

Arctic WOLVES



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2008 Field Reports

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Field site:

Alert, Ellesmere Island (NU)

Date of activities in the field

21 May to 6 August 2008

Field personnel

Dr. R.I. Guy Morrison, principal investigator, National Wildlife Research Centre

Dr. François Vezina, post-doctoral researcher

Clare E. Hodgetts, field assistant

Jean-Rémi Julien, IPY field assistant (summer student)

Junior Carrier, IPY field assistant (summer student)

Planned activities

Shorebirds

- Capture and banding of shorebirds
- Collection of blood samples for DNA and blood metabolite determinations
- Measurement of Basal Metabolic Rate of shorebirds
- Feeding experiments to determine changes in digestive capacity of shorebirds
- Resighting of previously colour-banded birds
- Monitoring timing of shorebird arrival and breeding
- Determination of breeding densities through coverage of survey plots
- Estimation of hatch success from nest monitoring
- Documenting species composition in area
- Artificial nest experiments to assess annual and spatial variation in predation pressure

Long-tailed Jaegers

- Determination of abundance of breeding Long-tailed Jaegers

Insects

- Determination of seasonal abundance of invertebrates using Malaise traps

Small mammals

- Monitoring of small mammal (lemming) abundance using snap traps

Plants

- Vegetation sampling (determination of standing crop and primary production)

Logistics

The project received outstanding support from Canadian Forces personnel at CFS Alert during the 2008 IPY activities, as it has in previous years during research operations in the area.

Field activities

Bird banding

A total of 275 birds were captured during the field season, including 256 during the post-arrival period from late May to the latter half of June. Blood samples were obtained from all birds to determine blood metabolite levels and for DNA-sexing. Basal Metabolic Rate was measured for a sample of Red Knots and Ruddy Turnstones. In another experiment, captive knots and turnstones were fed mealworms ad lib to determine changes in digestive capacity during the post-arrival/pre-breeding period. During the arrival period, flocks were scanned regularly for the presence of colour-banded individuals. Two Red Knots previously colour-banded at Alert were seen in northern Norway in May 2008 during their return migration to the breeding grounds. One recaptured Long-tailed Jaeger had originally been banded 21 years previously at Alert.

Artificial nest experiments

Following 2007 IPY protocols, one random set of 20 nests was distributed over a 2 km² plot located on coastal tundra bordering Alert Inlet. The plot was run twice, in early and late July. In addition, a line of 20 randomly located nests set at intervals of approximately 0.5 km along a transect was run twice using protocols developed in previous years at Alert: nest locations were the same as in 2007. In addition, a “long line” of 20 randomly located single quail and single chicken eggs was set running from Alert to Kirk Lake for comparison with studies in previous years at Alert.

Invertebrate abundance

Two lines of five Malaise traps were set up (23 June) in marsh and dry tundra habitats on the shores of Alert Inlet at the same locations used in 2007. Invertebrates were collected every two days from late June to early August in accordance with IPY protocols. In addition, two Malaise traps were set up near Alert (25 May) to measure invertebrate abundance starting earlier in the season before other field sites were accessible, with samples being collected every two days until early August.

Plot surveys

Eleven plots, which were generally 12 ha in area, were surveyed by a team of two. All plots were rope dragged. We found a total of 31 nests, 11 during plot surveys and 20 opportunistically.

Shorebird, predator, and wildlife monitoring

Nests found during fieldwork and plot surveys were visited regularly to determine nesting phenology and hatch success. Habitat data were recorded in the immediate vicinity of the nest (one square metre) and in the general area. Numbers and locations of Long-tailed Jaeger nests were monitored throughout the season. Records were maintained of sightings of other potential predators including Arctic foxes and Arctic wolves, as well as of other wildlife occurring in the area. Daily species logs were kept throughout the season at two set locations and during travel through the Alert area during the course of fieldwork.

Lemmings

Six trap lines (snap traps) were installed in late July, three in wet/damp habitats and three in dry habitats. Two lines of 20 stations and one line of 10 stations were set in each habitat, 15 m apart, with each station consisting of 3 traps within a 2-m radius of the point for a total of 180 traps. Only one collared lemming was caught in the wet/damp habitats.

Primary production and standing crop

Vegetation sampling was carried out at four separate locations, two in damp, marshy areas and two in drier, poorly vegetated habitats. We used exactly the same procedures as in 2007. Sampling took place in the period from 24 to 30 July 2008.

Snowmelt

Snow cover was monitored visually throughout the summer from one vantage point that allowed estimation of cover over a variety of flat and sloped terrain.

Field site:
Bylot Island (NU)

Date of activities in the field

12 May to 22 August 2008

Field personnel

Gilles Gauthier, principal investigator, Université Laval
Joël Bêty, principal investigator, Université du Québec à Rimouski
Austin Reed, principal investigator, Canadian Wildlife Service
Marie-Christine Cadieux, research assistant, Université Laval
Madeleine Doiron, PhD student, Université Laval
Jean-François Therrien, PhD student, Université Laval
Laura McKinnon, PhD student, Université du Québec à Rimouski
Arnaud Tarroux, PhD student, Université du Québec à Rimouski
David Duchesne, MSc student, Université Laval
Marc-André Valiquette, MSc student, Université du Québec à Rimouski
Cassandra Cameron, MSc student, Université du Québec à Rimouski
Élise Bolduc, MSc student, Université du Québec à Rimouski
Loïc Valéry, Post-doc fellow, Université Laval
Meggie Desnoyers, BSc student, Université de Montréal
Christine Demers, BSc student, Université du Québec à Trois-Rivières
Geneviève Cauchon-Ouellet, BSc student, Université Laval
Vanessa Duclos, BSc student, Université Laval
Marie-Claude Martin, technician, Université Laval
Adam Desjardins, BSc student, Université du Québec à Rimouski
Élisabeth Tremblay, BSc student, Université du Québec à Rimouski
Pierre-Yves L'Hérault, BSc student, Université du Québec à Rimouski
Émilie Chalifour, BSc student, Université du Québec à Montréal
Émilie D'Astous, BSc student, Université du Québec à Rimouski
Martin Patenaude-Monette, BSc student, Université de Sherbrooke
Joassie Ootoova, Inuit field assistant
Ivan Koonoo, Inuit field assistant
Joshua Enookolo, Inuit field assistant
Leslie Qanguq, Inuit field assistant

Planned activities

Climate

- Automated recording of weather parameters at 3 stations
- Recording of snow cover and snow depth in spring

Plants

- Sampling of standing crop and primary production of vascular plants in wetlands and mesic tundra

- Sampling of annual impact of goose grazing on wetlands (exclosures)

Snow geese

- Measure of goose nesting density
- Measure of reproductive success (pre-hatch and post-hatch)
- Survey of the whole colony during brood-rearing

Shorebirds and insects

- Measure of nesting density
- Measure of reproductive success (pre-hatch and post-hatch)
- Conduct experiments on predation pressure with artificial nests
- Sampling of seasonal abundance of insects

Small mammals

- Measure annual abundance using snap-traps
- Measure seasonal abundance and demography using live-trapping
- Sampling of winter nests to measure winter abundance and demography
- Study of sub-nivean thermal environment
- Maintaining the snow-fence experiment

Arctic/red foxes

- Monitoring of known dens to measure abundance and reproductive success
- Sampling of blood and hair for isotopic and genetic analyses
- Collection of scats for diet analysis
- Marking of adult and young to study demography
- Marking of adults with satellite transmitters to study year-round foraging strategy
- Installing automatic cameras on dens to determine litter size

Avian predators

- Measure of nesting density of raptors and tundra seabirds
- Measure of their reproductive success
- Collection of regurgitation pellets for diet analysis
- Sampling of blood for isotopic analyses
- Observation of prey delivery rates at nests (visually and with cameras)
- Marking of gulls, jaegers and owls for demographic studies
- Marking of Long-tailed jaegers with satellite transmitters to study long-distance movements and breeding site fidelity
- Visit of sites where Snowy owls marked with a satellite transmitter in summer 2007 had settled in 2008

Logistics

Logistics at the Bylot Island field station was challenging this summer due to the size of the field crew (a record high) and of the amount of activities taking place. Nonetheless, we did not experience major logistic problems. Weather was exceptionally good during the first half of the summer, but very poor during the second half, resulting in the loss of some field days during that period.

Field work was conducted over a total study area of about 400 km² on Bylot Island. Within this area, we had 2 camps as usual, the Camp-1 (Base-camp) and the Camp-2, 30 km away. Most activities were conducted on foot in two core areas of about 50 km² around each camp. Camp-1 is a prime brood-rearing area for snow geese whereas Camp-2 is located in the center of the

snow goose nesting colony. Snowmobiles, helicopter, and temporary fly camps were used extensively for work conducted outside the two core areas, which mainly concerned predators (foxes and raptors).

Field activities

Climate

We retrieved weather data from our 3 automated recording stations without problems. Most of the sensors functioned normally throughout the winter. The spring was exceptionally warm and sunny but from mid July to our departure in August we had cooler and wetter weather. Our snow-depth transects showed that snow-melt was the earliest ever recorded, in part because the snow-pack was very thin at the end of the winter, and we had warm temperature in May and June.

Plants

We established a total of 36 goose exclosures in wetlands at 3 sites (Camp-1, Camp-2 and Dufour Point, 12 exclosures per site) in June. We sampled above-ground biomass inside and outside these exclosures in mid August to determine plant production and the impact of goose grazing. We also established an additional 12 lemming exclosures in wetlands to determine the impact of lemmings. Plant production was higher than last year and higher than the 19-year average recorded on Bylot Island. Goose grazing impact was relatively low this year, which is surprising considering the good production (see below). We measured primary production of mesic habitat at 12 lemming/goose exclosures in this habitat by sampling biomass at the beginning and the end of the season.

Snow geese

We surveyed about 440 nests in the colony (Camp-2) and monitored their reproductive success. We web-tagged more than 2450 young at hatch, banded 3395 adults and young in August around Camp-1, recaptured several hundred marked birds and measured close to 1000 goslings to monitor their growth. Snow goose arrival was early, possibly due to good conditions encountered during the spring migration in northern Quebec where the spring melt was also early this year. Geese started nesting immediately upon arrival on Bylot Island and the peak laying date was advanced compared to the long-term average. The nesting density was relatively high, indicating a good reproductive effort by the population, and clutch size was high. Predation rate on nests was low, especially by foxes, and thus nesting success was high. Survival of young during the summer was apparently good because the young:adult ratio in our banding drives in August was above the long-term average.

Shorebirds and insects

We documented the presence of a total of 8 shorebird species at Camp-1 and Camp-2. Thirty-seven shorebird nests of 5 species were monitored. The most abundant nesting birds were the Baird's Sandpipers and American Golden Plovers. Nest density was lower than in previous years but arrival and lay dates were early relative to last year. In addition to the monitoring of natural nests, 160 artificial nests were deployed. Predation pressure on natural and artificial nests was low likely due to an increase in the abundance of lemmings on Bylot Island. Arctic fox was the only shorebird egg predator identified using remote cameras. Forty-one shorebirds were banded at the nest and 8 broods were tracked over a period of up to 13 days.

Seasonal changes in diversity and abundance of insects were determined using 10 pitfall traps deployed at both wetland and mesic tundra habitats (5 traps per habitats) at Camp 1 and Camp 2. At Camp 1, an additional 5 pitfall traps were placed in the snow-fence experimental plot. Pitfall traps were sampled every 2 days (June 13 to August 22 at camp 1 and June 13 to July 17 at camp 2). A total of 700 samples were collected over the entire season and are currently analyzed.

Small mammals

We conducted small-mammal live-trapping in two grids (12 x 12 traps), one in wetland habitat and one in mesic habitat at Camp-1. We trapped lemmings over 3-day periods 3 times in each grid from mid-June to mid-August. We also trapped lemmings using the same timeline in a third grid set up on the snow-fence experimental plot (10 x 10 traps). The snow fence was set up on this third grid in late July 2007 (300 x 300m; 1500m of snow fence erected). We conducted snap-trapping survey in July at the Camp-1 and Camp-2 areas in July. We ran a large number of transects for lemming winter nests. We retrieved the temperature loggers deployed in 2007 at winter nest sites found during the summer and random sites. During our search of owls marked with radio-transmitters we surveyed lemming abundance at two sites on Baffin Island in early July with snap-traps, at Mary River (220 km south of Bylot) for 2 days and in Central Baffin Island (564 km south-east from Bylot).

Our different indices of lemming abundance yielded variable results. Live-trapping at Camp-1 indicated a high abundance of lemmings, much higher than in 2007 and comparable to 2004. Brown lemmings greatly outnumbered collared lemmings in live captures, contrary to last year. Abundance was also higher in the wetland grid than in the 2 mesic grids. Snap-trapping in July suggested a moderately low abundance of lemmings at both camps (lower than in 2007) but heavy rain during this period flooded many of the trapping sites at Camp-1 and likely biased our abundance estimates. Winter nest surveys also indicated high lemming abundance and we collected 229 winter nests for analysis in the laboratory. Snap-trapping conducted at both Mary River and on central Baffin Island also indicated a high abundance of lemmings at these two sites. Globally, our data are indicative of a high abundance of lemmings over a large area of the eastern Arctic (possibly over all of Baffin Island).

At the arrival of our crew in mid-May more than half of the snow fence had fell on the ground and many steel T-bars had been broken over the winter. We were able to repair some of the damaged portion and it was further strengthen in early August when more guy ropes we installed in order to prevent similar damages again this winter. The remaining portion of the snow fence will be reinstalled next summer.

Arctic/red foxes

We inspected all known dens in the study area (n=103, including 4 new ones found in 2008) for signs of use by foxes and presence of cubs. We found a total of 58 fox dens with signs of activity and 24 were used for reproduction. We found 23 litters of arctic fox ranging from 1 to 13 cubs (average: 7.8 cubs/litter) and 1 litter of red foxes with a minimum of 2 cubs. Dens with reproduction were scattered all over the research area, though most of them (16/24) were located around the goose colony. A few families used multiple dens to rear their cubs once they were old enough to follow the adults.

We captured 17 adults (7 females, 10 males) and 50 cubs (31 females, 19 males). Seven of the captured adults had already been captured and tagged between 2003 and 2007. All new

individuals captured were tagged with coloured and numbered plastic tags. We collected hair and blood samples, which will be used for stable isotopes and genetic analyses during the winter 2008-2009. These analyses will allow us to monitor yearly changes in the diet of foxes, and to determine family relationships between individuals.

In 2007 we had fitted 14 GPS collars to arctic foxes, of which only 5 could be recovered before the end the field season. We managed to recover 4 more units this year, by recapturing individuals. Seven individuals were also equipped in 2007 with Argos collars and 3 of them were resighted in 2008. This year, 16 adults were equipped with Argos collars. They will give positions of foxes every day (summer) or every second day (winter) for at least one year. This will show where foxes go during the winter season.

Avian predators

We ran several transects to find raptor and seabird nests. Contrary to last year, more than half of the avian predator nests were found during these systematic searches. We revisited most nests found to monitor their success, collected pellets at owl, jaeger, hawk and gull nests, and deployed 15 automatic-triggered cameras at several nests to monitor prey delivery rates of adults. We captured adults and young at several nests to band them and to collect blood samples for isotopic analyses.

We found 20 snowy owl nests, 9 near Camp-1 and the rest were scattered over a large area between Camp-1 and Camp-2 (up to 300 km²). At least 15 of these nests were successful at fledging at one or more young. We also found 8 rough-legged hawk nests but these were scattered over a very large area and few of these nests could be monitored. We found 30 glaucous gull nests, 78 long-tailed jaeger nests and 2 parasitic jaeger nests, which is much higher than last year. Nesting success of these seabirds was generally good and higher than in 2007. We marked 23 gulls (6 adults and 17 young) and 37 jaegers (24 adults and 13 young). We collected more than 2500 pellets at owl, jaeger and gull nests and we collected blood samples on 20 juvenile owls, 33 jaegers (17 adults and 16 young) and 23 gulls (6 adults and 17 young).

We were able to trap 10 female jaegers in their territory and mark them with ARGOS transmitters. Marked jaegers left Bylot Island by mid- to late August and headed south for the Atlantic where they seemed to gather 600 to 1,000 km east of Newfoundland. Unfortunately, by the end of September, only 2 transmitters were still operational. One of these jaegers was heading further south and the last signal we received indicated that this bird was about 600 km west of Mauritania.

We also successfully tracked over a full year the movements of 9 of the 12 female owls radio-marked in 2007. In 2008, 8 of these females settled throughout Baffin Island, from Mingo Lake in the south to Erichsen Lake in the north (none on Bylot Island). At all of these sites, we resighted our radio-marked female and we found a nest for 7 of them during our visits. All of them had chicks, which indicated that they bred successfully. The last bird settled in Prince Patrick Island in the western Arctic but only in early June, thus it is unlikely that this bird bred this year. The average distance between the site where the birds nested in 2007 and where they settled in 2008 is 733 km (range: 235-1228 km). Eight of these transmitters are still operational and we are following for the second year their fall movements. By early October, all birds had started to move from their nesting site. Although the birds are again showing highly variable movement patterns among individuals, there seems to be a consistency within individuals in following the same general migratory track used last spring.

Field site:

Cape Churchill (MB) and Akimiski Island (NU)

Date of activities in the field

Cape Churchill: **Group 1:** 9 April to 19 August 2008

Group 2: 25 May to 15 August 2008

Akimiski Island: **Group 3:** 10 May to 25 August 2008

Field personnel

Cape Churchill - Group 1

Robert L. Jefferies, principal investigator, University of Toronto

Kate Edwards, PhD student, University of Toronto

Shannon Refvik, summer undergraduate assistant, University of Toronto

Sarah Dungan, summer undergraduate assistant, University of Toronto

Geoffrey Legault, summer undergraduate assistant, University of Toronto

Freyja Forsyth, research technician, University of Toronto

LeeAnn Fishback, science coordinator, Churchill Northern Studies Centre

Carley Basley, northern research technician, Churchill Northern Studies Centre

Heather Stewart, Parks Canada, Churchill

Cape Churchill - Group 2

Robert F. Rockwell, principal investigator, American Museum of Natural History

Linda Gormezano, PhD student, City University of New York

Frank Uvino, camp manager

Elise Gornish, PhD student, University of Florida

Kit Schnaars, PhD student, City University of New York

David Koons, P.I. Utah State University

Marlon Ulloal, summer student

Jay McGowan, summer undergraduate student, Cornell University

Tom Johnson, summer undergraduate student, Cornell University

Brad Walker, summer undergraduate student, Cornell University

Andrea Rawluk, summer undergraduate student, Trent University

Bernie Fernandes, summer undergraduate student, York University

Ryan Walkoski, northern summer student

Zac Ungar, volunteer

Kevin Burke, Parks Canada, Churchill

Pierre Marchand, Parks Canada, Churchill

Akimiski Island - Group 3

Kenneth F. Abraham, principal investigator, Ontario Ministry of Natural Resources

Rod Brook, research biologist, Ontario Ministry of Natural Resources

Sarah Hagey, research technician, Ontario Ministry of Natural Resources

Danica Hogan, research technician, Ontario Ministry of Natural Resources

Andree-Michelle D' Aoust-Messier, research technician, Ontario Ministry of Natural Resources
Burke Korol, Ontario park ecologist, Ontario Ministry of Natural Resources
Mike Allen, resource technician, Ontario Ministry of Natural Resources
Tara Macdonald, resource technician, Ontario Ministry of Natural Resources
Lisa Pollock, graduate student, Trent University
Erica Nol, collaborating researcher, Trent University
Peter Kotanen, collaborating researcher, University of Toronto
Mark Peck, volunteer, Royal Ontario Museum
John Brunjes, volunteer, Kentucky Department of Natural Resources
Jean Iron, volunteer
Gerry Binsfield, volunteer
Tyler Hoar, volunteer
Jim Hastie, volunteer

Planned activities

Cape Churchill - Group 1

- Natural history log
- Daily bird list
- Flowering times
- Changes in soil nutrient biomass, soil temperature, soil water content, soil nutrients and physical properties of soils in a wet sedge meadow during the winter-spring transition
- ¹³C ¹⁵N uptake experiment into roots of *Carex aquatilis* at low temperatures
- Effects of nutrient additions on microbial biomass during the winter-spring transition
- PLFA analyses of the winter-spring soil microbes
- Methane and CO₂ fluxes from wet sedge meadows
- Shrub encroachment along a vegetational gradient
- Nitrogen fixation rates and nitrogen mineralization rates along a vegetational gradient
- Seasonal changes in arthropods along a vegetational gradient
- Die-back in *Leymus mollis* and nematode infection
- Faecal densities in sedge meadows as an index of goose-use
- Phenology of the growth of *Carex aquatilis* both above- and below-ground
- Effects of shoot-pulling on the growth of *Carex aquatilis* in three sedge meadows
- Effects of grazing and non-grazing of *Puccinellia phryganodes* swards on plant biomass and soil microbial biomass
- Decomposition of litter of *Carex aquatilis*
- Standing crop of *Carex aquatilis* inside and outside exclosures
- Interviews with First Nations people
- Student participation in Science Day organized by the CNSC for the people of Churchill and visitors

Cape Churchill - Group 2

- Aerial surveys of staging geese
- Ground transect surveys of geese for nesting density, clutch size and float status
- Exclosure repair
- Polar bear den work

Field site: Cape Churchill and Akimiski Island

- Polar bear ground transects
- Deployment of new exclosures
- Scoring of exclosures and control regions
- Aerial photography of snow goose brood flocks
- Snow goose banding
- Coastal polar bear transects
- Fox surveys

Akimiski Island - Group 3

- Natural history log
- Daily bird list
- Goose abundance (Canada geese, snow geese)
- Goose nesting success (Canada geese)
- Goose brood size (Canada geese)
- Arthropod monitoring
- Artificial nest monitoring
- Small mammal abundance
- Plant monitoring
- Incidental observations seabirds, mammals, raptors
- Standing crop of *Carex aquatilis* inside and outside exclosures (*Carex aquatilis* grazing experiment)
- Isotope-food web (fox)
- Weather monitoring
- Interviews with First Nations people

Logistics

Cape Churchill - Groups 1 & 2

No serious problems were encountered, except caribou foraged in exclosures in the salt marsh at La Pérouse Bay.

Akimiski Island - Group 3

Polar bear interference with arthropod traps which resulted in reduced seasonal coverage and sample size.

Field activities

Cape Churchill - Group 1

We accomplished all of the planned studies listed above. At present many of the samples collected in relation to seasonal changes and in experiments are being analysed. This is going to take time to accomplish so results are not immediately forthcoming.

Cape Churchill - Group 2

Research progress on the Cape Churchill Peninsula during the 2008 field season (25 May through 15 August) targeted a range of projects. Early season work on lesser snow geese included standard aerial surveys to inventory staging birds and ground transects to determine nesting density, clutch size and nesting phenology. We collected polar bear hair and scat at

standard interior denning sites and coastal transects. We repaired vegetation recovery exclosures at 5 separate sites. We marked ~100 nests of common eiders to be revisited later for estimating hatching success. Beginning in July, we returned and scored the vegetation at the exclosures and their paired control sites. We flew our standard transects for aerial photography of snow goose broods. During our banding operations we processed approximately 3500 adult and gosling snow geese. We revisited the common eider nests we marked and determined that >90% had been depredated by arctic wolves. We covered close to 100 km of coastal transects between Cape Churchill and Rupert Creek collecting fresh polar bear scat and hair (the latter from day beds). We flew our standard fox transects and estimated the number of active and inactive dens. We stopped at all the active dens to determine what the arctic foxes were foraging on.

Akimiski Island - Group 3

At Akimiski Island, we undertook studies in 2008 that relate to several of the IPY subprojects or protocols. We conducted nest monitoring of Canada geese from incubation through hatch which yielded nest density, clutch size, and reproductive success information, and followed that up with brood observations through the first 6 weeks of brood rearing to determine survival. We collected some clutch size, nest density and phenology data for snow geese. We recorded semipalmated plover and killdeer nests whenever they were encountered. We followed the predator count protocols through the nesting period of both species to determine an index of avian predator abundance and collected some counts during the brood rearing period. We recorded incidental observations of all potential predators, along with daily bird checklists. We conducted artificial nest trials in early and late June, in an area of upper intertidal *Puccinellia phryganodes* to beach ridge transition, to determine an index of predation pressure for ground nesting birds, especially shorebirds. We installed 5 modified malaise-pitfall traps in two habitats (upper intertidal *Puccinellia phryganodes* swards, and supratidal *Festuca rubra* swards) to collect information on abundance, species composition and phenology of arthropods during two field sessions (June, August). We conducted live-trapping for small mammals in three habitats (grass/willow, spruce forest, riparian) to index abundance and species composition. We monitored aboveground biomass of *Puccinellia phryganodes* swards, and supratidal *Festuca rubra* swards, and followed up on the 2007 trials on *Carex aquatilis* grazing pressure and standing crop. We developed a draft food web for Akimiski Island and opportunistically collected animal tissues for isotopic analysis. Finally, we had an automated weather station operating throughout the season.

Departures from Planned Activities

Akimiski Island - Group 3

Delayed start on First Nations project. New graduate student, Jennifer Robus, began in September 2008. She will be conducting interviews with First Nations people over the winter and is establishing contacts in three communities (Attawapiskat, Peawanuck and Moosonee-Moose Factory) but timelines are uncertain.

Field site:

Fosheim Peninsula, Ellesmere Island (NU)

Date of activities in the field

7 July to 8 August 2008

Field personnel

Josée Lefebvre, principal investigator, Canadian Wildlife Service

Céline Maurice, wildlife technician, Canadian Wildlife Service

Francis St-Pierre, wildlife technician, Canadian Wildlife Service

Planned activities

- Plants
 - Sampling above-ground primary production/goose exclosures in wetlands and mesic tundra habitats
- Geese
 - Determine abundance and pre/post hatch reproductive success
- Small mammals
 - Sampling of winter nests to measure winter abundance
 - Sampling of active burrows
 - Determine annual abundance using snap-traps
- Foxes
 - Determine abundance
 - Sampling of hair for isotopic analyses
 - Collection of scats for diet analysis
- Shorebirds
 - Determine abundance and reproductive success
- Raptors and seabirds
 - Determine abundance
- Arthropods
 - Determine abundance and phenology
- Weather conditions
- Tabulate daily reports of all species observations

Logistics

The logistics of conducting field work in this remote area was a challenge because of the need to coordinate all of the different activities within a limited time frame. In the beginning of the field work, we had a reduced availability of the helicopter which we had to share with a few crews surrounding Eureka which delayed a few activities. No major logistic problems were experienced. Field work was conducted on the Fosheim Peninsula on Ellesmere and the south part of Schei Peninsula on Axel Heiberg Island. An intensive study area, Eastwind Lake on Fosheim Peninsula, was the area where most field work was done, which was 20 km from the camp. Quads were used to have access to this study area.

Field activities

Geese

On 8 and 12 July, we surveyed the south part of Axel Heiberg Island, Brant and Shamrock Islands and Fosheim Peninsula of Ellesmere Island to evaluate the relative abundance of Greater Snow Geese (GSG) and Eastern High Arctic (EHA) Brant. Since the spring snow melt was early in eastern Arctic this year, we missed the nesting period and only observed groups of molting adults and broods. On Brant Island, 13 predated Brant nests were found and none on Shamrock Island. Between 31 July and 5 August, a total of 72 broods were observed on a survey with an average of 4.14 young/brood. At the end of the field season, we banded more than 560 new Greater Snow Geese and more than 60 adult females were necks-collared in three days. Furthermore, we recaptured 89 banded Greater Snow Geese including 2 adult males banded on Bylot Island (in 2000 and 2006) and two in southern Québec (Île-aux-Oies in 2007 and Cap Tourmente National Wildlife Area in 1997). Seeing that brood size was generally more important this year than last, we assume that reproduction was quite good in this area during the summer.

Plants

We established a total of 16 exclosures in wetland and mesic tundra habitat at the beginning of July (8 exclosures per habitat). We sampled above-ground biomass inside and outside the exclosures in late July - early August.

Small mammals

In July, we conducted winter nest and burrow surveys at Eastwind Lake site. A snap-trapping survey was also done at the end of July – early August in wet and dry habitat. We captured 10 collared lemmings (*Dicrostonyx* spp.), 10 times more than last year. Field impressions suggest that lemmings were quite abundant based on direct observations in field and the presence of weasels.

Foxes

The two known dens were found with signs of activity this year. No new dens were found on the Fosheim Peninsula. We collected samples of winter fur and scats for diet and genetic analyses.

Shorebirds

The nesting period for shorebirds was over when we started our survey in early July due to early snow melt. To determine breeding phenology, we captured 20 chicks (12 Ruddy Turnstone (*Arenaria interpres*) and 8 Redknot (*Calidris canutus*)) in different broods to determine their age.

Raptors and seabirds

We conducted a 16-km transect along the Blacktop Ridge to find raptor nests. No nest was found and we only had one incidental observation of a Gyrfalcon in mid-July. A few Snowy Owls were observed on Fosheim Peninsula during aerial surveys.

We found 16 Glaucous Gull (*Larus hyperboreus*) nests and 1 Sabine's Gull (*Larus sabini*) nest on Brant Island. Due to distance between this site and the main study area, and the limited flying time, we did not go back to determine breeding success.

Field site: Fosheim Peninsula, Ellesmere Island

Arthropods

Phenology and abundance of arthropods were determined using 10 modified pitfall traps installed both in wetland and mesic tundra habitat (5 per site) at Eastwind Lake. All pitfall traps were checked every 2 days between 9 July and 2 August. A total of 110 samples were collected.

Daily reports of species observations

A daily report of all species observed was prepared.

Field site:
Herschel Island (YT)

Date of activities in the field
11 April to 30 September 2008

Field personnel

Charles Krebs, principal investigator, University of British Columbia
Alice Kenney, research associate, University of British Columbia
Liz Hofer, research associate, University of British Columbia
Daniel Gallant, PhD student, Université du Québec à Rimouski
Guillaume Szor, research associate, Université du Québec à Rimouski
François Racine, field assistant, Université du Québec à Rimouski
Scott Gilbert, instructor, Yukon College
Michael Nelligan, research associate, private sector
Polly Madsen, research associate, private sector
Alistair Blachford, PhD student, University of British Columbia
Frank Doyle, research associate, Wildlife Dynamics Consulting
Som Ale, post-doctoral fellow, Lakehead University
William Halliday, undergraduate assistant, Lakehead University
Don Reid, research associate, Wildlife Conservation Society of Canada
Maria Leung, research associate, private sector
Sam McLeod, field assistant, Aklavik
Isla Myers-Smith, PhD student, University of Alberta
Catherine Henry, undergraduate student, University of Alberta
Georges-Olivier Cimon, field assistant
Dave Mossop, instructor, Yukon College
Kelsey Russell, field technician, Yukon College
Fritz Mueller, photographer, private sector
Helen Slama, furbearer technician, Yukon Environment
Ben Gilbert, field assistant; northern student
Andrew Fehr, field assistant, IPY student

Logistics

Herschel Island was our primary field site for the IPY work in 2008, and we completed most of the planned field work there. The air strip was flooded once in summer, necessitating changes in flight schedules. We also completed some IPY research objectives at Komakuk Beach, Ivvavik National Park, in 2008. By adding a wall tent to our field camp, for cooking and general living, we made this station a much more pleasant field experience. Because access to Komakuk by Twin Otter is not compromised by short or periodically risky airstrip, this site appears more suitable for field work beyond IPY.

Field activities

Herschel Island

SUBJECT	2008 WORK ACCOMPLISHED	DATA TREND	INTERPRETATION	WORK in 2009
Snow Enhancement by Snow Fencing	Snow depth transects run in mid April across all trapping grids, including the area with fencing.	Fencing enhanced snow depth from 20-50 cm in control areas, to > 100 cm within 20 m of fence.	Fencing works to enhance snow depths, but would have to be spaced much closer together to provide enhancement across the whole space.	Experiment repeated in winter 2008-09; then dismantled in August 2009.
Snow depths across topographic relief	Ran three transects of snow depths every 20 m across various valley systems to assess patterns of accumulation.	Snow depths typically 10 – 40 cm in relatively open and wind-swept areas, increasing to >200 cm on steep lee slopes.	Herschel, with lots of relief, provides a relatively large area of deep snow for lemming winter habitat.	None.
Snow Cover and Pattern of Snow Melt	One snow transect of 25 stations, 10 m apart run from 27 May through to full melt (30 May) in wet lowland. Pattern of snow melt in major habitats recorded from 25 May to 11 June	Full snow cover in low elevation wetland almost completely lost before start of field session in late May.	A winter of relatively little snow accumulation, plus an earlier onset of melt, resulted in tundra being exposed much earlier in 2008 than 2007.	Repeat in late May.
Primary Production	Standing crop plots clipped in He and Ko upland habitats, inside and outside herbivore exclosures, in early June and early August. Graminoid communities sampled for NPP with clip plots in early August (peak of growth).	Data not fully compiled.		Repeat clip plots in upland habitats, at least with clipping at peak growth.
Arthropods	5 traps in wet alluvial fan & 5 traps in dry upland heath established and run continuously from 6 June to 12 August. Butterflies collected and prepared for identification. Phenology of emergence of adult insects recorded.	Much earlier emergence and peak in 2008 than 2007. Arachnids dominate early, with coleopterans, dipterans and crane flies dominant in July. Increasing rate of capture, with strong variability related to weather. Range extensions for at least 5 butterflies; Rare arctiid moth identified.	Abundant and diverse arthropod fauna, with persistent high pressure in June and early July. Unclear how well arthropod abundance coincided with hatching.	None (not enough person power).

Herschel Island (continued)

SUBJECT	2008 WORK ACCOMPLISHED	DATA TREND	INTERPRETATION	WORK in 2009
Bird Migration	Daily transect (c. 1.1 km) ranging from low wetland to dry upland run from 26 May to 11 June.	Many migrants already present by start of sampling (early spring). Some unusual species (WTSP; YRWA).	The wetland area near the camp is a key staging ground for the island as a whole.	Repeat (start earlier in season if possible).
Raptor Abundance – point observations	10 min surveys from high point above camp (26 May to 11 June)	Dominance of resident raptors setting up nests (SNOW).		Repeat in conjunction with the Bird Migration transect.
Raptor Abundance – nest searches	The eastern half of the island (c. 50 sq km) well searched for nests of RLHA, PEFA, SEOW, SNOW and LTJA	Nests of SNOW (6), RLHA (4), PEFA (4), SEOW (1), and LTJA (2), with eggs. SEOW failed. Heavy SNOW chick mortality – poor prey delivery & heat stress. 1 RLHA & 2 PEFA nests failed as cliff nest sites collapsed.	SNOW were able to nest in 2008 at lemming densities similar to 2007. Timing of snow melt (earlier in 2008) may be key to onset of nesting. Lemming densities high enough for high fledging rates in RLHA and PEFA, if nests did not collapse. Fledging earlier in 2008.	Repeat.
Raptor telemetry	4 adult Snowy Owls instrumented with satellite tags; capture at nests.	Birds are successfully living with tags, and started longer movements in Sept. By mid October, 3 were west into Alaska, and one was south near Old Crow.	Successful procedure.	Repeat if Snowy Owl nesting again.
Raptor Diet	Pellet collection route put in place in June and run in mid August at fledging. Pellets also collected at nests. Reconyx camera recording of some prey deliveries to SNOW nests	Pellets not yet analysed. Prey remains at SNOW nests indicated heavy use of birds (ducks, ptarmigan, passerines). PEFA diet included many passerines and shorebirds.	Apparently insufficient lemmings to support survival of majority of SNOW nestlings.	Repeat in early June (winter pellets), and in August.
Passerine and Shorebird Abundance	Two full (12 ha) PRISM plots established and run in upland wet and dry communities (He, Ko, Gu). One smaller (6 ha) PRISM plot run on alluvial fan (or habitat).	Few shorebirds nesting in the upland areas. Most upland nesters are LALO, SASP & AMPI, with scattered GWGO and ROPT. Nesting densities higher on alluvial fan.	The majority of the island is not productive shorebird habitat. The alluvial fan habitat is most productive for shorebirds– SESA, SEPL, BASA.	Use the lemming trapping grids as “rapid” PRISM plots (when searching for lemming winter nests).
Shorebird & Passerine Nesting Success – Direct observations	Sample of at least 140 shorebird and passerine nests tracked from some time in incubation through hatching, and some to fledging.	Data have not been compiled exactly, but indicate earlier mean hatching dates for prominent species (e.g., SESA, LALO) compared to mid-80s.	Some potential evidence for effects of climate change on phenology.	Repeat for a small sample in easy to access sites.

Herschel Island (continued)

SUBJECT	2008 WORK ACCOMPLISHED	DATA TREND	INTERPRETATION	WORK in 2009
Shorebird Nesting Success – Experimental Nests	Two trials run with quail eggs as per protocol. (40 nests per trial)	Low rates of nest depredation in 2008, compared to 2007.	Single red fox hunting in trial area in 2008, apparently not so intent or focused on this kind of predation?	Do not repeat.
Shorebird and Passerine Nesting Habitat	Sample of c. 40 shorebird and passerine nests were subject to habitat description using PRISM manual protocol and form, after fledging.	Data not yet analysed.	Uncertain.	None.
Small Mammal Abundance	Two upland 9 ha grids (“Fence” and “Ridgetop”) trapped in early June, July, August, and Sept; one 2 ha alluvial fan grid (“Graveyard”) trapped in same time periods. Winter nest counts on all grids (June). No trapping on relative abundance index lines.	In upland, lemmings and voles were fairly abundant in spring (c. 6/ha), decreasing in mid summer, and generally recovering to moderate density in fall (6 to 11/ha); densities on alluvial fan followed same pattern, with 18/ha in spring to 20/ha in fall. <i>Microtus</i> expanded from fan into upland wet habitats during summer. 2007-08 winter nests on snow enhancement area noticeably concentrated in areas of deeper snow, but also suffered very high rates of weasel depredation (c. 50%).	4 principal small mammal habitats: gravel-grass spit by habitation (commensal <i>Microtus economus</i>); Carex-moss wetlands in drainages and alluvial fan (<i>Lemmus</i> and <i>Microtus</i>); upland Dryas-Salix heath (<i>Dicrostonyx</i>); and Eriophorum tussock - Salix (<i>Lemmus</i> and <i>Dicrostonyx</i>) communities.	Spring (June) live trapping of all three grids. Late summer (August) trapping of all three grids. Spring (June) counts of all winter nests on all three grids.
Lemming Summer Habitat Selection	Trapped each of 8 microplots 4 times in July and August. Ran enhanced cover treatments and estimated activity with tracking tubes.	Data still to be analysed for habitat selection. Tracking tube data indicates trend to increased activity in areas with enhanced cover.		Continued sampling with these and perhaps other experiments. Details still under consideration.

Herschel Island (continued)

SUBJECT	2008 WORK ACCOMPLISHED	DATA TREND	INTERPRETATION	WORK in 2009
Lemming Winter Ecology	<p>Maintained snow enhancement treatment (5 rows of fencing) on one-half of Fence Grid, with other half as control (for 2008-09 winter).</p> <p>Established 31 wooden trapping boxes with traps for future live-trapping through the snow pack.</p> <p>Downloaded temperature logger data from 2007-08 winter, and re-established 14 sites with temperature loggers to monitor winter temperature regimes on each of the three lemming trapping grids, and within the fence treatment on Fence Grid.</p>	<p>Areas with snow deeper by the fencing had significantly warmer subnivean temperatures.</p> <p>Trapping cylinders (plastic buckets) put in place in 2007-08 winter were generally useless – destroyed by high winds or filled with snow.</p> <p>Lemmings were attracted to the areas of deeper snow for winter use (see Small Mammal Abundance above)</p>	<p>The snow depth enhancement experiment is a success in that fencing does create deeper snow, and lemmings are attracted to areas with deeper snow. However, we are unlikely to see a population level response with this treatment, because the weasel(s) can find the local concentrations of lemmings by the fences and the experiment acts as a predator enhancement treatment.</p>	<p>Late winter 2008-09 – live-trapping through the snow using the trapping boxes.</p> <p>Spring 2009 – June – winter nest counts on each of the two zones on Fence Grid.</p> <p>August 2009 – dismantle and remove snow fencing</p>
Lemming survival (telemetry)	<p>VHF radio-telemetry on 20-30 adults (mix of species) in June-July, and Sept., to quantify survival, causes of mortality, and home range use.</p>	<p>Survival was higher in early summer (raptor mortality most common) than Sept (weasel and raptor mortality)</p>	<p>Telemetry works well, though some radios are lost without us being able to figure out cause of loss. Could be used in late winter (to quantify habitat use under snow), or in early winter.</p>	<p>Consider again in late winter 2008-09.</p>
Foxes	<p>Dens – ground search for all dens, including those recorded 1984-90. Record use by species, and whether reproductive or not.</p> <p>Food availability – estimate abundance of small mammals associated with a sample of dens.</p> <p>Collect scats.</p> <p>Movements – live-trap, and ear-tag or instrument foxes with satellite tags.</p>	<p>Found 26 of 38 dens from 1984-90; remainder collapsed.</p> <p>Found total of 59 dens. 2 natal arctic fox dens & 12 dens used intermittently by arctic fox. 0 natal red fox dens, and 3 dens used by red fox (NE of island).</p> <p>No foxes live-trapped; 1 natal den predated by grizzly bear.</p>	<p>Dynamic balance between two fox species is ongoing on Herschel.</p>	<p>Repeat.</p>

Herschel Island (continued)

SUBJECT	2008 WORK ACCOMPLISHED	DATA TREND	INTERPRETATION	WORK in 2009
Other Mammalian Predator Abundance & Diets	Least Weasels – infrequent captures in lemming traps. Animals ear-tagged. All – incidental observations, and collection of scats.	Least weasels probably the main predator in winter, especially on upland sites. Wolverine – at least one occasionally using island. Grizzly bear - occasional observations Polar bear- none. Ermine - one using driftwood at Pauline Cove in Sept. Mink - one set of tracks at Pauline Cove.		Weasel – mark recapture live-trapping population estimate over 1 sq. km.

Mainland - Komakuk Beach, western North Slope, and Shingle Point

SUBJECT	2008 WORK ACCOMPLISHED	DATA TREND	INTERPRETATION	WORK in 2009
Small Mammal Abundance - Komakuk	Mark-recapture live trapping of two, 9 ha grids (Shore – known as control; and Lake – formerly called Snow), late June and late August. Mark-recapture relative abundance live-trapping of index lines, late June and Late August. Winter nest counts and mapping on both 9 ha grids in late June.	Densities low (total of 2 to 4/ha), and increasing a little during the summer on both grids. No <i>Dicrostonyx</i> , and <i>Microtus</i> are most common. Densities a little lower than previous two years. Total captures of 21 on index lines - very similar to previous 2 years. Winter nest counts much lower than on Herschel, and low proportion (c. 5%) occupied by weasels. Only 1 shrew caught this year.	Small mammals declined over winter – poor winter conditions and ongoing weasel predation. Small mammals held at relatively low densities through summer by predation mortality. <i>Microtus</i> becoming more dominant in this system since 2006.	June – live trap both grids and index lines. August – live trap index lines and both grids.

Mainland - Komakuk Beach, western North Slope, and Shingle Point (continued)

SUBJECT	2008 WORK ACCOMPLISHED	DATA TREND	INTERPRETATION	WORK in 2009
Predator Abundance - Komakuk	General survey of study area for evidence of breeding	CORA fledged 3 young (late June); PEFA fledged 3 young (Aug) ; RLHA fledged 3 young from nest on ground; Arctic fox natal den on airstrip – c. 2 pups weaned; Least weasels bred in summer, and active throughout.	Quite high density of predators, despite low densities of small mammals.	June – repeat regional search for raptor nests and fox dens.
Fox den distribution and occupancy	Aerial survey of fox dens on north slope from Alaska border east to Babbage R. Complete search of some of this region, and focused visits of historical den sites.	105 den sites recorded – mix of previously recorded, new, and collapsed dens. 3 arctic fox reproductive dens (12 dens used by arctic fox); 0 red fox reproductive dens (2 used by red fox).	The dynamic balance between the two fox species continues since the 1970s, though arctic fox seem to be more resilient to low prey abundance on the mainland.	None – no resources.
Gyrfalcon and Ptarmigan abundance – British Mountains – Shingle Pt lowlands	Aerial surveys in late June of a sample stretch of drainages in British Mountains, and transect on coastal plain to quantify gyrfalcon nesting density and occupation, and ptarmigan abundance	Dave Mossop and assistant flew the surveys. Data not finalized.		None – no resources.
Lemming Winter Ecology - Komakuk	Establish snow fence treatment on Lake Grid (9 ha), with Shore grid as the control. Establish temperature button stakes to record temperatures at various heights above ground.	Snow fencing established along c. 4 of 6 potential lines – treatment incomplete but covering majority of grid. Temperature buttons established on both grids.		June – map winter nest distribution with respect to snow fencing. August – complete the fence erection for subsequent winter.

Field site:

Walker Bay, Kent Peninsula (NT)

Date of activities in the field

None

Field personnel

None

Planned activities

- Winter nest surveys
- Small mammal live-trapping/habitat selection
- Arthropod abundance
- Raptor abundance
- Plant standing crop
- Incidental shorebird nest monitoring

Logistics

Camp destroyed by grizzly bears.

Field activities

2008 field season postponed by medical emergency