

# The Canadian Field-Naturalist

Volume 119, Number 4

October–December 2005

## Breeding and Non-Breeding Range of Canada, *Branta canadensis*, and Cackling Geese, *Branta hutchinsii*, in the Eastern Canadian Arctic

MARK L. MALLORY<sup>1,3</sup>, ALAIN J. FONTAINE<sup>1</sup>, and HUGH BOYD<sup>2</sup>

<sup>1</sup> Canadian Wildlife Service, P.O. Box 1714, Iqaluit, Nunavut X0A 0H0 Canada

<sup>2</sup> Canadian Wildlife Service, National Wildlife Research Centre, Carleton University (Raven Road), Ottawa, Ontario K1A 0H3 Canada

<sup>3</sup> Corresponding author: mark.mallory@ec.gc.ca; phone: (867) 975-4637

Mallory, Mark L., Alain Fontaine, and Hugh Boyd. 2005. Breeding and non-breeding range of Canada, *Branta canadensis*, and Cackling Geese, *Branta hutchinsii*, in the eastern Canadian Arctic. *Canadian Field-Naturalist* 119(4): 483-489.

The accepted breeding distribution of Canada Geese from the Atlantic Population (*Branta canadensis interior*) in the eastern Canadian Arctic is currently confined to northern Québec and the south coast of Baffin Island. Here we provide evidence based on observations from scientific studies, Inuit hunters, and territorial Wildlife Officers that *B. c. interior* now breeds in growing numbers 500 km farther north on northeastern Baffin Island than previously reported. Cackling Geese (*B. hutchinsii*), which breed more widely across eastern Arctic Canada, to about 72°N, may also be increasing there. Moreover, individuals of both species are seen occasionally as far north as Ellesmere Island in small flocks and within migrating or moulting flocks of Snow Geese (*Chen caerulescens*) or Brant (*B. bernicla hrota*), though none of these far northern stragglers are known to have bred. Whether these observations reflect a recent range expansion or improved distributional knowledge from more intensive recent survey efforts remains unknown.

Key Words: *Branta canadensis*, Canada Goose, *Branta hutchinsii*, Cackling Goose, breeding, distribution, Arctic

Our knowledge of the distribution of breeding birds in the Canadian Arctic is based largely on reports from early explorers (e.g., Parry 1824; Nansen 1897), from initial scientific survey efforts (e.g., Duvall and Handley 1948\*; Ellis and Evans 1960; Manning 1976), and from more recent aerial reconnaissance (e.g., Nettleship 1974; McLaren 1982; Gaston et al. 1986). Some long-term studies have also provided insights into annual variation in species that breed in certain areas (e.g., Gaston and Ouellet 1997; Lepage et al. 1998). While many gaps in our knowledge of breeding bird distributions in the Arctic remain, it is now clear that distributions of some birds in the Arctic are changing. For example, Snow Goose (*Chen caerulescens*) colonies have expanded markedly in the past 30 years; breeding now occurs in new areas or at higher densities than previously recorded, in some cases seriously degrading habitats (Mowbray et al. 2000). Ross's Geese (*Chen rossii*) now breed farther east in Nunavut and in greater numbers than they did 20 years ago (Ryder and Alisauskas 1995). In addition, satellite telemetry has shown that some Canada Geese (*Branta canadensis*) use southeastern Baffin Island as a stop-over point en route to their breeding areas in Greenland (Scribner et al. 2003).

The breeding distribution of different populations of Canada Geese in the eastern Canadian Arctic has recently undergone extensive review (Dickson 2000a; Canadian Wildlife Service Waterfowl Committee 2003; Boyd and Dickson in Kear 2004). Even more recently, the American Ornithologists' Union (Banks et al. 2004) decided to split Canada Geese into two species, separating the small Cackling Geese, *B. hutchinsii*, from the larger forms of *B. canadensis*. Two breeding populations of these types of similar geese can be commonly found north of 60° in eastern Nunavut. In the Kivalliq region and around Foxe Basin, the Tallgrass Prairie Population dominates, which is principally composed of Cackling Geese (Bellrose 1980; Dickson 2000b). Some of the Atlantic Population geese (mostly *B. c. interior*, a larger race of Canada Goose) that breed in northern Québec may breed in southwestern Baffin Island. Although the North Atlantic Population (*B. c. canadensis*, also a larger race of Canada Goose) breeds in northern Labrador, it is not reported to breed on Baffin Island. To the east across Baffin Bay, Canada Geese breeding in western Greenland are morphologically and genetically similar to the Atlantic population (Fox et al. 1996; Scribner et al. 2003).

We have combined breeding range data from a variety of sources in Figure 1 to show the current, accepted, northern portion of the breeding distribution of Canada and Cackling geese (Bellrose 1980; Reed et al. 1980; Godfrey 1986; Dickson 2000b; Mowbray et al. 2002). Godfrey (1986) mentioned that some geese were thought to breed on the Cumberland Peninsula, without confirmation. This note deals chiefly with new information on the distribution and probable range expansion of the Atlantic Population of *B. c. interior* into the eastern Canadian Arctic islands. It has also moved into west Greenland, where its numbers have grown rapidly in the last 30 years (Fox et al. 1996; Malecki et al. 2000; Scribner et al. 2003). This new information suggests that current range maps require revision.

## Methods

Much of the information on the breeding range of Canada and Cackling geese reported here came from Inuit hunters, including verified data from the five-year Nunavut Wildlife Harvest Study (Priest and Usher 2004). This harvest study required hunters to identify the number, location and date of animals (in this case, geese and/or eggs) harvested, and these records were subsequently verified by field technicians. These results were then summarized and published (Priest and Usher 2004), such that results for a community represent harvest in that year within the hunting region around that area. Other data were also collected as part of local ecological knowledge studies focused on various subjects during discussions with Inuit hunters and Wildlife Resource Officers in communities along Baffin Bay (e.g., Mallory et al. 2003). Local knowledge has proven to be an effective means of examining wildlife distributions in the Arctic, as Inuit are keen observers of their environment (Gilchrist et al. 2005\*).

The other main sources of data were incidental observations by MLM and AJF in the course of ground- and boat-based surveys of other migratory bird species between 2000 and 2004 (Fontaine et al. 2001; Mallory et al. *in review*). Scattered published and unpublished materials collected by other biologists during non-systematic aerial surveys of the Queen Elizabeth Islands and coastlines of Lancaster and Jones Sound in 1968-1969 and 1971 amplify some of those records (e.g., Heyland and Boyd 1969\*; HB). In these cases, "large" or "small" geese were typically identified by the relative size of their head and neck, or their body size in relation to nearby birds (e.g., Snow Geese). There have been no systematic surveys to determine the distribution of Canada or Cackling geese in the eastern Canadian Arctic. However, portions of the breeding population have been assessed directly (e.g., Malecki and Trost 1990), as part of colony surveys for Snow Geese (D. Caswell, personal communication), or in some other bird survey projects (e.g., Johnston et al. 2000).

## Results

### *Reports by Inuit hunters*

In discussions with hunters in eastern Nunavut, we received reports on Canada Geese near various communities. Hunters in Iqaluit (63°45'N 68°30'W) have observed increases in the number of large Canada Geese upon islands and hillsides of Frobisher Bay. In Pangnirtung (66°30'N 66°W), Inuit hunters and National Park wardens stated that numbers of geese in Cumberland Sound have increased dramatically since the 1970s, and that some birds breed in the area, often at eider colonies. Further north, hunters from Qikiqtarjuaq (67°30'N, 64°W) told us about harvesting adult geese and their eggs near Cape Searle (67°14'N, 62°28'W) and Reid Bay (66°56'N, 61°46'W), the same area where we observed breeding geese during our field studies (below). At Clyde River (70°45'N, 68°W), local hunters observe and harvest medium to large-sized geese. In Arctic Bay (73°02'N, 85°10'W), hunters shoot adult small geese, presumably *B. hutchinsii*, but local breeding has not been confirmed, although Cackling Geese do breed near southern Admiralty Inlet (Figure 1).

Results from the Nunavut Wildlife Harvest Study support the local ecological knowledge shared with us by Inuit hunters. Between 1996 and 2001, adult geese (apparently large geese, hence Canada Geese) were harvested by hunters from the communities of Iqaluit, Pangnirtung, Qikiqtarjuaq, Clyde River, Pond Inlet, Resolute Bay, and Grise Fiord (Figure 1; Priest and Usher 2004). Harvest of Canada Geese was not reported at Grise Fiord between 1956 and 1972 (Riewe 1977). The magnitude of the annual harvest decreases as one moves north from Iqaluit to Resolute, with approximately 350 Canada Geese harvested each year among these communities (Priest and Usher 2004). An estimated 350 Canada Goose eggs are collected annually among residents of Iqaluit, Pangnirtung, Qikiqtarjuaq and Clyde River (Priest and Usher 2004), confirming breeding near these communities.

### *Other observations of breeding Canada Geese*

During surveys of breeding marine birds along the coastline of Frobisher Bay and Cumberland Sound in August 2000, Canada Geese were seen frequently in lowland arctic meadows and on grassy hillsides facing the coast (Fontaine et al. 2001), many of them with young of the year (J. A. Akearok, personal communication). In other breeding bird surveys along the north shore of Frobisher Bay in July 2001 and 2002, numerous other flocks of adults, as well as paired nesting Canada Geese were observed (MLM). In June 2000 to 2004, numerous small flocks of paired birds with no young were observed near the Iqaluit airport and in nearby inland valleys. Hence, geese in the Frobisher Bay area appear to be a mix of breeding birds, failed breeders and moult migrants, all of medium to large races.

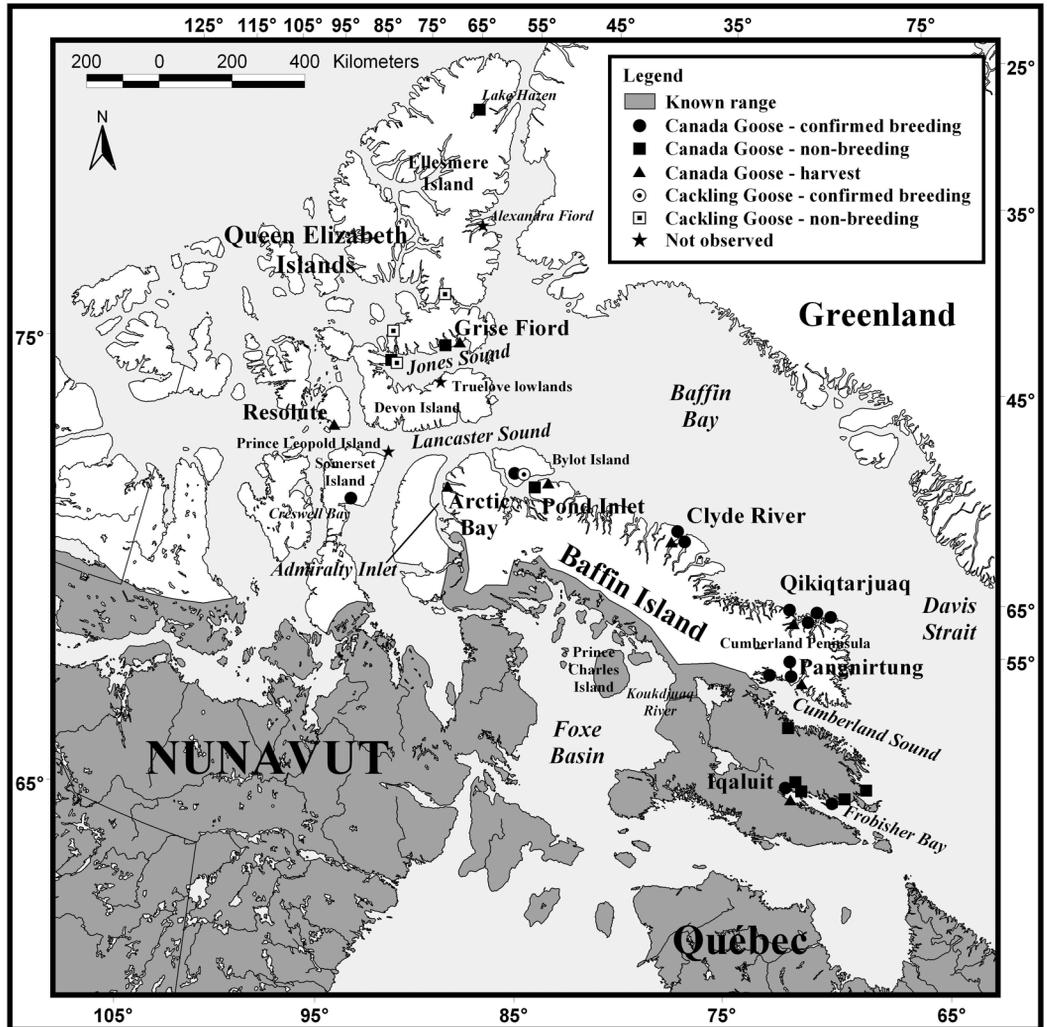


FIGURE 1. Known range (shaded) and new location observations (dots) of Canada (*Branta canadensis*) and Cackling geese (*Branta hutchinsii*) in eastern Nunavut, Canada. The existing range represents a composite of information from a variety of published sources. Note that solid triangles for Canada Goose harvest include harvest of adults and/or eggs, and do not differentiate between Canada Geese and Cackling Geese.

On 11-14 June 2001, we also observed approximately 50 nesting Canada Geese on the northern Cumberland Peninsula near Merchants Bay (67°20'N, 62°30'W). Inuit at a local outpost camp had been harvesting Canada Goose eggs for a week; there were at least 12 eggs in a bucket at the camp on 11 June. Another 18 pairs of breeding geese were seen on 7 June 2002 on nearby Qaulluit Island (67°12'N, 62°33'W). During the trips from Qikiqtarjuaq to Qaulluit Island, other Canada Geese were often flushed from heath slopes and lowlands along the 100-km route. All the geese in this region were large, suggesting *B. c. interior* affinities.

On southern Bylot Island (73°N, 78°W), J. D. Heyland (personal communication) found nesting geese each year from 1969-1971. Most of them were small, apparently Cackling Geese, but in 1970 a larger pair bred successfully (JDH and HB). A photograph taken before 1937 at Pond Inlet shows a local Inuit woman with Snow Geese and one Cackling Goose harvested nearby (A. Reed, personal communication). Lepage et al. (1998) saw flocks of small, Cackling Geese on Bylot Island almost every year between 1979 and 1997, and confirmed breeding on three occasions. They also saw five larger birds that they suggested were *B. c. interior*. C. Machtans flushed a Canada Goose of un-

recorded size off a nest containing four eggs on 28 June 1997 at Creswell Bay (72°50'N, 93°11'W) on Somerset Island (C. Machtans, unpublished data). Its mate was in the vicinity and other geese (approximately four) were also observed but details concerning breeding status were not recorded.

Cackling or Canada geese were seen in appreciable numbers along the east and west coasts of Foxe Basin in 1979 (Reed et al. 1980), but not on the islands in the Basin. In 1987 and 1988, small numbers of medium-sized geese bred on Rowley Island (69°N, 78°W; Boyd 1989). The parents of one brood were noticeably larger than those of a second brood. As none were caught and measured, it was not possible to determine the species involved. In 1989, at least five pairs of small geese (*B. hutchinsii*) were seen at nests in the northwest of Prince Charles Island (Boyd 1999).

#### *Adult Cackling and Canada geese in the Queen Elizabeth Islands*

A flightless dark goose was seen among a flock of 20 flightless Snow Geese at the north end of Vendom Fiord, Ellesmere Island (77°40'N, 82°30'W) on 26 July 1968, and another in a flock of 70 Snow Geese on a small lake near Goose Fiord (76°57'N, 88°45'W), on 8 August 1971 (HB). They were smaller than the Snow Geese, suggesting *B. hutchinsii*. No Canada Geese were seen on extensive aerial surveys of Devon and Ellesmere islands, nor along the coast of northwestern Greenland, in 1969.

On 10 June 2003, a single, large race Canada Goose was photographed with a flock of Eastern High Arctic Brant (*B. bernicla hrota*) at Cape Vera, northern Devon Island (76°15'N, 89°15'W). Two days later, another single goose was photographed at this site, again within a flock of Brant, but on this occasion the bird was clearly a Cackling Goose (AJF). This bird stayed at the site for over a week and was attempting to establish a pair bond with one of the Brant. Two more Canada Geese were observed at Cape Vera in 2004, one single bird on 30 May and another on 7 June. Unfortunately, no data on size or flock association were recorded.

In Quttinirpaaq National Park on northern Ellesmere Island, park wardens report having seen Canada Geese of unknown size in the vicinity of Lake Hazen (81°47'N, 71°03'W): one lone bird on 3 June 2001 and another on 1 July 2002.

Interestingly, Duvall and Handley (1948\*) recorded no Canada Geese in southwestern Ellesmere Island in 1947, and Prach (1986\*) reported none in five years of study at Cape Vera between 1980 and 1984. Nor were any Canada Geese observed during long-term studies on Prince Leopold Island (74°N, 90°W) from 1988 to 2004 (Nettleship et al. 1990; A. J. Gaston, personal communication), during aerial marine surveys in 1977 in Lancaster Sound (Nettleship and Gaston 1978), during ecological research studies in the True-love Lowlands on northeastern Devon Island (75°41'N, 84°35'W) in 1966-1969 and 1971-1974 (Hussell and

Holroyd 1974; Pattie 1977), nor at Alexandra Fiord on eastern Ellesmere Island (78°53'N, 75°55'W) in annual studies since 1982 (G. Henry, personal communication).

#### Discussion

Dickson (2000b:12) noted that "As a species, *Branta canadensis* is doing well and increasing rapidly in abundance and range". The new reports and observations presented here suggest that indeed the known breeding range of the Canada Goose in the eastern Canadian Arctic should be revised and extended at least 500 km further north along the northeast coast of Baffin Island from currently published limits.

The breeding range of *B. c. interior* has long been known to extend to the south coast of Baffin Island (Palmer 1976; Bellrose 1980). We suspect that geese breeding along the eastern Baffin Island coast are all larger race, probably part of the Atlantic (*B. c. interior*) population, given that this population migrates through this region to Greenland (Scribner et al. 2003). Canada Geese reported breeding on Bylot Island (Lepage et al. 1998) are thought to include both Atlantic Population geese as well as Cackling Geese, the latter presumably of the Tallgrass Prairie Population known to breed in central Nunavut and on western Baffin Island around Foxe Basin. Geese breeding in Creswell Bay are most likely from the latter population. The Tallgrass Prairie Population is believed to be increasing and these breeding records extend their range by a distance of about 300 km to the north and 200 km to the northeast (Dickson 2000b).

Given that Canada Geese were encountered along many hillsides in Frobisher Bay and south from Qikiqtarjuaq during our surveys, it is likely that the distribution of geese along the eastern coast of Baffin Island is sparse and fragmented at least as far north as Clyde River. The numbers breeding along the coast north of Clyde River will likely never become large, because the Arctic Cordillera holds only a few small pockets of potential feeding sites for geese, on wet meadows at the inner ends of fiords. The greatest scope for further expansion may lie in the west of Baffin Island, especially in the lakes and marshes of the Gifford River basin (70°30'N, 84°W), where Greater Snow Geese began to breed in the 1980s, after using it as a moulting area since at least the 1960s. That area, outside the usual range of Inuit goose hunters, though visited by them in winter, has not been searched for geese for many years. Moreover, Canada Geese have been observed as far north as northern Ellesmere Island, and thus non-breeders may inhabit suitable habitats across the coastal areas of Ellesmere, Devon and northern Baffin islands.

It is likely that some Canada Geese have frequented these areas for many years, at least as non-breeding or moulting birds, as suggested by some earlier survey efforts and by Inuit hunters who have reported seeing

increases in the number of Canada Geese in the past 30 years. Because much of this area was glaciated as recently as 4000 years ago, Canada Geese probably were not in the area until long after the last glacial period (Dickson 2000b). Suitable breeding habitat is patchily distributed along eastern Baffin Island, as much of the region is part of the Arctic Cordillera and supports limited, suitable vegetation for goose forage. The goose habitat is probably similar to Greenland, where Canada Geese are distributed in areas with low snow cover and where snow disappears first in the spring (Malecki et al. 2000).

Why then have goose numbers increased in these regions? Although many Canada Goose populations in North America are steadily increasing, trends in population size for the Atlantic and North Atlantic Populations have highly fluctuated in recent years (Dickson 2000b). The Atlantic Population of *B. c. interior*, which is doubtfully distinguishable based on morphology from the North Atlantic Population (*B. c. canadensis*) breeding chiefly in Labrador, decreased from an estimated 120 000 breeding pairs in 1988 to about 30 000 pairs in 1995. When that decrease became obvious on its wintering range, chiefly in and around Maryland, the American hunting season was closed for several years, and the season and bag limit in southern Québec and Ontario were reduced. Those measures resulted in a rapid recovery of the breeding population and its expansion to around 160 000 breeding pairs in 2002 and 2003 (CWS 2003), at which time hunting restrictions were relaxed. That expansion seems to have fuelled the growth of the breeding population in the Kangerlussuaq region (67°N, 50°W) of western Greenland which has been growing since the 1970s (Kristiansen et al. 1999), to now more than 2600 pairs (Malecki et al. 2000). Intuitively, it would appear that this expansion may account for the recent increase on Baffin Island as well. It is also possible that the moult migrations from increasing goose populations in areas in the south have led to the initiation of breeding in new areas in the Arctic (Mowbray et al. 2002). Still, our recent investigation did not allow us to determine whether the observed extension of breeding range represents a recent expansion, or rather a more complete record based on more intensive research along this coast in the past decade. Irrespective of the cause, it is clear that Canada Geese breed much further north on eastern Baffin Island than previously reported in the literature.

Cackling Geese breed abundantly on the Great Plain of the Koukdjuak (66°N, 73°W), where many have been banded in recent years (K. M. Dickson, personal communication), and have been seen in many other parts of Baffin Island, especially on the west side, north at least to Bernier Bay (71°N, 88°W). The Tall Grass Prairie Population, to which these birds belong, defies enumeration at any stage of its annual life cycle. It

migrates through central North America to winter in south-west Texas and north-east Mexico, passing through staging areas used by many other populations, so that it is hard to tell how its numbers may be changing. *B. hutchinsii* was first found breeding in west Greenland in 1914, but has since done so irregularly and in small numbers (Salomonsen 1967). It seems to have been greatly outnumbered there by *B. c. interior* during the latter's recent expansion (Boertmann 1994). Whether *B. hutchinsii* and *B. c. interior* can share the same breeding areas is not clear.

The distribution and abundance of various waterbirds in Nunavut are changing. Inuit hunters are providing important observations on these changes that have subsequently been confirmed by scientific surveys (e.g., Robertson and Gilchrist 1998; Mallory et al. 2003). While much of our evidence is presently circumstantial, the observations and oral reports documented here lay the baseline for directed surveys to confirm distributional extensions. Continued efforts on gathering local ecological knowledge as well as scientific surveys need to be continued and expanded if these changes are not only to be detected but explained.

### Acknowledgements

Field studies presented here received financial and logistic support from Environment Canada, the Nunavut Wildlife Management Board, and the Polar Continental Shelf Project. Thanks to the Resource Officers in each of the communities for verifying information, D. Caswell, T. Gaston, D. Haché, G. Henry, D. Heyland, D. Luukkonen, C. Machtans, R. Malecki, and A. Reed for providing unpublished data, and K. Dickson, A. Erskine and an anonymous referee for comments on the manuscript.

### Documents Cited (marked \* in text)

- Duval, A. J., and C. O. Handley. 1948. Second wildlife reconnaissance of the eastern arctic. Unpublished report, Canadian Wildlife Service, Yellowknife, Northwest Territories.
- Gilchrist, H. G., M. L. Mallory, and F. R. Merkel. 2005. Can traditional ecological knowledge contribute to wildlife management? Case studies of migratory birds. *Ecology and Society* 10: 20 [online] URL: <http://www.ecologyandsociety.org/vol10/iss1/art20/>
- Heyland, J. D., and H. Boyd. 1969. An aerial reconnaissance of the eastern Canadian Arctic, 20-29 July 1969, in search of Greater Snow Geese. Unpublished report, Canadian Wildlife Service, Iqaluit, Canada.
- Prach, R. W. *Editor*. 1986. Cape Vera polynya project. Unpublished report, Canadian Wildlife Service, Iqaluit, Canada.

### Literature Cited

- Banks, R. C., C. Cicero, J. L. Dunn, A. W. Kratter, P. C. Rasmussen, J. V. Remsen, J. D. Rising, and D. F. Stotz. 2004. Forty-fifth supplement to the American Ornithology

- gists' Union Check-list of North American Birds. *Auk* 121: 985-995.
- Bellrose, F. C.** 1980. Ducks, geese and swans of North America, third edition. Stackpole Books, Harrisburg, Pennsylvania.
- Boertmann, D.** 1994. A annotated checklist to the birds of Greenland. *Meddelelser om Grønland Bioscience* 38: 1-63.
- Boyd, H.** 1989. Geese on Rowley Island, NWT, in 1987 and 1988. *Canadian Wildlife Service Progress Notes* 181: 1-6.
- Boyd, H.** 1999. Tolling by breeding Brent and small Canada Geese. *Wildfowl* 50: 195-197.
- Canadian Wildlife Service Waterfowl Committee.** 2003. Population Status of Migratory Game Birds in Canada: November 2003. *Canadian Wildlife Service Migratory Birds Regulatory Report Number 10*, Environment Canada, Ottawa.
- Dickson, K. Editor.** 2000a. Towards conservation of the diversity of Canada Geese (*Branta canadensis*). *Canadian Wildlife Service Occasional Paper 103*, Environment Canada, Ottawa.
- Dickson, K.** 2000b. The diversity of Canada Geese. Pages 11-24 in *Towards conservation of the diversity of Canada Geese (Branta canadensis)*. Edited by K. Dickson. *Canadian Wildlife Service Occasional Paper 103*, Environment Canada, Ottawa.
- Ellis, D. V., and J. Evans.** 1960. Comments on the distribution and migration of birds in Foxe Basin, Northwest Territories. *Canadian Field-Naturalist* 74: 59-70.
- Fontaine, A. J., M. L. Mallory, H. G. Gilchrist, and J. Akearok.** 2001. Coastal survey of eiders and other marine birds along the Hall Peninsula, southeast Baffin Island, Nunavut. *Canadian Wildlife Service Technical Report 366*, Environment Canada, Iqaluit.
- Fox, A. D., C. Glahder, C. R. Mitchell, D. A. Stroud, H. Boyd, and J. Fikke.** 1996. North American Canada Geese (*Branta canadensis*) in West Greenland. *Auk* 113: 231-233.
- Gaston, A. J., and H. Ouellet.** 1997. Birds and mammals of Coats Island, N.W.T. *Arctic* 50: 101-118.
- Gaston, A. J., R. Decker, F. G. Cooch, and A. Reed.** 1986. The distribution of larger species of birds breeding on the coasts of Foxe Basin and northern Hudson Bay, Canada. *Arctic* 39: 285-296.
- Godfrey, W. E.** 1986. *The birds of Canada*, Revised Edition. National Museums of Canada, Ottawa.
- Hussell, D. J. T., and G. L. Holroyd.** 1974. Birds of the True-love Lowland and adjacent areas of northeastern Devon Island, N.W.T. *Canadian Field-Naturalist* 88: 197-212.
- Johnston, V. H., C. L. Gratto-Trevor, and S. T. Pepper.** 2000. Assessment of bird populations in the Rasmussen Lowlands. *Canadian Wildlife Service Occasional Paper Number 101*.
- Kear, J. Editor.** 2004. *The Family Anatidae*. Oxford University Press, London.
- Kristiansen, J. N., A. D. Fox, and N. S. Jarrett.** 1999. Resightings and recoveries of Canada Geese *Branta canadensis* ringed in West Greenland. *Wildfowl* 50: 199-203.
- Lepage, D., D. N. Nettleship, and A. Reed.** 1998. Birds of Bylot Island and adjacent Baffin Island, Northwest Territories, Canada, 1979 to 1997. *Arctic* 51: 125-141.
- 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.
- Malecki, R. A., A. D. Fox, and B. D. J. Batt.** 2000. An aerial survey of nesting Greater White-fronted and Canada Geese in West Greenland. *Wildfowl* 51: 49-58.
- Mallory, M. L., H. G. Gilchrist, A. J. Fontaine, and J. A. Akearok.** 2003. Local ecological knowledge of ivory gull declines in Arctic Canada. *Arctic* 56: 293-298.
- Mallory, M. L., A. J. Fontaine, J. A. Akearok, and V. H. Johnston.** *In review*. Synergy of local ecological knowledge, community involvement, and scientific study to develop marine wildlife areas in eastern Arctic Canada. *Ocean and Coastal Management*.
- Manning, T. H.** 1976. Birds and mammals of the Belcher, Sleeper, Ottawa, and King George Islands, NWT. *Canadian Wildlife Service Occasional Paper 28*, Environment Canada, Ottawa.
- McLaren, P. L.** 1982. Spring migration and habitat use by seabirds in eastern Lancaster Sound and western Baffin Bay. *Arctic* 35: 88-111.
- Mowbray, T. B., F. Cooke, and B. Ganter.** 2000. Snow Goose (*Chen caerulescens*). *In The Birds of North America*, number 514. Edited by A. Poole and F. Gill. The Academy of Natural Sciences, Philadelphia, and the American Ornithologists' Union, Washington, D.C.
- Mowbray, T. B., C. R. Ely, J. S. Sedinger, and R. E. Trost.** 2002. Canada Goose (*Branta canadensis*). *In The Birds of North America*, number 682. Edited by A. Poole and F. Gill. The Academy of Natural Sciences, Philadelphia, and the American Ornithologists' Union, Washington, D.C.
- Nansen, F.** 1897. *Farthest North (2 Volumes)*. Constable, London.
- Nettleship, D. N.** 1974. Seabird colonies and distribution around Devon Island and vicinity. *Arctic* 27: 95-103.
- Nettleship, D. N., and A. J. Gaston.** 1978. Pelagic distribution of seabirds – Western Lancaster Sound and Barrow Strait. *ESCOM Report number AI-09*, Environment Canada, Ottawa.
- Nettleship, D. N., J. W. Chardine, E. P. Huyck, and W. W. Lidster.** 1990. Field investigation of seabirds at Prince Leopold Island, Lancaster Sound, Northwest Territories, 1988. *Canadian Wildlife Service Technical Report 97*, Environment Canada, Ottawa.
- Palmer, R. S. Editor.** 1976. *Handbook of North American Birds. Volume 2 Waterfowl (first part)*. Yale University Press, New Haven & London.
- Parry, W. E.** 1824. *Journal of a Second Voyage for the Discovery of a North-West Passage from the Atlantic to the Pacific*. London.
- Pattie, D. L.** 1977. Population levels and bioenergetics of Arctic birds on Truelove Lowland. Pages 413-436 in *Truelove Lowland, Devon Island, Canada*. Edited by L. C. Bliss. University of Alberta Press, Edmonton, Alberta.
- Priest, H., and P. J. Usher.** 2004. *The Nunavut Wildlife Harvest Study, August 2004*. Nunavut Wildlife Management Board, Iqaluit.
- Reed, A., P. Dupuis, K. Fischer, and J. Moser.** 1980. An aerial survey of breeding geese and other wildlife in Foxe Basin and northern Baffin Island, Northwest Territories, July 1979. *Canadian Wildlife Service Progress Note 114*, Environment Canada, Ottawa.
- Riewe, R. R.** 1977. The utilization of wildlife in the Jones Sound region by the Grise Fiord Inuit. Pages 623-644 in *Truelove Lowland, Devon Island, Canada*. Edited by L. C. Bliss. University of Alberta Press, Edmonton, Alberta.

- Robertson, G. J., and H. G. Gilchrist.** 1998. Evidence of population declines among common eiders breeding in the Belcher Islands, Northwest Territories. *Arctic* 51: 378-385.
- Ryder, J. P., and R. T. Alisauskas.** 1995. Ross' Goose (*Chen rossii*). In *The Birds of North America*, number 514. Edited by A. Poole and F. Gill. The Academy of Natural Sciences, Philadelphia, and the American Ornithologists' Union, Washington, D.C.
- Salomonsen, F.** 1967. Fuglene på Grønland. Rhodos, København. 342 pp. [English translation of waterbird chapters by R. G. B. Brown, for Atlantic Region, Canadian Wildlife Service, 1982].
- Scribner, K. T., R. A. Malecki, B. D. J. Batt, R. L. Inman, S. Libants, and H. H. Prince.** 2003. Identification of source population for Greenland Canada Geese: genetic assessment of a recent colonization. *Condor* 105: 771-782.

Received 14 December 2004

Accepted 15 September 2005