10th annual newsletter

The Snow Bunting Report

CANADIAN SNOW BUNTING NETWORK

Samuelle Simard-Provençal

This year's highlights

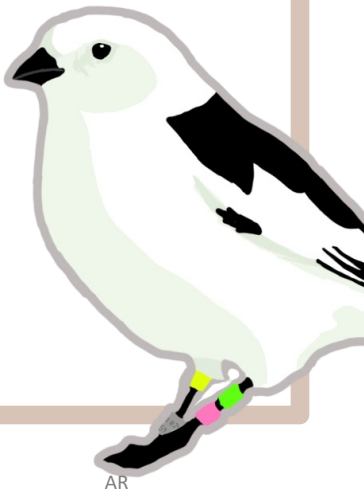
- New student projects, and updates to current projects
- Banding in Labrador
- Back in Alert
- Continuing work in Iqaluit

Newsletter Editors: Samuelle Simard-Provençal, Rebecca Jardine, and Alysha Riquier

Welcome back to the 10th annual Canadian Snow Bunting Network! We are excited to share the amazing work of the birds, students and community members!

Want updates? Like us on Facebook or follow us on Instagram at www.facebook.com/SNBUnetwork or @csbn_rcpn

Got questions about Snow Bunting research in Canada? Contact Dr. Oliver Love at olove@uwindsor.ca



Undergraduate students join in for some important research at the University of Windsor!

Hot real estate
Holly Mosco, Undergraduate student at U Windsor

Arctic species are experiencing many new challenges due to global climate change such as geographic range shifts, changing community compositions and timing differences in important life events. Another key and very significant change for organisms is heat stress which is becoming more common considering rapidly increasing Arctic temperatures. In attempts to cool, Snow Buntings are thought to alter their breeding behaviour by becoming physically inactive, reducing foraging effort and reducing their time spent attending to young. Nest-site selection may be another behaviour affected yet it is not well understood in Snow Buntings. Other species have been observed to have preferences when choosing nests, many preferences include tree coverage, nearby vegetation, orientation to the sun and temperature.


Rebecca Jardine

In my undergraduate thesis, I will be investigating the nest-site temperature preferences of Snow Buntings. I will be using temperature data collected from Qikiqtakuluk (East Bay Island) to identify geographic hot and cold spots. This information will then be overlapped with known nest sites to observe patterns related to temperature. This research aims to enhance our understanding of the impacts of climate change and rising Arctic temperatures on Snow Buntings and breeding behaviour.


Samuelle Simard-Provençal

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Return rates of the Snow Bunting? Place your bets!
Evelyn Petro, Undergraduate student at U Windsor

Many traits of the Snow Bunting's life history have been under researched, with many aspects contributing to gaps in knowledge about this bird. I will be analyzing multi-year banding data collected by a variety of researchers from multiple breeding sites to investigate return rates of buntings. The multi-year nature of the data being used in this study will not only provide information about return rates, but also breeding site fidelity and possibly adult survivorship. Additionally, using data from multiple sites will allow for comparison of this information between sites. This research aims to fill some of the gaps in Snow Bunting life history and will hopefully provide valuable information about these birds that can be used to understand the population decline.


Samuelle Simard-Provençal

New graduate students and research from UQAR and the University of Windsor!

In the heat of the moment
Emmanuelle Gouin, MSc student at UQAR

Recent studies suggest that cold-adapted Arctic species have a limited ability to tolerate even mildly warm temperatures. Snow Buntings are a good example, with their very low capacity to dissipate metabolic heat. This is a concern given that the Arctic is warming faster than the global average. Thus, with rising temperatures, very active buntings (as during the breeding season) would risk hyperthermia if they maintained their effort. It could get even worse for those who dare breed in the High Arctic, since they are exposed to 24-hour daylight during the breeding months.

The objective of my master's thesis is to determine the effect of rising temperatures in the High Arctic on the thermoregulation and reproductive performance of Snow Buntings. We suggest that, as temperatures rise, birds could maintain their parental effort independently of thermal conditions without affecting reproductive performance. However, this will be at the expense of increasing body temperature. On the contrary, birds could also reduce their parental effort in response to increasing ambient temperature to maintain a constant body temperature, but at the expense of reproductive performance.


Chris Seymore

To meet my objective, I am conducting fieldwork during the summers of 2023 and 2024 on the specie's northernmost breeding range (Alert, Nunavut, 82°N). Breeding pairs are captured and implanted with thermal radio frequency identification (RFID) tags that register chick provisioning rates and adult body temperatures for each nest visit. Ambient temperature is measured using a micrometeorological station (Kestrel) and operative temperature (the environmental temperature as perceived by the buntings) is measured using 3D-printed plastic models. Reproductive performance data such as lay dates, hatching success, chick mass on day eight and approximate fledging dates are collected throughout the breeding phases.

This project builds on recent research on the species tolerance to heat and rising summer temperatures in the Arctic. The results from this research will help us further understand how buntings are responding to global warming and how those responses can affect fitness.


Francois Vezina

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City living in the North
Patricia Rokitnicki, PhD student at UWindsor

Urbanization is increasing globally, significantly affecting biodiversity and the environment. Urbanization is changing city climates and predator-prey dynamics, which, in turn, impacts behaviour, physiology, and ultimately, fitness in birds. Studies show that changes in temperature, food availability, and nesting sites in urban areas lead to birds laying eggs earlier and lower chick survival than in non-urban areas. While there's been a lot of research on the impact of urbanization on biodiversity in southern latitudes, we know little about how it affects Arctic wildlife.

Urbanization has been rising in the circumpolar Arctic since the 1950s and is expected to increase even more as Arctic temperatures rise. Since urbanization increases local temperatures relative to non-urban sites, birds adapted to the cold, like Snow Buntings, may be significantly affected by both climate warming and Arctic urbanization. However, our understanding of how Snow Buntings respond to the impacts of climate change and urbanization and its effects on breeding decisions and fitness remains limited.

My project aims to address this gap by investigating the costs and benefits of Arctic urban life in the context of urbanization and climate change. The primary objective is to understand how changes in temperature, predation rates, and food abundance affect Snow Buntings' breeding decisions (e.g., choice of nesting site, lay date, clutch size), behaviour (e.g., foraging effort), and fitness (e.g., chick survival). This research will build on existing and proposed data from Iqaluit, Nunavut (urban site), and a long-term research site at East Bay Island, Nunavut (non-urban site). The goal is to understand whether Snow Buntings can adapt their breeding decisions to maximize fitness in response to the combined effects of urbanization and climate change. Overall, this research will help assess the expected impacts of future changes coming to the north, guiding conservation efforts and policy changes designed to support populations of Arctic breeding birds.

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Cold specialist : do adults and juveniles Snow Buntings have the same heat loss? A comparative study on their breeding and wintering ground.

Rachel Demers, Researcher at UQAR

During their breeding season in the Arctic, Snow Buntings can face cold conditions or even snowstorms! Working with a Snow Bunting population at the northern boundary of their breeding range (Alert, NU, Canada 82°N), we examined morphological traits and metabolic variation in juvenile buntings in the weeks following fledging and compared it to that of adults. We showed that, in summer, recently fledged juveniles had incomplete growth and, more importantly, lost 14% more heat to the environment than adults. Given that these cold specialists also spend winter in environments where their energy demands for thermoregulation are high, we then compared the heat loss of adults and juveniles on one of their wintering sites (Rimouski, Quebec). Unexpectedly, the adults lost 12% more heat than juveniles! To know more about this surprising result, please read our article "**Born in the cold: contrasted thermal exchanges and maintenance costs in juvenile and adult Snow Buntings on their breeding and wintering grounds**" published this year in the Journal of Comparative Physiology B (https://doi.org/10.1007/s00360-023-01502-8).

New post-doctoral research fellow starting research on Snow Buntings!

Forecasting Breeding Grounds with Optimal Thermal Conditions for Snow Buntings and Thick-Billed Murres in the Changing Arctic Climate

Rajapandian Kanagaraj, post–doctoral fellow at UQAR and McGill University

The Arctic region is experiencing greater warming than the global average under climate change. Cold-specialist birds in the Arctic are becoming increasingly vulnerable to this warming trend because of the increased occurrence of temperature extremes in their breeding habitats. This poses a greater challenge for them because they must increase their activities during the breeding season to increase reproductive success while maintaining their body temperatures within a relatively narrow range in the face of temperature extremes.


Samuelle Simard-Provençal

In the first stage of the project, I aim to spatially assess the impact of thermoregulatory constraints on the fitness of Snow Buntings and Thick-Billed Murres within the Arctic under climate change. To this end, I will develop a spatial mechanistic model to evaluate the impact of ongoing climate change on the breeding habitats of these species. More specifically I will (1) assess the thermal habitat suitability for these species during breeding season across the Arctic under present and future climatic conditions and (2) project the spatial distribution of potential heat-stress hotspot areas where they may face difficulties in maintaining their physiological functions under climate change.

The thermal habitat suitability will be assessed using physiological field and experimental data available for these species. An operative thermal threshold will be estimated by fitting thermal performance curves to the physiological data. For Snow Buntings the operative thermal threshold estimated using a thermoregulatory polygon developed for this species by my collaborators will also be used in the analysis.

The hotspot areas will be identified by calculating a heat-stress measure based on degree days. For a given location in the study area, the degree day measure will be calculated based on the duration and extent to which the air temperature exceeds the operative thermal threshold identified for these species during the breeding season. The higher the degree days, the greater the heat-stress for a given species in a particular location.


Samuelle Simard-Provençal

Starting up CSBN banding in Forteau, Labrador

Expanding the bunting network
Vernon Buckle, CSBN bander in training

Like any region within Canada's north, Labrador winters are harsh, being long and cold. By the end of March, most folks living here in the "Big Land" are looking forward to much warmer sunny days and with it, the arrival of spring.

The announcement of spring in many Canadian locations by migrating birds is probably by the American Robin. For us it is the arrival of Snow Buntings! It's not unusual, even on snowy days in late March, to find a Snow Bunting or two trying to gather some food from the roadsides or any recently exposed patches of lawn. Then out of seemingly nowhere, they begin to multiply, two turns to ten, then hundreds in the matter of a couple of days. Many folks across Labrador then quickly engage in this feeding frenzy, racing off to the store for a bag of bird seed or even a bag of oatmeal, just to have the excitement of these beautiful bundles of feathers feeding on their properties.

Labrador, although with only 6% of the population, makes up 71% of the area of the province of Newfoundland and Labrador. The island of Newfoundland is separated from mainland Labrador by the Strait of Belle Isle, about 20 kms wide. Apart from three interior towns, most communities are coastal with only a portion connected by roads. Snow Buntings and their migration through Labrador is a big deal here, with many citizens making it known when the first "snowbird" arrives. Even CBC radio's Labrador Morning gets in on the action, checking in to see how the movement of birds is going each year.

A few years ago, the Snow Bunting Project was formed to keep track of Snow Bunting counts across Labrador. This was purely a citizen science initiative with participation from every community, with many sending in daily counts and photos. This is then compiled into a spreadsheet, hopefully proving useful going forward, especially to show trends, etc.

There are many here who have asked "Where are these birds coming from?" or "Where do they breed?". Over the past few years, nearly 20 band numbers have been photographed here and confirmed to have wintered in Ontario and Quebec. This past spring, Rick Ludkin, an Ontario bander, along with Samuelle Simard-Provençal, paid a visit, joined by the NunatuKavut Community Council Biologist, setting up temporary banding stations at Forteau, Red Bay and Happy Valley-Goose Bay, banding 314 birds. These passing birds are thought to breed in Greenland and the eastern Arctic and hopefully the bands will confirm that. One of those birds was already resighted at Iqaluit!!! With continued focus, some of these questions can be answered, including about the health of the population.

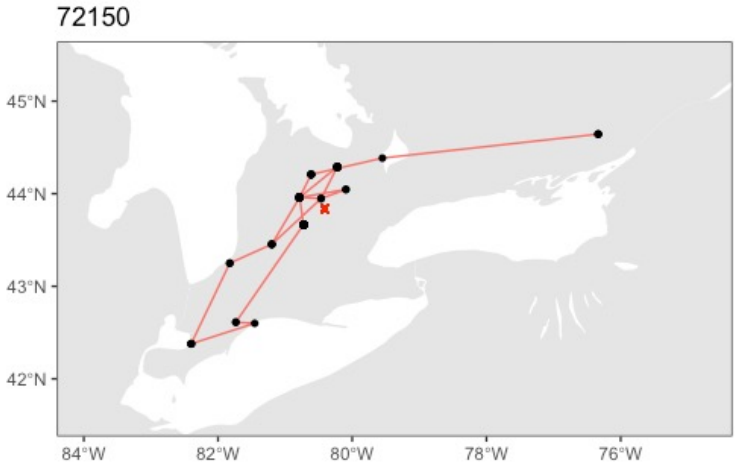
Continuing research from graduate students at UQAR and the University of Windsor

Eat or fly, you must choose
Baptiste Courtin, PhD student at UQAR

Hi Snow Bunting followers, here is a quick update on one of my thesis projects (probably my favorite): the impact of fat accumulation on the flight manoeuvrability and take-off performance of Snow Buntings during their migration. I was glad to build my outside experiment during my first ever Canadian winter. Trying to do knots on small ropes (and thus without gloves) at -30°C is something I was not mentally prepared for, but hey, I still have my ten fingers and now I'm more than ready for my next winter here. It took cutting, building, testing, and converting inches to centimeters (which was certainly the most confusing part), yet in the end me and the birds got a big, beautiful experimental aviary for the spring fattening period. And indeed, after some preliminary analysis, they seem to have lost some of their flight maneuverability and take-off ability over the course of their fattening! I still have a lot of data to analyze, though I was lucky enough to be able to present these results to other fellow students and researchers in Montréal at the SQBEC congress (Société Québecoise pour l'Étude Biologique du Comportement) in October 2023, which was a blast!

Birds on the move
Samuelle Simard-Provençal, MSc student, U Windsor

This past winter, I completed the field work for my master's thesis. I deployed radio tags on Snow Buntings in Fergus, Cayuga, Port Rowan, and Windsor, ON. My team and I managed to deploy 72 radio tags in the span of 5 days. We had hoped to put out more tags, however last winter proved to be a poor winter for buntings in Southern Ontario. We originally intended to capture birds in Port Rowan, however we had to change location to Cayuga, and even then, we struggled to catch enough birds in Cayuga. Nevertheless, we persevered and still pulled off a successful winter field season!



The rest of the winter, spring, and summer, we waited for the Motus network of radio towers to collect movement data. Now I am currently working to analyze the data the Snow Buntings diligently collected so we may better understand their wintering movements. Above is an example map that tracks a female Snow Bunting released in Fergus!

Too hot to handle
Rebecca Jardine, MSc Student at U Windsor

With Arctic temperature's rising, it may be increasingly hard for cold-adapted species such as the Snow Bunting to adapt to their new thermal environment during the breeding season. The objective of my research is to examine whether buntings are changing their breeding behaviour to avoid heat stress at a location in the low Arctic. I am interested in examining body temperature and activity levels throughout their entire breeding period, to see whether Snow Buntings are responding to increased heat constraint differently.

I completed two successful field seasons (2022 and 2023) on Qikiqtakuluk (East Bay Island), where we banded and tagged birds at 14 and 15 nests respectively. These tags recorded body temperature and frequency of nest feeding trips of breeding birds, which allows us to learn if breeding buntings need to alter their behaviour to avoid heat stress. My next steps are to begin analyzing these data to determine which factors are driving Snow Bunting provisioning rates.

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Snow Buntings are famous in Europe
Sachin Anand, PhD student at UQAR

Hello Snow Bunting enthusiasts, I am Sachin Anand, a doctoral student at the University of Quebec at Rimouski. I recently had the opportunity to present at the 14th European Ornithologists' Union (EOU) Conference at Lund University, Sweden 2023.

The EOU was set up in the year 1997 with the goal of advancing ornithological research within Europe. They hold conferences every two years at different locations across Europe. This year's conference was held at my alma mater, Lund University in Sweden, between the 21st and 25th of August. The conference had around 460 participants and there were usually five parallel oral presentation sessions and two plenary talks along with poster sessions every day. This is just an example to show the scale of this conference.

For my oral session, I presented preliminary results from an experiment conducted last winter on the relationship between heat and cold tolerance of Snow Buntings. Considering the vast number of people who attended my talk, I can safely conclude that the Snow Bunting is a well-known and loved bird among ornithologists. Throughout the conference, I engaged with several researchers who provided valuable insights into my research work.

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Update on the winter diet project!
Inès Fache, PhD student at UQAR

After a few months of giving seeds to the wintering birds in Rimouski (QC), we now know more about the kind of agricultural seeds Snow Buntings eat during the winter. After testing what they prefer between "old seeds" like barley, corn, oat and wheat and "new seeds" like canola and soy, we found some interesting results.

Here in the east, corn is the big winner, followed closely by canola, a culture introduced in 1996 in Québec. Then, buntings seemed to prefer wheat and barley over oats. And finally, no popularity for the soybeans, here since 1986 in Québec... Buntings can be curious and come to see what it is, but otherwise don't want to eat it.

Results still need to be analysed more finely because the Snow Buntings were joined by Horned Larks, a Lapland Longspur and a few American Crows. We also heard from banders that corn is not really eaten in the West, so let's keep in mind that those preferences could change across the country. My next steps are analysing the influence of weather on their diet's selection and determine how much energy buntings are getting from each kind of seed.

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Mismatch due to a warming Arctic
Alysha Riquier, MSc student at U Windsor

With the warming of the Arctic, many Arctic birds such as the Snow Bunting are affected by climate variability. A well-studied consequence of climate change is asynchronization between the phenology (i.e. the timing of recurring biological events) of predators (birds) and their prey (arthropods). This is also known as mismatch. However, it is unknown if this is this mechanism behind the population decline of the Snow Bunting. My thesis is focused on examining the link between food availability (arthropods) and laying phenology of Snow Buntings as climate change accelerates.

In addition to using historical data (2007-present), in spring-summer of 2022 and 2023, I did field work on Qikiqtakuluk (East Bay Island), NU. I took breeding measures such as lay date and clutch size, as well as eventual success outcomes (e.g., hatching, and fledgling success). Pitfall traps were used to collect arthropod samples to quantify biomass present throughout the Snow Bunting nesting season.

My next steps will be focused on gathering weather data and analyzing trends within the collected data. My thesis questions will help determine whether Snow Buntings have the flexibility in their laying decisions to keep pace with the expected increases in the effects of climate change in the Arctic.

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Project update!
Marianne Turcotte, MSc student at UQAR

In last year's annual newsletter, I presented to you my master's project. Here is a little update about it. I initially was planning on conducting a physiological comparison between sexes in Snow Buntings across a latitudinal gradient. Unfortunately, as some of you may have noticed, this past winter was a hard one for capturing Snow Buntings, due to warm weather and very few snowfalls. With the help of awesome banders, I was able to gather enough data to compare males throughout a latitudinal gradient, from Fergus to Rimouski. Now that I have analyzed most of my data, it is time for me to write a scientific article and my master's thesis.

I would like to give a special thanks to the wonderful banders that helped me capture Snow Buntings during my fieldwork. Rick Ludkin, Nancy Furber, David Lamble, Patrice Bourgault and Rodger Titman, it was a great pleasure working with you. Your passion for banding is quite inspiring. Thank you all and hopefully the 2024 banding season will be a busier one for all of you CSBN collaborators!

Back to Alert, NU!

2023, back to Alert to study Snow Buntings!
Audrey LePogam, Post-doctoral researcher at UQAR

April 19, 2023, we receive the official confirmation from our colleagues at the Department of National Defence that it would be possible to go to Alert this year. After 3 summers of not going to the field due to Covid, our excitement was at its peak! One month later, it was with a lot of restlessness that we ultimately landed in Alert.

The supposed length of the field season was supposed to be 4 months, which after all this time, was well worth it. The weather conditions on our arrival were still very wintery, with landscapes completely white and ambient temperatures close to -10°C. Hard to believe that in these conditions, passerines weighing barely 30 grams were already there looking for nesting sites. However, there they were! Walk-in traps enable us to catch 7 of them in the pre-breeding period. In early May, the rising temperature allow the birds to spread out over the snow-free territories and start singing.

Armed with binoculars, but also lots of patience and perseverance we started exploring and searching for nest-building pairs. The vastness of the land and the persistent snow make this a hard task. Nonetheless, our tenacity paid off in the end: between June 3rd and July 13th, we had found a total of 20 nests. Among them, 13 were equipped with antennae, to keep track of the number of times the adults return to the nest as part of Emmanuelle's project. At the same time, 23 adults were equipped with RFID tags to record their body temperature on each visit to the nest.

Unfortunately, not all the nests had reached the fledging stage, because of the presence of ermines; fearsome predators that were very abundant on the territory this summer. Finally, after the breeding period, the feeding sites which remained enabled us to catch around 50 individuals. Data obtained will allow us to learn more about the phenotypic changes in preparation for fall migration. But with birds present at Alert up until September 20, results from this work are more than promising!

Continuing research in Iqaluit, NU!

A new phase of Snow Bunting research, outreach, and education, based in Iqaluit, NU

Oliver Love, U Windsor, and Emily McKinnon, University of Manitoba

It's hard to believe we're already planning our Iqaluit, NU, research and outreach programs for 2024! What are we up to in Nunavut's capital city, and why is this an important area for research and outreach? To start, there is a general lack of northern songbird research across the vast Arctic, and there are currently no research, education or monitoring programs for songbirds in Iqaluit. While locals most certainly have been observing changes in the avifauna as the climate warms (American Robins in Iqaluit!), researchers based in southern Canada and academic scientists generally are late to the game to examine and understand the biology of the local Iqaluit songbirds. We have lots of catching up to do as we learn from and engage with local birders and knowledge holders to expand our understanding of the impacts of climate change in the North!

Second in our motivation to expand work in Iqaluit was the knowledge that while many southern researchers travel through Iqaluit every year on their way to study remote parts of the north, the local community doesn't often get the benefit of engaging with researchers. *Why can't our team conduct world-class research on birds while also engaging with the local community, by sharing our research and providing outreach and training to interested community members?*

Finally, the remoteness of many Arctic field sites (and the inherent logistical challenges involved in working and traveling to those sites) makes them inaccessible to many excellent students and researchers. Working in town in Iqaluit helps us to expand access to field experiences and training, and to include a greater diversity of wonderful people who want to help study songbirds. Our ongoing Iqaluit work is an effort to create positive outcomes for birds, researchers, and the local community.

For the next 3-5 years, we'll be working to understand whether buntings breeding in Iqaluit are benefitting, or suffering consequences, from their urban lifestyle. We are also trying to understand whether cold-specialists like Snow Buntings can still work at peak performance raising chicks while the North is heating up. Does city life make it easier, or even harder for buntings to fledge chicks? Finally, while Snow Buntings have been our flagship songbird for many years, they are breeding side-by-side with many other understudied songbirds. That's why we're building a foundation to be able to expand into monitoring other species such as Northern Wheatears, American Pipits, Lapland Longspurs and Horned Larks. Stay tuned for tales of buntings, birds, and people in the urban Arctic!

The Snow Bunting Report

CANADIAN SNOW BUNTING NETWORK

2023

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