally banded in northern Quebec between 1997 and 2013 (the 3 exceptions were 1 bird banded in OH in 2013, 1 banded in ON in 2012, and 1 banded in SC in 2009). A total of 42 catches were made by the crew, with a mean of 35 geese per catch (range: 17–59 geese); this mean is unchanged from 2013 and lower than the long-term average of 43 geese. All captured flocks contained goslings and all catches were made in an area extending approximately 185 km along the Hudson Bay coast and extending 40 km inland, specifically from the Sorehead River in the north to the Mariet River in the south. Overall, in 2014 AP Canada Goose productivity along eastern Hudson Bay was below average. (It is interesting to note that the last year when productivity indices [Table 1: Imm.:Ad, Imm.:BP, Mean no. geese/catch (except for 2012), and Mean brood size (helico.)] were above the long-term average was 2008.)

Ungava Bay

From 5 to 11 August, 2698 geese were banded along Ungava Bay. Of this total, 1063 were adults (highest number since 2006) and 1635 were goslings (Table 2). An additional 71 previously banded adults were recaptured; with one exception all recaptures were originally banded in northern Quebec between 1997 and 2013 (1 was originally banded in PA in 2012). A total of 48 catches were made, with a mean of 58 geese per catch (range: 24–166 geese); this mean is lower the long-term average of 73 geese. All captured flocks contained goslings and all catches were made between Leaf River in the south to north of Virgin Lake (near Kangirsuk). Number of geese was relatively poor in the Aupaluk area but excellent further north (towards Payne Bay and Virgin Lake area). In addition, a brood flock of Richardson's Geese (Cackling Goose) were captured and banded (18 adults and 22 goslings—first time a brood from Ungava Bay). Overall, in 2014 AP Canada Goose productivity along Ungava Bay was good.

Table 1. Atlantic Population Canada Geese banded along Hudson Bay, Nunavik, 1997-2014.

Year	Adults	Young	Total	Imm: Ad ^{1,2}	Imm: BP ^{2,3}	Recap-tures ⁴	Banding Dates	No. catches	Mean no. geese/catch ^{2,5}	Mean brood size (helico.) ^{2,6}
1997	355	793	1148	1.94	4.14	5	28/07 - 09/08	32	37	3.14
1998	1360	2461	3821	1.72	4.17	69	29/07 - 08/08	63	62	3.62
1999	2018 ⁷	3314	5332	1.45	3.82	146	30/07 - 09/08	133	41	3.45
2000	1285	1334	2619	1.00	2.26	90	05/08 - 15/08	80	34	3.03
2001	1845	4103	5948	1.89	3.54	232	01/08 - 11/08	83	75	3.38
2002	2011	2547	4560⁸	1.21	2.89	141	07/08 - 18/08	110	43	3.17
2003	2092	3736	5828	1.71	3.80	283	02/08 - 11/08	88	69	3.27
2004	1226	1662	2888	1.23	3.83	139	06/08 - 15/08	68	45	2.93
2005	1209	2022	3231	1.34	3.23	76	01/08 - 11/08	91	36	3.28
2006	1675	3296	4971	1.66	4.03	123	31/07 - 13/08	96	53	3.10
2007	1043	1216	2259	1.14	2.76	82 (6)	06/08 - 14/08	82	29	2.54
2008	1169	2066	3235	1.67	3.77	98	02/08 - 09/08	67	50	3.17
2009	1113	1281	2394	1.09	2.53	61 (4)	05/08 - 13/08	78	32	2.58
2010	1015	1388	2403	1.22	2.82	82	06/08 - 14/08	84	30	2.66
2011	577	470	1047	0.84	1.95	32	05/08 - 18/08	42	26	2.57
2012	803	1344	2147	1.41	2.97	56 (6)	04/08 - 14/08	47	47	2.86
2013	839	801	1640	0.95	2.25	63	03/08 - 12/08	49	35	2.49
2014	710	710	1420	1.02	2.31	57	07/08 - 16/08	42	35	2.54
Total	22345	34544	56891⁸	1.36	3.17	1835 (16)	27/07 - 18/08	1335	43	2.99

¹ Immature (gosling) to adult ratio at time of banding drive (capture), including birds not banded.

² In the “Total” row, the average across years is presented.

³ Immature (gosling) to adult female with brood patch ratio at time of banding drive (capture), including birds not banded.

⁴ Includes birds fitted with a new band (i.e., old band replaced). Does not include the number of Cackling Goose (Richardson’s) recaptures—these numbers are presented in parentheses.

⁵ Includes newly banded geese, recaptures, and birds released unbanded but excludes repeats (i.e., individuals previously caught the same year).

⁶ The mean brood size of individual family groups observed by the author during annual banding program (i.e., from helicopter in search of moulting family groups to capture and band).

⁷ Includes 2 adult females captured in June on their nest.

⁸ Includes 2 whose ages were not recorded.

Table 2. Atlantic Population Canada Geese banded along Ungava Bay, Nunavik, 1997-2014.

Year	Adults	Young	Total	Imm: Ad ^{1,2}	Imm: BP ^{2,3}	Recap- tures ⁴	Banding Dates	No. catches	Mean no. geese/ catch ^{2,5}
1997	917	1081	1998	1.17	2.56	44	30/07 - 05/08	22	99
1998	675	1332	2007	1.67	3.54	84	26/07 - 03/08	23	91
1999	1039	1200	2239	1.15	2.89	185	27/07 - 05/08	28	89
2000	1032	896	1928	1.16	2.76	67	28/07 - 05/08	37	55
2001	943	1568	2511	1.88	3.27	35	31/07 - 10/08	43	60
2002	1103	1541	2644	1.40	3.42	61	30/07 - 08/08	37	75
2003	1451	2713	4164	1.77	3.85	182	29/07 - 08/08	49	90
2004	928	766	1694	1.08	2.71	98	29/07 - 08/08	31	59
2005	1006	1888	2894	1.94	4.11	90	01/08 - 11/08	34	92
2006	1234	1377	2611	1.40	3.00	96	27/07 - 05/08	37	76
2007	1050	918	1968	1.46	2.83	101	31/07 - 10/08	27	86
2008	1011	2223	3234	2.39	5.15	106	01/08 - 08/08	41	83
2009	277	259	536	1.05	2.56	22	02/08 - 06/08	11	52
2010	809	1387	2196	1.90	3.92	46	01/08 - 07/08	32	75
2011	437	646	1083	1.45	3.57	42	01/08 - 07/08	22	51
2012	626	794	1420	1.38	2.68	81	02/08 - 07/08	26	58
2013	849	1251	2100	1.50	3.16	92	03/08 - 09/08	31	73
2014	1063	1635	2698	1.57	3.36	71	05/08 - 11/08	48	58
Total	16450	23475	39925	1.52	3.30	1503	26/07 - 11/08	579	73

¹ Immature (gosling) to adult ratio at time of banding drive (capture), including birds not banded.

² In the “Total” row, the average across years is presented.

³ Immature (gosling) to adult female with brood patch ratio at time of banding drive (capture), including birds not banded.

⁴ Includes birds fitted with a new band (i.e., old band replaced).

⁵ Includes newly banded geese, recaptures, and birds released unbanded but excludes repeats (i.e., individuals previously caught the same year).

Table 3. Total number of Atlantic Population Canada Geese banded in Nunavik (Hudson Bay and Ungava Bay regions combined), 1997-2014.

Year	Adults	Young	Total	Imm : Adult ^{1,2} $\bar{x} \pm SE (n)$		Imm : Brood ^{2,3} $\bar{x} \pm SE (n)$		Recap- tures ⁴	No. catches
1997	1272	1874	3146	1.53	0.13 (42)	3.28	0.28 (31)	49	54
1998	2035	3793	5828	1.71	0.08 (81)	4.01	0.23 (77)	153	86
1999	3057 ⁵	4514	7571	1.40	0.05 (156)	3.66	0.17 (152)	331	161
2000	2317	2230	4547	1.05	0.05 (108)	2.70	0.21 (32)	157	117
2001	2788	5671	8459	1.89	0.09 (121)	3.43	0.22 (64)	267	126
2002	3114	4088	7204⁶	1.26	0.04 (142)	3.03	0.13 (142)	202	147
2003	3543	6449	9992	1.73	0.07 (129)	3.82	0.17 (136)	465	137
2004	2154	2428	4582	1.19	0.05 (97)	3.50	0.27 (96)	237	99
2005	2215	3910	6125	1.58	0.08 (80)	3.57	0.19 (80)	166	125
2006	2909	4673	7582	1.58	0.06 (125)	3.74	0.17 (126)	219	133
2007	2093	2134	4227	1.21	0.06 (104)	2.78	0.12 (105)	183	109
2008	2180	4289	6469	1.95	0.13 (106)	4.31	0.26 (106)	204	108
2009	1390	1540	2930	1.09	0.04 (85)	2.54	0.09 (79)	83	89
2010	1824	2775	4599	1.42	0.06 (106)	3.17	0.13 (101)	128	116
2011	1014	1116	2130	1.07	0.12 (56)	2.56	0.31 (56)	74	64
2012	1429	2138	3567	1.40	0.06 (63)	2.85	0.13 (63)	137	73
2013	1688	2052	3740	1.17	0.07 (73)	2.61	0.17 (73)	155	80
2014	1773	2345	4118	1.32	0.09 (78)	2.89	0.17 (78)	128	90
Total	38795	58019	96816⁶	1.42	0.07 (18)	3.25	0.13 (18)	3338	1914

¹ Mean immature (gosling) to adult ratio at time of banding drive (capture), including birds not banded (n =number of catches).

² In the "Total" row, the average across years is presented (n = number of years).

³ Mean immature (gosling) to adult female with brood patch ratio at time of banding drive (capture), including birds not banded (n =number of catches).

⁴ Includes birds fitted with a new band (i.e., old band replaced).

⁵ Includes 2 adult females captured in June on their nest.

⁶ Includes 2 whose age were not recorded.

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 2014) were also excluded. The mean I:A ratio at the time of banding was 1.02:1 for Hudson Bay flocks ($n=35$ catches) (Table 1) and 1.57:1 for Ungava Bay flocks ($n=43$ catches) (Table 2); the ratio was significantly different between the two regions ($t=3.14$, $df=76$, $P<0.01$). 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 2.31:1 ($n=35$) and at Ungava Bay this ratio was 3.36:1 ($n=43$) (Tables 1, 2); the ratio was significantly different between the two regions ($t=3.18$, $df=76$, $P<0.01$).

BAND RETURNS

From 1997 to 2014, 96,816 adult and juvenile AP Canada Geese were captured and banded on the Ungava Peninsula breeding grounds in northern Québec.

Of these, as of 6 February 2015, 14,877 geese, or 15.4%, had been shot and reported by hunters (Table 4). 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 have steadily increased as regular seasons have been re-instated and hunting regulations have been liberalised. Since 2001 direct recovery rates have been relatively stable, about 3–6% (for both adults and juveniles) in the United States and 1–2% in Canada (excluding aboriginal harvest; Table 4).

Table 4. Direct recoveries and direct recovery rate (%) of Canada Geese banded in northern Québec, 1997–2014¹ (recoveries as of 6 February 2015; from GameBird, BBL).

Year	ADULTS							JUVENILES						
	n banded	Direct Recoveries						n banded	Direct Recoveries					
		Canada		USA		Total			Canada		USA		Total	
	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)		
1997-1998	1272	0	0.00	4	0.31	4	0.31	1874	2	0.11	6	0.32	8	0.43
1998-1999	2035	1	0.05	9	0.44	10	0.49	3793	5	0.13	18	0.47	23	0.61
1999-2000	3057	10	0.33	21	0.69	31	1.01	4514	46	1.02	29	0.64	75	1.66
2000-2001	2317	12	0.52	19	0.82	31	1.34	2230	12	0.54	15	0.67	27	1.21
2001-2002	2788	10	0.36	67	2.40	77	2.76	5671	47	0.83	194	3.42	241	4.25
2002-2003	3114	29	0.93	103	3.31	132	4.24	4088	47	1.15	127	3.11	174	4.26
2003-2004	3543	46	1.30	115	3.25	161	4.54	6449	81	1.26	114	1.77	195	3.02
2004-2005	2154	38	1.76	98	4.55	136	6.31	2428	36	1.48	133	5.48	169	6.96
2005-2006	2215	31	1.40	92	4.15	123	5.55	3910	97	2.48	231	5.91	328	8.39
2006-2007	2909	35	1.20	82	2.82	117	4.02	4673	86	1.84	233	4.99	319	6.83
2007-2008	2093	24	1.15	69	3.30	93	4.44	2134	29	1.36	88	4.12	117	5.48
2008-2009	2180	28	1.28	84	3.85	112	5.14	4289	85	1.98	248	5.78	333	7.76
2009-2010	1390	17	1.22	44	3.17	61	4.39	1540	18	1.17	45	2.92	63	4.09
2010-2011	1824	11	0.60	83	4.55	94	5.15	2775	54	1.95	189	6.81	243	8.76
2011-2012	1014	12	1.18	31	3.06	43	4.24	1116	25	2.24	39	3.49	64	5.73
2012-2013	1429	15	1.05	51	3.57	66	4.62	2138	50	2.34	115	5.38	165	7.72
2013-2014	1688	26	1.54	71	4.21	97	5.75	2052	33	1.61	146	7.12	179	8.73
2014-2015 ²	1773	22	1.24	59	3.33	81	4.57	2345	47	2.00	69	2.94	116	4.95

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

² Data for 2014/2015 hunting season are incomplete.

CONCLUSIONS AND PLANS FOR 2015

Our knowledge of this population has expanded dramatically since the start of the annual recruitment study in 1996 and of the banding program in 1997. The banding program has been very successful with almost 97,000 AP geese banded to date; in addition we participated in a band return-rate study for AP geese in 2003-2005. Our data from this year's banding program indicate that production, as measured by immature:adult ratio, was below average along Hudson Bay but good along Ungava Bay (Table 5).

Table 5. Summary of AP Canada Geese projects in northern Québec in 2014.

<i>Variable</i>	<u>Ungava Bay</u>		<u>Hudson Bay</u>	
	2014	Long-term Average ¹	2014	Long-term Average ¹
<u>Banding Program</u> (this report)				
number banded (adults+goslings)	2698	39,925 ²	1420	56,891 ²
immature:adult ratio	1.57	1.51	1.02	1.36
immature:brood patch female	3.36	3.29	2.31	3.17
mean no. geese per catch	58	74	35	43
<u>Breeding Pair Survey</u>				
number of breeding pairs on Ungava Peninsula (Harvey, Rodrigue & Earsom 2014)	183,642	188,772		

¹ Banding program: 1997–2014; breeding pair survey: 5-year running average (i.e., 2010–2014)

² Total number banded since 1997.

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). At the 2011 summer Atlantic Council Meeting the banding program was renewed for an additional five years (2012-2016), although at a smaller scale. Specifically, each year, including 2015, there will be one banding crew for Ungava Bay, with an objective of banding 800 adults, and one banding crew for Hudson Bay and with the same objective. Recruitment (nesting) site(s) will be visited in June if deemed necessary (season appears to be exceptionally early or late) and if funding and logistics permit.

ACKNOWLEDGEMENTS

Financial support was provided by the Canadian Wildlife Service, the U.S. Fish and Wildlife Service, the states of the Atlantic Flyway, Ducks Unlimited Inc., and from Pennsylvania the Blue Mountain Conservation Fund, the Lancaster County Chapter-Waterfowl USA, Lehigh Valley Chapter Safari Club, and Susquehanna River Wetlands Trust. The Wildlife Management Institute facilitated financial administration. The Nunavik Hunting, Fishing and Trapping Association again showed strong support for the study. Makivik Corporation also showed strong support and Sandy Suppa provided logistical help out of Kuujjuaq, as did Aliva Tulugak in Puvirnituk. Special thanks to Ted Nichols (NJ) for finding volunteers to participate in the recruitment and banding operations, and to Pierre Brousseau for assisting with the banding summary for Ungava Bay.

In 2014, banding along Hudson Bay was undertaken by a crew comprised of Richard Cotter (CWS), Shirley Orichefsky (CWS), Dennis Stewart (SC), Brian Van Druten (SC), and Gord Bain, pilot (EC130 B4 helicopter) and Dan Berndt, flight engineer, of the Ontario Ministry of Natural Resources (OMNR). At Ungava Bay, the banding crew was comprised of Pierre Brousseau (CWS), Jean Rodrigue (CWS), Stéphane Turgeon (CWS) and Jim Bennett (MD), along with Nunavik Rotors (A-Star) helicopter pilot Natalie D'Astous.

REFERENCES

- Harvey, W.F., J. Rodrigue and S.D. Earsom. 2014. A breeding pair survey of Canada Geese in northern Québec - 2014. Maryland Department of Natural Resources and Canadian Wildlife Service, Québec Region.
- Hughes, R.J., A. Reed, L. Rancourt and R. Bergeron. 2000. Breeding ecology of Canada Geese near the Laforge-1 hydroelectric reservoir in north-central Québec. Pages 99-107 in Dickson, K.M. (ed.). Towards conservation of the diversity of Canada Geese (*Branta canadensis*). Canadian Wildlife Service Occasional Paper No. 103.
- Malecki, R.A. and R.E. Trost. 1990. A breeding ground survey of Atlantic Flyway Canada Geese, *Branta canadensis*, in northern Québec. Canadian Field-Naturalist 104:575-578.

