

Arctic WOLVES



2009 Field Reports

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Field site:

Akimiski Island (NU)

Dates of activities in the field

10 May to 15 September 2009

Field Personnel

Ken Abraham, principal investigator, Ontario Ministry of Natural Resources

Rod Brook, collaborator, Ontario Ministry of Natural Resources

Sarah Hagey, wildlife technician, Ontario Ministry of Natural Resources

Christopher Sharp, MSc student, Trent University

Jennifer Robus, MSc student, Trent University

Stacy Gan, MSc student, Trent University

Lisa Pollock, MSc student, Trent University

Gabriel Foley, summer undergraduate student, Sault College

Andrée-Michelle D'Aoust-Messier, MSc student, Laurentian University

Beth McLarnon, summer undergraduate student, Laurentian University

Regis Cornale, volunteer field assistant, Ontario Ministry of Natural Resources

Carmen Lishman, wildlife technician, Ontario Ministry of Natural Resources

Mitchell Beck, summer undergraduate student, Trent University

Planned activities

- Natural history log
- Daily weather monitoring
- Daily bird list
- Incidental observations Seabirds, Mammals, Raptors
- Goose abundance (Canada geese, snow geese)
- Goose nesting success (Canada geese, snow geese)
- Goose age ratios at banding/brood size (Canada geese, snow geese)
- Arthropod monitoring
- Artificial nest monitoring
- Small mammal abundance
- Plant flowering dates
- Standing crop of *Puccinellia phryganodes* and *Festuca rubra* inside and outside enclosures
- Isotope-Food web (Fox)
- Weather monitoring
- Interviews with First Nations people

Logistics

Season was one of the later recorded years for the Akimiski Island site. However, the planned activities were not compromised. The camp was occupied from late May until mid-September, giving one of the longest daily observation record sets for the study. Once again,

polar bear interference with arthropod traps reduced completeness of seasonal coverage and sample size and was responsible for destruction of parts of most traps.

Field activities

We once again undertook studies in 2009 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 incidental brood observations through the first 6 weeks of brood rearing to determine survival. We determined age ratios at banding. We collected some clutch size, nest density and phenology data for snow geese along the coastal portion of the colony, and determined age ratios at banding. We recorded bird nests, especially 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 to avian predator abundance and also 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 different habitats, but especially 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 through the summer (June to August). We conducted live-trapping for small mammals in three habitats (grass/willow, spruce forest, riparian) to index abundance and species composition. We monitored above ground biomass of *Puccinellia phryganodes* swards, and supratidal *Festuca rubra* swards inside and outside exclosures at five sites, twice during the season (beginning of growth, and peak of growth). We captured 3 red fox for deployment of collars to track home range and interaction with ground nesting birds. We continued to opportunistically collect tissues for isotopic analysis of food web for Akimiski Island. We conducted interviews on climate change, goose populations, coastal habitats and aboriginal activities related to all of these in two communities. Finally, we had an automated weather station operating throughout the season.

Departures from planned activities

Interviews with First Nations peoples were conducted in 2 communities (Moosonee/Moose Factory and Peawanuck) whereas we had planned to conduct them also in Attwapiskat and other communities if time allowed. Within-community events precluded participation of Attwapiskat and other communities were not approached due to anticipate timing and workload for the main MSc project.

Field site:
Alert, Ellesmere Island (NU)

No field activities were planned in 2009 at Alert for the International Polar Year.

Field site:
Bylot Island (NU)

Dates of activities in the field

23 May to 21 August 2009

Field personnel

Gilles Gauthier, principal investigator, Université Laval
Joël Bêty, principal investigator, Université du Québec à Rimouski
Dominique Berteaux, principal investigator, Université du Québec à Rimouski
Gérald Picard, wildlife technician, Université Laval
Marie-Christine Cadieux, research assistant, Université Laval
Denis Sarrazin, research assistant, Université Laval
Cassandra Cameron, research assistant, Université du Québec à Rimouski
Marie-Claude Martin, technician, Université Laval
Pierre Legagneux, PDF, Université Laval
Louise Laurin, Canadian Wildlife Service
Madeleine Doiron, PhD student, Université Laval
Jean-François Therrien, PhD student, Université Laval
Frédéric Bilodeau, PhD student, Université Laval
Laura McKinnon, PhD student, Université du Québec à Rimouski
Sandra Lai, PhD student, Université du Québec à Rimouski
Meggie Desnoyers, MSc student, Université Laval
Élisabeth Tremblay, MSc student, Université du Québec à Rimouski
Élise Bolduc, MSc student, Université du Québec à Rimouski
Émilie Chalifour, MSc student, Université du Québec à Rimouski
Audrey Jobin-Piché, BSc student, Université Laval
Maxime Sirois, BSc student, Université Laval
Stéphanie Pellerin, BSc student, Université Laval
Pierre-Yves L'Hérault, BSc student, Université du Québec à Rimouski
Jean-François Lamarre, BSc student, Université du Québec à Rimouski
Léonie Mercier, BSc student, Université de Sherbrooke
Joassie Ootoova, Inuit field assistant, Pond Inlet
Samuel Arreal, Inuit field assistant, Pond Inlet
Lee Innuarak, Inuit field assistant, Pond Inlet
Leslie Qanguq, Inuit field assistant, Pond Inlet

Planned activities

Climate

- Automated recording of weather parameters at 3 stations
- Recording of snow cover and snow depth in spring
- Recording manually daily precipitation during the summer

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)

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
- Maintaining the snow-fence experiment

Arctic/red foxes

- Monitoring of known dens to measure abundance and reproductive success
- Marking of adult and young to study demography
- Marking of adults with satellite radio-collars to study year-round foraging strategy
- Sampling of blood and hair for isotopic and genetic analyses
- Installing of automatic cameras on dens to determine demographic parameters (eg. litter size) and record behaviours at den (eg. feeding rates, types of preys, intraspecific interactions)

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 and jaegers for demographic studies

Other species

- Recording daily incidental observations of mammals and birds encountered in the field
- Recording nests of other bird species

Logistics

We did not experience major logistic problems. Weather was exceptionally good throughout the summer. 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 foxes.

Field activities

Climate

We retrieved weather data from our 3 automated recording stations. Most of the sensors functioned normally throughout the winter. However, we lost some data at one station due to water infiltration in the control box during the spring. The spring was warm and sunny and these conditions prevailed during most of the summer. Snowmelt was early and the summer was fairly dry compared to the previous year.

Plants

We established a total of 24 goose exclosures in wetlands at 2 sites (Camp-1 and Camp-2, 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. Plant production was similar to last year and higher than the 20-year average recorded on Bylot Island. Goose grazing impact was moderate this year. 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 400 nests in the colony (Camp-2) and monitored their reproductive success. We web-tagged more than 2400 young at hatch, banded 5417 adults and young in August around Camp-1, recaptured several hundred marked birds and measured close to 1500 goslings to monitor their growth. Snow goose arrived in early June and within a few days started to move to nesting areas. The peak lay date was similar to the long-term average. The nesting density was high, indicating a good reproductive effort by the population but clutch size was low. 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 monitored the breeding activity of shorebirds. We found 13 nests of American Golden Plovers and 12 of Baird's Sandpipers, the most abundant nesting species in the Camp-1 area in 2009. We also monitored 2 nests of White-rumped Sandpipers, formerly one of the most abundant nesting species. Median lay dates of American Golden Plovers and Baird's Sandpipers were similar to that of previous years. However, for White-rumped Sandpipers, the lay date was the latest observed over the last 4 years but this is based only on 1 nest. A total of 18 shorebirds were banded this year: 6 adult Baird's Sandpipers and 12 American Golden Plover (4 adults and 8 chicks). Re-sightings of previously banded Baird's Sandpipers were similar to previous years with 2 banded birds re-sighted in the study area and one found nesting. No documented cases of nest predation or failure were recorded this year at Camp-1. In addition to the monitoring of natural nests, 40 artificial nests were deployed during both early to mid-incubation and mid- to late-incubation to experimentally assess annual predation pressure. Daily nest survival estimates for artificial nests in 2009 were lower than in 2008 and 2007 but similar to 2006 or 2005.

Seasonal changes in diversity and abundance of insects were determined using 10 pitfall traps deployed at Camp-1 and 10 traps at Camp-2, both in wetland and mesic tundra habitats (5 traps per habitat). Pitfall traps were sampled every 2 days from 13 June to 21 August at Camp-1 and from 13 June to 17 July at Camp-2. Four additional traps were also deployed close to Camp-

1 to provide estimates of insect density. A total of 650 insect samples were collected over the entire season and are currently being analysed.

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). We conducted snap-trapping survey in late July at the Camp-1 and mid July in the Camp-2 area. We surveyed our three trapping grids and ran a large number of transects for lemming winter nests.

Our different indices of lemming abundance yielded similar results. Live-trapping at Camp-1 indicated a low abundance of lemmings, much lower than in 2008. Brown lemmings were greatly outnumbered by collared lemmings in live captures. Snap-trapping in July also suggested a low abundance of lemmings at both camps (lower than in 2008). Only collared lemmings were caught during our snap trapping sessions (at both camps). Winter nest surveys also indicated low lemming abundance and we collected 104 winter nests for analysis in the laboratory. Ten of those nests showed signs of predation by weasels while 26 showed signs of reproductive activity by both species.

At the arrival of our crew at the end of May a few parts of the snow fence had fell on the ground over the winter but we were still able to collect snow depth data along 6 transects covering the experimental trapping grid. We also ran 3 additional transect in a control grid. We were able to repair the damaged portions and we reinstalled the remaining portion of the snow fence that had been damaged during the 2007-2008 winter. The entire snow fence was further strengthened in early August with more guy ropes.

Arctic/red foxes

We inspected all known dens in the study area (n=106, including 3 new ones found in 2009) for signs of use by foxes and presence of reproductive foxes with cubs. Nineteen dens showed signs of activity (fresh digging and/or footprints). Five of them were used for reproduction. We found 4 litters of arctic fox ranging from 1 to 7 cubs (average: 4 cubs/litter) and no litter of red fox. Three natal dens were located near the goose colony and one was located close to Dufour Point. Sixty percent (9/15) of observed cubs were captured and tagged. A few families used multiple dens to rear their cubs once these were old enough to follow the adults from the natal den to another rearing den.

We captured 14 adults (8 females, 6 males) and 9 juveniles (7 females, 2 males). Two of the captured adults had already been captured and tagged between 2003 and 2007. Hair and blood samples were collected and will be used for stable isotopes and genetic analyses. All captured adults were equipped with Argos radio-collars which will monitor the habitat use and movements of foxes throughout the whole year. Cubs were noticeably smaller than in the previous years at the same period and few cubs appeared to survive through the summer. Camera monitoring permitted us to complete our visual observations of litter sizes, and showed that litter sizes decreased rapidly from emergence (21-24 June) to the end of July.

Avian predators

We ran several transects to find raptor and seabird nests. We revisited most nests found to monitor their success, collected pellets at hawk nests, and deployed an automatic-triggered cameras at a hawk nest 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 4 rough-legged hawk nests but these were scattered over a very large area and only one of these nests could be monitored. We found 32 glaucous gull nests, 1 long-tailed jaeger nests and 6 parasitic jaeger nests. Nesting success of these seabirds was generally lower than in 2008. We marked 7 young gulls, 4 adult long-tailed jaeger and 17 adult parasitic jaegers. We collected a few pellets at hawk nests and we collected blood samples from jaegers (21 adults and 3 young).

Other species

Daily incidental observations were recorded from 23 May to 17 July. We also recorded nests of lapland longspurs, sandhill cranes, king eiders, long-tailed ducks, Canada geese, red-throated loons, pacific loons, rock ptarmigans, arctic terns and peregrine falcons.

Field site:
Cape Churchill (MB)

Dates of activities in the field

Group 1: 25 May to 22 August 2009

Group 2: 23 May to 15 August 2009

Field personnel

Group 1

Robert L. Jefferies, principal investigator, University of Toronto

Kate Edwards, PhD candidate, University of Toronto

Shannon Refvik, summer undergraduate assistant, University of Toronto

Marine Cusa, summer undergraduate assistant, University of Toronto

Geoffrey Legault, summer undergraduate assistant, University of Toronto

LeeAnn Fishback, science coordinator, Churchill Northern Studies Centre

Carley Basley, northern research technician, Churchill Northern Studies Centre

Katrina Jensen, northern research technician, Churchill Northern Studies Centre

Leah Olivier, high school student, Churchill

Group 2

RF Rockwell, principal investigator, American Museum of Natural History

David Koons, collaborator, Utah State University

Jon Sperling, collaborator, Queens College of City University of New York

Daryll Hedman, collaborator, Manitoba Environmental Conservation

Frank Uvino, camp manager

Kit Schnaars, PhD student, American Museum of Natural History

Linda Gormezano, PhD student, American Museum of Natural History

Dave Iles, MSc student, Utah State University

Jon Talon, pilot, Hudson Bay Helicopters

David Walker, collaborator, Wapusk National Park

Jessop Boden, summer undergraduate assistant, Utah State University

Marine Cusa, summer undergraduate assistant, University of Toronto

Melissa Gibbons, assistant, Wapusk National Park

Derek Hildebrand, assistant, Wapusk National Park

Geoff Legault, summer undergraduate assistant, University of Toronto

Shannon Refvik, summer undergraduate assistant, University of Toronto

Heather Stewart, assistant, Wapusk National Park

Planned activities

Group 1

- Natural history log
- Daily bird list
- Flowering times
- Methane and CO₂ fluxes from wet sedge meadows
- Above and below-ground plant biomass determination along a vegetation gradient
- Nitrogen fixation rates and nitrogen mineralization rates along a vegetation gradient
- Microbial biomass determination along a vegetation gradient
- Seasonal changes in arthropods along a vegetation gradient
- 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
- 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

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
- Polar bear ground transects
- Deployment of new recovery exclosures
- Scoring of plants in exclosures and paired control regions
- Aerial photography of snow goose brood flocks
- Snow goose banding
- Coastal polar bear transects
- Fox surveys
- Incidental observations Seabirds, Mammals, Raptors

Logistics

Group 1 and 2

Principal investigator Robert Jefferies passed away suddenly on 8 July 2009. Robert Rockwell assumed field leadership for Group 1, and research was carried out by the rest of the field team, with input from senior graduate students Kate Edwards and Emma Horrigan. Kate Edwards joined the field team for the final 10 days in Churchill.

Activities for both groups (more so group 2) were hampered by the extreme levels of snow, lateness of melt and then severe flooding.

Field activities

Group 1

The summer came very late and this meant that field activities were compressed into a shorter growing season. The vegetation transects set up in 2008 to measure nitrogen cycling in an areas experiencing shrub encroachment (80 meters long, across 3 distinct vegetation types), were surveyed every two weeks to measure microbial biomass, rates of nitrogen mineralization, and nitrogen fixation. Insect surveys using pitfall traps were carried out in vegetation types similar to those along the transect, approximately every 2-3 days throughout the summer. Just before the onset of senescence, above and below-ground plant biomass samples were harvested for each vegetation type. Methane and carbon dioxide gas fluxes were measured weekly from thaw to senescence.

Carex aquatilis phenology and biomass harvests, and experiments investigating the effects of grazing and shoot-pulling were continued as per the protocols from previous years. An experiment previously set up to determine decomposition rates of *Carex aquatilis* litter in different habitats continued with samplings at the beginning and at the end of the growing season. A similar but longer-term decomposition experiment was established and initial measurements were taken. Many of the samples collected in relation to these experiments are currently being analysed, so results are not yet available.

Group 2

Research on the Cape Churchill Peninsula during the 2009 field season targeted a range of projects. The most extreme snow and ice conditions encountered in 41 years delayed both biological and research activities. As of 2 June 2009 we encountered 100% snow and ice cover from Churchill east to Cape Churchill and south to the Owl River. From there south to York Factory snow and ice cover was still 75%. We estimated between 5 and 10 million geese (CAGO, WFGO, BRGO, LSGO and ROGO) occupied the coast from the Owl River to York Factory. Destructive foraging by this mass of geese resulted in severe habitat degradation assessed later in the season. Flooding following melt delayed snow goose nest initiation further to the point that less than 35% of the Cape Churchill Peninsula population nested. Extreme predation by arctic foxes, wolves, black bears, grizzly bears and polar bears resulted in complete nesting failure of snow geese in the region. Those that did not nest and those that failed performed a moult migration to areas unknown.

We repaired vegetation recovery exclosures at 5 separate sites. We marked ~150 nests of common eiders to be revisited later and estimated that 95% of them failed. Beginning in July, we returned and scored the vegetation at the exclosures and their paired control sites. Polar bears came ashore about 1 week later than usual and were extremely fat. However, they continued foraging on everything available including beluga whales, ringed seals and caribou. We collected polar bear hair and scat at standard interior denning sites and covered close to 200 km of coastal transects between Cape Churchill and the Pen Islands collecting fresh polar bear scat and hair (the latter from day beds). We flew our standard fox transects but given results from the previous years and the limited prey bases (only 35% of the snow geese nested and extreme flooding severely reduced microtine populations) we focused our efforts on determining activity at the dens on our transect. Only 17% were active in contrast to 77% in 2008. No fox cubs were observed.

Departures from planned activities

Group 1

We accomplished all of the planned studies listed above except the interviews with First Nations people. As this project was to be conducted by Robert Jefferies, it was not carried out after his death. Robert Rockwell, Kenneth Abraham, and Kate Edwards are currently in preparations to do this work in 2010.

Group 2

Owing to the unprecedented numbers of geese delayed south of the snow line through 5 June 2009, we performed additional vegetation work to estimate the extent of damage. Since no snow geese remained on the Cape Churchill Peninsula after the massive nesting failure, we abandoned our banding efforts after two days of searching for birds.

Field site:

Fosheim Peninsula, Ellesmere Island (NU)

Dates of activities in the field

30 July to 6 August 2009

Field personnel

Josée Lefebvre, principal investigator, Canadian Wildlife Service
Christian Marcotte, wildlife technician, Canadian Wildlife Service
Francis St-Pierre, wildlife technician, Canadian Wildlife Service

Planned activities

- Determine post hatch reproductive success of geese
- Determine annual abundance of small mammals using snap-traps
- Determine fox abundance
- Weather conditions
- Tabulate daily reports of all species observations

Logistics

Activities were reduced this year due to logistical constraint. Field work was conducted on the Fosheim Peninsula on Ellesmere and the east part of Axel Heiberg Island. An intensive study area, Eastwind Lake on Fosheim Peninsula, was the area where small mammal field work was done, which was 20 km from the camp.

Field activities

Geese

Between 31 July and 6 August, a total of only 17 individual broods were observed among 25 groups while out on surveys with an average of 3.82 goslings per brood. At the end of the field season, we had banded a total of 486 geese, including 96 adult females marked with neck-collars. In addition, we recaptured 86 birds previously banded. Two of them were banded on Bylot Island in previous years (2001 and 1993) as well as 4 adults originally banded in southern Quebec (Cap Tourmente, 1997 and Île-aux-Oies, 2008 and 2009) and one Lesser Snow Goose banded as a gosling on Baffin Island in 2004. Brood size was lower than the last two years. We assume that reproduction was bad in this part of the High-Arctic because spring migration was delayed by snow storms and a late spring.

Small mammals

We conducted small mammal snap-trapping in both mesic and wet meadow habitats for population monitoring. Only one collared lemming was captured in mesic habitat with a total of over 780 night-traps.

Field site: Fosheim Peninsula, Ellesmere Island

Foxes

The two known dens showed no signs of activity this year. No new dens were found on the Fosheim Peninsula or on Axel Heiberg Island in 2009.

Daily reports of species observations

A daily report of all species observed was prepared.

Field site:
Herschel Island (YT)

Dates of activities in the field
18 April to 25 August 2009

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 de Québec à Rimouski
 Francis Taillefer, field assistant, Université de Québec à Rimouski
 Andrew Fehr, field assistant, IPY student Aurora Research Institute
 Scott Gilbert, instructor, Yukon College
 Daniel Fehr, field assistant, IPY student Aurora Research Institute
 Frank Doyle, research associate, Wildlife Dynamics Consulting
 Tamara Hansen, field assistant, IPY student Aurora Research Institute
 Don Reid, research associate, Wildlife Conservation Society Canada
 Maria Leung, research associate, private sector
 Isla Myers-Smith, PhD student, University of Alberta
 Meagan Grabowski, undergraduate student, University of Alberta
 Annika Trimble, field assistant, Aurora Research Institute

Field Work

Herschel Island

SUBJECT	2009 WORK ACCOMPLISHED	DATA TREND	INTERPRETATION	FUTURE WORK
Snow Enhancement by Snow Fencing & Winter Temp Profiles	Snow depth transects run in mid April across all trapping grids, including the area with fencing. Temperature button data downloaded.	Fencing enhanced snow depth but to a lesser extent than 2007-08, perhaps due to thaw-freeze event (Jan 17). Fencing dismantled.	Fencing works to enhance snow depths and moderate sub-nivean temperatures, but would have to be spaced much closer together to provide enhancement across the whole space.	Field – none. Analysis and publication.
Snow Cover and Pattern of Snow Melt	One snow transect of 25 stations, 10 m apart run from 23 May through to full melt in wet lowland. Pattern of snow melt in major habitats recorded from 23 May to 11 June.	Snow melt significantly later in 2009, especially than 2008, but also than 2007.	Slow spring melt and May snow fall result in much later emergence of bare ground.	Compare temperature regime in 2009 to historical records.

Herschel Island (continued)

SUBJECT	2009 WORK ACCOMPLISHED	DATA TREND	INTERPRETATION	FUTURE WORK
Primary Production	<p>Graminoid production estimates at peak growth (early August) in OR and GU habitats (n=12 plots each).</p> <p>Standing crop and production estimates from clip plots in n=8 exclosures and controls in HE and KO habitats, early August.</p> <p>Exclosures removed.</p>	Samples still being processed.	None	Field – none. Data analysis and use in Ecopath.
Vegetation Community Composition	Point cover estimates taken for the two ITEX plots on Collinson Head, last sampled in 2004.	Data still being analysed.	Uncertain	Field – none.
Willow growth	Plots established to monitor willow growth in future, by Isla Myers-Smith. Samples taken to assess historical growth from rings.	Data still being analysed.	Uncertain	Field – general plans to return within 5 years to track plots.
Arthropods	<p>3 traps in wet alluvial fan run from 18 June to 13 July (the period corresponding to the peak biomass in previous 2 yrs), to see whether late spring in 2009 has effects.</p> <p>Butterflies collected and prepared for identification.</p>	<p>Low abundance of arthropods throughout the sampling period with some increase in July. Generally lower availability than previous 2 years, and peak may be extended beyond 13 July.</p> <p>Flight periods of butterflies substantially later in 2009, and abundance reduced.</p>	The later onset of melt and low early season temperatures seem to have reduced the abundance and/or flight opportunities for arthropods. Question as to whether the thaw-freeze event in winter had any effect.	Arthropod sorting at Université du Québec à Rimouski. Data analysis and publication.
Bird Migration	Daily transect (c.1.1 km) ranging from low wetland to dry upland run from 23 May to 11 June.	Same species mix, but reduced abundances compared to previous years.	The wetland area near the camp is a key staging ground for the island as a whole.	Field – none. Data analysed and presented in conjunction with nesting phenology data.
Raptor Abundance – point observations	10 min surveys from high point above camp (21 May to 11 June)	Low abundance, but includes nomadic prospecting SEOW and SNOW.	Similar to previous years.	Field – none.

Herschel Island (continued)

SUBJECT	2009 WORK ACCOMPLISHED	DATA TREND	INTERPRETATION	FUTURE WORK
Raptor Abundance – nest searches	The eastern end of the island (c. 21 sq km) well searched for nests of RLHA, PEFA, SEOW, SNOW and LTJA.	RLHA (2), PEFA (3), LTJA (3). No SNOW or SEOW.	Numerical response of raptor nesting pairs reduced for some raptors probably because of late snow melt and/or low lemming abundance.	Field – possible collaboration with USFWS for 2010. Data analysis and publication.
Raptor Diet	Pellet collection route run in June. Pellets also collected at nests.	Pellets not yet analysed.		Field – none. Data analysis and publication.
Passerine and Shorebird Abundance	One full (12 ha) PRISM plot run in upland dry community (KO, GU). One smaller (6 ha) PRISM plot run on alluvial fan (OR habitat).	LALO, SASP, ROPT in upland; LALO, SESA, LESA in lowland. Lower densities than 2008.	Similar pattern to previous years.	Field – none. Data available for Ecopath, and other publications.
Shorebird & Passerine Nesting Success – Direct observations	Sample of 110 nests (passerine, shorebird, gallinaceous, waterfowl) tracked from some time in incubation through hatching, and some to fledging.	Considerable red fox predation on alluvial fan and point. Fairly high nest success, as in other years. ROPT success higher this year.	Similar pattern to previous years.	Field – none. Data analysis and publication.
Small Mammal Abundance	Early June: Two upland 9 ha grids (“Fence” and “Ridgetop”), and one 2 ha alluvial fan grid (“Graveyard”) trapped. Winter nest counts on all grids (June). Upland relative abundance index lines trapped. Early August: Two upland 9 ha grids (“Fence” and “Ridgetop”), and one 2 ha alluvial fan grid (“Graveyard”) trapped.	June trapping indicated overwinter crash of brown lemmings (esp on alluvial fan), but stable collared lemmings on upland. 2008-09 winter nests abundance less than previous years. Small rodents declined on upland grids during summer, but <i>Microtus</i> density increased on alluvial fan.	Asynchronous population patterns of small mammals perplexing (see also Komakuk). Perhaps brown lemmings have particular difficulty with winter conditions. Summer declines correlated with local red fox natal den, and likely higher predation pressure than previous years.	Field – possible 2010 density estimation in June (associated with continuing fox and raptor work). Data analysis and publication.

Herschel Island (continued)

SUBJECT	2009 WORK ACCOMPLISHED	DATA TREND	INTERPRETATION	FUTURE WORK
Lemming Winter Ecology	Maintained snow enhancement treatment (5 rows of fencing) on one-half of Fence Grid, with other half as control (for 2009-10 winter). Live-trapping using trapping boxes (installed in fall 2008) through snow in April. Boxes removed. Downloaded temperature logger data from 2008-09 winter.	Snow fencing enhanced snow depths and attracted lemmings to deeper snow, but less than 2007-08. Trapping boxes survived well over-winter, and provided some April trapping opportunity – but little success. Major thaw-re-freeze event in mid-January.	Snow fence treatment effect reduced in 2008-09 compared to 2007-08 because Jan thaw solidified snow, reducing redistribution, and lemming numbers declined. Spring trapping through snow would need more time and ideally more pre-bating during fall after snow.	Field – none. Data analysis and publication.
Lemming survival (telemetry).	VHF radio-telemetry on 30+ adults (mix of species) in June-July, and August, to quantify survival, causes of mortality, and home range use.	Considerable jaeger and red fox predation, plus many radios not recovered suggesting predation.	Summer lemming population declines could have resulted from predation.	Field – none. Data analysis and publication.
Lemming Habitat Selection	Mapping habitats on grids using Morris protocol.	Completed Graveyard Grid.		Field – none. Data analysis at Lakehead University.
Lemming Predation Risk / Cover assessments	Quantifying the spatial extent of refuges provided by micro-topography and vegetation cover, to compare predation risk (esp. from SNOW) between study grids and study areas.	Completed sampling on Ridgetop and Fence grids.	Similar patterns on Herschel and Bylot Islands.	Field – none. Data analysis and publication.
Foxes	Dens – ground search for all dens, including those recorded 1984-90. Record use by species, and whether reproductive or not. Food availability/diet – estimate abundance of small mammals by habitat type. Collect scats. Movements – live-trap, and ear-tag or instrument foxes with satellite tags.	1 natal arctic fox den, and 1 natal red fox den confirmed. Prey abundance and fox den characteristics data collected. 2 AF and 2 RF (both pairs and both natal dens) instrumented with satellite tags.	First study where both species are sympatric and successfully reproducing, and telemetered. Continuing low number of natal dens, but consistent with the pattern of lemming abundance.	Field – possible return in early 2010 to live-trap and increase sample of satellite tags. Data analysis and publication.

Herschel Island (continued)

SUBJECT	2009 WORK ACCOMPLISHED	DATA TREND	INTERPRETATION	FUTURE WORK
Other Mammalian Predator Abundance & Diets	Least Weasels – infrequent captures in lemming traps. Animals ear-tagged. All – incidental observations, and collection of scats.	Least weasels rare in 2009. Wolverine – at least one occasionally using island. Grizzly bear – 2+ in 2009. Polar bear – none.	Least weasels seem to have suffered from winter conditions or winter predation.	Field – none.

Komakuk, western North Slope

SUBJECT	2009 WORK ACCOMPLISHED	DATA TREND	INTERPRETATION	FUTURE WORK
Small Mammal Abundance - Komakuk	Mark-recapture live trapping of two, 9 ha grids (Shore, and Lake) in late June and late August. Winter nest counts and mapping on both 9 ha grids in late June.	June densities low, and <i>Microtus</i> almost the only small mammal present in summer 09. Over winter crash of <i>Lemmus</i> on both grids. <i>Microtus</i> age distribution and remains in nest indicate over-winter breeding. Winter nest counts reduced from previous winter, and mostly <i>Microtus</i> . Substantial weasel predation. Population increases (almost all <i>Microtus</i>) during summer on both grids.	Small mammal decline over winter result of poor winter conditions (thaw-freeze in Jan) and ongoing weasel predation. Summer population increase because of low abundance of predators (no fox or RLHA). Little evidence of weasels. <i>Microtus</i> becoming more dominant in this system since 2006.	Field – none. Data analysis and publication.
Predator Abundance - Komakuk	General survey of study area for evidence of breeding	CORA fledged 4 young (26 June); PEFA (1) incubating; PAJA (1) incubating; RLHA nest failed (June 16 – probably predated) . No spring fox activity. No weasels caught. Vagrant SNOW and SEOW.	Low predator numbers allow microtine population increases.	Field – none.

Komakuk, western North Slope (continued)

SUBJECT	2009 WORK ACCOMPLISHED	DATA TREND	INTERPRETATION	FUTURE WORK
Fox den distribution and occupancy	Aerial survey of fox dens on north slope from Alaska border east to Babbage R. Ground visits of dens with higher probability of being natal.	56 den sites visited. 2 arctic fox reproductive dens; 1 red fox reproductive den	Low density of reproductive dens follows generally low small rodent abundance.	Field – none.
Lemming Winter Ecology - Komakuk	Snow fence treatment on Lake Grid (9 ha), with Shore grid as the control. Temperature button stakes to record temperatures at various heights above ground.	Snow fence treatment had some effect: twice as many grid cells traversed by fence had small mammal clippings and runways compared to grid cells > 40 m from fencing. No clear association of winter nests with fencing. Population trends on snow fence treatment and control confounded with weasel predation. Thaw event on 17 Jan. Temp profiles indicate substantial early winter snow (at least 30 cm), even on control grid.	Winter population declines driven by weasel predation. Deeper snow enhances winter habitat quality and use.	Field – none. Data analysis and publication.

Field site:

Walker Bay, Kent Peninsula (NT)

Dates of activities in the field

7 to 26 June 2009

Field personnel

Douglas Morris, principal investigator, Lakehead University

Jody MacEachern, MSc student, Lakehead University

William Halliday, BSc student, Lakehead University

Planned activities

- Lemming live-trap census on 12 microplots and Wilson/Krebs enclosure
- Winter nest counts on 12 microplots and Wilson/Krebs enclosure
- Two-day raptor “fly-by” surveys
- Incidental reports and snow cover
- Estimates of plant biomass (emphasis on large shrubs)

Logistics

Camp trashed by grizzly bears and wolverines since spring 2008. Some repairs made to the kitchen cabin by Nunavut wildlife in May but no clean-up. Stored supplies and gear damaged and scattered by grizzlies, frozen in ice, and covered by snow. Oven and fridge destroyed by bears, as was the backup stove and all propane lines, potable water storage unsafe to use, gasoline stolen by persons unknown, aviation cache from 2008 expired.

Two days spent on clean-up and garbage disposal, additional time allocated throughout the field season to repairs, digging out essential gear (e.g., electrical fencing), and garbage disposal.

Two grizzlies entered camp and forced us to post sentries and carry a firearm in the field during our final research collection period.

Expected future bear and wolverine damage forced us to remove all research gear and provisions from the camp.

Temperatures were well below normal while precipitation was above normal. We had no ability to record climatic data because the weather station had been destroyed by bears. Late melt and deep snow delayed some field work, required changes in potable water collection and storage, but did not interfere with overall data collection.

Daily communication with PCSP Resolute restricted to satellite phone. VHF radio signals received at Walker Bay, but could not transmit to Resolute.

Several items in our food order were not shipped by the Yellowknife coop.

Field activities

Lemming abundance

Lemming live-trap census completed on schedule. Lowest densities of lemmings in our six years of data collection at Walker Bay.

Lemming winter nests

Winter nest counts completed on schedule. Some recounts required during snowmelt.

Raptor visual survey

Raptor “fly-by” surveys completed on schedule.

Incidental survey

Incidental reports recorded daily from 9-24 June 2009. Egg counts and GPS locations recorded for all bird nests encountered. Snow cover recorded from 9 June (95%) until 18 June (<1%).

Plants

Estimates of willow densities (*Salix lanata*) completed on all plots. Sub-samples and wet weights recorded on microplots.