

**Breeding ground banding of
Atlantic Population Canada Geese in Nunavik – 2019**



*A good habitat for broods, north of Korak River, Hudson Bay region
Photo: Shirley Orichefsky*

**A Progress Report Prepared for the
Atlantic Flyway Council
February 2020**

By Josée Lefebvre and Shirley Orichefsky,
Canadian Wildlife Service,
Environment and Climate Change Canada

Supported by:
Atlantic Flyway Council,
Canadian Wildlife Service and the U.S. Fish and Wildlife Service



INTRODUCTION

After a sharp decline in the size of the Atlantic Population (AP) of Canada Geese in the early 1990's, a program of breeding ground banding was initiated in 1997. Canada Geese were banded in the Ungava region of northern Québec, now called Nunavik, in the 1960's (13 069 birds) and late 1980's (5 662 birds). The present program of breeding ground banding includes both the Hudson Bay and Ungava Bay portions of the breeding range where 90% of the Canada Geese breeding in northern Québec occurred (Malecki and Trost 1990). Harvey *et al.* (2019) estimated the 2019 breeding pairs at 119 530 on the Ungava Peninsula.

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 2019

We banded brood flocks of Canada Geese along the northern Hudson Bay coast and along the west coast of Ungava Bay between 5 and 14 August. Helicopters were used to round up and help drive flightless geese toward funnel-shaped traps. Depending on the weather conditions, between two and six catches were conducted per day (N=50; mean=3.8). Two days of banding were lost due to weather in both regions. In total, 3 233 Canada Geese were banded of which 1874 were juveniles.

RESULTS

Hudson Bay

Banding activities were carried out between 5 and 14 August along the Hudson Bay. Two days were lost due to bad weather. A total of 1603 Canada Geese were captured and banded along Hudson Bay over 10 days of banding (Figure 1, Appendix A). Of this total, there were 705 adults and 898 goslings. An additional 12 previously banded adults were recaptured. A total of 30 catches were made by the crew and all of the flocks contained goslings. Two to 5 catches were conducted per day (mean=3.75), each comprised of between 23 and 137 birds (mean= 54). All catches were made in an area extending approximately 185 km along the Hudson Bay coast and extending 50 km inland, specifically from north of the Mariet River in the south to the Illukotat River in the north. The northernmost 30 km, a newly explored sector, looks extremely promising, since eight catches were done in that area for a total 731 new birds (45 percent of total birds), including a family of Cackling Geese (2 adults and 4 goslings). The objective of 800 adults banded was close to be reached this year.

In terms of productivity (J: BP), the 2019 index (2.47) was below the long-term average (2.71) yet the 2nd best year since 2013 (Figure 2, Appendix A). In the long term, from 1998 to 2019, we note a significant decrease in productivity (J:BP) through time ($F=13.11$; $r^2=0.40$; $df=1$ & 20 ; $p=0.0017$).

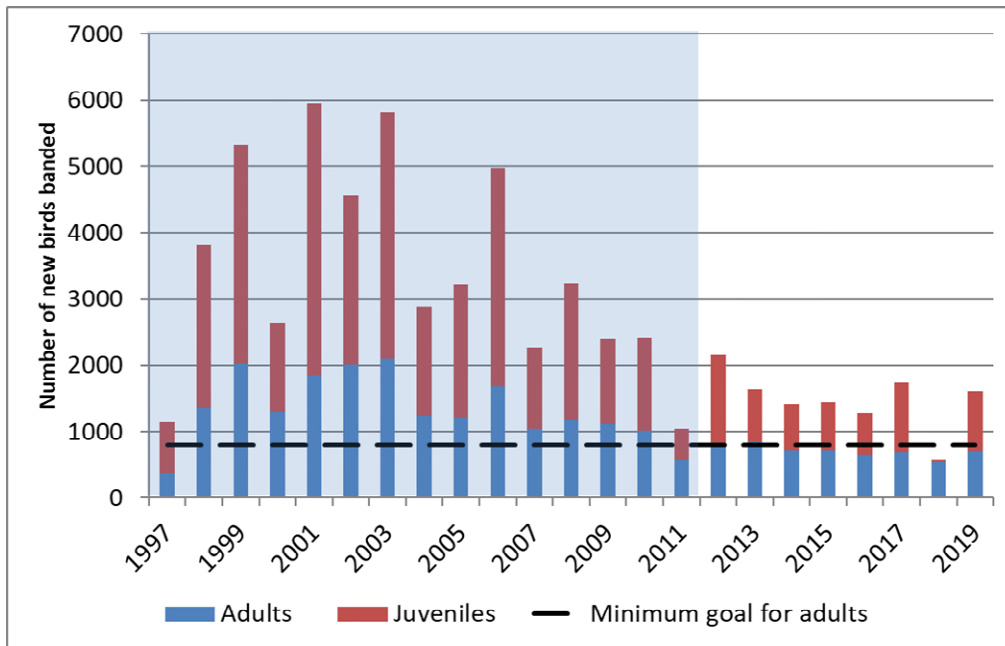


Figure 1. Number of adults and juveniles of Atlantic Population (AP) Canada Geese banded in the Hudson Bay region, 1997-2019. The shaded area on the graph represents the years where there were two banding crews. The black dashed line represents the minimum goal for banded adults.

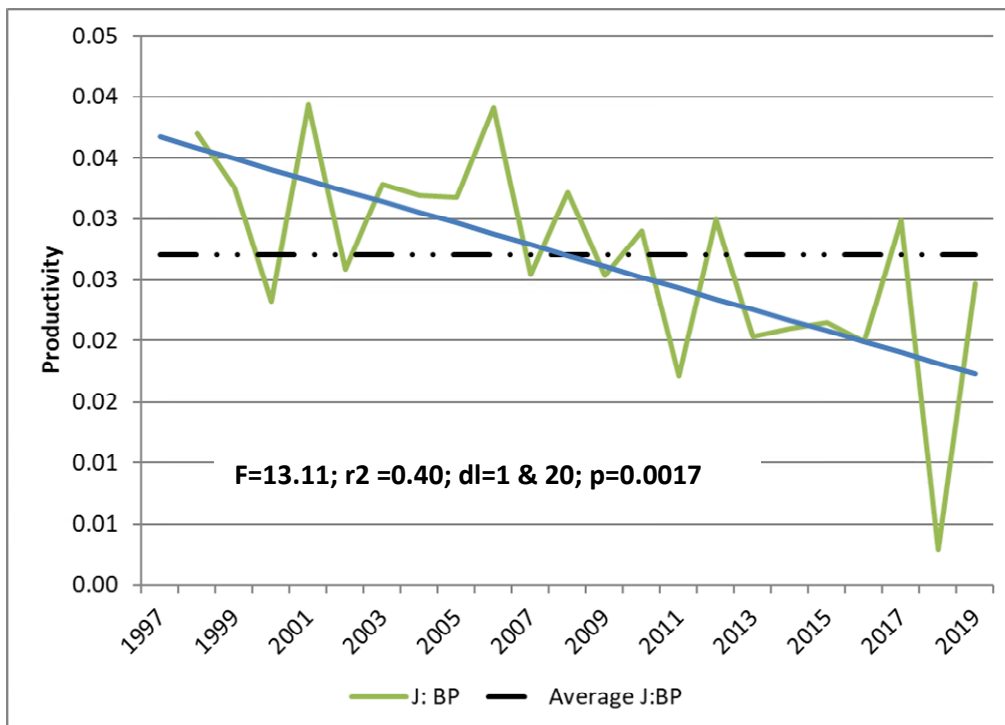


Figure 2. Productivity of AP Canada Geese in the Hudson Bay region, 1997-2019. The ratio J:BP represents the ratio of juveniles to number of females with a brood patch (recaptured females included).

Ungava Bay

From 5 to 12 August, 1 630 geese were banded along Ungava Bay. Two days were lost due to bad weather. Of this total, 654 were adults and 976 were goslings (Figure 3; Appendix B). An additional 91 previously banded adults were captured. A total of 20 catches, all containing goslings, were made in an area extending approximately 150 km, from Aupaluk in the south to 50 km south of Quaqtak in the north. Between 2 and 6 catches were conducted per day (mean=4.0) having between 28 and 221 birds per catch (mean= 88). The objective of 800 adults banded was not reached this year. In addition to these Canada Geese, the team recaptured 1 banded adult Cackling Goose (*B. hutchensii*) and banded 5 goslings. They also recaptured 3 banded adult Blue Snow Geese (*Anser caerulescens*) and banded another 9 adults with 16 goslings.

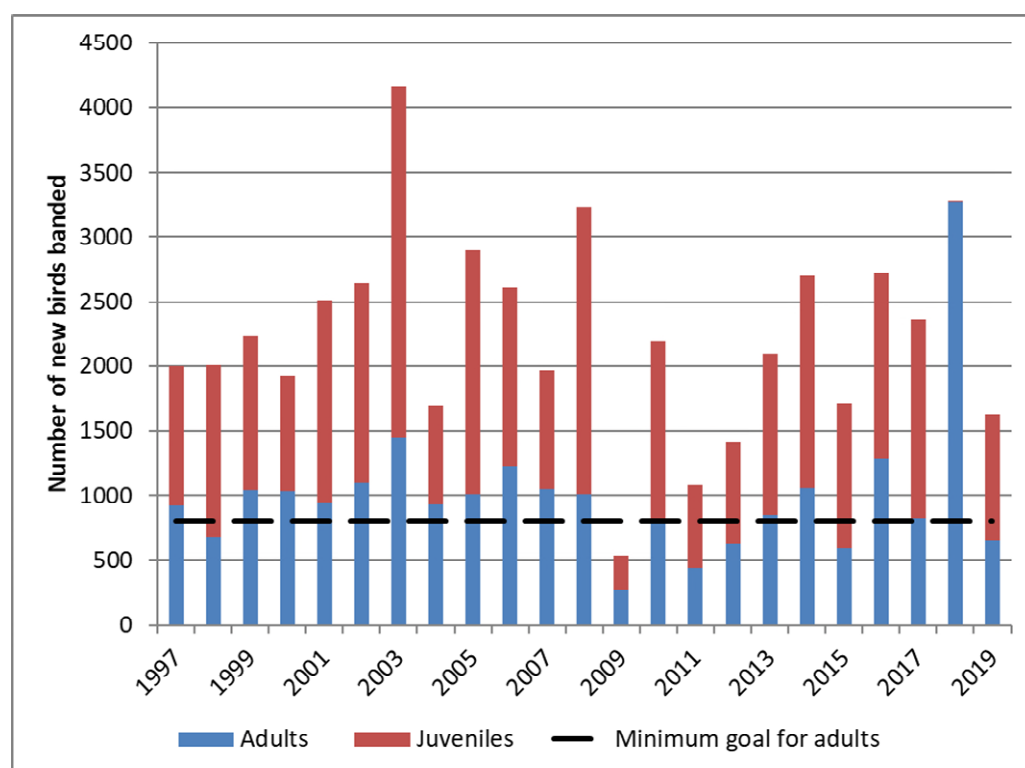


Figure 3. Number of adults and juveniles of Atlantic Population Canada Geese banded in the Ungava Bay region, 1997-2019. The black dashed line represents the minimum goal for banded adults.

In terms of productivity (J:BP), the 2019 index (2.70) was below the long-term average (2.76) (Figure 4; Appendix B). Overall, in 2019 AP Canada Goose productivity was around the long term average along Ungava Bay but there is no significant trend in the productivity through time ($F=0.73$; $r^2=0.03$; $df=1$ & 21 ; $p=0.4029$).

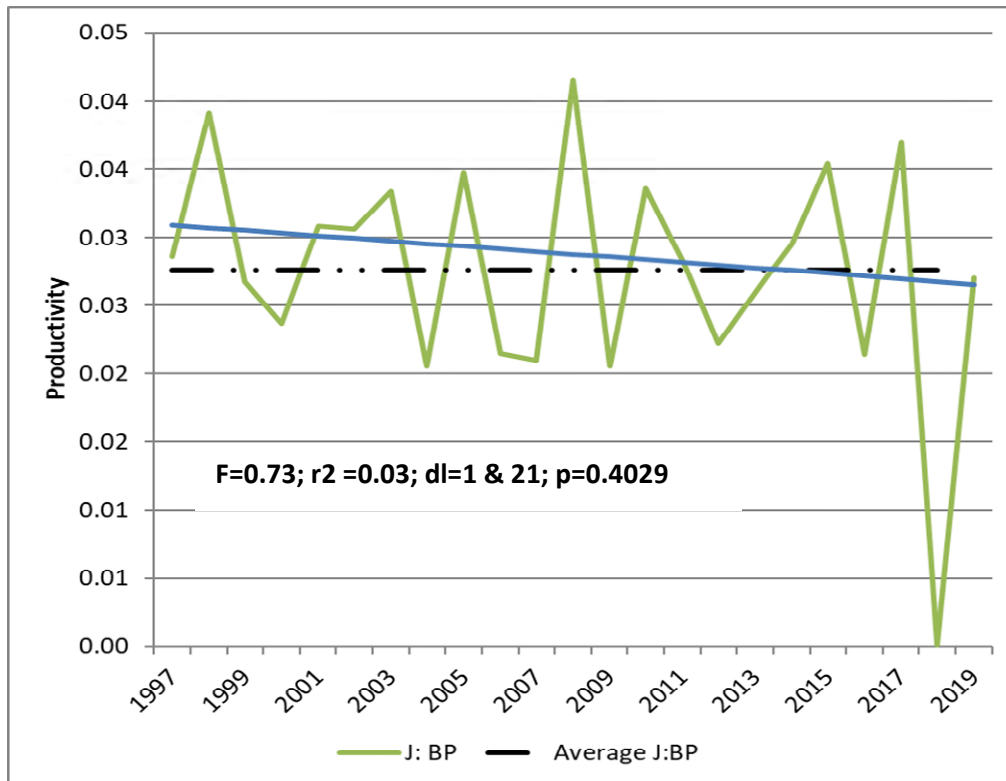


Figure 4. Productivity of Atlantic Population Canada Geese in the Ungava Bay region, 1997-2019. The ratio J:BP represents the ratio of juveniles to number of females with a brood patch (recaptured females included).

BAND RETURNS

From 1997 to 2019, 115 149 AP Canada Geese were captured and banded on the Ungava Peninsula breeding grounds in Nunavik (Appendix C). 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 was also shot and reported by Aboriginal subsistence hunters. 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 liberalized. Since 2001, direct recovery rates have significantly increased in adults both in Canada ($F=9.42$; $r^2 =0.37$; $dl=1 \ \& \ 16$; $p=0.0073$) and in the United States ($F=6.18$; $r^2 =0.28$; $dl=1 \ \& \ 16$; $p=0.0244$; Figure 5; Appendix D). No significant trend was found in juvenile recovery rates in Canada ($F=1.04$; $r^2 =0.06$; $dl=1 \ \& \ 16$; $p=0.3240$) and in the United States ($F=0.49$; $r^2 =0.03$; $dl=1 \ \& \ 16$; $p=0.4933$; Figure 6; Appendix D). In Canada, direct recovery does not include aboriginal harvest.

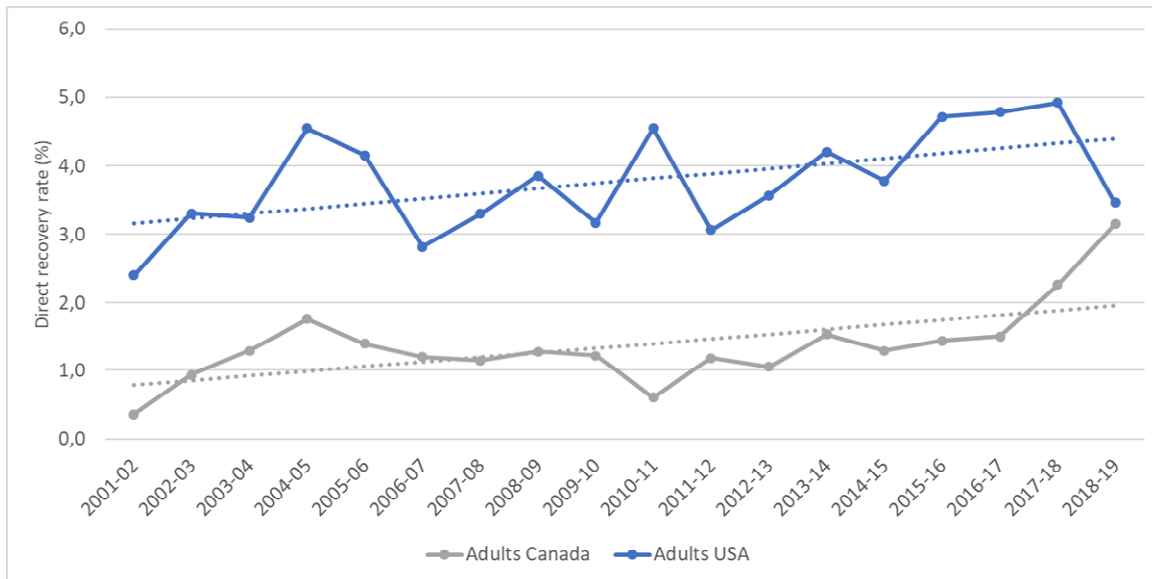


Figure 5. Adult direct recovery rates and trend (dash line) in Canada and in United States for Atlantic Population Canada Geese from 2001-2002 to 2018-2019.

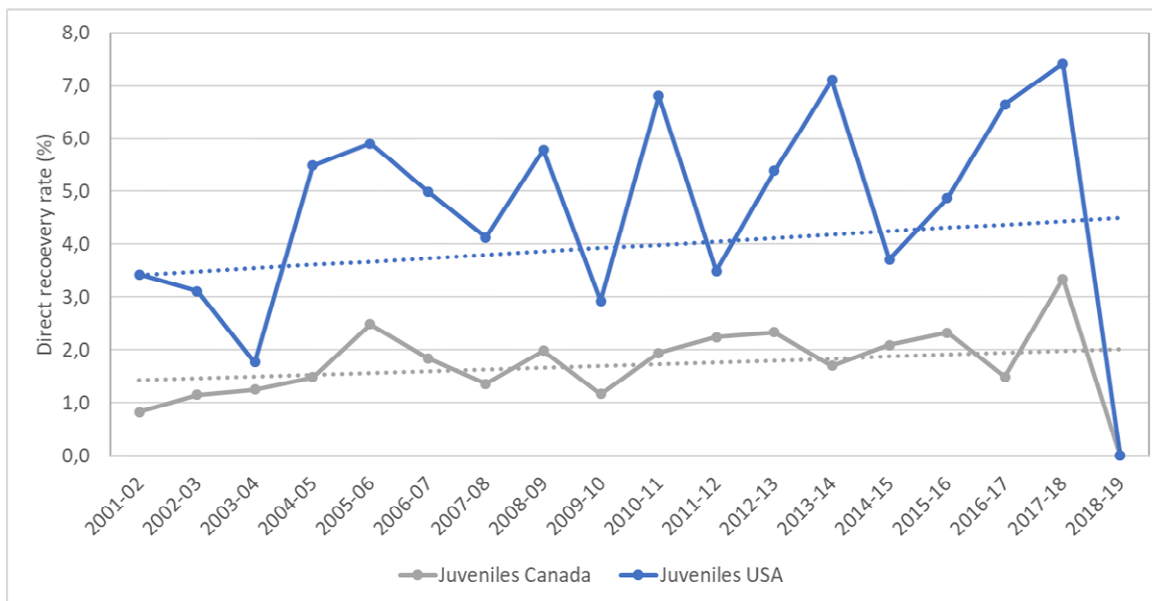


Figure 6. Juvenile direct recovery rates and trend (dash line) in Canada and in United States for Atlantic Population Canada Geese from 2001-2002 to 2018-2019.

CONCLUSION AND PLANS FOR 2020

The banding program has been very successful with the number of AP Canada Geese banded to date and 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. Combining both regions, in 2019 the ratio of juveniles to adult females with brood patch (J:BP), a good productivity index, was 2.58 (Figure 7, Appendix C). In conclusion, productivity of AP Canada Geese nesting on the Ungava Peninsula in 2019 was below the long term average and the pressure through direct recovery rates over time is still increasing, more detailed analyses might be needed.

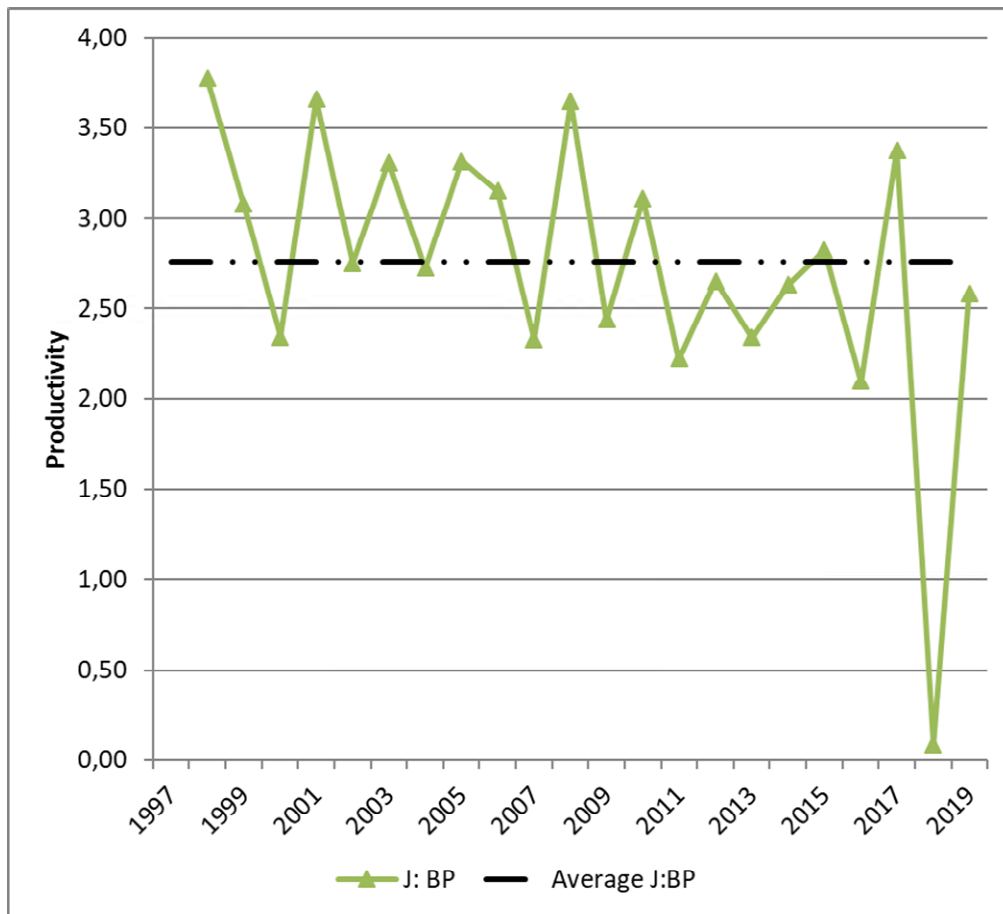


Figure 7. Productivity of Atlantic Population Canada Geese banded in Nunavik, 1997-2019. The ratio J:BP represents the ratio of juveniles to number of females with a brood patch (recaptured females included).

At the Atlantic Council Meeting in 2015, the banding program was renewed for five years (2017-2021), at the same scale as the previous 5-years. Specifically each year, including 2020, there will be one banding crew in each region (Ungava Bay and Hudson Bay) with an objective of banding 800 adults. Additional effort will be put to reach the minimum objective in the Hudson Bay region since this was not met in the last six years and Illukotat River area will be revisited in 2020. Recruitment (nesting) sites 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. The Wildlife Management Institute facilitated financial administration. The Nunavik Hunting, Fishing and Trapping Association and Makivik Corporation again showed strong support for the study, as did Aliva Tulugak and his family in Puvirnituq. Special thanks to Ted Nichols (NJ) for finding volunteers to participate in the banding operations.

In 2019, banding along Hudson Bay was undertaken by a crew comprised of Benoit Audet (CWS), Gary Costanzo (VA), Shirley Orichefsky (CWS), Francis St-Pierre (UQAM), and the OMNRF (EC-130) helicopter pilot Andrew Brunet and engineer Dan Polera. At Ungava Bay, the banding crew was comprised of Jim Bennett (MD), Bill Harvey (MD), Jean Rodrigue (CWS), Sandy Suppa (Makivik) and Nunavik Rotors (A-Star) helicopter pilot Natalie D'Astous.

REFERENCES

Harvey, W.F., J. Rodrigue and R. Sprangler. 2019. A breeding pair survey of Canada Geese in northern Québec - 2019. Maryland Department of Natural Resources and Canadian Wildlife Service, Québec Region. 7 pages.

Malecki, R.A. and Trost, R.E. 1990. A breeding ground survey of Atlantic Flyway Canada Geese, *Branta canadensis*, in northern Québec. Canadian Field-Naturalist 104:575-578.

Appendix A. Atlantic Population Canada Geese banded along Hudson Bay in Nunavik, 1997-2019.

Year	Adults	Juveniles	Total	Recaptures ¹	J:Ad ^{2,3}	J:BP ^{2,4}	No. catches ²	Mean no. geese/catch ^{2,5}
1997	355	793	1 148	5	2.20	.	32	37
1998	1 360	2 461	3 821	69	1.72	3.70	63	62
1999	2 018	3 314	5 332	146	1.53	3.26	133	41
2000	1 285	1 334	2 619	90	0.97	2.33	80	34
2001	1 845	4 103	5 948	232	1.98	3.93	83	75
2002	2 011	2 547	4 558	141	1.18	2.59	110	43
2003	2 092	3 736	5 828	283	1.57	3.29	88	69
2004	1 226	1 662	2 888	139	1.22	3.20	68	45
2005	1 209	2 022	3 231	76	1.57	3.18	91	36
2006	1 675	3 296	4 971	123	1.83	3.91	96	53
2007	1 043	1 216	2 259	82	1.08	2.54	82	29
2008	1 169	2 066	3 235	98	1.63	3.22	67	50
2009	1 113	1 281	2 394	61	1.09	2.54	78	32
2010	1 015	1 388	2 403	82	1.27	2.90	84	30
2011	576	470	1 046	32	0.77	1.72	42	26
2012	803	1 344	2 147	56	1.56	2.99	47	47
2013	839	801	1 640	63	0.89	2.03	49	35
2014	710	710	1 420	57	0.93	2.10	42	35
2015	721	732	1 453	51	0.95	2.15	40	36
2016	638	634	1 272	39	0.94	1.99	37	34
2017	682	1 054	1 736	16	1.51	2.99	40	44
2018	535	27	567	12	0.05	0.29	9	64
2019	705	898	1603	12	1.25	2.47	30	54
Total	25 625	37 889	63 514	1965	1.29	2.70	65	44

¹ Includes birds fitted with a new band (i.e., old band replaced)

² In the 'Total' row, the average across years is presented

³ Ratio of juvenile to adult Canada Geese banded, recaptured birds are included

⁴ Ratio of juvenile to adult female with brood patch geese banded, recaptured birds are included

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

Appendix B. Atlantic Population Canada Geese banded along Ungava Bay in Nunavik, 1997-2019.

Year	Adults	Juveniles	Total	Recaptures ¹	J:Ad ^{2,3}	J:BP ^{2,4}	No. catches ²	Mean no. geese/catch ^{2,5}
1997	917	1 081	1 998	44	1.12	2.86	22	99
1998	675	1 332	2 007	84	1.75	3.92	23	91
1999	1 039	1 200	2 239	185	0.98	2.67	28	89
2000	1 032	896	1 928	67	0.82	2.37	37	55
2001	943	1 568	2 511	35	1.60	3.09	43	60
2002	1 103	1 541	2 644	61	1.32	3.06	37	75
2003	1 451	2 713	4 164	182	1.66	3.34	49	90
2004	928	766	1 694	98	0.75	2.06	31	59
2005	1 006	1 888	2 894	90	1.72	3.48	34	92
2006	1 234	1 377	2 611	96	1.04	2.15	37	76
2007	1 050	918	1 968	101	0.80	2.10	27	86
2008	1 011	2 223	3 234	106	1.99	4.16	41	83
2009	277	259	536	22	0.87	2.06	11	52
2010	809	1 387	2 196	46	1.62	3.36	32	75
2011	437	646	1 083	42	1.35	2.83	22	51
2012	626	794	1 420	81	1.12	2.22	26	58
2013	849	1 251	2 100	92	1.33	2.60	31	73
2014	1 063	1 635	2 698	71	1.44	2.96	48	58
2015	593	1 119	1 712	56	1.72	3.54	26	66
2016	1 284	1 440	2 724	128	1.02	2.14	35	80
2017	821	1 547	2 368	34	1.81	3.70	29	83
2018	3273	3	3276	136	0.00	0.01	39	88
2019	654	976	1630	91	1.31	2.70	20	86
Total	23 075	28 560	51 635	1 948	1.27	2.76	32	75

¹ Includes birds fitted with a new band (i.e., old band replaced)

² In the 'Total' row, the average across years is presented

³ Ratio of juvenile to adult Canada Geese banded, recaptured birds are included

⁴ Ratio of juvenile to adult female with brood patch geese banded, recaptured birds are included

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

Appendix C. Atlantic Population Canada Geese banded in Nunavik (Hudson Bay and Ungava Bay combined), 1997-2019.

Year	Adults	Juveniles	Total	Recaptures ¹	J:Ad ^{2,3}	J:BP ^{2,4}	No. catches
1997	1 272	1 874	3 146	49	1.42	.	54
1998	2 035	3 793	5 828	153	1.73	3.77	86
1999	3 057	4 514	7 571	331	1.33	3.08	161
2000	2 317	2 230	4 547	157	0.90	2.34	117
2001	2 788	5 671	8 459	267	1.86	3.66	126
2002	3 114	4 088	7 202	202	1.23	2.75	147
2003	3 543	6 449	9 992	465	1.61	3.31	137
2004	2 154	2 428	4 582	237	1.02	2.72	99
2005	2 215	3 910	6 125	166	1.64	3.32	125
2006	2 909	4 673	7 582	219	1.49	3.15	133
2007	2 093	2 134	4 227	183	0.94	2.33	109
2008	2 180	4 289	6 469	204	1.80	3.65	108
2009	1 390	1 540	2 930	83	1.05	2.44	89
2010	1 824	2 775	4 599	128	1.42	3.11	116
2011	1 013	1 116	2 129	74	1.03	2.22	64
2012	1 429	2 138	3 567	137	1.37	2.65	73
2013	1 688	2 052	3 740	155	1.11	2.34	80
2014	1 773	2 345	4 118	128	1.23	2.63	90
2015	1 314	1 851	3 165	107	1.30	2.82	66
2016	1 922	2 074	3 996	167	0.99	2.09	72
2017	1 503	2 601	4 104	50	1.67	3.37	69
2018	3808	30	3838	148	0.01	0.08	48
2019	1359	1874	3233	103	1.28	2.58	50
Total	48 700	66 449	115 149	3 915	1.28	2.75	97

¹ Includes birds fitted with a new band (i.e., old band replaced)

² In the 'Total' row, the average across years is presented

³ Ratio of juvenile to adult Canada Geese banded, recaptured birds are included

⁴ Ratio of juvenile to adult female with brood patch geese banded, recaptured birds are included

Appendix D. Direct recoveries and direct recovery rate (%) of Canada Geese banded in northern Québec, from 1997-98 to 2018-19¹ (recoveries as of 15 July 2019; from GameBirds, BBL).

Year	Adults						Juveniles							
	n banded	Canada		USA		Total		n banded	Canada		USA		Total	
		n	%	n	%	n	%		n	%	n	%	n	%
1997-98	1 272	0	0.00	3	0.24	3	0.24	1 874	2	0.11	6	0.32	8	0.43
1998-99	2 035	1	0.05	9	0.44	10	0.49	3 793	5	0.13	18	0.47	23	0.61
1999-00	3 057	10	0.33	21	0.69	31	1.01	4 514	46	1.02	29	0.64	75	1.66
2000-01	2 317	12	0.52	19	0.82	31	1.34	2 230	12	0.54	15	0.67	27	1.21
2001-02	2 788	10	0.36	67	2.40	77	2.76	5 671	47	0.83	194	3.42	241	4.25
2002-03	3 114	29	0.93	103	3.31	132	4.24	4 088	47	1.15	127	3.11	174	4.26
2003-04	3 543	46	1.30	115	3.25	161	4.54	6 449	81	1.26	114	1.77	195	3.02
2004-05	2 154	38	1.76	98	4.55	136	6.31	2 428	36	1.48	133	5.48	169	6.96
2005-06	2 215	31	1.40	92	4.15	123	5.55	3 910	97	2.48	231	5.91	328	8.39
2006-07	2 909	35	1.20	82	2.82	117	4.02	4 673	86	1.84	233	4.99	319	6.83
2007-08	2 093	24	1.15	69	3.30	93	4.44	2 134	29	1.36	88	4.12	117	5.48
2008-09	2 180	28	1.28	84	3.85	112	5.14	4 289	85	1.98	248	5.78	333	7.76
2009-10	1 390	17	1.22	44	3.17	61	4.39	1 540	18	1.17	45	2.92	63	4.09
2010-11	1 824	11	0.60	83	4.55	94	5.15	2 775	54	1.95	189	6.81	243	8.76
2011-12	1 013	12	1.18	31	3.06	43	4.24	1 116	25	2.24	39	3.49	64	5.73
2012-13	1 429	15	1.05	51	3.57	66	4.62	2 138	50	2.34	115	5.38	165	7.72
2013-14	1 688	26	1.54	71	4.21	97	5.75	2 052	35	1.71	146	7.12	181	8.82
2014-15	1 773	23	1.30	67	3.78	90	5.08	2 345	49	2.09	87	3.71	136	5.80
2015-16	1 314	19	1.45	62	4.72	81	6.16	1 851	43	2.32	90	4.86	133	7.19
2016-17	1 922	29	1.51	92	4.79	121	6.30	2 074	31	1.49	138	6.65	169	8.15
2017-18	1 503	34	2.26	74	4.92	108	7.19	2 601	87	3.34	193	7.42	280	10.77
2018-19	3 808	120	3.15	132	3.47	252	6.62	30	0	0.00	0	0.00	0	0.00

¹Table excludes native harvest from James Bay, Nunavik, northern Ontario, Labrador, and Nunavut.