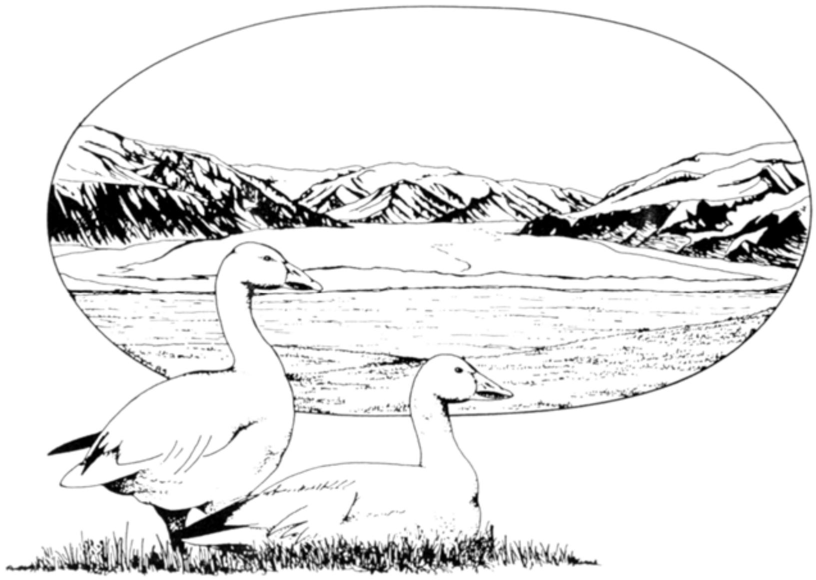
POPULATION STUDY OF GREATER SNOW GEESE AND ITS NESTING HABITAT ON BYLOT ISLAND, NUNAVUT IN 2011: A PROGRESS REPORT



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INTRODUCTION

In 2011, we continued our long-term study of the population dynamics of Greater Snow Geese (*Chen caerulescens atlantica*) and of the interactions between geese, plants and their predators on Bylot Island. Like many other goose populations worldwide, Greater Snow Geese have increased considerably during the late XXth century. The exploding population has imposed considerable stress on its breeding habitat, while extensive use of agriculture lands provides an unlimited source of food during winter and migratory stopovers for them. Remedial management during autumn, winter and spring has been undertaken since 1999 in Canada and 2009 in the United States to curb the growth of this population. A synthesis report produced in 2007 evaluated the initial success of these special conservation measures. However, the Action Plan released in 2006 by the Canadian Wildlife Service called for a continued monitoring of the dynamic of this population and of its habitats. In response to those needs, the long-term objectives of this project are to (1) study changes in the demographic parameters of the Greater Snow Goose population, and especially the effects of the spring conservation harvest, (2) determine the role of food availability and predation in limiting annual production of geese, and (3) monitor the impact of grazing on the Arctic vegetation.

OBJECTIVES

Specific goals for 2011 were as follows:

1) Monitor productivity (egg laying date, clutch size and nesting success) of Greater Snow Geese on Bylot Island.
2) Mark goslings in the nest to provide a sample of known-age individuals to be used to assess the growth of goslings by their recapture in late summer.
3) Band goslings and adults, and neck-collar adult females at the end of the summer to continue the long-term study of demographic parameters such as survival and breeding propensity.
4) Monitor the abundance of lemmings and study their demography.
5) Monitor the breeding activity of other bird species and in particular avian predators (Snowy Owls, jaegers and Glaucous Gulls).
6) Monitor the breeding activity of foxes at dens.
7) Capture and mark adults Arctic Foxes and their pups with ear-tags to study their movements and demography.
8) Sample plants in exclosures to assess annual production and the impact of goose grazing on plant abundance in wet meadows.
9) Maintain our automated environmental and weather monitoring system.

FIELD ACTIVITIES

Field camps. — In 2011, we operated two camps on Bylot Island: the main field station, located at 6 km from the coast in the largest glacial valley on the island (“Qarlikturvik Valley”, 73° 08' N, 80° 00' W), was occupied from 13 May to 21 August. A secondary camp, located in a narrow valley 30 km south of the Base-camp and 5 km from the coast (“Camp-2 area”, 72° 53' N, 79° 54' W) was occupied from 24 May to 19 July (Fig. 1). Finally, sixteen fly camps were also established for 5-13 days at various times throughout the island, west of Pointe Dufour. We also have to report the total loss of our radio repeater station due to a malfunction of the system, which complicated communication among field teams throughout the summer.

Field parties. — The total number of people in both camps ranged from 2 to 17 depending on the period. Members of our field party included project leaders Gilles Gauthier, Joël Bêty, and Dominique Berteaux and several graduate students whose thesis projects addressed many of the objectives mentioned above: Guillaume Souchay (PhD student, objectives 1, 2 and 3), Frédéric Bilodeau (PhD, objective 4) and Sandra Lai (PhD, objectives 6 and 7). Several other students assisted them in the field, including: Arnaud Tarroux, Catherine Baltazar, Patrick Morissette, Patrick Bouchard, Jean-François Guay, Pierre-Yves L’Hérault, Nicolas Trudel, Eeva Soininen, Marie-Ève DeLadurantaye. Other people in the field included Marie-Christine Cadieux, a research professional in charge of goose banding and plant sampling (objectives 3 and 8); Denis Sarrazin, a research professional responsible of the maintenance of the weather stations (objective 9); Christian Marcotte, a wildlife technician from the Canadian Wildlife Service (Quebec region) and Tim Moser, a biologist from the US Fish and Wildlife Service (Minnesota state). Finally, we hired 3 persons from Pond Inlet to work with us: Philip Awa (marking goslings in nests: 4-14 July) Samuel Arreak (goose banding: 6-15 August) and Trevor Arreak (goose banding: 11-15 August).

Several other people also used our camps during the summer. They were Jean-François Lamarre (MSc student), Émilie Chalifour (MSc student), Josée-Anne Otis, Laurence Paquette and Catherine Doucet who studied shorebirds and insects under the supervision of Joël Bêty; the field party of Daniel Fortier (Université de Montréal), which included Stéphanie Coulombe (MSc student) and Michel Paquette (MSc student), who studied the permafrost and the geomorphology of the island; and the field party of Isabelle Laurion (Institut National de la Recherche Scientifique), which included Catherine Girard, Karita Negandhi, Paschale Noël Bégin and Gabrièle Deslongchamps, who studied the carbon cycle in ponds. Finally, several other persons visited our camp during the summer. Gesoni Killiktee (*Sirmilik* JPMC chairman), Moses Koonark (acting mayor) visited the field station; Carey Elverum (manager of *Sirmilik National Park*) and Diane Volker (park warden) inspected both camps; Shelley Elverum (instructor at the Pond Inlet Arctic College) and Matthew Blackman (Parks Canada, Iqaluit) joined our banding team for one day; finally, Eric Solomon (Vancouver Aquarium), and Anne Pélouas (freelance journalist) and Bertrand Lemeunier (photograph), reporting on Canadian Arctic parks and their wildlife, also visited the field station.

Environmental and weather data. — Environmental and weather data continued to be recorded at our four automated stations. Our network includes 3 full stations, two at low and one at high elevation (20 m and 370 m ASL, respectively) where air and ground temperature, air humidity, precipitations, snow depth on the ground, solar radiation, wind speed and direction are recorded on an hourly basis throughout the year (Fig. 1). A fourth station measures soil surface temperature in areas grazed and ungrazed by geese (i.e. exclosures). All automated stations were visited during the summer to download data and were found to be operating normally except for a few sensors that had been damaged overwinter as the air temperature sensor on one station and the two snow depth sensors had been knocked down overwinter, apparently by a polar bear. Daily precipitation was also recorded manually during the summer. Finally, snowmelt was monitored by measuring snow depth at 50 stations along two 250-m transects and by visually estimating snow cover in the Qarlikturvik Valley, both at 2-day intervals.

Monitoring of goose arrival and nesting. — We monitored goose arrival in the Qarlikturvik Valley by counting goose pairs every two to three days from our arrival on the island until the end of snowmelt on sample plots. Nest searches were carried out within walking distance (~6 km) of both the main field station and the Camp-2 between 8 and 18 June. Nests are found by systematic searches conducted over various areas in the field. At Camp-2, where the bulk of the goose colony is located, nest searches are conducted in two ways: 1) over an intensively-studied core area (ca 50 ha) located in the centre of the colony every year, and 2) within a variable number of 1 and 2-ha plots randomly located throughout the colony. Nest density was calculated over a fixed 30-ha area within the intensively-studied core area. We also attempted to find the nests of as many neck-collared females as possible through intensive searches on foot throughout the nesting colony. All nests were revisited at least twice to determine laying date, clutch size, hatching date and nesting success. During the hatching period, we visited a sample of nests almost daily to record hatch dates and to web-tag goslings.

Goose banding. — From 6 to 15 August, we banded geese with the assistance of local Inuit people and a helicopter. Goose flocks of a few hundred birds were rounded up and driven by people on foot into a holding pen made of plastic netting. All captured geese were sexed and banded with a metal band, and all recaptures (web-tagged or leg-banded birds) were recorded. A sample of young and adults was measured (mass and length of culmen, head, tarsus and 9^{th} primary) and some adult females were fitted with coded yellow plastic neck-collars. Finally, we collected some blood samples from adult females during banding to determine if hormone levels could provide an index of the impact of environmental factors on the stress level of molting adults.

Small mammals. — We sampled the annual abundance of lemmings at two sites in the Qarlikturvik Valley (one in wet meadow habitat and one in mesic habitat) and one site at the Camp-2 (mixed habitat) in July using snap-traps. At each site, we used 240 traps set at 80 stations spaced 15-m apart along two to four parallel transect lines 100 m apart and left open for 3 or 4 days. We used Museum Special traps baited with peanut butter and rolled oats. Since 2004, we also sample lemming abundance using live-traps. We trapped on 2 permanent grids (330×330 m) in the Qarlikturvik Valley (one in wet meadow habitat and one in mesic habitat) with 144 traps per grid and on a 3^{rd} grid (270 × 270 m; 100 traps) in mesic habitat where a snow-manipulation experiment was set up in 2007 with snow fences. We used Longworth traps baited with apples and set at each grid intersection every 30-m. We trapped for 3 consecutive days during 3 periods (mid-June, mid-July and mid-August) on each grid. All trapped animals are identified, sexed, weighed and marked with electronic PIT tags (or checked for the presence of such tags). Finally, we sampled the abundance of lemming winter nests along 60 500-m transects randomly distributed in 3 different habitats of the Qarlikturvik Valley: wetlands, mesic tundra and streams in mesic tundra.

Breeding activity of foxes at dens and marking. — All known fox dens located within a 475 km^2 area were visited one to five times during the summer and inspected for signs of use and/or presence of reproductive adults with pups. We attempted to live-trap adults with padded leghold traps at locations where foxes were seen hunting or travelling. At reproductive dens, we noted the species (Arctic Fox, *Vulpes lagopus*, or Red Fox, *Vulpes vulpes*) and minimum litter size, and, whenever possible, we live-trapped pups with Tomahawk® collapsible cage traps. Cage traps were kept under continuous surveillance and leghold traps were visited at least every 6 hours. Captured foxes were measured, weighed and tagged on both ears using a unique set of coloured and numbered plastic tags. In addition, some adult Arctic Foxes were fitted with ARGOS satellites collars. Samples of winter and summer fur, blood, and scats were also collected for genetic and diet analyses.

Monitoring of other bird species. — We monitored the nesting activity of Snowy Owls (*Bubo scandiacus*), Long-tailed and Parasitic Jaegers (*Stercorarius longicaudus* and *S. parasiticus*), Glaucous Gulls (*Larus hyperboreus*), Rough-legged Hawks (*Buteo lagopus*) and Lapland Longspurs (*Calcarius lapponicus*). Nests were found through systematic searches of suitable habitats or opportunistically and revisited to determine their fate (successful or not) until fledging.

Monitoring of plant growth and goose grazing. — The annual plant production and the impact of goose grazing was evaluated in wet meadows dominated by graminoid plants at 2 sites (Fig. 1): the Qarlikturvik Valley (brood-rearing areas), and the Camp-2 area (nesting colony). At each site, 12 exclosures (1 × 1 m) were installed in late June, and plant biomass was sampled in ungrazed and grazed areas (i.e. inside and outside exclosures) at the end of the plant-growing season between 10 and 14 August. Plants were sorted into sedges (*Eriophorum scheuchzeri* and *Carex aquatilis*) and grasses (*Dupontia fisheri*). Use of the area by geese was monitored by counting faeces on 1 × 10 m transects located near each exclosure every 2 weeks in the Qarlikturvik Valley and once at the end of the season at the Camp-2 area.

PRELIMINARY RESULTS

Weather conditions. — Temperature in spring was warm. Air temperature averaged 1.18°C between 20 May and 20 June (1.15°C above normal), which corresponds to the period of goose arrival and egg-laying, and 1.61°C (0.21°C above normal) during 1-15 June, the peak pre-laying and laying periods. The snow pack at the end of winter was relatively thin (snow depth was 24.6 cm on 31 May) and the warm weather in spring resulted in a near-normal snowmelt in the lowlands (Fig. 2). The summer was generally warm and sunny and precipitations were below normal (cumulative rain: 35 mm, long-term average: 89 mm). This summer was the driest recorded since 1995. It is also noteworthy that the past 2 summers (2009 and 2010) were the warmest recorded since the beginning of the study.

Goose arrival and nesting activity. — The number of geese counted on the hills surrounding the Qarlikturvik Valley (main field station), usually the first area used by geese upon arrival, was low at our first count on 2 June (92 pairs) but increased steadily thereafter. Number of geese peaked at 342 pairs on 12 June (Fig. 3). This suggests that goose arrival on Bylot Island was close to normal this year. The subsequent decline in goose numbers was due to the movements of geese to the nesting colony, away from the Qarlikturvik Valley.

Median egg-laying date in the colony was 13 June, which is close to the long-term average egg-laying date on Bylot Island (Table 1). Nest density in the colony was much higher than last year (4.67 nests/ha vs. 2.47 nest/ha in 2010) and above the long-term average. Only 19 nests were found in the Qarlikturvik Valley (predominantly a brood-rearing area) compared to 76 in 2010. Overall, average clutch size was 3.74, which is the long-term average (Table 1).

Nesting success of geese. — Nesting success (proportion of nests hatching at least one egg) was very high this year in the colony (90%, a value well above the long-term average, Table 1). Activity of Arctic Foxes and avian predators around goose nests was relatively low. During the summer, 89 neck-collared birds were sighted, similar to last year (85). Peak hatch was on 8 July, which is close to the long-term average (Table 1). We tagged 1782 goslings in nests at hatch, 1774 in the Camp-2 area and 8 in the Qarlikturvik Valley. Overall, nesting conditions of geese in 2011 were therefore very good.

Density of broods. — In 2011, the density of goose faeces at the end of the summer in wet meadows of the Qarlikturvik Valley was fairly high, especially compared to recent years (6.9 ± 0.8 [SE] faeces/m^2, Fig. 4). Accumulation of faeces began in mid-July, when newly-hatched broods started to move in the valley from the colony further south and increased steadily thereafter until mid- August. Faeces density at the end of the summer was also high in the wet meadows of the nesting colony at Camp-2 (6.3 ± 1.7 faeces/m^2; long-term average: 3.7 ± 0.4).

Goose banding. — The banding operation was successful this year. We conducted 8 drives in our core banding area, i.e. in the lowlands and hills bordering the main field station to the south and north (<8 km), and 3 additional drives further away, between the Camp 2 and the Qarlikturvik Valley. We banded a total of 3802 geese, including 537 adult females marked with neck-collars and 41 young that had been marked with web-tags at hatch. In addition, we had 270 recaptures of adults banded in previous years. The young:adult ratio among geese captured at banding (1.19:1) was similar to last year and above the long-term average (Table 1). In contrast, mean brood size toward the end of brood-rearing (2.80 young, SD = 1.15, n = 147; counts conducted from 30 July to 5 August) was higher than last year and also above the long-term average. By combining information on brood size and young:adult ratio at banding, we estimated that 85% of the adults captured were accompanied by young, a high value. Overall, these results are indicative of a good production of young on Bylot Island by the end of the summer. Finally, we collected 15 blood samples from adult females to examine hormone levels during molt.

Small mammals. — During our survey using snap traps, we cumulated 1439 trap-nights at our 2 trapping sites of the Qarlikturvik Valley from 26 to 31 July, and 960 trap-nights at the Camp-2 from 14 to 17 July. In the Qarlikturvik sites, we caught 27 Brown Lemming (*Lemmus trimucronatus*) and no Collared Lemmings (*Dicrostonyx groenlandicus*), which yielded a combined index of abundance of 2.01 lemmings/100 trap-nights, a high value (Fig. 5). The estimated abundance was similar in the Camp-2 area, as 6 Collared Lemming and 10 Brown Lemmings were caught, for an index of 1.73 lemmings/100 trap-nights. The live-trapping survey conducted throughout the summer in the Qarlikturvik Valley area revealed the same picture. Overall, we captured 431 different lemmings (430 Brown and 1 Collared), including 227 that were captured more than once, for an index of 12.6 lemmings/100 trap-nights (excluding recaptures), a number higher than last year (8.9 lemmings/100 trap-nights). A formal estimation of density using capture-recapture analytical methods indeed showed that the peak of Brown Lemming abundance initiated in 2010 persisted in 2011 whereas Collared, which were extremely abundant in 2010, had disappeared this year (Fig. 6). The number of lemming winter nests found along our transects (n = 60) was also higher than the previous year as 347 were found in 2011 compared to 261 in 2010.

Breeding activity of foxes at dens and marking. — We found 4 new fox dens on the island in 2011, bringing the total to 102 known denning sites still intact. Among these dens, we found signs of activity (fresh digging and/or footprints) at 40 of them, a high number. The breeding activity of foxes reached a record high as we found 28 different litters (31% of known denning sites) of Arctic Foxes, a considerable increase over last year (17 litters found in 2010) and 1 of Red Foxes. This value is higher than the typical proportion of fox dens used in previous years of high lemming abundance (average: 18%). Minimum litter size of Arctic Fox varied between 1 and 14 pups (7 pups on average). A total of 35 adults and 24 juveniles of Arctic Foxes and 2 adults and 3 juveniles of Red Foxes were captured during trapping sessions. Twenty-six of the adult Arctic Foxes captured were new individuals and 9 of them had been marked in previous years. All new individuals were marked with ear-tags. Among the adults captured 33 Arctic Foxes and 2 Red Foxes were also fitted with satellite collars to study their home ranges and movements at large spatial scale over the entire annual cycle.

Monitoring of other bird species. — We found 27 nests of Glaucous Gulls (vs. 25 in 2010), 60 nests of Long-tailed Jaegers (vs. 58 in 2010), 4 nests of Parasitic Jaegers (vs. 3 in 2010), 15 nests of Rough-legged Hawks (vs. 21 in 2010) but no nest of Snowy Owls (vs. 34 in 2010). Except for Snowy Owls, which were conspicuously absent from Bylot Island this summer, predators that typically show a strong numerical response to lemming abundance such as the Rough-legged Hawk and Long-tailed Jaeger were still abundant in 2011. Finally, we found 122 nests of Lapland Longspurs compared to 116 in 2010. Average clutch size was 2.6 eggs for gulls (vs. 2.3 in 2010), 2.0 eggs for jaegers (vs. 2.0 in 2010), 4.5 eggs for hawks (vs. 3.8 in 2010) and 5.4 eggs for longspurs (vs. 5.2 in 2010). Nesting success (proportion of nests successful in fledging at least one young) was high for gulls (89% vs. 88% in 2010), Long-tailed Jaegers (89% vs. 93% in 2010), and moderately high for longspurs (67% vs. 60% in 2010). Success was unknown for Parasitic Jaegers and hawks.

Plant growth and grazing impact. — Plant production in wet meadows of the brood-rearing area was well above the long-term average and was actually the highest value ever recorded at the site (Fig. 7). Above-ground biomass of graminoid plants in the Qarlikturvik Valley reached 73.7 ± 10.0 [SE] g/m^2 in ungrazed areas in mid-August compared to 62.8 ± 11.4 in 2010 (long-term average since 1990: 48.1 g/m^2). At the nesting colony (Camp-2 area), graminoid biomass in 2011 reached a surprisingly high value as it was twice as high than last year (154.6 ± 15.2 vs. 76.4 ± 12.2 g/m^2 in 2010) and more than three times higher than the long-term average (Fig. 8). It is noteworthy that the record primary production detected at Camp-2 this year was entirely due to *Eriophorum* because *Dupontia* biomass did not change much compared to the previous year. This huge increase in *Eriophorum* production was related to a mast flowering because the density of flowers reached 368 flowers/m^2 in 2011, a value 10 times higher than the long-term average at the site (Fig. 9).

Grazing pressure was moderate in the wet meadows of the Qarlikturvik Valley as geese had removed 18% of the above-ground biomass (difference between paired grazed and ungrazed plots) by mid-August (grazing was undetectable in 2010; long-term average: 31%; Fig. 7). As usual, grazing pressure was higher on *Eriophorum* (27% of biomass removed) than on *Dupontia* (8% of biomass removed). At the Camp-2 area (nesting colony), the grazing pressure was very low again this year with only 7% of the graminoid biomass removed by geese, the same as in 2010 (long-term average at this site: 25%; Fig. 8). Geese removed 9% of the *Eriophorum* production at this site whereas no grazing impact was detected for *Dupontia*.

CONCLUSIONS

The production of young geese on Bylot Island was high in 2011 and several factors contributed to this. First, temperature was mild in spring and snow-melt was rapid in early June. These conditions allowed geese to nest near normal dates and to lay a good clutch size. It also appears that the breeding effort of the population was very good as judged by the very high density of nests in the core of the colony. Second, lemming abundance stayed high for a second consecutive summer, even increasing more from last summer values. Consequently, geese experienced a very high nesting success, as is usually the case when lemming abundance is high, because lemmings are the preferred prey of predators such as foxes, gulls and jaegers. Under such conditions, predators prey less on bird eggs as they concentrate their foraging on lemmings. To our surprise, no Snowy Owls nested on Bylot Island last summer despite the high lemming abundance. Therefore, association with Snowy Owls, which exclude other predators from their nest surrounding and provide a predator refuge for geese nesting nearby, was not a factor this year.

Based on the young:adult ratio recorded at banding on Bylot Island, we anticipated a proportion of young in the fall flock around 29%, above the long-term average (23%). This prediction was upheld as the proportion of young measured during juvenile counts conducted in southern Québec this fall was 28% (n = 31,719), very close to our prediction. This suggests that breeding conditions encountered on Bylot Island were fairly representative of those elsewhere in the Eastern Canadian Arctic in 2011 and that weather conditions during the northern part of the fall migration were fairly good. Although we had no ground report from other greater snow goose colony last summer, we had indications that the high abundance of lemmings encountered on Bylot Island was fairly widespread across the Eastern Canadian Arctic, which likely contributed to a high breeding success there as well. The good feeding conditions encountered by geese on Bylot Island last summer (see below) probably also have led to a good body condition of young at fledging, and thus a good survival during the fall migration.

Above-ground plant production in the wet meadows of Bylot Island was exceptionally good in 2011. In the Qarlikturvik Valley, it was the highest value recorded in over 20 years of monitoring, slightly exceeding the previous record set in 2000. This high production is consistent with the long-term trend of increasing plant production that we observed at our site, and is likely due to on-going warming observed on Bylot Island (Gauthier et al. 2011). The last 3 summers in particular were the warmest recorded in the area for the past 3 decades. At the nesting colony (Camp-2), a peculiar situation prevailed in 2011 as above-ground plant production suddenly jumped to a value twice as high as the one recorded in the Qarlikturvik Valley brood-rearing area. This is surprising because over the past decade, plant production at the nesting colony has been on average 40% lower than in the Qarlikturvik Valley. It turns out that the high plant production recorded at the nesting colony was entirely due to a massive flowering by *Eriophorum*, as the abundance of flowers was an order of magnitude higher in 2011 compared to previous years. Because we detected no similar flowering of *Eriophorum* in the Qarlikturvik Valley, local conditions must account for this unusual situation at the nesting colony. A possible explanation is that goose grazing pressure on *Eriophorum* has been relatively light in recent years (2008-2010: 17% on average vs. 38% for 1998-2007; Valery et al. 2010) and especially low in 2010. Because chronic goose grazing reduces below-ground reserves in *Eriophorum* (Beaulieu et al. 1996), this suppresses flowering in most tillers. The decrease in goose grazing pressure at this site in recent years combined to the warm summer temperature that prevailed may have caused this mass flowering. A similar situation was observed in permanent exclosures where goose grazing had been suppressed for several years at the Qarlikturvik Valley (Gauthier et al. 2004). If this is correct, we expect that both flowering and above-ground production of *Eriophorum* should go down at the nesting colony in 2012.

The goose grazing pressure in the Qarlikturvik Valley was moderate in 2011, though higher on *Eriophorum*, their preferred plant, than on *Dupontia*. The very good plant production recorded last summer may have attenuated the impact of geese on the vegetation. At the nesting colony (Camp-2), the grazing pressure was very light, which may not be surprising considering the exceptional production of *Eriophorum* recorded there. These observations, in combination with the long-term increase in plant production that we documented, suggest that, in recent years, climate warming may have had a greater effect on plant production than goose grazing.

PLANS FOR 2012

The long-term objectives of our work are to study the population dynamics of Greater Snow Geese, and the interactions between geese, plants, and their predators on Bylot Island. A major focus of the project is to monitor changes in demographic parameters (such as survival rate, hunting mortality, breeding propensity, reproductive success, and recruitment) and habitat (annual plant production and grazing impact) in response to the spring conservation harvest and other special management actions implemented since 1999 in Canada and since 2009 in the United States. Other aspects of the project include *i*) understanding better the links between events occurring during the spring migration and the subsequent breeding success of geese; *ii*) determining the long-term effects of geese on the arctic landscape; *iii*) expanding our estimate of the carrying capacity of Bylot Island for geese to upland habitats; *iv*) study indirect interactions between snow geese and lemmings via shared predators; *v*) study the ecology of the main predator of geese, Arctic Foxes; *vi*) examine the impact of avian predators on goose reproductive success; and *vii*) study the impact of climate change on goose reproduction and molt. In 2012, we anticipate to:

1) Monitor productivity (egg laying date, clutch size and nesting success) and nesting distribution of Greater Snow Geese on Bylot Island.
2) Mark goslings in the nest to provide a sample of known-age individuals to assess the growth and pre-fledging survival of goslings by their recapture in late summer.
3) Band goslings and adults, and neck-collar adult females at the end of the summer to continue the long-term study of demographic parameters such as survival and breeding propensity.
4) Monitor the level of intestinal parasite infestations in goslings and study their impact on survival.
5) Study factors affecting the molt (chronology, plumage quality) of adults during the summer such as timing of breeding, food availability, body condition and the hormonal status.
6) Monitor the abundance of lemmings and study their demography.
7) Monitor the breeding activity of other bird species, in particular avian predators (Snowy Owls, jaegers, Glaucous Gulls and Rough-legged Hawks).
8) Monitor the breeding activity of foxes at dens and study their movements and demography.
9) Sample plants in exclosures to assess annual production and the impact of goose and lemming grazing on plant abundance in wet meadows.
10) Maintain our automated environmental and weather monitoring system.

In 2012, at least 7 graduate students will be involved in the Bylot Island snow goose project. **Guillaume Souchay** (PhD) will continue his study of spatial variations in snow goose demographic parameters in the High Arctic and the impact of parasites on gosling survival. **Vincent Marmillot** (MSc) will start a study of factors affecting molt in snow geese. **Sandra Lai** (PhD) will continue her study on the annual and seasonal movements of Arctic Foxes around the goose colony using satellite telemetry. **Clément Chevalier** (PhD) will initiate a study of the population dynamic of Arctic Foxes with a special emphasis on annual variation on survival. **Camille Morin** (MSc) will start a study of fox den use. **Dominique Fauteux** (PhD) will initiate a study of the role of predation in the cyclic dynamic of lemming populations. Finally, **Audrey Robillard** (PhD) will start a study on inter-annual movements of predatory birds (primarily Snowy Owls and Long-tailed Jaegers) and habitat use by wintering owls.

Table 1. Productivity data of Greater Snow Geese nesting on Bylot Island over the past decade.

	2002	2003	2004	2005	2006	2007	2008	2009	2010	**2011**	Average[2]
Number of nest monitored	470	585	676	346	393	494	466	405	372	**382**	--
Nest density (nb/ha)	5.17	8.87	1.10	3.90	2.57	3.00	4.34	4.17	2.47	**4.67**	3.52
Median date of egg-laying	16 June	9 June	11 June	12 June	14 June	16 June	10 June	12 June	13 June	**13 June**	12 June
Clutch size	3.43	3.90	3.65	3.60	3.68	3.91	4.10	3.38	3.68	**3.74**	3.71
Nesting success[1]	53%	82%	78%	66%	42%	82%	74%	74%	80%	**90%**	67%
Median date of hatching	11 July	6 July	7 July	8 July	10 July	11 July	6 July	9 July	10 July	**8 July**	9 July
Number of geese banded	2650	5259	3617	5304	4603	4260	3395	5417	4267	**3802**	--
Ratio young:adult at banding	0.81:1	1.31:1	0.94:1	1.03:1	0.74:1	1.11:1	1.11:1	1.07:1	1.18:1	**1.19:1**	1.04:1
Brood size at banding	1.67	2.74	2.50	2.42	2.20	2.90	3.07	2.35	2.39	**2.80**	2.52
Proportion of adults with young at banding	97%	96%	75%	86%	67%	77%	72%	91%	98%	**85%**	83%

[1] Mayfield estimate
[2] Period 1989-2011

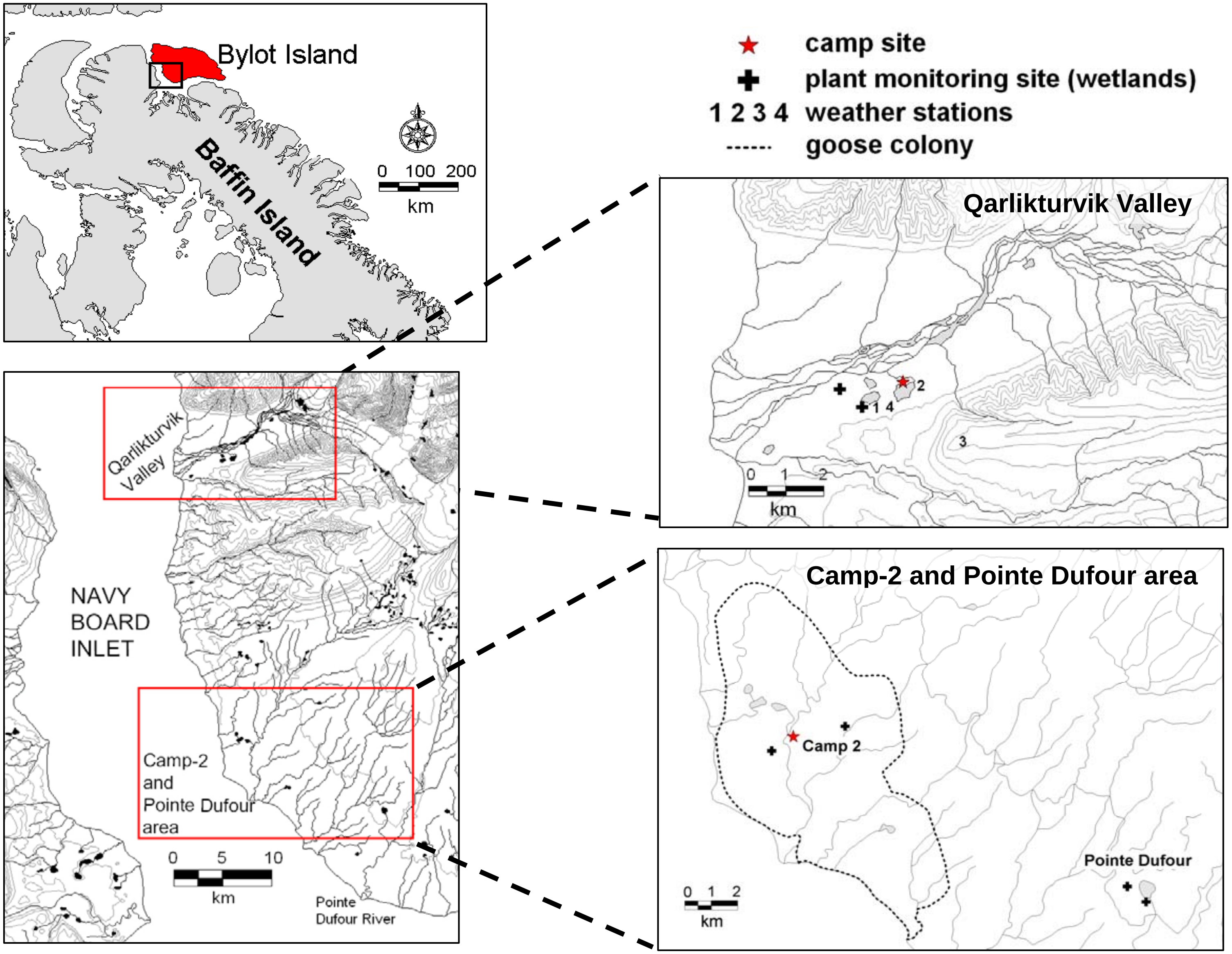

Figure 1. General location of the study area, Bylot Island, Nunavut, and of the two main study sites (Qarlikturvik Valley and the Camp-2 area) on the South plain of the island. Enlarged maps on the right present these study sites in more details, including camp locations, sampling sites and our four weather stations. Pointe Dufour was not sampled in 2011.

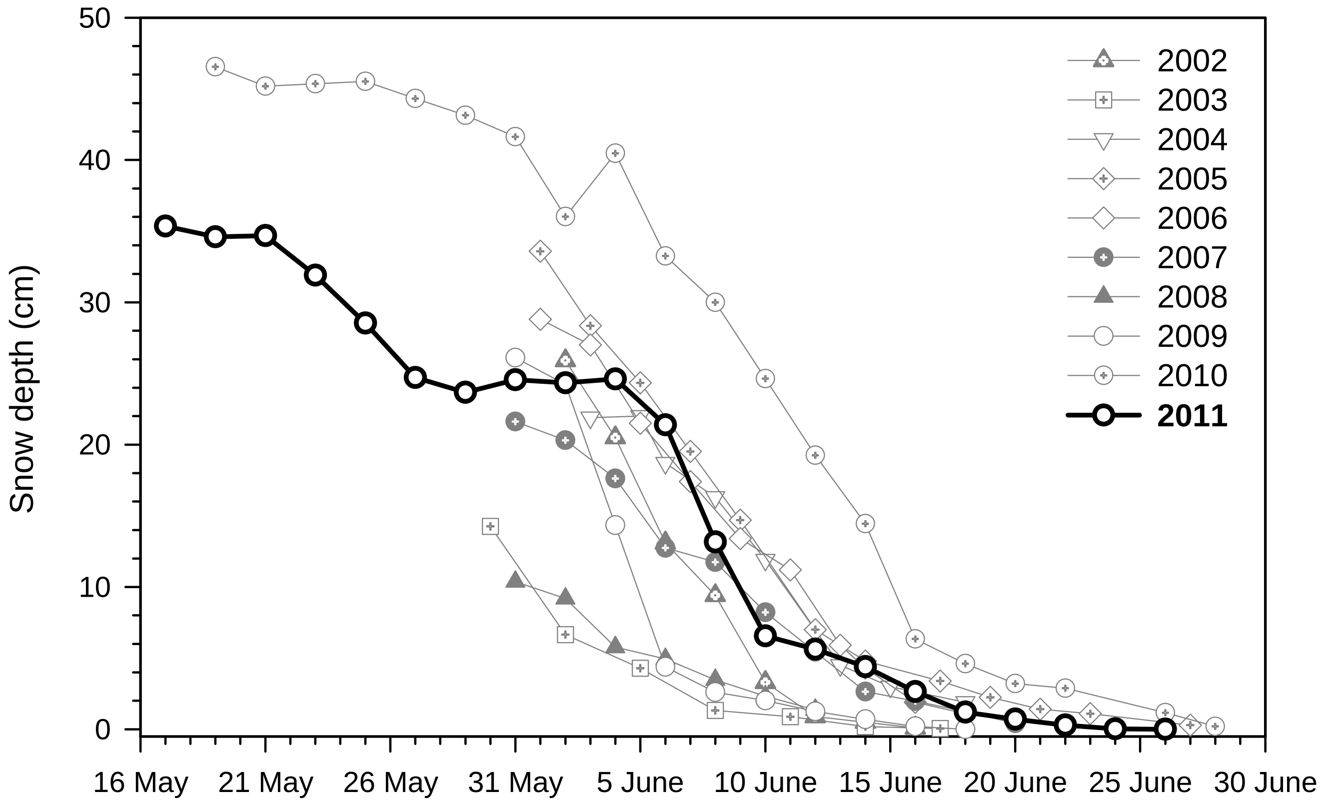

Figure 2. Average depth of snow along 2 transects showing the rate of snowmelt in the lowlands of Bylot Island over the past decade (*n* = 50 stations).

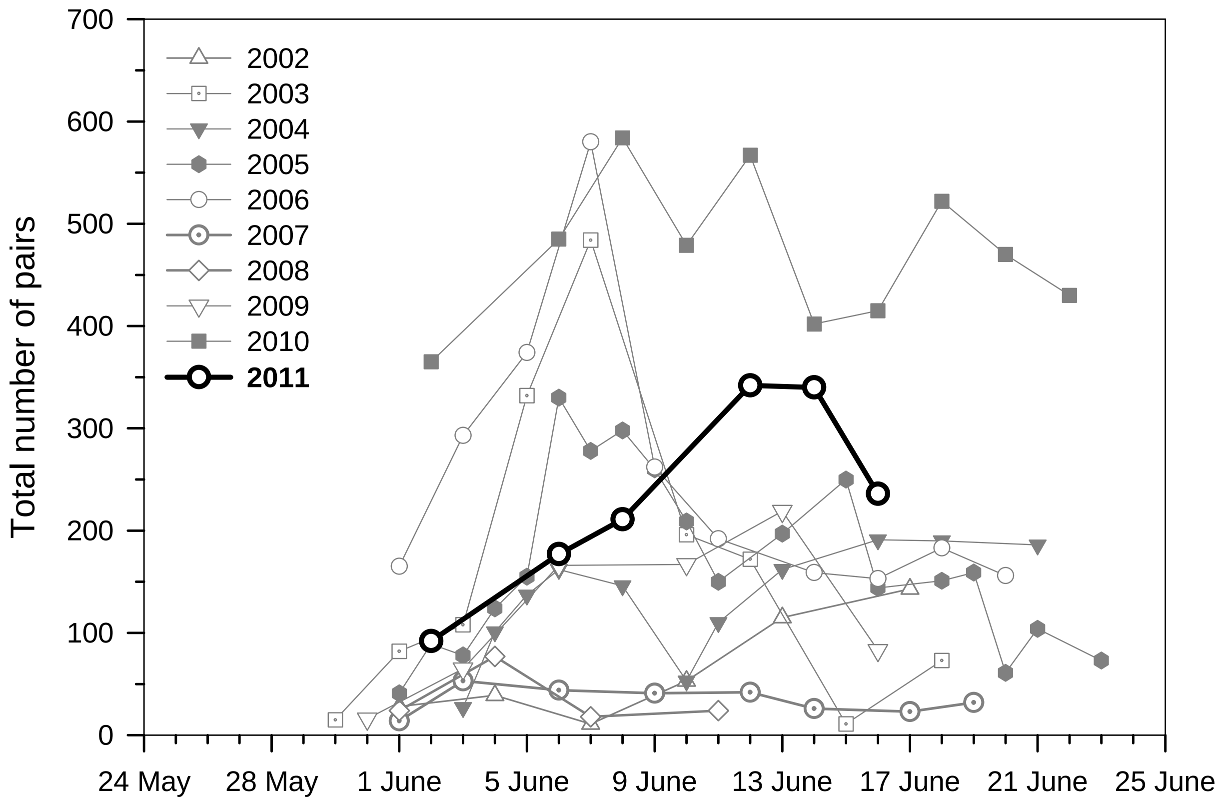

Figure 3. Total number of goose pairs counted in the Qarlikturvik Valley from arrival of our crew on Bylot Island until the end of snowmelt over the past decade.

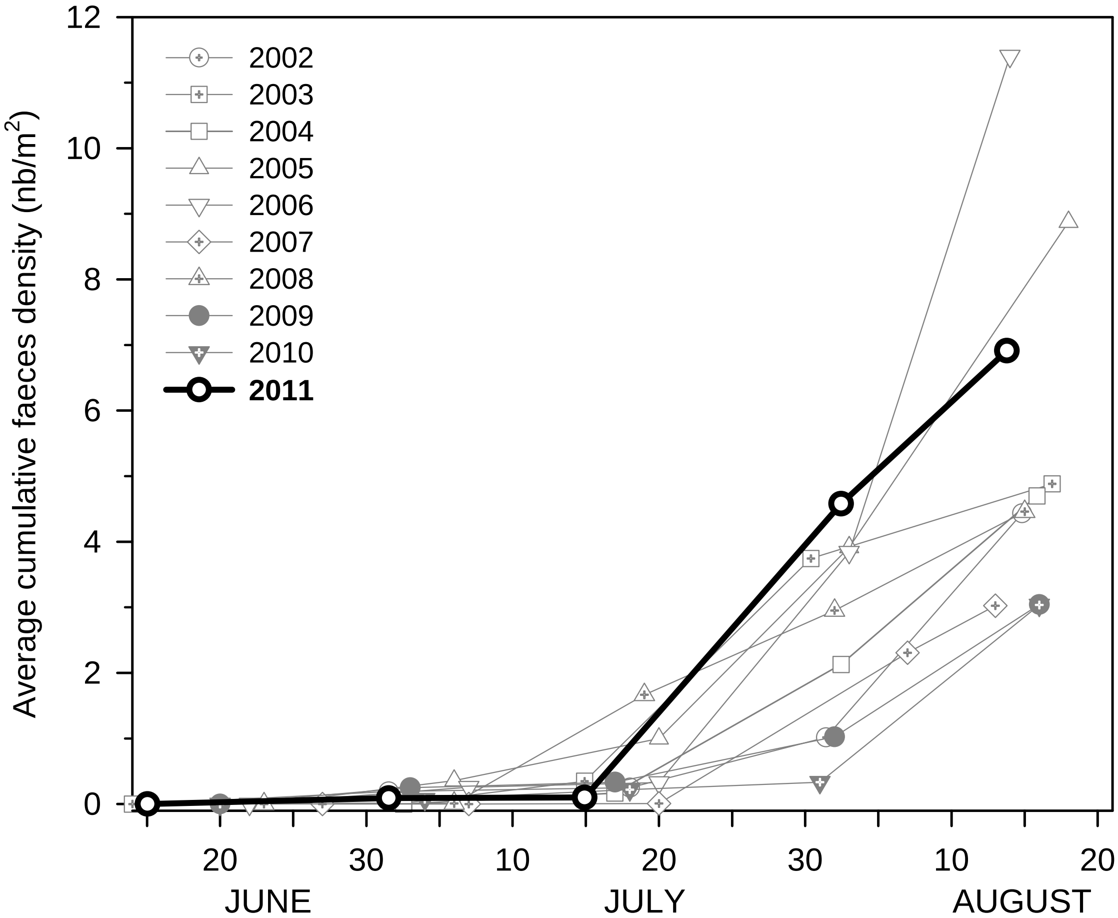

Figure 4. Average cumulative faeces density showing the use of the Qarlikturvik Valley by Greater Snow Goose families on Bylot Island throughout the summer over the past decade (*n* = 12 transects of 1 x 10 m).

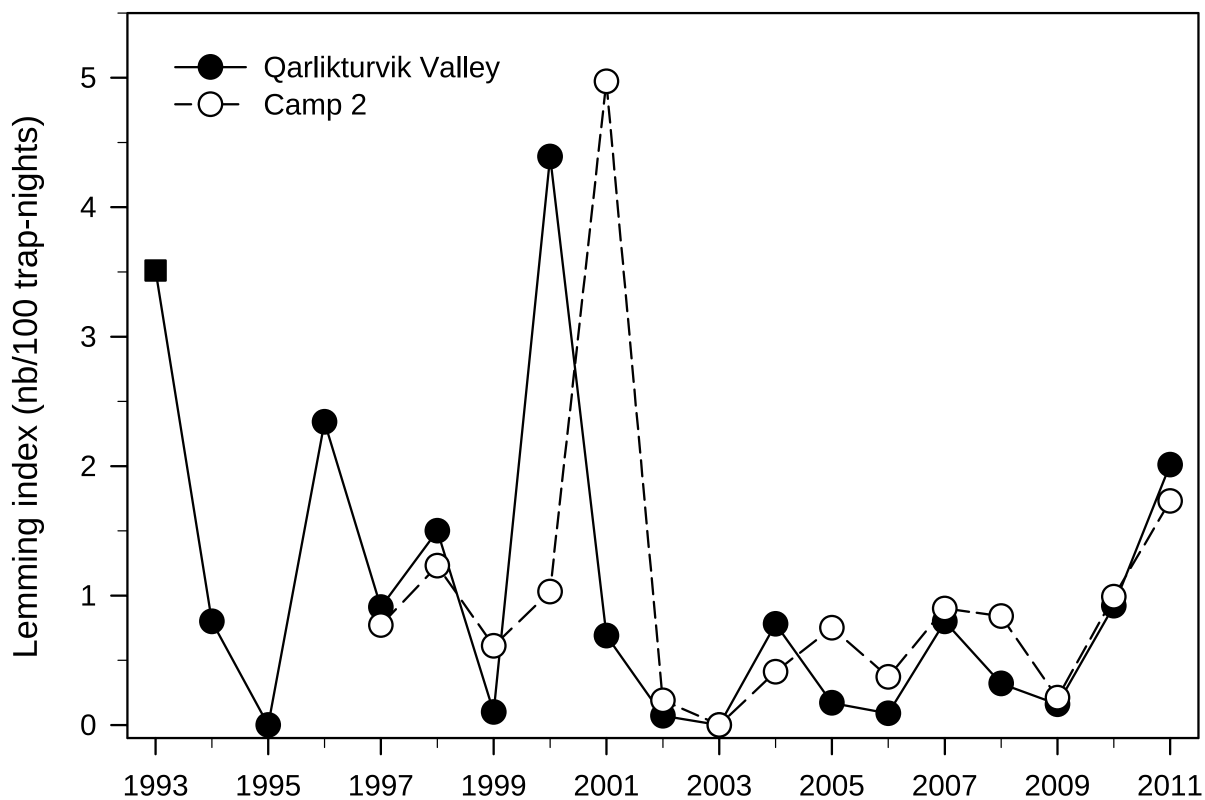

Figure 5. Annual index of lemming abundance at two study areas (Qarlikturvik Valley and Camp 2) located 30 km apart on Bylot Island.

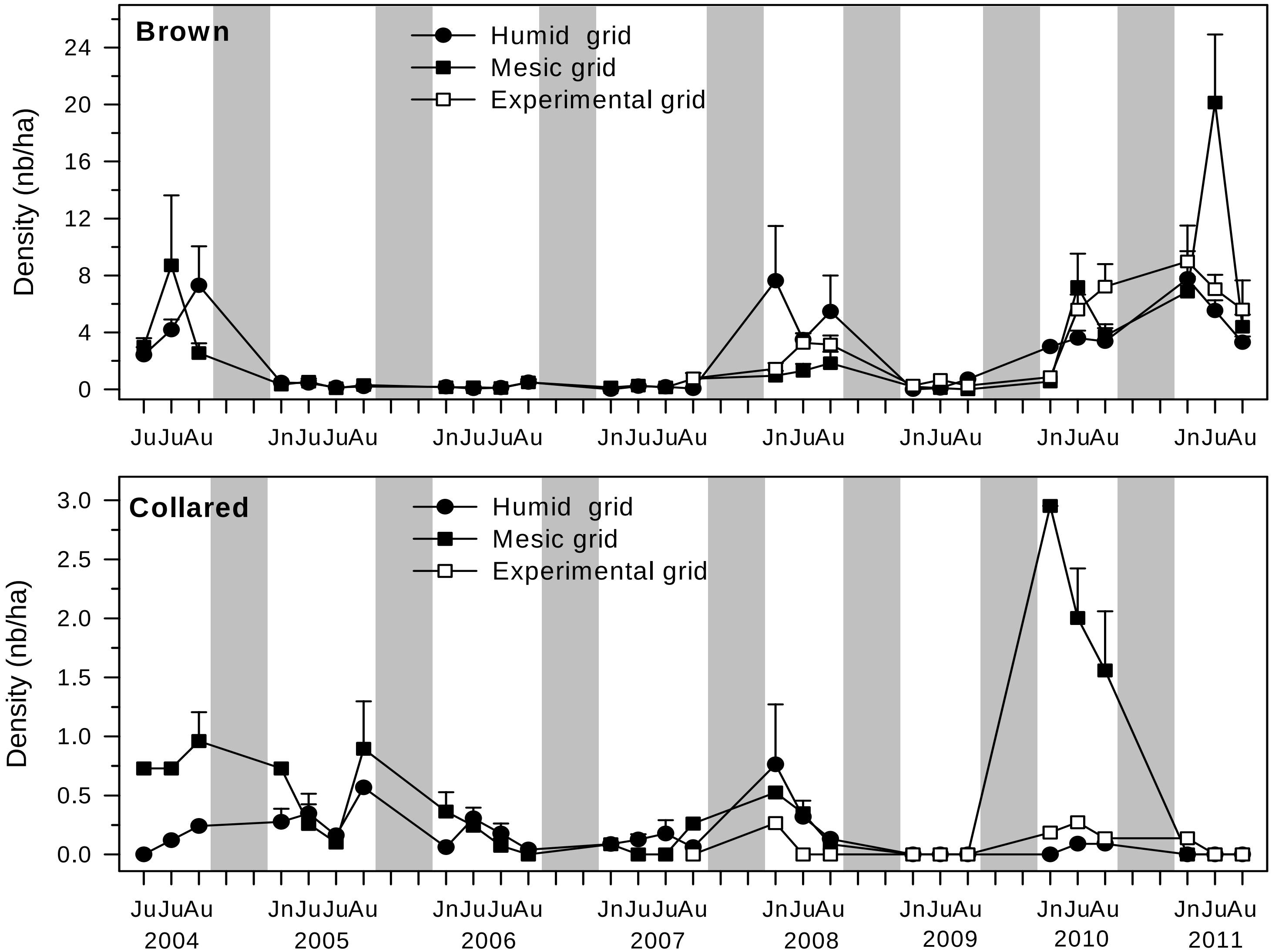

Figure 6. Summer density (+ SE) of Brown and Collared Lemmings on 3 trapping grids located in the Qarlikturvik Valley of Bylot Island (snow cover was increased on the experimental grid). The gray area indicates winter. Jn = mid June, Ju = July (early and late for 2004-2007; mid-July since 2008), Au = mid-August.

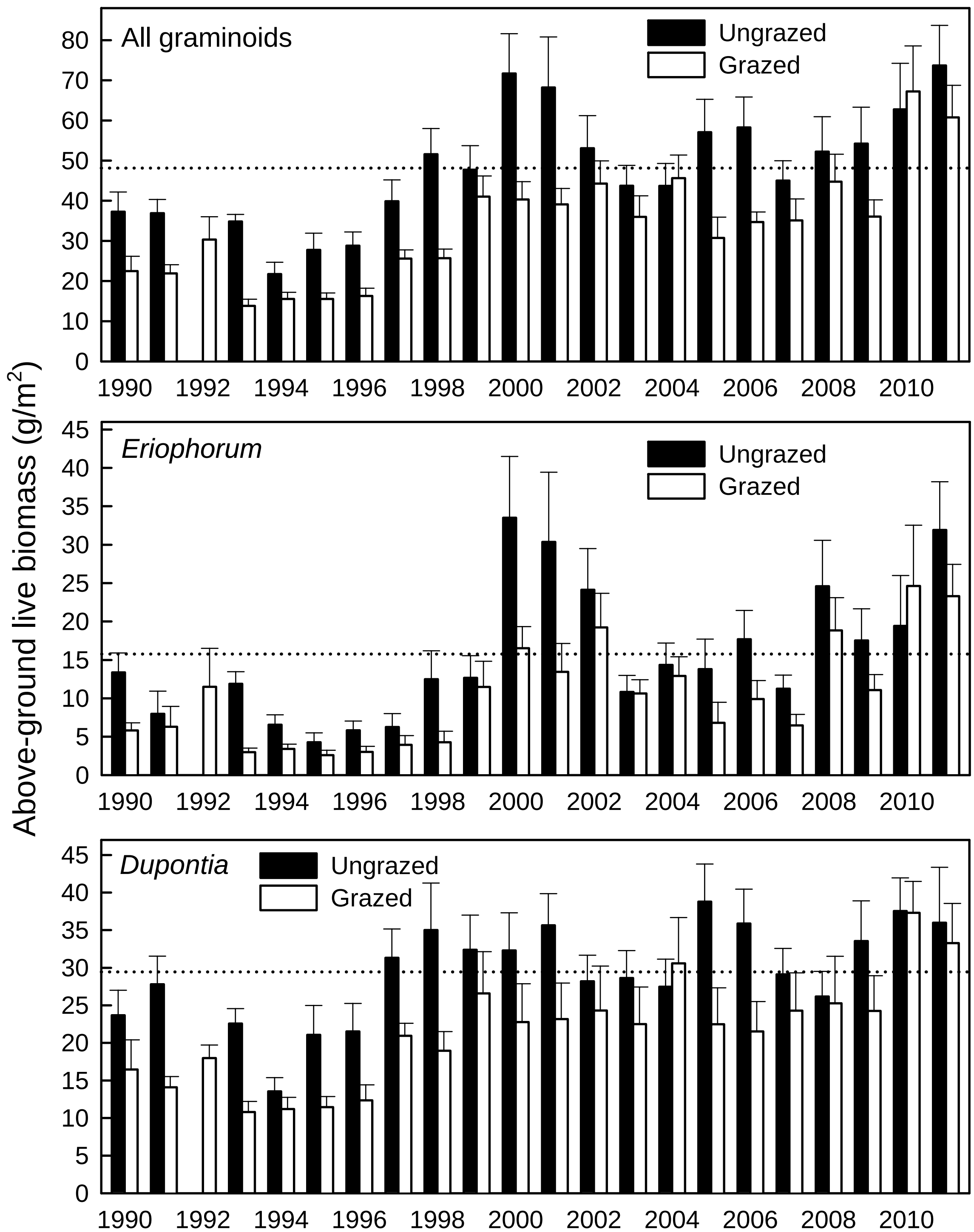

Figure 7. Live above-ground biomass (mean + SE, dry mass) of graminoids between 10 and 13 August in grazed and ungrazed wet meadows of the Qarlikturvik Valley, Bylot Island (n = 12). Total graminoids include *Eriophorum scheuchzeri*, *Dupontia fisheri* and *Carex aquatilis*. There is no data from ungrazed area in 1992. The dashed line is the long-term average for ungrazed area.

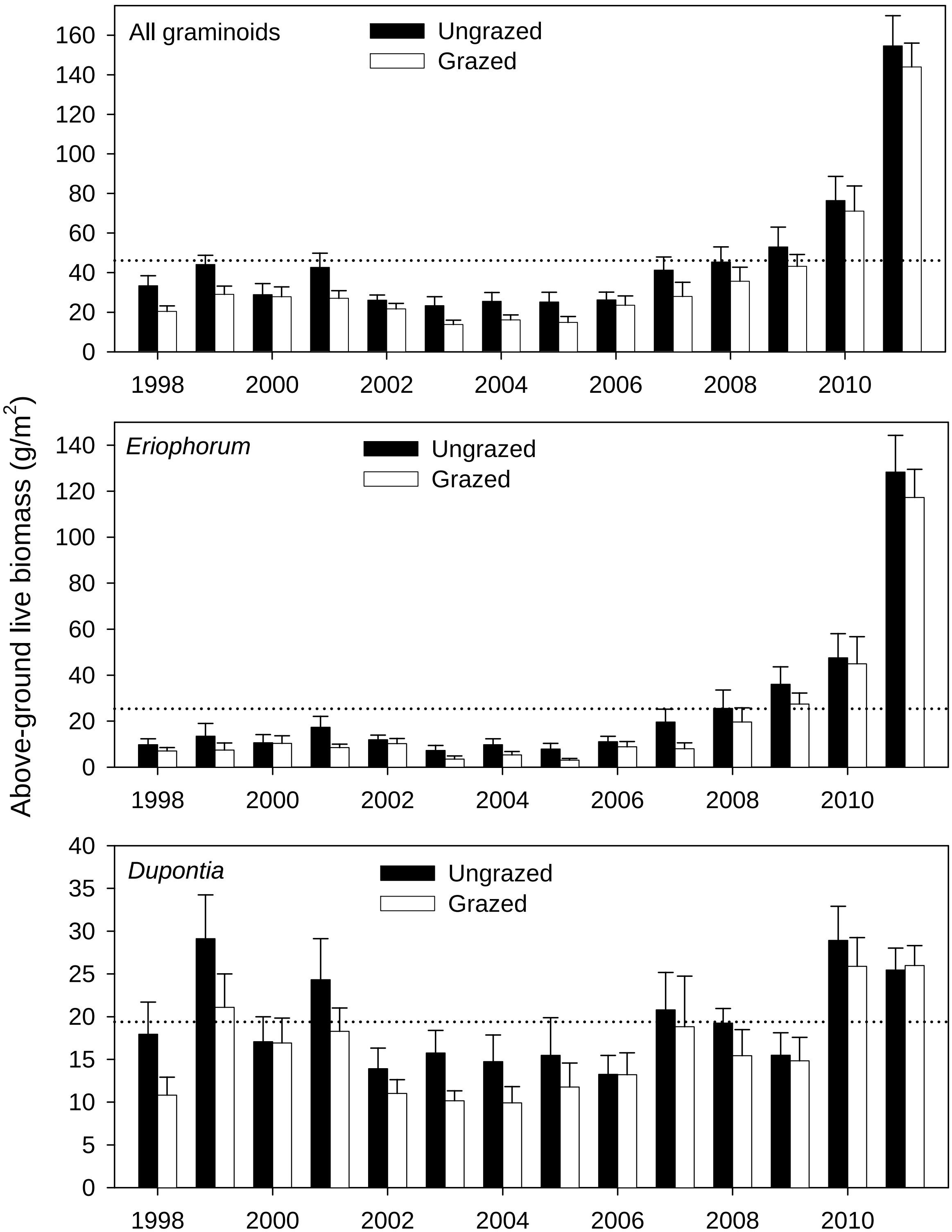

Figure 8. Live above-ground biomass (mean + SE, dry mass) of graminoids on 14 August in grazed and ungrazed wet meadows of the Camp-2 (goose colony), Bylot Island (n = 12, except in 2008 where n = 8). Total graminoids include *Eriophorum scheuchzeri*, *Dupontia fisheri* and *Carex aquatilis*. The dashed line is the long-term average for ungrazed area.

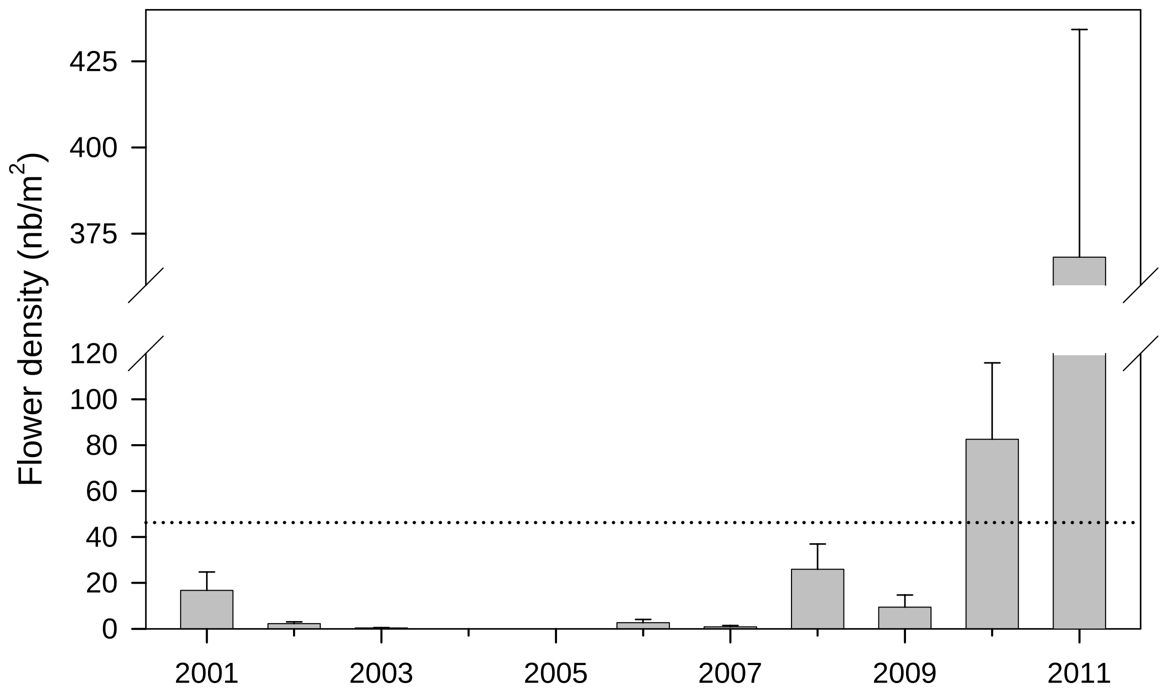

Figure 9. Flower density (mean + SE) of *Eriophorum* in ungrazed wet meadows of the Camp-2 (goose colony), Bylot Island (n = 12, except in 2008 where n = 8). The dashed line is the long-term average.

PUBLICATIONS FROM OUR WORK ON BYLOT ISLAND (1990-2011)

Papers in refereed journals

Legagneux, P., G. Gauthier, D. Berteaux, J. Bêty, M.C. Cadieux, F. Bilodeau, E. Bolduc, L. McKinnon, A. Tarroux, J.-F. Therrien, L. Morissette, & C.J. Krebs. Disentangling trophic relationships in a high arctic tundra ecosystem through food web modeling. **Ecology** (*in press*)

Giroux, M.-A., D. Berteaux, N. Lecomte, G. Gauthier, G. Szor & J. Bêty. Benefiting from a migratory prey: spatio-temporal patterns in subsidization of an arctic predator. **Journal of Animal Ecology** (*in press*).

Reid, D., F. Bilodeau, C.J. Krebs, G. Gauthier, A.J. Kenney, B. S. Gilbert, M.C.Y. Leung, D. Duchesne & E. Hofer. Lemming winter habitat choice: a snow-fencing experiment. **Oecologia** (*in press*).

Cameron. C., D. Berteaux & F. Dufresne. 2011. Spatial variation in food availability predicts extrapair paternity in the arctic fox. **Behavioral Ecology** (*in press*).

Duchesne. D., G. Gauthier & D. Berteaux. 2011. Habitat selection, reproduction and predation of wintering lemmings in the Arctic. **Oecologia** 167:967-980.

Gauthier. G., D. Berteaux, J. Bêty, A. Tarroux, J.-F. Therrien, L. Mckinnon., P. Legagneux & M.-C. Cadieux. 2011. The arctic tundra food web in a changing climate and the role of exchanges between ecosystems. **EcoScience** 18:223-235.

Legagneux, P., P.L.F. Fast, G. Gauthier & J. Bêty. 2011. Manipulating individual state during migration provides evidence for carry-over effects modulated by environmental conditions. **Proceedings of The Royal Society B**, *online doi:10.1098/rspb.2011.1351*.

Therrien, J.-F., G. Gauthier & J. Bêty. 2011. An avian terrestrial predator of the Arctic relies on the marine ecosystem during winter. **Journal of Avian Biology** 42:363-369.

Therrien, J.-F., G. Fitzgerald, G. Gauthier & J. Bêty. 2011. Diet-tissue discrimination factors of carbon and nitrogen stable isotopes in snowy owl blood. **Canadian Journal of Zoology** 89:343-347.

Duchesne, D., G. Gautier & D. Berteaux. 2011. Evaluation of a method to determine the breeding activity of lemmings in their winter nests. **Journal of Mammalogy** 92:511-516.

Therrien, J.-F. 2010. Territorial behavior of Short-eared Owls, *Asio flammeus*, at more than 1000 km north of their current breeding range in north-eastern Canada: evidence of range expansion. **Canadian Field-Naturalist** 124:58-60.

Juillet, C., R. Choquet, G. Gauthier & R. Pradel. 2010. A capture-recapture model with double-marking, live and dead encounters, and heterogeneity of reporting due to auxiliary mark loss. **Journal of Agricultural, Biological and Environmental Statistics** 16:88-104.

Côté, G., R. Pienitz, G. Velle & X. Wang. 2010. Impact of geese on the limnology of lakes and ponds from Bylot Island (Nunavut, Canada). **International Review of Hydrobiology** 95:105-129.

Tarroux, A., D. Berteaux & J. Bêty. 2010. Northern nomads: ability for extensive movements in adult arctic foxes. **Polar Biology** 33:1021-1026.

Tarroux, A., D. Ehrich, N. Lecomte, T.D. Jardine, J. Bêty & D. Berteaux. 2010. Sensitivity of stable isotope mixing models to variation in isotopic ratios: evaluating consequences of lipid extraction. **Methods in Ecology and Evolution** 1:231-241.

Pouliot R., M. Marchand-Roy, L. Rochefort & G. Gauthier. 2010. Estimating moss growth in arctic conditions: a comparison of three methods. **The Bryologist** 113:322-332.

Béchet, A., J.-F. Giroux, G. Gauthier & M. Belisle. 2010. Why roost at the same place? Exploring short-term fidelity in staging snow geese. **Condor** 112:294-303.

Valéry, L., M.-C. Cadieux & G. Gauthier. 2010. Spatial heterogeneity of primary production as both cause and consequence of foraging patterns of an expanding Greater Snow Goose colony. **Ecoscience** 17:9-19.

Morrissette, M., J. Bêty, G. Gauthier, A. Reed & J. Lefebvre. 2010. Climate, indirect trophic interactions, carry-over and density-dependent effects: which factors drive high arctic snow goose productivity? **Oikos** 119:1181-1191.

Gruyer, N., G. Gauthier & D. Berteaux. 2010. Demography of two lemming species on Bylot Island, Nunavut, Canada. **Polar Biology** 33:725-736.

Pouliot R., L. Rochefort, and G. Gauthier. 2009. Moss carpets constrain the fertilizing effects of herbivores on graminoid plants in arctic polygon fens. **Botany** 87:1209-1222

Gagnon, C.A. & D. Berteaux. 2009. Integrating Traditional Ecological Knowledge and Ecological Science: a question of scale. **Ecology and Society** 14, article 19.

Gauthier, G., C.J. Krebs, D. Berteaux & D. Reid. 2009. Arctic lemmings are not simply food limited – a reply to Oksanen et al. **Evolutionary Ecology Research** 11: 483-484.

Lecomte, N., G. Gauthier, J.-F. Giroux, E. Milot & L. Bernatchez. 2009. Tug of war between continental gene flow and rearing site philopatry in a migratory bird: the sex-biased dispersal paradigm reconsidered. **Molecular Ecology** 18:593-602.

Lecomte, N., G. Gauthier, & J.-F. Giroux. 2009. A link between water availability and nesting success mediated by predator-prey interactions in the Arctic. **Ecology** 90:465-475.

Ellis, C.J., L. Rochefort, G. Gauthier & R. Pienitz. 2008. Paleoecological evidence for transitions between contrasting land-forms in a polygon-patterned High Arctic wetland. **Arctic, Antarctic and Alpine Research** 40:624-637.

Careau, V., J.-F. Giroux, G. Gauthier & D. Berteaux. 2008. Surviving on cached food – the energetics of egg-caching by arctic foxes. **Canadian Journal of Zology** 86:1217-1223.

Jasmin, J.N., L. Rochefort & G. Gauthier. 2008. Goose grazing influences the fine-scale structure of an arctic wetland bryophyte community. **Polar Biology** 31:1043-1049.

Dickey M.-H., G. Gauthier, & M.-C. Cadieux. 2008. Climatic effects on the breeding phenology and reproductive success of an arctic-nesting goose species. **Global Change Biology** 14:1973-1985.

Gruyer, N., G. Gauthier & D. Berteaux. 2008. Cyclic dynamics of sympatric lemming populations on Bylot Island, Nunavut, Canada. **Canadian Journal of Zoology** 86:910-917.

Careau, V., N. Lecomte, J. Bêty, J.-F. Giroux, G. Gauthier & D. Berteaux. 2008. Food hoarding of pulsed resources: temporal variations in egg-caching behaviour of arctic fox. **Ecoscience** 15:268-273.

Lecomte, N., V. Careau, G. Gauthier, & J.-F. Giroux. 2008. Predator behaviour and predation risk in the heterogeneous Arctic environment. **Journal of Animal Ecology** 77:439-447.

Gauthier G. & J.-D. Lebreton. 2008. Analysis of band-recovery data in a multisate capture-recapture framework. **Canadian Journal of Statistics** 36:1-15.

Szor, G., D. Berteaux & G. Gauthier. 2008. Finding the right home: distribution of food resources and terrain characteristics influence selection of denning sites and reproductive dens in arctic foxes. **Polar Biology** 31:351-362.

Lecomte, N., G. Gauthier, & J.-F. Giroux. 2008. Breeding dispersal in a heterogeneous landscape: the influence of habitat and nesting success in greater snow geese. **Oecologia** 155:33-41.

Carmichael, L.E., G. Szor, D. Berteaux, M.-A. Giroux, C. Cameron & C. Strobeck. 2007. Free love in the far North: plural breeding and polyandry of arctic foxes (*Alopex lagopus*) on Bylot Island, Nunavut. **Canadian Journal of Zoology** 85:338-343.

Gauthier, G., P.Besbeas, J.-D. Lebreton & B.J.T. Morgan 2007. Population growth in snow geese: A modeling approach integrating demographic and survey information. **Ecology** 88:1420-1429.

Audet, B., E. Lévesque & G. Gauthier. 2007. Seasonal variation in plant nutritive quality for greater snow goose goslings in mesic tundra. **Canadian Journal of Botany** 85:457-462.

Audet, B., G. Gauthier & E. Lévesque. 2007. Feeding ecology of greater snow goose goslings in mesic tundra on Bylot Island, Nunavut, Canada. **Condor** 109:361-376.

Careau, V., J.F. Giroux, & D. Berteaux. 2007. Cache and carry: hoarding behaviour of arctic fox. **Behavioral Ecology and Sociobiology** 62 :87-96.

Careau, V., N. Lecomte, J.F. Giroux, & D. Berteaux. 2007. Common ravens raid arctic fox food caches. **Journal of Ethology** 25:79-82.

Mainguy, J., G. Gauthier, J.-F. Giroux & I. Duclos. 2006. Habitat use and behaviour of greater snow geese during movements from nesting to brood-rearing areas. **Canadian Journal of Zoology** 84:1096-1103.

Mainguy, J., G. Gauthier, J.-F. Giroux & J. Bêty. 2006. Gosling growth and survival in relation to brood movements in Greater Snow Geese (*Chen caerulescens atlantica*). **Auk** 123:1077-1089.

Lecomte, N., G. Gauthier, L. Bernatchez & J.-F. Giroux. 2006. A new non-damaging blood sampling technique of waterfowl embryos. **Journal of Field Ornithology** 77:24-27.

Gauthier, G., F. Fournier & J. Larochelle. 2006. The effect of environmental conditions on early growth in geese. **Acta Zoologica Sinica** 52(supplement):670-674.

Gauthier, G., J.-F. Giroux & L. Rochefort. 2006. The impact of goose grazing on arctic and temperate wetlands. **Acta Zoologica Sinica** 52(supplement):108-111.

Féret M., J. Bety, G. Gauthier, J.-F. Giroux & G. Picard. 2005. Are abdominal profiles useful to assess body condition of spring staging Greater Snow Geese? **Condor** 107:694-702.

Gauthier, G., J.-F. Giroux, A. Reed, A. Béchet & L. Bélanger. 2005. Interactions between land use, habitat use, and population increase in greater snow geese: what are the consequences for natural wetlands? **Global Change Biology** 11:856-868.

Calvert, A.M. & G. Gauthier. 2005. Effects of exceptional conservation measures on survival and seasonal hunting mortality in greater snow geese. **Journal of Applied Ecology** 42:442-452.

Menu, S., G. Gauthier & A. Reed. 2005. Survival of young greater snow geese during the fall migration. **Auk** 122:479-496.

Calvert, A.M., G. Gauthier & A. Reed. 2005. Spatiotemporal heterogeneity of greater snow goose harvest and implications for hunting regulations. **Journal of Wildlife Management** 69:561-573.

Reed, E.T., G. Gauthier & R. Pradel. 2005. Effects of neck bands on reproduction and survival of female greater snow geese. **Journal of Wildlife Management** 69:91-100.

Bêty, J., J.-F. Giroux, & G. Gauthier. 2004. Individual variation in timing of migration: causes and reproductive consequences in greater snow geese (*Anser caerulescens atlanticus*). **Behavioural Ecology and Sociobiology** 57:1-8.

Gauthier,G. & J.-D. Lebreton. 2004. Population models in greater snow geese: a comparison of different approaches. **Animal Biodiversity and Conservation** 27:503-514.

Reed, E.T., G. Gauthier & J.-F. Giroux. 2004. Effects of spring conditions on breeding propensity of greater snow goose females. **Animal Biodiversity and Conservation** 27:35-46.

Béchet, A., J.-F. Giroux, & G. Gauthier. 2004. The effects of disturbance on behaviour, habitat use and energy of spring staging snow geese. **Journal of Applied Ecology** 41:689-700.

Béchet, A., A. Reed, N. Plante, J.-F. Giroux & G. Gauthier. 2004. Estimating the size of large bird populations: the case of the greater snow goose. **Journal of Wildlife Management** 68:639-649.

Gauthier, G., J.-F. Giroux, J. Bêty & L. Rochefort. 2004. Trophic interactions in a High Arctic Snow Goose colony. **Integrative and Comparative Biology** 44:119-129.

Gauthier, G., J. Bêty & K. Hobson. 2003. Are greater snow geese capital breeders? new evidence from a stable isotope model. **Ecology** 84:3250–3264.

Demers, F., J.-F. Giroux, G. Gauthier & J. Bêty. 2003. Effects of collar-attached transmitters on behavior, pair bond, and breeding success of snow geese. **Wildlife Biology** 9:161-170.

Féret, M., G. Gauthier, A. Béchet, J.-F. Giroux & K. Hobson. 2003. Effect of a spring hunt on nutrient storage by greater snow geese in southern Québec. **Journal of Wildlife Management** 67:796-807.

Béchet, A., J.-F. Giroux, G. Gauthier, J.D. Nichols & J. Hines. 2003. Spring hunting changes the regional movements of migrating greater snow geese. **Journal of Applied Ecology** 40:553-564.

Bêty, J., G. Gauthier, & J.-F. Giroux. 2003. Body condition, migration and timing of reproduction in snow geese: a test of the condition-dependent model of optimal clutch size. **American Naturalist** 162:110-121.

Cooch, E.G., G. Gauthier & R. Rockwell. 2003. Apparent differences in stochastic growth rates based on timing of census: a cautionary note. **Ecological Modelling** 159:133-143.

Reed, E.T., J. Bêty, J. Mainguy, G. Gauthier & J.-F. Giroux. 2003. Molt migration in relation to breeding success in greater snow geese. **Arctic** 56:76-81.

Reed, E.T., G. Gauthier, R. Pradel, & J.-D. Lebreton. 2003. Age and environmental conditions affect recruitment in greater snow geese. **Ecology** 84:219-230.

Fournier, F. & G. Gauthier. 2002. The effect of food quality on developmental plasticity and digestive efficiency in greater snow goose goslings. **Integrative and Comparative Biology** 42:1231-1231.

Reed, A., R.J. Hughes, & H. Boyd. 2002. Patterns of distribution and abundance of Greater Snow Geese on Bylot Island, Nunavut, Canada 1983-1998. **Wildfowl** 53:53-65.

Righi, M. & G. Gauthier. 2002. Natural infection by intestinal cestodes: variability and effect on growth in greater snow goose goslings. **Canadian Journal of Zoology** 80:1077-1083.

Bêty, J., G. Gauthier, E. Korpimäki & J.-F. Giroux. 2002. Shared predators and indirect trophic interactions: lemming cycles and arctic-nesting geese. **Journal of Animal Ecology** 71:88-98.

Mainguy, J., J. Bêty, G. Gauthier & J.-F. Giroux. 2002. Are body condition and reproductive effort of laying greater snow geese affected by the spring hunt? **Condor** 104:156-162.

Menu, S., G. Gauthier & A. Reed. 2002. Changes in survival rates and population dynamics of greater snow geese over a 30-year period: Implications for hunting regulations. **Journal of Applied Ecology**39:91-102.

Gauthier, G., R. Pradel, S. Menu & J.-D. Lebreton. 2001. Seasonal survival of greater snow geese and effect of hunting under dependence in sighting probability. **Ecology** 82:3105-3119.

Bêty, J. & G. Gauthier. 2001. Effects of nest visits on predators activity and predation rate in a snow goose colony. **Journal of Field Ornithology** 72:573-586.

Bêty, J., G. Gauthier, J.-F. Giroux & E. Korpimäki. 2001. Is goose nesting success and lemming cycles linked? Interplay between nest density and predators. **Oikos** 93:388-400.

Poussart, C., G. Gauthier.& J. Larochelle. 2001. Incubation behavior of greater snow geese in relation to weather conditions. **Canadian Journal of Zoology** 79:671-678.

Massé, H., Rochefort, L. & G. Gauthier. 2001. Carrying capacity of wetland habitats used by breeding greater snow geese. **Journal of Wildlife Management** 65:271-281.

Menu, S., G. Gauthier & A. Reed. 2001. Survival of juvenile greater snow geese immediately after banding. **Journal of Field Ornithology** 72:282-290.

Morez, V., G. Gauthier & A. Reed. 2000. Effect of body condition on the vulnerability of greater snow geese to hunting and capture. **Journal of Wildlife Management** 64:875-886.

Fortin, D., & G. Gauthier. 2000. The effect of postural adjustment on the thermal environment of greater snow goose goslings. **Canadian Journal of Zoology** 78:817-821.

Poussart, C., J. Larochelle & G. Gauthier. 2000. The thermal regime of eggs during laying and incubation in Greater Snow Geese. **Condor** 102:292-300.

Lepage, D., G. Gauthier & S. Menu. 2000. Reproductive consequences of egg-laying decisions in snow geese. **Journal of Animal Ecology** 69:414-427.

Menu, S., J.B. Hestbeck, G. Gauthier & A. Reed. 2000. Effects of neck bands on survival of greater snow geese. **Journal of Wildlife Management** 64:544-552.

Fortin, D., G. Gauthier & J. Larochelle. 2000. Body temperature and resting behavior of greater snow goose goslings in the High Arctic. **Condor** 102:163-171.

Fortin, D., J. Larochelle & G. Gauthier. 2000. The effect of wind, radiation and body orientation on the thermal environment of greater snow goose goslings. **Journal of Thermal Biology** 25:227-238.

Piedboeuf, N. & G. Gauthier. 1999. Nutritive quality of forage plants for greater snow goose goslings: when is it advantageous to feed on grazed plants? **Canadian Journal of Zoology** 77:1908-1918.

Blouin, F., J.-F. Giroux, J. Ferron, G. Gauthier, & J. Doucet. 1999. The use of satellite telemetry to track greater snow geese. **Journal of Field Ornithology** 70:187-199.

Lepage, D., A. Desrochers & G. Gauthier. 1999. Seasonal decline of growth and fledging success in snow geese *Anser caerulescens*: an effect of date or parental quality? **Journal of Avian Biology** 30:72-78.
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
Lesage, L. & G. Gauthier. 1998. Effect of hatching date on body and organ development in greater snow goose goslings. **Condor** 100:316-325.
Lepage, D., G. Gauthier & A. Desrochers. 1998. Larger clutch size increases fledging success and offspring quality in a precocial species. **Journal of Animal Ecology** 67:210-216.
Lepage, D., G. Gauthier & A. Reed. 1998. Seasonal variation in growth of greater snow goose goslings: the role of food supply. **Oecologia** 114:226-235
Tremblay, J.-P., G. Gauthier, D. Lepage, & A. Desrochers. 1997. Factors affecting nesting success in greater snow geese: effects of habitat and association with snowy owls. **Wilson Bulletin** 109:449-461.
Lesage, L. & G. Gauthier. 1997. Growth and organ development in greater snow goose goslings. **Auk** 114:229-241.
Gauthier, G., L. Rochefort & A. Reed. 1996. The exploitation of wetland ecosystems by herbivores on Bylot Island. **Geoscience Canada** 23:253-259.
Lepage, D., G. Gauthier & A. Reed. 1996. Breeding site infidelity in greater snow goose: a consequence of constraints on laying dates? **Canadian Journal of Zoology** 74:1866-1875.
Beaulieu, J., G. Gauthier & L. Rochefort. 1996. The growth response of graminoid plants to goose grazing in a High arctic environment. **Journal of Ecology** 84:905-914.
Reed, A., R.J. Hughes & G. Gauthier. 1995. Incubation behavior and body mass of female greater snow geese. **Condor** 97:993-1001
Gauthier, G. & R.J. Hughes. 1995. The palatability of arctic willow for greater snow geese: the role of nutrients and deterring factors. **Oecologia** 103:390-392.
Choinière, L. & G. Gauthier. 1995. Energetics of reproduction in female and male greater snow geese. **Oecologia** 103:379-389
Gauthier, G., R.J. Hughes, A. Reed, J. Beaulieu & L. Rochefort. 1995. Effect of grazing by greater snow geese on the production of graminoids at an arctic site (Bylot Island, NWT, Canada). **Journal of Ecology** 83:653-664
Lindholm, A., G. Gauthier & A. Desrochers. 1994. Effects of hatch date and food supply on gosling growth in arctic-nesting greater snow geese. **Condor** 96:898-908.
Hughes, R.J., G. Gauthier & A. Reed. 1994. Summer habitat use and behaviour of greater snow geese *Anser caerulescens atlanticus*. **Wildfowl** 45:49-64.
Hughes, R.J., A. Reed & G. Gauthier. 1994. Space and habitat use by greater snow goose broods on Bylot Island, Northwest Territories. **Journal of Wildlife Management** 58:536-545.
Manseau, M. & G. Gauthier. 1993. Interactions between greater snow geese and their rearing habitat. **Ecology** 74:2045-2055.
Gauthier, G. 1993. Feeding ecology of nesting greater snow geese. **Journal of Wildlife Management** 57:216-223.
Gauthier, G., Giroux, J.-F. & J. Bédard. 1992. Dynamics of fat and protein reserves during winter and spring migration in greater snow geese. **Canadian Journal of Zoology** 70:2077-2087.
Reed, A., H. Boyd, P. Chagnon, and J. Hawkings. 1992. The numbers and distribution of greater snow geese on Bylot Island and near Jungersen Bay, Baffin Island, in 1988 and 1983. **Arctic** 45:115-119.
Gauthier, G. & J. Tardif. 1991. Female feeding and male vigilance during nesting in greater snow geese. **Condor** 93:701-711.

Reports and other publications

Gauthier, G. & D. Berteaux (editors). 2011. ArcticWOLVES : Arctic Wildlife Observatories Linking Vulnerable EcoSystems. Final synthesis report. Centre d'études nordiques, Université Laval, Quebec City, QC, 133 pp.

Therrien, J.-F., G. Gauthier, J. Bêty & G. Mouland. 2008. Long-distance migratory movements and habitat selection of Snowy Owls in Nunavut. Unpublished report, Centre d'études nordiques, Université Laval, Quebec City, QC, 47 pp.

Cadieux, M.-C, G. Gauthier, C. Gagnon, E. Lévesque, J. Bêty, & D. Berteaux. 2008. Monitoring the environmental and ecological impacts of climate change on Bylot Island, Sirmilik National Park – 2004-2008 final report). Unpublished report, Centre d'études nordiques, Université Laval, Quebec City, QC, 113 pp.

Calvert, A.M., G. Gauthier, E.T. Reed, L. Bélanger, J.-F. Giroux, J.-F. Gobeil, M. Huang , J. Lefebvre & A.Reed. 2007. Section I. Present status of the population and evaluation of the effects of the special conservation measures. Pages 5-64 in Reed, E.T. and A.M. Calvert, eds. An evaluation of the special conservation measures for Greater snow geese: report of the Greater Snow Goose Working Group. Arctic Goose Joint Venture Special Publication. U.S. Fish and Wildlife Service, Washington D.C. and Canadian Wildlife Service, Ottawa, ON.

Gauthier, G. & E.T. Reed. 2007. Section II. Projected growth rate of the Greater Snow Goose population under alternative harvest scenario. Pages 65-74 in Reed, E.T. and A.M. Calvert, eds. An evaluation of the special conservation measures for Greater snow geese: report of the Greater Snow Goose Working Group. Arctic Goose Joint Venture Special Publication. U.S. Fish and Wildlife Service, Washington D.C. and Canadian Wildlife Service, Ottawa, ON.

Bélanger, L., G. Gauthier, J.-F. Giroux, J. Lefebvre, A.Reed & E.T. Reed. 2007. Conclusion. Pages 75-78 in Reed, E.T. and A.M. Calvert, eds. An evaluation of the special conservation measures for Greater snow geese: report of the Greater Snow Goose Working Group. Arctic Goose Joint Venture Special Publication. U.S. Fish and Wildlife Service, Washington D.C. and Canadian Wildlife Service, Ottawa, ON.

Gagnon, C., M.-C. Cadieux, G. Gauthier, E. Lévesque, A. Reed & D. Berteaux. 2004. Analyses and reporting on 15 years of biological monitoring data from Bylot Island, Sirmilik National Park of Canada. Unpublished report, Centre d'études nordiques, Université Laval, Quebec City, QC, 115 pp.

Gauthier, G. & S. Brault. 1998. Population model of the greater snow goose: projected impacts of reduction in survival on population growth rate. Pp 65-80 *in* The Greater Snow Goose: report of the Arctic Goose Habitat Working Group, B.D.J. Batt ed. Arctic Goose Joint Venture Special Publication. U.S. Fish and Wildlife Service, Washington D.C. and Canadian Wildlife Service, Ottawa, Ont.

Giroux, J.-F., G. Gauthier, G. Costanzo & A. Reed. 1998. Impact of geese on natural habitats. Pp. 32-57 *in* The Greater Snow Goose: report of the Arctic Goose Habitat Working Group, B.D.J. Batt ed. Arctic Goose Joint Venture Special Publication. U.S. Fish and Wildlife Service, Washington D.C. and Canadian Wildlife Service, Ottawa, Ont.

Reed, A., J.-F. Giroux & G. Gauthier. 1998. Population size, productivity, harvest and distribution. Pp. 5-31 *in* The Greater Snow Goose: report of the Arctic Goose Habitat Working Group, B.D.J. Batt ed. Arctic Goose Joint Venture Special Publication. U.S. Fish and Wildlife Service, Washington D.C. and Canadian Wildlife Service, Ottawa, Ont.

Giroux, J.-F., B. Batt, S. Brault, G. Costanzo, B. Filion, G. Gauthier, D. Luszcz, & A. Reed. 1998. Conclusions and management recommendations. Pp 81-88 *in* The Greater Snow Goose: report of the Arctic Goose Habitat Working Group, B.D.J. Batt ed. Arctic Goose Joint Venture Special Publication. U.S. Fish and Wildlife Service, Washington D.C. and Canadian Wildlife Service, Ottawa, Ont.

Gauthier, G. and Menu, S. 1997. The use of capture-recapture models in greater snow geese: is there a transient effect of capture and marking on survival? *Proceed. of the Survey Methods Section, 24th Annual Meeting of the Statistical Society of Canada*, Fredericton, NB.

Presentations at national/international conferences

Therrien, J.-F., G. Gauthier & J. Bêty. 2011. Avian predators play a key role in population regulation and energy flux of the Arctic tundra food web. *Annual Meeting of the Raptor Research Foundation*, Duluth, MN.

Legagneux, P., P. Fast, G. Gauthier & J. Bêty. 2011. Manipulating individual state during migration provides evidence for carry-over effects modulated by environmental conditions. *Society of Canadian Ornithologists Annual Meeting*, Moncton, NB.

Gauthier, G. 2011. Lemmings: a keystone species of the tundra food web vulnerable to climate change. *6th annual meeting of the Canadian Society of Ecology and Evolution*, Banff, AB.

Tarroux, A., D. Berteaux & J. Bêty. 2011. The marine side of a terrestrial mammal: trophic niche and diet specialization of arctic foxes. *Estación Biológica de Doñana – CSIC*, March, Sevilla, Spain.

Gauthier, G. & M.-C. Cadieux. 2011. Goose-plant interactions on Bylot Island in the context of global warming. *Twelfth North American Arctic Goose Conference*, Portland, OR.

Legagneux, P., P. Fast, G. Gauthier & J. Bêty. 2011. Migratory connectivity in Greater Snow Geese: carry-over effects of a manipulation of spring body condition. *Twelfth North American Arctic Goose Conference*, Portland, OR.

Fast, P., C. Redjadj, G. Gauthier & J. Bêty. 2011. Using isotopes to assess the importance of stopover sites to fuel migration and reproduction in Snow Geese. *Twelfth North American Arctic Goose Conference*, Portland, OR.

Doiron, M., G. Gauthier & E. Lévesque. 2011. Climate change and the ecological mismatch between Greater Snow Goose breeding and plant phenology. *Twelfth North American Arctic Goose Conference*, Portland, OR.

Desnoyers, M. & G. Gauthier. 2011. Travelling in greater snow goose flocks: do you know with whom you're travelling? *Twelfth North American Arctic Goose Conference*, Portland, OR.

Horrigan, E., R.L. Jefferies & G. Gauthier. 2011. Vegetation responses to simulated snow goose herbivory in two arctic ecosystems. *Twelfth North American Arctic Goose Conference*, Portland, OR.

Gauthier, G. & D. Berteaux. 2010. Is the tundra food web controlled by top predators? New evidence from the ArcticWOLVES project. *Seventh ArcticNet Scientific Meeting*, Ottawa, ON.

Bilodeau, F., G. Gauthier & D. Berteaux. 2010. Life under the snow: the effect of the snow cover on lemming population dynamics. *Seventh ArcticNet Scientific Meeting*, Ottawa, ON.

Chalifour, E., J. Bêty, M. Bélisle, J. Lefebvre & J.-F. Giroux. 2010. Molt migration of Greater Snow Geese. *Seventh ArcticNet Scientific Meeting*, Ottawa, ON.

Tarroux, A., D. Berteaux & J. Bêty. 2010. Surviving the arctic winter: insights into the foraging tactics of an arctic terrestrial predator. *Seventh ArcticNet Scientific Meeting*, Ottawa, ON.

Fast, P. 2010. Studies of migratory connectivity and nest choice in Arctic waterfowl. *Max Planck Institute for Ornithology*, Seewiesen, Germany.

Gauthier, G., J.-F. Therrien, J. Bêty, F. Doyle & D. Reid. 2010. Surprising migratory movements and site fidelity unraveled by satellite-tracking of snowy owls. *25th International Ornithological Conference*, Sao Paulo, Brazil.

Legagneux, P., G. Gauthier, D. Berteaux, J. Bêty, M.-C. Cadieux, G. Szor, F. Bilodeau, E. Bolduc, L. McKinnon, A. Tarroux, J.-F. Therrien, M.-A. Valiquette, L. Morissette & C.J. Krebs. 2010. Modeling temporal trophic dynamics of a terrestrial arctic ecosystem. *IPY Oslo Conference*, Oslo, Norway.

Doiron, M., G. Gauthier & E. Lévesque. 2010. Plant-herbivore interactions and climate change: the case of the Greater Snow Goose. *IPY Oslo Conference*, Oslo, Norway.

Legagneux, P., P. Fast, G. Gauthier & J. Bêty 2010. Effect of spring condition manipulation on reproductive success in the greater snow geese *Chen caerulescens*. *5th annual meeting of the Canadian Society of Ecology and Evolution*, Quebec, QC.

Therrien, J.F., G. Gauthier & J. Bêty. 2010. The lemming buffet: is there anything left after owls and jaegers have eaten? *5th annual meeting of the Canadian Society of Ecology and Evolution*, Quebec, QC.

Desnoyers, M. & G. Gauthier. 2010. Le voyage organisé, un aspect inconnu du comportement grégaire de la grande oie des neiges *Chen caerulescens*. *5th annual meeting of the Canadian Society of Ecology and Evolution*, Quebec, QC.

Gauthier, G., D. Berteaux, J. Bêty, P. Legagneux, L. McKinnon, J.-F. Therrien, A. Tarroux, M.-C. Cadieux, C.J. Krebs, D. Reid, & D. Morris. 2010. The role of predators in structuring the Arctic terrestrial food web: preliminary results from the ArcticWOLVES project. *IPY Canada Early Results Workshop*, Ottawa, ON.

Doiron, M., G. Gauthier, & E. Lévesque. 2010. Impacts of climate change on a High Arctic herbivore: The case of the Greater Snow Goose. *IPY Canada Early Results Workshop*, Ottawa, ON.

Therrien, J.-F., G. Gauthier, J. Bêty D. Reid and F. Doyle. 2010. Long-distance movements of two avian predators, the Snowy Owl and Long-tailed Jaeger, tracked via satellite. *IPY Canada Early Results Workshop*, Ottawa, ON.

Reid, D., C.J. Krebs, G. Gauthier, A. Kenney, S. Gilbert, E. Hofer, D. Duchesne, M. Leung & F. Bilodeau. 2010. Snow depth and small mammal winter habitat choice: a tundra fencing experiment. *IPY Canada Early Results Workshop*, Ottawa, ON.

Lai, S., D. Berteaux & J. Bêty. 2009. From land to sea ice with the arctic fox, following the movements of a terrestrial mammal in the Canadian High Arctic. *Sixth ArcticNet Scientific Meeting*, Victoria, BC.

Tarroux, A., D. Berteaux & J. Bêty. 2009. Nomades de l'Arctique : Capacité de déplacement à grande échelle chez le renard polaire. *Sixth ArcticNet Scientific Meeting*, Victoria, BC.

Tarroux, A., D. Berteaux & J. Bêty. 2009. The marine side of a terrestrial mammal : trophic niche and diet specialization in arctic foxes. *Sixth ArcticNet Scientific Meeting*, Victoria, BC.

Therrien, J.F., G. Gauthier & J. Bêty. 2009. The lemming buffet: is there anything left after owls and jaegers have eaten? *Sixth ArcticNet Scientific Meeting*, Victoria, BC.

Fast, P., C. Redjadj, G. Gauthier & J. Bêty. 2009. Fuelling up before the flight: Assessing the importance of stopover sites in an Arctic migrant using stable isotopes. *Sixth ArcticNet Scientific Meeting*, Victoria, BC.

Gauthier, G., C. Juillet, J. Bêty & M. Morrissette. 2009. Annual productivity in Greater Snow Geese: which fecundity parameter is the best predictor and why? *Meeting of the International Society of Ecological Modelling*, Quebec city, QC.

Legagneux, P., G. Gauthier & C.J. Krebs. 2009. Spatial and temporal trophic dynamics of terrestrial arctic ecosystems. *ECOPATH conference*, Vancouver, BC.

Gauthier, G. 2009. Impact of climate change on arctic terrestrial food webs: examples from the Bylot Island long term study. *Canadian Society of Ecology and Evolution Annual Meeting*, Halifax, NS.

Gauthier, G. & D. Berteaux. 2008. Arctic Wildlife Observatories Linking Vulnerable EcoSystems (ArcticWOLVES): A study of the impact of climate change on tundra food webs. *Arctic Change Conference*, Quebec City, Qc.

Gauthier, G. & M.C. Cadieux. 2008. Impact of climate change on arctic terrestrial food webs: examples from the Bylot Island long term study. *Arctic Change Conference*, Quebec City, Qc.

Doiron, M., G. Gauthier & E. Lévesque. 2008. Plant-herbivore interactions and climate change: The Case of the Greater Snow Goose. *Arctic Change Conference*, Quebec City, Qc.

Therrien, J.F., G. Gauthier & J. Bêty. 2008. Reproductive success and long-distance movements of Snowy Owls: is this top arctic predator vulnerable to climate change? *Arctic Change Conference*, Quebec City, Qc.

Valiquette, M.A. & G. Gauthier. 2008. Numerical and functional responses of a generalist avian predator, the glaucous gull, to variations in lemming abundance in the Arctic. *Arctic Change Conference*, Quebec City, Qc.

Juillet, C., M. Doiron, G. Gauthier & M.C. Cadieux. 2008. Importance of local and regional climatic effects on the reproduction of a migratory species, the Greater Snow Goose. *Arctic Change Conference*, Quebec City, Qc.

Côté, G., R. Pienitz, G. Gauthier, D. Muir & B. Wolfe. 2008. Impacts of present-day and past animal populations on the nutrient and contamination status of freshwater lakes on Bylot Island, Nunavut (Canada). *Arctic Change Conference*, Quebec City, Qc.

Pouliot, R., L. Rochefort, M. Marchand-Roy & G. Gauthier. 2008. Polygon fens and trophic interactions: 15 years of research on Bylot Island. 4th International Meeting on the Biology of Sphagnum, Juneau, Alaska.

Gauthier, G. & D. Berteaux. 2008. ArcticWOLVES: a study of the tundra food web. *International IPY conference on the Dynamics of Lemmings and Arctic foxes in the Circumpolar Tundra,* Salekhard, Russie.

Berteaux, D. & Gauthier, G. 2008. Dynamics of lemmings and arctic foxes on Bylot Island, Nunavut, Canada. *International IPY conference on the Dynamics of Lemmings and Arctic foxes in the Circumpolar Tundra*, Salekhard, Russie.

Duchesne, D., G. Gauthier & D. Berteaux. 2007. Characterization of the winter environment of lemmings in relation to the snow cover in the Arctic. *Fourth ArcticNet Scientific Meeting*, Collingwood, ON.

Doiron, M., G. Gauthier & E. Lévesque. 2007. Impacts of climate change on plant-herbivore interactions in the High Arctic. *Fourth ArcticNet Scientific Meeting*, Collingwood, ON.

Juillet, C., G. Gauthier, R. Pradel & Rémi Choquet. 2007. Use of mixture of information models to evaluate the effect of special conservation measures on survival in a hunted species, the Greater Snow Goose. *EURING-2007 meeting*, Otago, New Zealand.

Gauthier, G., K. Hobson & J. Bêty. 2006. Diet change inferred from stable-isotopes in spring-staging Greater Snow Geese. *XXIVth International Ornithological Congress*, Hamburg, Germany.

Gauthier, G. 2006. Application of capture-recapture methods to demographic analyses of bird populations: case studies with an emphasis on multistate models. Colloque *Capture 2006*, Université Laval, Québec, QC.

Dickey, M.-H. & G. Gauthier. 2005. Effect of climate variables on the phenology and reproductive success of Greater Snow Geese (*Chen caerulescens atlantica*). *Eleventh North American Arctic Goose Conference*, Reno, NV.

Lecomte, N., G. Gauthier, L. Bernatchez & J.-F. Giroux. 2005. Population structure of a Greater Snow Goose colony. *Eleventh North American Arctic Goose Conference*, Reno, NV.

Gauthier, G., A.M. Calvert & E.T. Reed. 2005. Impacts of special conservation measures on demographic parameters in Greater Snow Geese (*Chen caerulescens atlantica*). *Eleventh North American Arctic Goose Conference*, Reno, NV.

Mainguy, J., G. Gauthier, J.-F. Giroux & J. Bêty. 2005. Long distance brood movements in Greater Snow Geese : effects on goslings growth and survival. *Eleventh North American Arctic Goose Conference*, Reno, NV.

Ouellet, N., J. Larochelle & G. Gauthier. 2005. Effect of locomotion on growth in Greater Snow Goose goslings (*Chen caerulescens atlantica*). *Eleventh North American Arctic Goose Conference*, Reno, NV.

Lecomte, N., G. Gauthier & J.-F. Giroux. 2005. Habitat effects on nest predation risks : the case of the Greater Snow Goose. *Eleventh North American Arctic Goose Conference*, Reno, NV.

Audet, B., G. Gauthier & E. Lévesque. 2005. Feeding ecology of Greater Snow Goose (*Chen caerulescens atlantica*) goslings in upland tundra on Bylot Island, Nunavut. *Eleventh North American Arctic Goose Conference*, Reno, Nevada.

Bêty, J., J.-F. Giroux, & G. Gauthier. 2004 Individual variation in timing of migration : causes and reproductive consequences in greater snow geese. *122nd American Ornithologist Union Meeting*, Québec, Canada.

Calvert, A.M. & G. Gauthier. 2004. Exceptional conservation measures: how have they affected survival and hunting mortality in greater snow geese. *122nd American Ornithologist Union Meeting*, Québec, Canada.

Audet, B., G. Gauthier & E. Lévesque. 2004. Feeding ecology of Greater Snow Goose (*Chen caerulescens atlantica*) goslings in upland tundra on Bylot Island, Nunavut. *122nd American Ornithologist Union Meeting*, Québec, Canada.

Lecomte, N., G. Gauthier & J.F. Giroux. 2004. Habitat effects on nest predation risks: the case of the Greater Snow Goose. *122nd American Ornithologist Union Meeting*, Québec, Canada.

Gauthier, G., J.-F. Giroux, A. Reed, A. Béchet & L. Bélanger. 2004. Interactions between land use, habitat use and population increase in greater snow geese: what are the consequences for natural wetlands? Intecol 7th Interational Wetlands conference, Utrecth, Netherlands.

Giroux, J.-F., G. Gauthier, A. Béchet, M. Féret, J. Mainguy, J. Bêty & V. Lemoine. 2003. Controling overabundant bird populations: the case of the greater snow goose. Third International Wildlife Management Congress, 1-5 December 2003, Christchurch, New Zealand.

Gauthier, G. & J.D. Lebreton. 2003. Population models in Greater Snow Geese: a comparison of different approaches. *EURING-2003 meeting*, Radolfzell, Germany.

Reed, E., G. Gauthier & J.-F. Giroux. 2003. Effects of spring conditions on breeding propensity of greater snow goose females. *EURING-2003 meeting*, Radolfzell, Germany.

Calvert, A.M. & G. Gauthier. 2003. Applying band recovery models to an evaluation of the demographic impacts of exceptional conservation measures. *EURING-2003 meeting*, Radolfzell, Germany.

Gauthier, G., J. Bêty, J.-F. Giroux & L. Rochefort. 2003. Trophic interactions in a High Arctic Snow Goose colony. *Annual Meeting of the Society for Integrative and Comparative Biology*, Toronto, ON.

Fournier, F., G. Gauthier & J. Larochelle. 2003. The effect of food quality on developmental plasticity and digestive efficiency in Greater Snow Goose goslings. *Annual Meeting of the Society of integrative and comparative biology*, Toronto, ON.

Gauthier, G. 2002. Are Greater Snow Geese overabundant? A review of population Dynamics and management actions on this population in North America. *7th Annual Meeting of the Goose Specialist Group of Wetlands International*, El Rocio, Spain.

Gauthier, G., F. Fournier & J. Larochelle. 2002. The effect of environmental conditions on early growth in geese. *XXIIIrd International Ornithological Congress*, Beijing, China

Gauthier, G., J.-F. Giroux & L. Rochefort. 2002. The impact of goose grazing on Arctic and temperate wetlands. *XXIIIrd International Ornithological Congress*, Beijing, China.

Bêty, J., G. Gauthier, E. Korpimäki & J.-F. Giroux. 2001. Shared predators and indirect trophic interactions: lemming cycles and arctic-nesting geese. *119th American Ornithologist Union Meeting*, Seattle, WA.

Bourguelat, G., G. Gauthier & R. Pradel. 2001. New analytical tools to study stopover length in birds : what can we learn from the greater snow goose example? *119th American Ornithologist Union Meeting*, Seattle, WA.

Gauthier, G. 2001. The effects of management actions on populations: greater snow goose. *Tenth North American Arctic Goose Conference*, Québec, QC.

Gauthier, G. & J.D. Lebreton. 2001. Population models in greater snow geese: a comparison of different approaches. *Tenth North American Arctic Goose Conference*, Québec, QC.

Gauthier, G., K. Hobson & J. Bêty. 2001. The role of nutrient reserves in egg formation in greater snow geese: a reply to Ankney (1995). *Tenth North American Arctic Goose Conference*, Québec, QC.

Mainguy, J., J. Bêty & G. Gauthier. 2001. Is body condition of laying greater snow geese affected by the Québec spring conservation hunt? *Tenth North American Arctic Goose Conference*, Québec, QC.

Bêty, J., G. Gauthier, E. Korpimäki & J.-F. Giroux. 2001. Cyclic lemmings and greater snow geese: direct observations of an indirect trophic interaction. *Tenth North American Arctic Goose Conference*, Québec, QC.

Reed, E. & G. Gauthier. 2001. The costs of raising a family in greater snow geese *Chen caerulescens* *atlantica*. *Tenth North American Arctic Goose Conference*, Québec, QC.

Righi, M. & G. Gauthier. 2001. Abundance and distribution of intestinal helminths in greater snow geese on the breeding colony, and during their fall and spring migration. *Tenth North American Arctic Goose Conference*, Québec, QC.

Renaud, M., G. Gauthier & J. Larochelle. 2001. Energetic cost of thermoregulation for greater snow goose goslings growing in a natural environment. *Tenth North American Arctic Goose Conference*, Québec, QC.

Féret M., G. Gauthier, J.-F. Giroux & K. Hobson. 2001. Impact of spring conservation hunt on nutrient storage of greater snow geese staging in Québec. *Tenth North American Arctic Goose Conference*, Québec, QC.

Bourguelat, G., G. Gauthier & R. Pradel. 2001. Estimation of the fall stopover length of the greater snow goose in the St. Lawrence estuary using capture-recapture methods. *Tenth North American Arctic Goose Conference*, Québec, QC.

Béchet, A. J.-F. Giroux & G. Gauthier. 2001. Impact of a spring hunt on the regional movements of staging greater snow geese. *Tenth North American Arctic Goose Conference*, Québec, QC.

Demers, F. J.-F. Giroux, G. Gauthier & J. Bêty. 2001. Effect of collar-attached transmitters on pair bond, breeding success and behavior of greater snow geese. *Tenth North American Arctic Goose Conference*, Québec, QC.

Otis, P., J. Larochelle & G. Gauthier. 2001. Energy cost of locomotion in greater snow goose goslings. *Tenth North American Arctic Goose Conference*, Québec, QC.

Duclos, I., E. Lévesque & L. Rochefort. 2001. Mesic habitats of the Greater Snow Goose (*Chen caerulescens atlantica*) on Bylot Island (Nunavut): characterization and feeding potential. *Tenth North American Arctic Goose Conference*, Québec, QC.

Gauthier, G., R. Pradel, S. Menu & J.D. Lebreton. 2000. Modelling seasonal survival rate of greater snow geese in presence of trap-dependence. *EURING-2000 meeting*, Point Reyes, CA.

Gauthier, G., R. Pradel, S. Menu & J.D. Lebreton. 2000. Seasonal variations in survival rate of a migratory and hunted species, the greater snow goose. *118th American Ornithologist Union Meeting*, St. John's, NF.

Gauthier, G., L. Rochefort, & A. Reed. 2000. Short- and long-term impact of snow goose herbivory on wetland ecosystems of Bylot Island. *Weltand-2000 international meeting*, Quebec city, QC.

Lévesque, E., C. Pineau, L. Rochefort & G. Gauthier. 1999. Combined influence of grazing and warming in a high arctic wet meadow. Abstract in *Plant response to climate change*, R.D. Hollister (ed), Proceedings from the *9th International Tundra Experiment Meeting*, East Lansing, MI.

Bêty, J, G. Gauthier & J.-F. Giroux. 1998. Factors affecting nesting success in greater snow geese: the interplay between nest density, lemming abundance and association with snowy owls. *Ninth North American Arctic Goose Conference*, Victoria, BC.

Massé, H., L. Rochefort & G. Gauthier. 1998. Estimating the carrying capacity of wetland habitats used by breeding greater snow geese on Bylot island (N.W.T, Canada). *Ninth North American Arctic Goose Conference*, Victoria, BC.

Demers, F., J.-F. Giroux & G. Gauthier. 1998. How faithful to their mate are radio-marked greater snow geese? *Ninth North American Arctic Goose Conference*, Victoria, BC.

Giroux, J.-F., F. Blouin, J. Ferron, G. Gauthier & J. Doucet. 1998. The fall migration of greater snow geese tracked by satellite. *Ninth North American Arctic Goose Conference*, Victoria, BC.

Menu S., G. Gauthier & A. Reed. 1998. Survival of young greater snow geese during the fall migration. *Ninth North American Arctic Goose Conference*, Victoria, BC.

Poussart, C., G. Gauthier & J. Larochelle. 1998. Incubation behavior of greater snow geese in relation to weather conditions. *Ninth North American Arctic Goose Conference*, Victoria, BC.

Gauthier, G. 1998. The role of food and timing of nesting in greater snow goose reproduction. *Ninth North American Arctic Goose Conference*, Victoria, BC.

Gauthier, G. 1997. Population regulation in Greater Snow Geese. *Symposium on how to manage thriving goose populations*, Zwolle, Netherlands.

Reed, A. & G. Gauthier. 1997. Changes in demographic and physical parameters of greater snow geese during an extended population growth phase. *Symposium on Over-abundant goose population: an emerging challenge in wildlife conservation, Wildlife Society 4th annual conference,* Snowmass, Colorado.

Gauthier, G. 1997. The use of capture-recapture models to estimate survival and movements in Greater Snow Geese *Session on biostatistics and survey methods in wildlife management, Annual meeting of the statistical society of Canada,* Fredericton, New-Brunswick.

Menu, S., G. Gauthier, A. Reed & J. Hestbeck. 1997. Effects of neck band on the survival of adult female greater snow geese. *Large-scale studies of marked birds, EURING 97,* Norwich, United Kingdom.

Gauthier, G. 1996. Energetics of reproduction in greater snow geese: the female condition model revisited. *International workshop on energetics of reproduction in birds, mammals and reptiles: exploring new technologies*, Chizé, France.

Giroux, J.-F., F. Blouin, J. Ferron, G. Gauthier, & J. Doucet. 1996. The use of satellite telemetry to track the fall migration of greater snow geese. *5th European conference on wildlife telemetry,* Strasbourg, France.

Piedboeuf, N. & G. Gauthier, G. 1996. Nutritional quality of feeding sites in Greater Snow Goose goslings: is it advantageous to use grazed sites? *Comparative Nutrition Society Symposium*, Washington, DC.

Lepage, D., G. Gauthier, & A. Desrochers. 1996. Le rôle des parents dans la variation de croissance et de survie chez la Grande Oie des neiges (*Chen caerulescens atlantica*). *Congrès international francophone sur le comportement animal*, Québec, QC.

Gauthier, G., R. J. Hughes, A. Reed, J. Beaulieu & L. Rochefort. 1995. Effect of grazing by greater snow geese on the production of graminoids at an arctic site (Bylot Island, NWT, Canada). *25th Arctic Workshop*, Québec, QC.

Gauthier, G., D. Lepage & A. Reed. 1995. Site infidelity in nesting Greater Snow Geese (*Chen caerulescens atlantica*). *Eighth North American Arctic Goose Conference,* Albuquerque, NM.

Beaulieu, J., G. Gauthier & L. Rochefort. 1995. Growth responses of plants to goose grazing in a High Arctic environment. *Eighth North American Arctic Goose Conference*, Albuquerque, NM.

Lepage, D., A. Desrochers & G. Gauthier. 1995. Clutch manipulation in Greater Snow Geese: the causal relationship between hatch date, brood size and pre-fledging growth. *Eighth North American Arctic Goose Conference,* Albuquerque, NM.

Lesage, L. & G. Gauthier. 1995. Effect of hatch date and brood-rearing site on growth pattern and organ development in Greater Snow Geese. *Eighth North American Arctic Goose Conference*, Albuquerque, NM.

Tremblay, J.-P., G. Gauthier, D. Lepage, A. Desrochers. 1995. Relationship between nest site characteristics and nesting success in greater snow geese. *Eighth North American Arctic Goose Conference*, Albuquerque, NM.

Blouin, F., J.-F. Giroux, J. Ferron, G. Gauthier & J. Doucet. 1995. Tracking the fall migration of greater snow geese using satellite telemetry. *Eighth North American Arctic Goose Conference*, Albuquerque, NM.

Gauthier, G. & D. Lepage. 1994. The interaction between food supply and gosling growth in greater snow geese. *XXIst Interational Ornithological Congress*, Vienna, Austria.

Gauthier, G. 1992. Diet, food quality and food intake of pre-laying and laying greater snow geese. *Seventh North American Arctic Goose Conference,* Vallejo, CA.

Choinière, L. & G. Gauthier. 1992. Reproductive energetics of female greater snow geese on Bylot Island (NWT), Canada. *Seventh North American Arctic Goose Conference,* Vallejo, CA.

Hughes, J., A. Reed & G. Gauthier. 1992. Habitat use by brood-rearing greater snow geese. *Seventh North American Arctic Goose Conference*, Vallejo, CA.

Lindholm, A. & G. Gauthier. 1992. Hatch date, food quality and growth of juvenile greater snow geese. *Seventh North American Arctic Goose Conference,* Vallejo, CA.

Manseau, M. & G. Gauthier. 1992. Brood-rearing habitats in greater snow geese: a comparative study based on the animal perception of its environment. *Seventh North American Arctic Goose Conference*, Vallejo, CA.

Reed, A. 1992. Incubation behavior and body mass of female greater snow geese. *Seventh North American Arctic Goose Conference*, Vallejo, CA.

Graduate student theses

Desnoyers, M. 2011. Le comportement social de la grande oie des neiges (*Chen caerulescens atlantica*) : existe-t-il des associations stables au sein des volées? MSc thesis, Département de biologie, Université Laval.

Juillet, C. 2011. Impact de la chasse sur la dynamique d'une population migratrice : le cas de la Grande Oie des neiges. PhD thesis, Département de biologie, Université Laval.

Tarroux, A. 2011. Utilisation de l'espace et des ressources chez un carnivore terrestre de l'Arctique : le renard polaire. PhD thesis, Département de biologie, Université du Québec à Rimouski.

Duchesne, D. 2009. Sélection de l'habitat, reproduction et prédation hivernales chez les lemmings de l'Arctique. MSc thesis, Département de biologie, Université Laval.

Marchand-Roy, M. 2009. L'effet fertilisant de la Grande Oie des neiges: cinq ans de suivi de l'azote et du phosphore dans les polygones de tourbe de l'Île Bylot au Nunavut. MSc thesis, Département de phytologie, Université Laval.

Cameron, C. 2009. Régimes d'appariement du Renard Arctique (*Vulpes lagopus*). MSc thesis, Département de biologie, Université du Québec à Rimouski.

Graham-Sauvé, M. 2008. Effets en cascade du climat et des interactions trophiques indirectes sur les plantes de la toundra par l'oie des neiges. MSc thesis, Département de biologie, Université du Québec à Rimouski.

Morrissette, M. 2008. L'influence respective du climat, des interactions trophiques indirectes et de la densité sur la productivité annuelle de la Grande Oie des neiges (*Chen caerulescens atlantica*). MSc thesis, Département de biologie, Université du Québec à Rimouski.

Giroux, M.-A. 2007. Effets des ressources allochtones sur une population de renards arctiques à l'Île Bylot, Nunavut, Canada. MSc thesis, Département de biologie, Université du Québec à Rimouski.

Lecomte, N. 2007. Risque de prédation, hétérogénété de l'habitat et fidélité au site de reproduction: Le cas de la Grande Oie des neiges dans le Haut-Arctique. PhD thesis, Département de biologie, Université Laval.

Gruyer, N. 2007. Étude comparative de la démographie de deux espèces de lemmings (*Lemmus sibericus* et *Dicrostonyx groenlandicus*), à l'Île Bylot, Nunavut, Canada. MSc thesis, Département de biologie, Université Laval.

Careau, V. 2006. Comportement de mise en réserve du renard arctique dans une colonie d'oies des neiges à l'Île Bylot, Nunavut. PhD thesis, Département de biologie, Université du Québec à Montréal.

Szor, G. 2006. Sélection des sites de tanières et des tanières de reproduction chez le renard arctique à l'Île Bylot, Nunavut. MSc thesis, Département de biologie, Université du Québec à Rimouski.

Dickey, M.H. 2006. Effet des facteurs climatiques sur la phénologie et le succès reproducteur de la grande oie des neiges (*Chen caerulescens atlantica*) à l'Île Bylot. MSc thesis, Département de biologie, Université Laval.

Pouliot, R. 2006. Les effets fertilisants de la grande oie des neiges sur la dynamique des milieux humides de l'île Bylot au Nunavut : impact du tapis de bryophites. MSc thesis, Département de phytologie, Université Laval.

Audet, B. 2006. Écologie alimentaire des oisons de la grande oie des neiges (*Chen caerulescens atlantica*) en milieux mésiques sur l'Île Bylot, Nunavut. MSc thesis, dépt. biologie, Univ. Laval.

Calvert, A.M. 2004. Variations spatiales et temporelles de la mortalité due à la chasse et les effets des mesures de gestion chez la grande oie des neiges (*Chen caerulescens atlantica*). MSc thesis, Département de biologie, Université Laval.

Mainguy, J. 2003. Déplacements des familles de la grande oie des neiges durant la période d'élevage, Île Bylot, Nunavut. MSc thesis, Département de biologie, Université Laval.

Bourguelat, G. 2003. Durée de séjour automnale de la grande oie des neiges dans l'estuaire du Saint-Laurent : une nouvelle approche méthodologique. MSc thesis, Département de biologie, Université Laval.

Reed, E. 2003. Coûts des soins parentaux et effet des conditions environnementales sur la reproduction de la Grande Oie des neiges. PhD thesis, Département de biologie, Université Laval.

Béchet, A. 2003. Ecologie et comportement de la grande oies des neiges lors de sa migration pré-nuptiale dans le Quebec méridional. PhD thesis, Département de biologie, Université du Québec à Montréal.

Duclos, I. 2002. Milieux mésiques et secs de l'Île Bylot, Nunavut (Canada): caractérisation et utilisation par la grande oie des neiges. MSc thesis, Département de chimie-biologie, Université du Québec à Trois-Rivières.

Otis, P. 2002. Adaptations au froid chez les oisons, juvéniles et adultes et modèles de croissance chez la grande oie des neiges. MSc thesis, Département de biologie, Université Laval.

Féret, M. 2002. Effet d'une chasse printanière sur la condition physique de la Grande Oie des neiges en migration. MSc thesis, Département de biologie, Université Laval.

Bêty, J. 2001. Interactions trophiques indirectes, prédation et stratégies de reproduction chez l'oie des neiges nichant dans le Haut-Arctique. PhD thesis, Département de biologie, Université Laval.

Demers, F. 2000. Effets des colliers émetteurs sur le maintien du couple, le succès reproducteur et le comportement de la grande oie des neiges. MSc thesis, Département de biologie, Université du Québec à Montréal.

Rioux, S. 2000. Effets du vent et du rayonnement sur la thermorégulation chez les oisons de la grande oie des neiges, *Chen caerulescens atlantica*. MSc thesis, Département de biologie, Université Laval.

Renaud, M. 1999. Coûts énergétiques de la thermorégulation chez les jeunes de la grande oie des neiges en milieu naturel. MSc thesis, Département de biologie, Université Laval.

Pineau, C. 1999. Facteurs limitant la croissance des plantes graminoïdes et des mousses dans les polygones de tourbe utilisés par la grande oie des neiges. MSc thesis, Département de phytologie, Université Laval.

Massé, H. 1998. Estimation de la capacité de support des différents écosystèmes humides utilisés par la grande oie des neiges nichant à l'Île Bylot (TNO, Canada). MSc thesis, Département de phytologie, Université Laval.

Menu, S. 1998. Survie de la grande oie des neiges : aspects méthodologiques et implications dans la dynamique de population. PhD thesis, Département de biologie, Université Laval.

Ratté, J. 1998. Thermorégulation et croissance chez les oisons de la Grande Oie des neiges (*Chen caerulescens atlantica*). MSc thesis, Département de biologie, Université Laval.

Poussart, C. 1997. Patron d'incubation et régime thermique des oeufs chez la Grande oie des neiges. MSc thesis, Département de biologie, Université Laval.

Lepage, D. 1997. Variations saisonnières du succès reproducteur chez la Grande Oie des neiges (*Chen caerulescens atlantica*). PhD thesis, Département de biologie, Université Laval.

Piedboeuf, N. 1996. Qualité nutritive des sites d'alimentation des oisons de la grande oie des neiges: est-il avantageux d'utiliser des sites déjà broutés? MSc thesis, Département de biologie, Université Laval.

Lesage, L. 1995. La croissance corporelle, et l'influence de la date d'éclosion et du site d'élevage sur le développement tissulaire chez les oisons de la grande oie des neiges. MSc thesis, Département de biologie, Université Laval.

Fortin, D. 1995. L'environnement thermique des oisons de la grande oie des neiges (*Chen caerulescens atlantica*) dans l'Arctique canadien. MSc thesis, Département de biologie, Université Laval.

Beaulieu, J. 1995. La croissance des plantes arctiques (*Dupontia fisheri* et *Eriophorum scheuchzeri*) en réponse au broutement par les oisons de la grande oie des neiges. MSc thesis, Département de biologie, Université Laval.

Hughes, J. 1992. Utilisation de l'habitat par la grande oie blanche pendant la période d'élevage des couvées à l'Ile Bylot, Territoires du Nord-Ouest. MSc thesis, Département de biologie, Université Laval.
Choinière, L. 1992. Stratégie énergétique de la grande oie blanche (*Chen caerulescens atlantica*) pendant la reproduction. MSc thesis, Département de biologie, Université Laval.
Manseau, M. 1991. Habitats d'élevage des oisons de la grande oie des neiges (*Chen caerulescens atlantica*): une approche comparative incluant la perception de l'animal. MSc thesis, Département de biologie, Université Laval.
Boismenu, C. 1991. Physiologie du jeûne prolongé chez la grande oie des neiges (*Chen caerulescens atlantica*). MSc thesis, Département de biologie, Université Laval.
Tardif, J. 1990. Comportement d'alimentation de la grande oie blanche (*Chen caerulescens atlantica*) en période pré-reproductrice. MSc thesis, Département de biologie, Université Laval.