ABSTRACTS / RÉSUMÉS

Meeting/ Réunion 2025
Society of Canadian Ornithologists
Société des ornithologistes du Canada
August 13-16 août, 2025

UNIVERSITY OF SASKATCHEWAN

Ifrah Abdirizak; Iqbal Bhalla; Xiaolei Yu; Christy Morrissey P12

Comparing avian species diversity inside and outside First Nations Lands using bioacoustics monitoring

Globally, First Nations lands managed with Indigenous stewardship practices have demonstrated higher biodiversity compared to non-Indigenous landscapes. However, limited research exists comparing avian biodiversity between habitats on First Nations and non-First Nations land in Prairie Canada. This study aims to investigate the relationship between avian diversity, abundance, and species at risk in natural habitats inside and outside First Nations reserve lands in the Redberry Lake region of Saskatchewan using bioacoustics monitoring and habitat mapping. In 2024, bioacoustic data were collected from 69 selected sites (33 First Nations lands and 36 non-First Nations lands) with contrasting native and tame grassland, forest and lake/wetland dominant land uses. Species richness and vocal activity (abundance) were analyzed manually through WildTrax and using the "HawkEars" automated Canadian bird song AI classifier. Preliminary findings suggest that at least 130 avian species were detected in our study area. Eight avian species listed under the Species at Risk Act (SARA) were detected in First Nations lands and seven SARA species were found in non-First Nations lands. Bank Swallow and Barn Swallow, both with threatened status, were detected inside and outside First Nations sites. We also detected species with special concern status in both site types including Red-necked Phalarope, Common Nighthawk, and Yellow Rail. This study provides insights into avian biodiversity patterns in the region and the value of First Nations lands for biodiversity conservation in Saskatchewan, contributing to a more detailed understanding of species distribution and habitat preferences in these areas. These findings will contribute to a more comprehensive conservation management approach that incorporates both Indigenous stewardship and scientific methods in protecting avian biodiversity in prairie ecosystems.

Erica Alex; Kevin Hawkshaw; Kiel Drake; Mitch Weegman P41

Point counts and line transects produce biased density estimates for raptors and galliformes: challenges for monitoring and conservation

Point count sampling is a commonly used method for monitoring multi-species avian communities, but may be ineffective at surveying wide ranging and cryptic species such as raptors and galliformes. To investigate this, we conducted line transect and point count sampling on sites across the Canadian prairies, and compared species density estimates for Sharp-tailed Grouse (Tympanuchus phasianellus), Red-tailed Hawk (Buteo jamaicensis), and Swainson's Hawk (Buteo swainsoni). We used distance sampling methods to model detection functions for each species on line transects and used the resulting probability of detection to correct raw counts and estimate density. For point count sampling, we used QPAD methods, which combine distance sampling and time removal models to generate detectability offsets. We then modelled density using poisson generalized linear mixed models of raw counts, including the offsets as a random effect. We compared methods based on model fit and properties, bootstrapped density estimates, and precision. For Sharp-tailed Grouse, point counts substantially underestimate density relative to line transects, although with greater precision, likely due to fewer individuals flushing in front of the observer. While line transect estimates for Sharp-tailed Grouse are likely more accurate, it is difficult to enumerate distant aggregations of birds such as leks, and estimates may still be biased low. For raptors, point counts and line transects generally produced similar density estimates and levels of precision. However for Swainson's Hawk, some detection functions for line transects had poor properties, leading to lower detectability and higher, less precise density estimates. In general, the results of our study were equivocal, and while line transects can be integrated into a point count-based monitoring scheme relatively easily, neither method may be ideal for estimating densities for these species. Our study highlights the challenges of surveying highly mobile and cryptic birds, and integrating them within broad, multi-species monitoring schemes.

Wondimu Ersino Ayano P40

Incubation behavior of a sex-role reversed shorebird: environmental influences in African Jacanas at Lake Hawassa, Ethiopia

Avian egg incubation is a critical component of parental care, requiring individuals to maintain optimal thermal conditions for developing embryos while balancing their own energetic needs. Understanding the factors influencing incubation behavior is essential for avian conservation. This study investigated how ambient temperature, wind speed, time of day, clutch size, and Julian lay date affect incubation duration and recess frequency in the African Jacana (*Actophilornis africanus*) at Lake Hawassa, Ethiopia, using generalized linear models (GLMs). Incubation behavior was continuously monitored at 20 nests over 24-hour periods using Wyze v3 cameras. GLMs incorporating spline terms revealed significant non-linear effects of temperature and wind speed on incubation duration, with the strongest reductions observed at high temperatures ($\beta_3 = -36.29 \pm 3.79$, $p < 0.001$) and low to moderate wind levels ($\beta = -14.81 \pm 4.78$, $p = 0.002$). Wind speed also significantly influenced recess frequency, with increased wind speeds associated with higher recess rates, particularly at lower wind levels ($\beta = 1.12 \pm 0.42$, $p = 0.007$). Across all monitored nests, male African Jacanas incubated for an average of 41.9 ± 19.4 minutes per hour during active incubation hours, corresponding to approximately 69.9% of each hour. Over the full 24-hour period, the mean hourly incubation time decreased to 11.5 minutes, with males taking an average of 1.56 ± 0.30 recesses per hour. Observed nest predators included Gallinula chloropus, Varanus niloticus, and female African Jacanas. These findings provide the first detailed account of incubation behavior in African Jacanas from Ethiopia and highlight key environmental factors shaping parental investment, with implications for nest monitoring and conservation efforts.

Harsimran Bains; Erin Bayne L1.1

Can acoustic cues help predict where Pileated Woodpecker nests are located?

The Migratory Bird Convention (MBCA) act is a law intended to limit the accidental destruction of nests from human activities. Recent amendments for Pileated Woodpecker (PIWO) cavities require that nest cavities must be protected year-round and those not being used must be protected for 36 months from their last known use before removal is allowed. Therefore, understanding where cavities are located allows industry to operate efficiently while adhering to the provisions of the MBCA. Acoustic monitoring can be a tool to assist in understanding woodpecker distribution in Alberta. Using PIWO drumming, vocalizations, and the vocalizations of secondary cavity nesters may inform us where to look for cavities. Understanding how these acoustic signatures can be used may help various groups, such as industry and landowners, by reducing costs associated with nest searching.

Tyne Baker; Jarrett Lubky SY1.6

SOFTSPOKEN: a tool for balancing human privacy and open data in bioacoustic research

Autonomous Recording Units (ARUs) are excellent for capturing a variety of information about sound-producing avian species in absence of an observer. Often, despite best efforts to warn of recording in the area, human voices are captured in these unsupervised recordings. Deploying sensors in outdoor environments, where people may have an expectation of privacy, poses challenges to ethically open-sourcing large-scale audio datasets. If the dataset is to be open-sourced or shared publicly (e.g. citizen science, research databases), removing human voices to protect privacy and comply with privacy laws is labor-intensive when done manually. We introduce SOFTSPOKEN (“Sound Optimization for Fading Talkative Signals and Preserving Other Key Environmental Noises”), a tool designed to automate this process. SOFTSPOKEN uses a machine-learned model trained to detect human speech while ignoring environmental, anthropogenic non-vocal, and animal sounds. The simple no-code graphical interface allows users to review detections and selectively silence time-intervals where voices occur before sharing datasets publicly. Additionally, users can generate summary outputs. These outputs are compatible with various analysis programs, aiding studies of anthropogenic effects on animal behaviour. We present the tool’s performance on novel test data and provide key considerations for users, including model strengths and limitations. We highlight our efforts to refine the model, improve detection accuracy, and minimize false positives and negatives. We will also showcase the workflow within the interface, emphasizing its accessibility for researchers and practitioners. SOFTSPOKEN supports ethical data sharing by safeguarding privacy while preserving the majority of time within recordings to minimize data loss. This open-source, free-to-use tool aims to foster large-scale collaboration and innovation in bio- and eco-acoustic monitoring.

Natasha Barlow, Gabriel Evans-Cook SY5.9

Chasing Chimney Swifts: an overview of Birds Canada’s current monitoring of Chimney Swifts in Ontario, lessons learned, and next steps for conserving our upstairs neighbors

Uncovering the mechanisms influencing the widespread decline of aerial insectivores is necessary for effective conservation. Often, a multi-faceted approach is required for reducing the cumulative pressures facing some of our most at-risk species. Chimney Swifts (*Chaetura pelagica*) face a myriad of threats that have contributed to their decline, and as a species that relies heavily on aging infrastructure in urban areas, they provide a unique opportunity to employ a variety of empirical and non-empirical approaches to address their conservation issues. As such, Birds Canada’s Ontario Chimney Swift Project has exercised a four-pronged approach to tackle the primary threats to Chimney Swifts on the breeding grounds in the province: 1) standardized occupancy/abundance surveys by volunteers or staff to identify potential critical habitat locations, 2) proactive outreach to landowners and relevant agencies (e.g., municipalities, permitting authorities, developers, private landowners), 3) targeted general public outreach in urban centres with identified Chimney Swift breeding populations, and 4) developing priority research to inform the efficacy of proposed mitigation measures and/or advise on management decisions. In this presentation, we will discuss the effectiveness of citizen-science led monitoring efforts, current challenges in conserving existing habitat, and the role of local communities in safeguarding critical habitat. Additionally, we will outline next steps in our research plan, including a pilot project which builds on past work to track Chimney Swifts during foraging flights, to further identify the habitat characteristics that inform foraging locations and dietary preferences. By sharing insights from our work, we aim to foster greater awareness of Chimney Swift conservation needs to inspire action to protect this unique and charismatic species.

Justin Benjamin; Quin Mann; Blaine Landsborough; James Quinn. TH2.4

Exploring hatching synchrony in a cooperative breeding bird

Hatching synchrony is well studied in birds and many hypotheses have been proposed and supported in various monogamous species. However, the complexity of many cooperative breeding systems inspires alternative and novel explanations. Joint laying species represent a rare subset of cooperative breeding in which multiple group females lay eggs in the same nest and share parental care. The pūkeko (*Porphyrio melanotus melanotus*) is a polygyandrous joint laying subspecies in Aotearoa New Zealand with high levels of kinship in the northern part of their range. Females do not appear to differentiate their eggs from those of other females and are tolerant towards other group members laying in the same nest. Early hatching eggs typically belong to dominant females and have greater chances of survival and becoming dominant adults themselves. Laying with a closely related female and tightening the hatching period could increase the number of early-hatching eggs and, therefore, may result in inclusive fitness benefits. We hypothesized that joint laying with a close relative increases the inclusive fitness benefit of dominant females compared to hypothetical prolonged laying of a similar sized clutch by a single female. Using a combination of observational and experimental data, we addressed this question by measuring the effects of various nesting and social group variables on hatching spread and measuring the effect of hatching synchrony on hatching success and chick survival. We also compared the effects of hatching order on survival in synchronous and asynchronous nests. To calculate potential inclusive fitness benefits to dominant females, we used microsatellite genotyping to measure the relatedness between joint laying females and between mothers and their offspring.

Lisha L. Berzins; Ann E. McKellar SY5.1

Aerial insectivores in agricultural landscapes: highlighting the value of wetlands for promoting population stability of a declining guild

Aerial insectivores have faced steep population declines in North America, with an estimated loss of nearly 160 million individuals since the 1970s. Agricultural intensification, habitat loss, pesticide use, extreme climatic events, and loss of high-quality insect prey are all threats to aerial insectivore populations worldwide. Several species within the guild sympatrically breed or co-occur in agricultural areas, and thus aerial insectivores can act as indicators of ecosystem health within agricultural working landscapes. In reviewing the literature, we developed the hypothesis that wetlands support aerial insectivores breeding in agricultural landscapes. Importantly, wetlands are a source of emergent aquatic insects, and these high-quality prey items have been found in the diets of several species, including those of conservation concern. We provide evidence that 1) aerial insectivores use wetland habitats for foraging and roosting while breeding in agricultural landscapes, 2) wetlands improve the reproductive success, health or fitness prospects of aerial insectivores, and, importantly, 3) wetlands may offset the negative effects of agricultural intensification. While evidence on the benefits of wetlands to aerial insectivores is biased toward swallows breeding in the Canadian Prairies, our review points to the likely widespread value of wetlands for aerial insectivores across North America due to their high frequency of use and being a source of high-quality prey. Overall, protecting wetland habitat may be critically important for the conservation of healthy aerial insectivore populations in agricultural working landscapes.

Levi M. C. Bettencourt; Karen Machin; Jennifer Provencher; Kirsty E. B. Gurney P20

Assessing the levels and biological fate of UV-328 in captive mallards

Plastic pollution is an escalating environmental threat with potential consequences for wildlife and human health, which have not been well studied. Benzotriazole UV-stabilizers, particularly UV-328, are widely used plastic additives that have been detected across ecosystems and multiple taxa. Recently classified as a Persistent Organic Pollutant under the Stockholm Convention, UV-328 has been found to bioaccumulate in animal tissues, however, its broader ecological impacts, including its maternal transfer and distribution among tissues remain poorly understood. This study examines the biological fate of UV-328 in birds, using captive mallards (*Anas platyrhynchos*) as a model. Over 10 days in 2022, we conducted a controlled oral exposure experiment with environmentally relevant doses of UV-328 (0.038 g/mL), delivered by gavage. To assess maternal transfer, we collected eggs daily; to evaluate concentrations in tissues, including in lipid-rich organs such as the liver, a subset of birds was euthanized at the end of the exposures. Preliminary analyses indicate substantial maternal transfer of UV-328 into eggs and an unexpected non-linear relationship between egg UV-328 concentration and exposure duration. These findings enhance our understanding of UV-328 bioaccumulation in avian species and its potential ecological risks. By integrating avian toxicology with emerging contaminant research, this study underscores the need for further interdisciplinary investigation into the environmental impact of plastic- associated pollutants.

Iqbal Bhalla; Christy Morrissey P13

The Prairie Precision Sustainability Network: detecting changes to biodiversity when marginal farmland is converted to perennial grassland

The Prairie Precision Sustainability Network (PPSN) is a social-ecological project that investigates the ecological, agricultural, and economic benefits of converting marginal cropland into perennial forages. Conducted over three provinces in Western Canada, the PPSN project will use bioacoustics methods to track the change in bird communities from 2025 to 2028. Using a Before-After-Control-Impact (BACI) study design, most sites will be maintained as cropland in 2025, and seeded with native grasses from 2026. The project will leverage new AI models for bird classification as well as soundscape analysis to describe bird communities in the aggregate-via soundscape metrics-and the specific-by identifying individual species and tracking their activity levels over time. The project will use new methods to overcome classifier biases and link vocal activity with absolute abundance-a measure with which one can establish correlations between changes in the landscape to changes in bird behavior. This data will enable a detailed exploration of how agricultural landscapes can benefit biodiversity, with implication for migration, ecosystem services and agroecological sustainability.

Mark T. Bidwell; Andrew D. Crosby; Maureen Angell; Susari Malala Irugal Bandaralage; Erin M. Bayne; Nicolas Comerford; John A. Conkin; Lukas J. Mundy; Bruce D. Pauli FR3.6

Threats and conservation opportunities for migrating whooping cranes in the oil sands region of Alberta, Canada

The Aransas-Wood Buffalo population of endangered whooping cranes (*Grus americana*) contains approximately 550 individuals that migrate twice annually through the Alberta Oil Sands Region (AOSR). Satellite tracking demonstrated that almost all cranes migrate through the surface mineable area, where many stop over. Ecosystem disturbance associated with oil sands development could impact cranes by reducing available stopover habitat, e.g., if cranes avoid developed areas; or by degrading habitat quality, e.g., if cranes are exposed to high concentrations of oil sands-related contaminants. Our objectives were to: (1) develop habitat selection models to estimate habitat reduction from development and identify high-conservation-value areas; and (2) use these models to guide wetland sampling for contaminant risk assessment. We developed a scale-integrated resource selection function, including selection of stopover sites and habitat selection within them, and sampled wetlands used by cranes during stopovers (N=26) in the AOSR and at reference nesting sites (N=30) over 400 km to the north. Our models showed cranes avoid certain anthropogenic disturbances, suggesting industrial development reduces available habitat. Maps revealed high-risk areas within the mineable region and adjacent areas with high conservation value. Wetland sampling demonstrated cranes at industrial sites face higher levels of potentially harmful contaminants than at reference and natural sites. Measured contaminants included naphthenic acids (NA) and polycyclic aromatic compounds (PAC), organic compounds found in oil sands tailings ponds, which were 29 times and 7.6 times greater, respectively, at AOSR stopover sites than at reference sites. Within the AOSR, contaminant concentrations varied substantially, with some sites having NA and PAC concentrations 400 and 184 times greater than others. Our work provides a science-based tool for land-use planners to identify threats and mitigate risks to migrating whooping cranes in the AOSR, aligned with the One Health framework that integrates ecosystem integrity, wildlife conservation and human dimensions.

Erin Bolger; Vanya G. Rohwer; Paul R. Martin SY3.1

Birds of a feather lose them together? Blackpoll Warbler moulting phenology

Moult is an energetically costly process in the life cycle of birds, and birds undergoing moult are extremely vulnerable. Moulting prior to migration is common in many species, and is important to ensure that a bird's feathers are in top condition for migration. However, moult is relatively unstudied compared to other annual processes such as breeding and migration. Migratory wood warblers (Parulidae) are thought to complete their post-breeding moult on the breeding grounds prior to their migration south. Yet, some boreal wood warblers have been observed moulting south of their breeding range, suggesting that they could be performing a moult migration. This behaviour might reflect responses to boreal forest fires that are increasing with climate change; alternatively, moult migration may represent a regular but overlooked behaviour that reflects our poor knowledge of the post-breeding ecology of boreal birds. We compiled data on the moulting location of Blackpoll Warbler (*Setophaga striata*) using photographs from the Macaulay Library (Cornell Lab of Ornithology) to test among these alternative hypotheses and to describe the location of moult relative to the breeding range. We created a breeding range map using eBird Status and Trends data to compare the location, age, and plumages of moulting and non-moulting birds from mid-June to October. We test if the proportion of birds moulting within their breeding range changes over time, and if so, if this proportion declines in response to broad-scale boreal forest fires. Overall, this work will provide a clearer understanding of when and where moulting occurs in Blackpoll Warblers, and how climate change might impact a poorly-known but vital stage in the life history of boreal forest birds.

Theresa M. Burg; Sara Castro-Garcia; Keith A. Hobson; Linda Lait; Victoria Lozano-Huerta; Thilini Maddegamgoda Lekamlage; Luca Montana; Anisha Neupane; Amanda Wartchow; Kevin J. Kardynal P30

Population genomics of four long-distance migratory aerial insectivores in North America

Understanding the forces shaping population genetic structure is crucial for evolutionary biology and conservation, especially for declining populations. In North America, migratory bird species experienced a net loss of 2.5 billion individuals since the 1970s, with aerial insectivores among the groups with the largest declines. Genetic data can be used to direct conservation initiatives by providing information on how populations are connected across the landscape. In this study, we explored the population genetic structure and connectivity of four long-distance migratory aerial insectivores (36 alder flycatchers, *Empidonax alnorum*, 60 cliff swallows, *Petrochelidon pyrrhonota*, 43 purple martins, *Progne subis*, and 41 violet-green swallows, *Tachycineta thalassina*) across their North American breeding ranges by generating genome-wide single nucleotide polymorphism (SNP) data through 3D-GBS (genotype-by-sequencing), a reduced-representation sequencing method. PCA and Bayesian clustering analyses revealed varying levels of genetic structure within the four species: alder flycatchers exhibited minimal differentiation across their range, whereas subtle regional structuring was detected in cliff swallows, and high differentiation was observed in purple martins and violet-green swallows. Significant pairwise FST values were found between all regions tested, ranging between 0.023 for the least differentiated regions in violet-green swallows to 0.250 for the largest differences in purple martins. Patterns of isolation by distance were detected only in purple martins while landscape resistance surfaces highlighted areas of high and low dispersal potential. This study demonstrates that historical processes, current landscape features, and species traits all interact to create complex patterns of population connectivity across multiple species of avian aerial insectivores.

Emily Burt; Rodger Titman; Shawn Craik; Mélanie Guigueno FR3.1

Patterns of genetic structure in colonially breeding red-breasted mergansers (*Mergus serrator*)

Investigating the distribution of genetic variation, or genetic structure, of a population provides valuable information on dispersal patterns and social behaviour. Natal philopatry can lead to genetic structuring and therefore results in the grouping of nests amongst genetic relatives. Kin selection can also promote kin grouping, particularly under conditions in which selection favours interactions among genetic relatives, such as conspecific brood parasitism (CBP). We aim to resolve the spatial genetic structuring in a colonial population of red-breasted mergansers (*Mergus serrator*) that exhibit high rates of CBP on two barrier islands in New Brunswick. Using microsatellites to genotype individuals and calculate pairwise kinship coefficients across three breeding seasons, we are assessing the genetic relationships between pairs of hens at the population-level, island-level, and increasing fine-scale distance intervals. Preliminary results indicate weak but significant spatial genetic structuring in the population at a coarse scale that varies in strength depending on the year, suggesting that kin grouping is a transient phenomenon in this population and that nesting decisions are also likely driven by processes other than kin selection.

Rachel T. Buxton; Miguel F. Jimenez; Aalia Khan; Tori D. Bakley; Lisha L. Berzins; Barbara Frei; Elizabeth A. Gow; Autumn-Lynn Harrison; Osvel Hinojosa-Huerta; Andrea R. Norris; Brendon Samuels; Douglas C. Tozer; Eric M. Wood; Theodore J. Zenzal Jr.; Paul A. Smith; Catherine Jardine; Mark S. Woodrey; Bradley Wilkinson; Angeles Raymundo FR1.3

Successes and opportunities in solutions-oriented avian conservation research

Conservation science struggles with an ongoing divide between research and action. Avian conservation research offers a wealth of successes and opportunities to guide more solutions-oriented conservation science. With bird conservation scientists and practitioners from various backgrounds, we discussed the definition, characteristics, and examples of solutions-oriented conservation science. Our discussions highlighted several examples where successful application of avian conservation science led to change in programs, policy, regulations, and social systems, including several with co-benefits for local communities. Examples included 1) community-driven science and tools to raise awareness on the issue of bird-window collisions, resulting in changing of building design standards; 2) community science programs eBird and Bird Canada's NatureCounts program, leveraging crowd-sourced data to contribute to species extinction risk assessments; 3) across-flyway shorebird conservation, empowering local communities and delivering co-benefits from South America to Nunavut; and 4) an understanding of the benefits of street trees for people and birds guiding urban management and planning in Los Angeles, CA. These successes were characterized by communication, collaboration, and co-development with local communities, decision-makers, practitioners, and Indigenous communities. We identified remaining opportunities for improvement, including aligning incentives and priorities between research and practice, working across disciplines to mobilize solutions, dismantling barriers to inclusion, and emphasizing the importance of relationship-building in conservation science. We outline suggestions that researchers can use to incorporate these lessons from solutions-oriented avian conservation science into training and mentoring programs.

Jules Cameron; Jessica Poirier P8

Using an Etuaptmumk (Two-Eyed Seeing) approach to winter marine bird monitoring in Unama'ki, Nova Scotia

Waterfowl and marine birds are important indicators of healthy environments of wetland and coastal ecosystems in North America. Climate change, destruction of habitat, and human disturbances are impacting marine birds in Unama'ki, the unceded ancestral territory of the Mi'kmaq. The Mi'kmaq are responsible for Msit no'kmaq (all our relations) and waterbirds have been identified as one of four biocultural leaders in Unama'ki. As part of baseline data collection to establish an Indigenous Protected and Conserved Area (IPCA), thirteen coastal sites were chosen and monitored three times between November and March, in each county of Unama'ki (Cape Breton). Species type and number present were recorded, with emphasis on gulls, ducks, and alcids. Environmental conditions, ice presence, predator presence, and human disturbance were also recorded. Sites located in Cape Breton Regional Municipality had the highest diversity among the three main types of species (n = 33), the highest incidence of ducks were found in Victoria County (n = 773), and Inverness County had the lowest number of species observed (n = 17) and individuals counted (n = 140). Richmond County had the highest number of individual birds observed outside the three main types (n = 245). The most common species observed was Red-Breasted Merganser (*Mergus serrator*) (n = 429). Rare species identified included Harlequin Duck (*Histrionicus histrionicus*), Horned Grebe (*Podiceps auritus*), and Hermit Thrush (*Catharus guttatus*). Most common observed predator was Atlantic Grey Seal (*Halichoerus grypus atlantica*). A slight negative relationship between number of birds observed and temperature was found but was not significant. Ice presence was qualitatively measured with 84.62% (n = 11) of sites having ice presence for at least one visit. Establishing baseline data with continuous monitoring will contribute to a greater knowledge of factors contributing to marine bird distribution and population density in Unama'ki and Atlantic Canada.

Kayla Caruso, Christy Morrissey, Ann E. McKellar SY4.1

Trends in shorebird abundance and diversity in relation to habitat changes at saline lakes of the Canadian Prairie Pothole Region

Shorebird populations worldwide are experiencing alarming declines due to climate change, habitat alteration, and human disturbance. Many shorebird species migrate vast distances between wintering and breeding grounds, depending on high-quality staging sites for rest and refuelling. While coastal stopover sites have been extensively studied, relatively few assessments have focused on inland saline lakes, which serve as vital stopovers for shorebirds migrating through North America's interior. This study investigates long-term changes in shorebird populations and their habitat by revisiting Saskatchewan lakes that previously hosted large shorebird populations but have not been surveyed in over two decades (since 2001) and examining trends in landcover via satellite imagery. Ten saline lakes in Saskatchewan were resurveyed during spring and fall migration in 2021 and 2022, and land-cover change at each lake was evaluated using satellite imagery from the spring migration period (May-mid-June) throughout the time series (1993-2022). Across all study lakes, total shorebird abundance was lower in spring but higher in fall. Species-specific observations included higher resident breeding Wilson's Phalarope numbers during both spring (+320%) and fall (+852%) periods in the contemporary compared to the historical survey period. In contrast, tundra-breeding species showed lower abundance in spring, with common species like Semipalmated Sandpipers and Sanderlings experiencing respective losses of 91% and 82% compared to historical numbers. Conversely, their abundance was higher during the contemporary fall migration period, with Semipalmated Sandpipers and Sanderlings showing respective increases of 222% and 1499% over historical counts. Species richness was significantly lower in the recent years, dropping from an average of 23 to 14 species. While correlations between shorebird numbers and landcover types were weak, landcover changes at study lakes revealed significant increases in water, and declines in salt flats and grasslands. This research provides key insights for conserving shorebird staging habitats in the increasingly vulnerable Prairie Pothole Region.

Edward Cheskey; Elizabeth Gow P39

A guide for local groups to assess the number of cats in their community by using trail cameras

Cats are a significant contributor to bird mortality in most southern Canadian municipalities. Between April and November 2020, Nature Canada, in partnership with the Club des Ornithologues de l'Outaouais (COO), used six trail cameras to determine the number of cats outside in Gatineau, Quebec, as well as draw conclusions on where the cats were most likely to be. This volunteer- driven project sampled 33 residential and commercial sites and 22 National Capital Commission parkland sites. Six volunteers managed the cameras, moving them from site to site every 14 days. Over 40,000 images were captured and sorted by additional volunteers over 200 hours. One hundred and thirty individually identifiable cats were photographed, averaging 2.36 cats per camera site. Cameras also detected 19 mammal and 15 bird species. Central coordination by a small group from Nature Canada and the COO managed the cameras and data sorting. Covariate data were collected within 100 m buffers around every camera site to determine building density, proportion of forest and water cover, presence of major roads, and median household income. Global detection and local abundance models generated results for correlations and population estimates. Building density, major roads and median income were the top co-variates in the models, suggesting they likely influenced cat abundance, with building density (sum of weights = 0.8) and major roads (sum of weights = 0.61) having the biggest effects. Best population estimates from the top models have a mean of 21,298 cats ranging from: 8905 to 48,419 within Gatineau. A senior year geomatics student from Carlton University created the spatial data set and Dr. Elizabeth Gow produced the predictive models and conducted statistical treatments of the data.

Sasha Chilibeck; Glenn Crossin; Katharine Studholme P4

Defining the timing of early breeding phenology of Atlantic Leach's Storm Petrels (*Hydrobates leucorhous*)

Laying date is one of the most important reproductive fitness metrics in birds, as it follows optimal foraging times to ensure the best chance at reproductive success – influencing both the parents' ability to provision for themselves and their offspring. This is especially pertinent for a declining seabird species in Atlantic Canada, Leach's Storm Petrels, as they are a slow reproducing species. At present, our understanding of the early reproductive timing for Leach's Storm Petrels in the Atlantic is anecdotal. This study's goal was to determine the timing of early breeding phenology for Storm Petrels from a historical dataset of geolocation sensor data (GLS) for six long-term study colonies across the Canadian Maritimes. GLS data describes location and activity of tagged individuals through recording environmental light levels. We aimed to characterize the timing of first burrow re-occupancy, differences in pre-laying activity between the sexes, and the lay-dates and start of incubation behaviour across the study colonies. Linear and generalized mixed models were run on the detected dates to determine if sex, colony, or year had the most significant effect on determining the timing of breeding phenology. We found that colony significantly impacted the timing of first burrow re-occupancy and lay-date/start of incubation; year significantly impacted the timing of first burrow re-occupancy; and sex significantly impacted pre-laying burrow activity, with males visiting the burrow considerably more and for longer than females, but females having a longer pre-laying exodus. These findings indicate that when Leach's Storm Petrel's return to their breeding colony they may be influenced by global ocean climatic conditions, but that lay-date/start of incubation is mainly influenced by localized conditions at the colony. Our findings may aid future research on Leach's Storm Petrel reproductive success and help to inform conservation management regarding the timing of key breeding activities.

Jonathan J. Chu; D. Ryan Norris; Marlee Pyott; Olivia Wilson; Elizabeth A. Gow SY2.4

Factors influencing predation rates of outdoor owned domestic cats (*Felis catus*) in two geographically and climatically distinct regions in Canada.

Understanding which factors lead to higher predation rates from cats is critical to understand their role in Canada's ecosystems and how to best target management efforts that support bird conservation. In Canada, cats are estimated to kill a staggering 150–350 million birds/yr, but mortality estimates are extrapolated from a small number of studies on cat predation rate from outside Canada that vary in habitat, season, intrinsic traits of the cat, and even the types of cats studied (rural vs urban dwelling). We estimated predation rates of owned domestic cats in two regions in Canada by attaching miniaturized (70g) animal-borne cameras and GPS trackers to cats for a 5-week period from June–October, 2021–2023 in southern Ontario (Guelph, Kitchener/Waterloo, Cambridge) (n = 48) and from May–August, 2024 in the south Okanagan Valley (Penticton to Osoyoos) (n = 34). We inspected recorded predation events to extract the time-of-day, microhabitat characteristics, location, and identity of the prey species. We found cats in Ontario killed 0.002 birds/hr in comparison to 0.009 birds/hr in the Okanagan. Combining these predation rates with estimated populations of outdoor cats, 7,662 (95% CI: 6,145–9,966) cats in Guelph, and 7,040 (95% CI: 4,348–11,721) cats in the south Okanagan, we estimated that cats killed 61,000 (95% CI: 49,000–80,000) birds between June–October each year in Guelph and 180,000 (95% CI: 111,000–300,000) birds between May–August each year in the south Okanagan. We also found, that among cats in Ontario, those with larger home range sizes had higher predation rates. Our results refine and add to our understanding of the impact of owned cats on Canadian birds and suggest that predation rates, to a certain extent, vary between regions and based on ecological factors.

Anastasia Cornea; Iqbal Bhalla; Christy Morrissey P42

Avian responses to non-crop vegetation in cropland: ecological trap or habitat refugia?

The Canadian Prairies have struggled to balance the demands of agriculture, one of the largest economic industries, with conservation goals. Agriculture poses multiple threats to the hundreds of bird species that utilize croplands and pastures for breeding and staging on migration. Cultivation of monocultures and extensive use of large machinery in crop fields eliminates habitat diversity and physically displaces birds, including ground nesting species. Additionally, increased exposure to highly toxic insecticides can impact avian food supply and has the potential to cause adverse effects to exposed individuals. We hypothesize that remnant non-crop habitats of grasses, shrubs, and trees may offer a refugia for migratory and resident species, but they may alternatively act as an ecological trap drawing in birds to low quality or high hazard habitats. We plan to study these non-crop areas in field margins or marginal cropland conversions associations with bird biodiversity to quantify the benefits and costs for farmland bird populations. Our primary research goals are to 1) measure avian richness and diversity before and after forage conversions or in crop and existing non-crop habitats and 2) quantify individual insecticide exposure and diet composition. Through the use of Audio Recording Units (ARUs), fecal eDNA analysis, and blood plasma insecticide analysis from 10 target species (e.g. Vesper sparrow, Savannah sparrow, Brown-headed cowbird, and Red-winged blackbird) across 8-12 sites in Saskatchewan, we will evaluate differences in species richness, diet and pesticide loads to vulnerable and declining populations occupying forage patches adjacent to cropland and assess the influence of patch size, configuration, and connectivity in mitigating negative effects. This study presents an exciting opportunity to explore how identification and conversion of marginal land to non crop vegetation can increase agricultural efficiency while simultaneously providing conservation benefits to farmland birds across the prairies.

Andrew D. Crosby; Mark T. Bidwell; Erin M. Bayne; John Conkin FR3.4

Nesting home range and habitat selection in Wood Buffalo National Park by the last wild, self-sustaining population of Whooping Cranes (*Grus americana*): implications for critical habitat designation

The Aransas-Wood Buffalo population (AWBP) of the highly endangered Whooping Crane (*Grus americana*), composed of approximately 500 individuals, nests exclusively in and around Wood Buffalo National Park in northern Alberta and adjacent Northwest Territories. A requirement for reaching and maintaining population recovery goals for the AWBP is to ensure sufficient breeding habitat to support the desired number of breeding pairs. While the AWBP continues to grow and expand its nesting range, little is known about breeding habitat selection by AWBP cranes outside of a small number of nest location habitat studies. Therefore, our objective was to model hierarchical habitat selection (home range and within home range) during the breeding season by nesting cranes in and around Wood Buffalo National Park using scale-integrated resource selection functions and use models to predict future habitat use outside the current nesting range. At the home range level, we found strong selection for fens and shallow surface water, neutral selection of marshes, and avoidance of treed wetlands, swamps, and uplands. We found evidence for functional responses to the local amount of upland habitat for home range selection. Within home ranges, incorporating central place foraging behaviour by controlling for distance to the nest substantially improved models, and changed selection strength estimates for some variables, suggesting that central place foraging influences foraging habitat decisions. Our scale-integrated modelling framework allowed us to develop maps of current and potential breeding range habitat that were conditional on scale-dependent selection processes, which is critical for delineating areas of potential importance for breeding range and population expansion.

Steve Cumming; Siu Chung Woo; Barbara Vuillaum; Mélina Houle; Pierre Racine; Steven Van Wilgenburg; Kevin Kardynal SY3.1

Assessing change in forest age structure in the western boreal forest using time-series digital forest resource inventory data

The boreal mixedwood forests of western Canada are characterized by stands of mixed aspen and white spruce in a shifting mosaic that was historically structured by natural disturbance, such as wildfire. By 1990, most of these forests had been allocated to harvesting. Harvesting selects for older stands and is expected to be additive to other disturbances. Forest songbirds strongly associated with older forests (e.g. Canada Warbler with deciduous and Cape May Warbler with spruce forest) must surely be affected as disturbances accumulate. To minimize such effects, they must be measured and attributed. In this study, we integrated: 1) time-series of digital forest resource inventory data based on aerial photography (dating c. 1990 and 2010) and 2) remote-sensed disturbance information at annual-resolution to quantify and attribute 25 years of age-structural change, from 1990 to 2015. Mapped forest stands were sampled at 1 ha resolution. Disturbance histories were constructed for each location using inventory disturbance records, mapped forest fires, and remote-sensed disturbance maps. Initial stand conditions were measured from the 1st inventory or inferred from the 2nd inventory and disturbance histories. We then reconstructed forest age structures for 1990 and 2015, detected changes over this 25 year period, and attributed causes, by jurisdiction and management regime. The total area disturbed from 1990–2015 varied from less than 10% to more than 25%. Forest harvesting was indeed strongly concentrated in forests aged >80 years. In managed forests of BC and Alberta, about 50% of the total area disturbed was attributed to forest harvesting. Future work will allocate disturbance rates by dominant tree species. Although forest management is still in early stages compared to rotation ages, the net effect on forest age structures (e.g. age truncation) may have already caused significant population declines in some old-forest dependent birds.

Vianney Cupiche-Herrera, Brian McLaren P11

The influence of conspecific attraction and habitat disturbance on habitat choices of a species at risk (*Cardellina canadensis*)

Disentangling the relative roles of environmental cues and social information in habitat selection is essential to identify more accurate conservation strategies for habitat and species, particularly with increasing anthropogenic change. We tested the influence of conspecific attraction and habitat disturbance on habitat choices of the Canada Warbler (*Cardellina canadensis*, CAWA) in forested landscapes that include managed and protected areas. We surveyed a gradient of disturbed areas (mainly due to forestry activity) during the 2021, 2022, and 2023 breeding seasons in Northwestern Ontario. We surveyed naturally occurring social aggregations of CAWA, as well as simulated conspecific attraction by using playbacks of CAWA songs and calls as an artificial cue during the pre-breeding season. We used generalized linear models to examine the influence of vegetation structure (shrub and canopy cover, canopy height, and forest type), level of post-harvest disturbance, and the song cues on the occurrence, social aggregation (abundance), and CAWA settlement during the pre-breeding season. The results showed that vegetation structure plays an important role in CAWA occurrence and social aggregation patterns, and that conspecific acoustic cues strongly influence pre-breeding settlement decisions. Disturbance at the local scale related to forest harvesting positively influenced social aggregation, whereas disturbance at the landscape scale had no effect on CAWA pre-breeding settlement periods. Conspecific songs during the pre-breeding season attracted males to settle in vacant sites in unharvested areas, thus an effective cue to males searching for breeding territories; however, likely because of these same cues, CAWA males also settle in new sites (not previously occupied) in areas with a low level of disturbance due to forest harvesting.

Jessica Deakin; Christopher Guglielmo; Christy Morrissey; Liam McGuire; Yolanda Morbey; Stuart Mackenzie; Pete Davidson; Amy Newman; Ryan Norris; Nigel Raine; Phil Taylor; Mitch Weegman P18

Motus on the move: expanding and enhancing the Motus Wildlife Tracking System across Canada

The Motus Wildlife Tracking System ('Motus') is a cooperative network of automated telemetry stations for tracking a variety of small and large animals over a wide range of spatial scales. Since 2014, Motus has grown to over 2,000 stations in 34 countries and over 55,000 animals have been tagged and tracked. With a Canadian Foundation for Innovation investment, over the next 5 years, we will be expanding and enhancing Motus across Canada. Our main objectives are to fill critical gaps in the network, intensify deployments in key regions for high-resolution tracking and experiments, and enhance the capabilities of Motus with acoustic monitors, light level meters, and particulate sensors. The investment will also support important and novel experiments and observational studies to answer fundamental questions in movement ecology, flight and refueling energetics, and environmental toxicology.

Anna Drake, Elly Knight, Mannfred MA Boehm, Erin Bayne, Luc Guindon, Lisa Venier, Steve Cumming, Jeff Ball, Teegan Docherty, and Diana Stralberg SY3.1

Assessing degradation in the boreal forest using national-scale forest bird indicators

Although Canada has low deforestation rates, subtle changes in forest state related to human activities (i.e., forest degradation) can negatively impact landbird populations. Identifying drivers of avian population declines are complicated by the fact that these species may additionally be impacted by climate change and, for migratory birds, changes occurring outside of Canada in winter and migratory regions. We use newly developed national-scale landbird species distribution and abundance models (SDMs) and time-matched, spatially explicit landcover and climate variables to predict landbird responses to changes in the Boreal Plains Ecozone (Bird Conservation Region 6.1) of Canada over a 30-year period (1990-2020). We place 34 species into old-, mature-, and early-seral forest associated groupings, and partition the contribution landcover, climate, and unexplained (year) covariates to predicted population change between 1990 and 2020. We examine shared spatial patterns of population change among species, identifying areas where forests may be considered degraded due to their reduced capacity to host our focal groups. Predictions from our models suggest a net decline in landbirds in the Boreal Plains. These losses were largely driven by old- and mature-forest associated species and were greater in the eastern portion of the study area.

Jelany Duali, Petr Procházka, Quinn M. R. Webber, D. Ryan Norris, Vojtech Brlík SA1.4

Post-migratory non-breeding movements in small migratory birds: facultative behaviour shaped by environmental conditions and flight efficiency

In the past, migratory songbirds were assumed to be largely stationary during the nonbreeding season. However, the widespread deployment of tracking devices has revealed that individuals from several species can move up to several thousands of kilometers to relocate to one or more nonbreeding sites, a phenomenon known as "post-migratory nonbreeding movements". Here, we used tracking data from 1,904 individuals in 74 passerine and near-passerine species to assess the prevalence of post-migratory nonbreeding movements and the degree to which this behaviour is influenced by migration timing, vegetation conditions, and life-history traits. We show that post-migratory nonbreeding movements were performed by 30% of individuals (n = 598) and occurred in 35% of species (n = 26). Our preliminary results indicate that individuals who arrived on the nonbreeding grounds earlier and initially settled at nonbreeding sites with low or declining vegetation greenness (i.e., primary productivity) were more likely to perform nonbreeding movements, but these effects were small. Across species, a higher average hand-wing index was associated with a higher movement probability, suggesting that species with a higher flight efficiency were more likely to use multiple nonbreeding sites. Our results provide a novel insight into poorly known behaviour, highlighting how species may respond to changes in their nonbreeding habitat and with important implications for predicting their response to ongoing environmental change.

Matthew E. Dyson; Andrew C. Collard; James H. Devries; Ashley J. Pidwerbesky; James E. Paterson; Tyler P. Cobb; Brian R. Eaton; Jori B. Harrison; Susan Koziel; Mitch D. Weegman P27

Wetlands in working landscapes: maintaining wetland resilience in the context of agroecosystems and climate change

The Prairie Pothole Region (PPR) supports the highest densities of breeding waterfowl in North America, but widespread wetland loss and agricultural intensification have reduced habitat quality and duck productivity. Agricultural land use has been linked to declines in duck reproductive success, likely by reducing invertebrate forage critical during breeding. These communities are influenced by wetland hydrology, vegetation, water chemistry, and exposure to agrochemicals. We are evaluating wetlands across an agricultural gradient to understand how land use affects water quality, invertebrate communities, and wetland use by waterfowl and other taxa. Our methods include water chemistry and pesticide sampling, conventional invertebrate net sweeps, and environmental genomics approaches (e.g., eDNA and bulk tissue metabarcoding). We use drones to count waterfowl pairs and broods, autonomous recording units (ARUs) to monitor birds and amphibians, and camera traps to index terrestrial mammals. We completed the first phase of our work in 2023 and 2024 studying 70 wetland basins across seven quarter sections in Alberta. We present preliminary results, including correlations between wetland water quality and agrochemical occurrence and concentrations with invertebrate and waterfowl abundance. This multi-scale, multi-taxa approach will clarify how agricultural intensification affects wetland food webs and waterfowl productivity in the PPR.

Megan Edgar; Jeffrey R. Ball; Teegan D.S. Docherty; Bruno Drolet; David Iles; Kevin Fort; Charles Francis; Samuel Haché; Anna Jacobson; C. Lisa Mahon; Eamon Riordan-Short; Rich Russell; Adam Smith; Peter Thomas; Judith D. Toms; Steven L. Van Wilgenburg SY3.1

The Canadian Boreal Bird Monitoring Program - progress to date and next steps

Confidence in status assessments for Canadian boreal landbirds has been hindered by a lack of well-structured and representative surveys owing to a difficult accessibility and generally low survey effort. This has resulted in biases in spatio-temporal coverage and sometimes poor representation of covariate space that have implications for estimating national and regional species abundance, distribution, and habitat relationships. In some cases, species distributions cannot yet be modelled from existing data. Substantial variation in model predictive accuracy remains for other species, with many species only showing low to moderate accuracy over large portions of the boreal forest. To address these important limitations, biologists from the Canadian Wildlife Service (CWS) developed a sampling framework that provides rigorous data at a national level via a network of regionally adapted sampling efforts. Our goal was to develop a randomized sampling design that was logistically feasible, cost-efficient, spatially balanced, and hierarchically structured to provide monitoring data that would improve our ability to model species distribution, abundance, and habitat relationships at multiple spatial scales across the Canadian boreal biome and provide basis for future change detection. The design has since been regionally implemented nationwide as part of the Canadian Boreal Bird Monitoring Program (BBMP). Our sampling design provides a standardized approach which facilitates collaborative data collection. To date, the BBMP has partnered with Indigenous groups, non-government organizations, breeding bird atlases, and industrial and academic partners. Here, we outline the sampling design, our framework for incorporating legacy research and monitoring sites, important progress to date, and how data have been used and disseminated to benefit the conservation of birds and other wildlife inhabiting the boreal forest. We also highlight the importance of standardized data collection. We hope awareness of the BBMP will foster broader collaboration, resulting in additional data to guide conservation of boreal birds across Canada.

Katelyn Eisner, Colleen Barber TH2.1

Nest composition of European Starlings (*Sturnus vulgaris*): an investigation into feather and anthropogenic material selection

Avian nests provide shelter for eggs and nestlings from weather and predators. Nests typically contain a mixture of natural substances including grasses and feathers from other species, and sometimes anthropogenic materials such as twine and candy wrappers. European starlings (*Sturnus vulgaris*) are an urban-thriving, cavity-nesting songbird. They lay two clutches of eggs in a breeding season (early season: April; late season: June) and males incorporate feathers as well as anthropogenic materials (litter) into their nests. This litter may be used as decoration to attract a female. My first objective was to compare total nest weight and feather weight/type (insulative vs. pennaceous) between early- and late-season nests. I predicted that early-season nests would be heavier and contain both more total feathers and more insulative feathers than the late-season nests because it is much colder in April than in June. Another objective was to determine whether a relationship exists between amount of white feathers and hatching success as has been found in other species. Finally, my third objective was to determine if the amount of litter a male incorporates into his nest differs between the early- and late-season or increases as he ages (examined over time as a longitudinal study). I collected and dissected 32 starling nests from the campus of Saint Mary's University in Halifax, Nova Scotia, Canada in 2024. Contrary to my predictions, early-season nests were not significantly heavier than late-season nests and more insulative feathers were present in late-season nests than early ones. Surprisingly, the amount of white feathers in nests was correlated with reduced hatching success. Finally, anthropogenic material did not differ between the early-season and late-season nests, and 16 individual males did not incorporate more litter into their nests as they aged. This study has implications in behavioural ecology and studying reproductive success in passerine species.

Elisa Elizondo; Thomas Bonnot; Thomas Thompson; Mitch Weegman FR4.2

Evaluating Mourning Dove demography and potential sources of estimate bias in Missouri, USA

Estimation of demographic parameters across the full annual cycle of birds has been a longstanding challenge because individuals are difficult to follow across seasons and structurally linking seasons can be statistically complex. Practitioners have increasingly used Integrated Population Models (IPMs) to leverage data across life stages, regions, and data sources for joint estimation of demographic rates. IPMs are currently being developed and implemented for multiple migratory bird species in North America to inform conservation plans that include harvest regulations. The Mourning Dove (*Zenaida macroura*) is the most harvested migratory bird in North America, with annual harvest estimates exceeding 17 million individuals, and thus has been a focal species for management agencies to develop data-base management plans. Dove survival estimates are low in Missouri relative to surrounding states, suggesting either that the data are not representative or that the state functions as a sink. To investigate potential drivers of low demographic rates, we developed an IPM for the state of Missouri that jointly estimated demographic parameters for four physiogeographic regions using data from 1999 to 2023. We also used this model structure to explore scenarios that included forecasted changes in the data sources. Two of the four regions contained highly productive state wildlife management areas that served as focal sites for banding efforts and harvest opportunities for hunters. We found that juvenile and adult survival in these two regions were ~39% and ~30% lower, respectively, than survival elsewhere in the state. Additionally, scenarios comparing the different productivity data sources (i.e. federal vs state wing collections) found that the state data may bias the productivity estimates high. Our results suggest that bias is the likeliest contributor of low population dynamics in Missouri relative to surrounding states and highlights the importance of assessing the implications of study designs on management outcomes.

Gabriel Evans-Cook; Natasha Barlow SY5.1

Counting holes in a crumbling wall: an overview of Birds Canada's long-term monitoring effort for Bank Swallows (*Riparia riparia*) along the north shore of Lake Erie

Long-term monitoring programs, especially for aerial insectivore species at risk, are crucial for deriving reliable population estimates and trends, and for developing well-informed recovery actions. To assess population trends in one of the largest known Bank Swallow (*Riparia riparia*) colonies in Canada, Birds Canada has conducted annual burrow surveys (used as a proxy for adult abundance) along the north shore of Lake Erie, Ontario, since 2010. Due to constant structural changes in the shoreline due to frequent erosion and land development, annual fluctuations in burrow counts are expected. However, annual burrow counts have consistently declined by 48.5% since 2016. Some evidence suggests a western shift in where the highest density of colonies occur, rather than outright population declines, which highlights the need for developing a predictive approach to habitat use and colony persistence. To address this, we are developing an ecological forecasting model that integrates the long-term burrow counts, erosion data, and informative habitat parameters. This model will improve our understanding of nest-site/colony-scale habitat selection and assist with predicting areas of potential conflict between Bank Swallow conservation initiatives and shoreline stabilization efforts (e.g., hardened shorelines). Continued long-term monitoring, interdisciplinary research, and targeted public outreach will be necessary to ensure this population's conservation success.

Ryan Fisher FR4.5

What can museums do for your ornithological research?

Museums provide valuable public education and outreach opportunities about ornithology, but museums in Canada are also repositories for vast amounts of ornithological data and scientific research. There are fourteen federal/provincial/territorial natural history museums in Canada housing and preserving over 450,000 avian specimens and their associated data. For each avian specimen, digital data about the collection location (i.e., an occurrence point), time of year and date of collection, morphological measurements, and age and sex of the specimen is recorded and stored in museum databases. In addition to external features of a specimen such as feathers and skin that can be used in a multitude of ecological and environmental analyses, many museums are now collecting tissues samples (e.g., liver, heart, muscle) that can be used for various research purposes including genetic analyses. To encourage collaboration and use of collections, specimen data for most museums in Canada is being made publicly available via sites such as the Global Bioinformation Facility or individual museum webpages. Lastly, I will highlight ways that researchers can contribute to museums and ensure that museums can continue to function to gather ornithological data and support research.

Ryan Fisher; Stephen Davis SY4.4

Weather has variables effects on grassland songbird reproductive success in Canada

Grassland songbirds breeding in Canada have experienced significant population declines likely because of habitat loss and degradation. Many climate change models predict an increase in the frequency, intensity, and duration of extreme precipitation and temperature events which could place further pressures on declining species. We monitored the fate of 1,868 individual nesting attempts of seven grassland songbird species in response to various precipitation and temperature measures over a ten-year period (1997-2002 and 2004-2008) in Saskatchewan, Canada. Daily nest survival rates of five species, including three at-risk species, were negatively influenced by high levels of precipitation, although the amount of precipitation where declines in daily nest survival occurred varied. Daily nest survival rates of two species were negatively correlated with high temperatures. We failed to detect any relationship between precipitation or temperature and the number of fledglings produced from successful nests. Extreme weather events could add additional stressors to declining populations of grassland birds in Canada. Increases in the frequency and intensity of extreme weather, specifically extreme precipitation events and short-term high temperatures, will likely lead to lower reproductive success for several species compared to current levels. This may be especially problematic for management of Sprague's Pipit (*Anthus spragueii*) and Baird's Sparrow (*Centronyx bairdii*) that primarily breed in Canada.

D.T. Tyler Flockhart SY2.5

What population of cats is the problem & solution?

Domestic cats, *Felis catus*, pose a substantial threat to avian biodiversity in Canada, contributing significantly to direct bird mortality. One critical question is which cat population—owned, unowned free-roaming, and feral—contribute most to this ecological impact and which offer the most effective avenues for mitigation. We employ a theoretical multi-state population model of cats and extend it to quantify predatory impacts on birds, to explore these dynamics. The model simulates cat and bird population growth, dispersal, and predation rates, allowing for a comparative analysis of the contributions of each cat group to overall bird mortality and viability. Crucially, this theoretical model is designed to be integrated with real-world data, including bird abundance and distribution surveys, and documented reports of predation events. By incorporating these empirical datasets, we can refine the model's accuracy and generate spatially explicit assessments of predation pressure in our communities. Future extensions of the model facilitate the simulation of various management scenarios, such as trap-neuter-return (TNR) programs, responsible pet ownership campaigns (e.g., leash laws, indoor-only policies), and habitat modification, to evaluate their efficacy in reducing avian mortality. This interdisciplinary approach, integrating ecological modeling with empirical data, provides a robust framework for identifying optimal intervention strategies. By quantifying the differential impacts of distinct cat populations and evaluating the potential of various mitigation strategies, this presentation aims to provide evidence-based recommendations for protecting Canada's avian biodiversity.

Jenn Foote; Kristin Hillier; Jordan Winter SY1.7

Protecting our urban forests: fast processing for species at risk using BirdNET

Development proposals often have short time-lines for public consultation and review. However, identifying habitat use by species at risk in areas of proposed development can help shape land use changes in urban and suburban areas. Autonomous recording technologies have resulted in large, and often publicly available, datasets that contain animal vocalizations. These recordings can be used to assess the community composition in areas where land-use changes are proposed. New developments in machine learning have also made automated species detection a possibility, like BirdNET. In Sault Ste Marie, ON, there was an announcement of a Hydro One development with four proposed routes, one of which passed through a beloved recreational trails system within a forest tract in the city limits. We had made autonomous recordings within this route in the previous breeding season, covering two trails sections. From mid-may to early July, we moved 10 Song Meter Minis in a grid over 180 locations, recording from 1h before sunrise until 5 hours after sunrise at each location. We ran these recordings through BirdNET for three species at risk: Eastern Wood Pewee, Wood Thrush, and Canada Warbler. We verified detections calculated the BirdNET confidence score for 90% probability of positive detections for these species and identified recording sites that were positive for each species Both Wood Thrush (64% of sites) and Eastern Wood Pewee (71% of sites) were locally abundant throughout the proposed route while Canada Warbler were found along a wetland area (17% of sites). Comparing our results to local eBird reports of these species suggests that densities are high compared to the background levels for the region. We presented our data to the community and to Hydro One at their consultation session, revealing that BirdNET can be used to rapidly identify species at risk and informing local management plans.

Barbara Frei; Ana Morales FR1.5

Bird richness during migration predicted by structure, not size, of urban green space

With 75% North American birds being migratory, it is likely not a question of if, but when, an individual passes through an urbanized landscape during their annual cycle. Urban light pollution is well documented to disrupt natural bird movements, attracting them to towns and cities where they may present higher plasticity in their habitat choices during migration stopovers than during the breeding period. Yet the value of urban areas for biodiversity conservation remains debated or ignored, with slow and uneven progress in including urban ecology in policy and programming. There remains the perspective that only larger, highly connected urban green spaces are of conservation value for migratory birds. To explore the conservation value of urban green spaces for migratory birds, we deployed Autonomous Recording Units (ARUs) across 48 locations in 12 sites across Montreal, Qc, Canada from 2022 – 2024. Using a mix of human transcription and machine-learning avian classifiers with human-validation, we identified bird species richness of each site for both the spring migration (April-May) and summer breeding (June-July) periods. While we found that bird species richness was strongly and positively related to green space size during the summer, this relationship was not significant during spring migration. Instead, site attributes such as tree canopy cover were a stronger predictor of bird species richness during migration, with sites having moderate levels of canopy cover associated with the highest species richness. This work challenges the common perspective that small urban green spaces have little conservation value for migratory birds, particularly in the critical migratory period.

Danae Frier P31

The Royal Saskatchewan Museum ornithology collection: a resource for researchers, educators, artists, and more

Natural history collections are vital for understanding the natural world, as they contain a permanent record of species, ecosystems, and environmental changes over time. These collections support scientific research, education, and conservation efforts by providing invaluable data for studying evolution, climate change, and species extinction. Additionally, they inspire public curiosity and foster a deeper appreciation for nature. The purpose of the Royal Saskatchewan Museum is to collect, study, and preserve specimens and information that enhances our knowledge of Saskatchewan's natural history. As part of this mandate, we maintain an active Ornithology collection. As of January 2025, our collection includes over 10,200 bird specimens from over 400 species– approximately 6500 study skins, 300 wings, 400 skeletons, 800 eggs, 300 nests, 600 fluid preservations, and 1300 taxidermy mounts. Additionally, we house over 1000 frozen tissue samples, taken from every specimen prepared since 2010. These collections are fully digitized and publicly available through the Global Biodiversity Information Facility (GBIF). Physical specimens can be accessed by request via collections visits, loans, or collaborative programming, and are used regularly in both scientific and creative endeavors. The RSM also aims to be a center of expertise in vertebrate specimen preparation and regularly provides training opportunities to students and professionals who are interested in contributing to the advancement of our understanding of Saskatchewan's unique ecology.

Érika Garcez da Rocha; Patrick K. Devers; Ilsa Griebel; Mitch Weegman P17

Spatio-temporal patterns of settling during the breeding season in American black ducks (*Anas rubripes*)

American black ducks migrate to breeding areas in eastern Canada and the northeastern US each spring, however how they explore potential nesting sites before settling (i.e., the prospecting period), remains relatively unknown. Using GPS and accelerometer (ACC) data, we aim to evaluate spatial and temporal prospecting and settling patterns during the breeding season. First, we are developing a method to identify the prospecting period. Then, we will assess the extent to which habitat and weather variables explain variation in black duck decisions for prospecting and settling on breeding areas. We have hourly GPS-ACC data from 400 female black ducks collected between 2021 and 2025. Migration will be classified as short when latitude and/or longitude was ≥0.25 and <0.5° and long when latitude and/or longitude was ≥0.5°. Wintering and breeding locations are defined as the clustered location with ≥ 30 days without any migratory movements. End of migration is considered the last long migratory movement. To distinguish prospecting and settling, we will calculate a minimum convex polygon (MCP) of 50% and 95%. The 50% MCP represents the area of highest use, the settling location, and the prospecting period occurs between migration's end and settling. To strengthen our classification, we will analyze movement metrics including net squared displacement and step length distributions. We predict that bird movement during prospecting will be greater than in settling locations but less than during active migration. Additionally, we hypothesize that young birds will prospect more than adults. We anticipate this work will provide new insights into the pre-nesting period, which is largely unstudied, particularly for boreal-nesting bird species, such as black ducks. Results from our work could inform revisions to conservation plans for the eastern boreal forest, to ensure a habitat that maximizes settling and breeding success.

Érika Garcez da Rocha; Patrick K. Devers; Ilsa Griebel; Mitch Weegman FR4.4

Refining machine learning techniques for improved classification of migratory bird behaviour using accelerometer data

Understanding animal behaviour, particularly during migration, can provide new insights for conservation planning. Advances in tracking technologies, such as joint Global Positioning System-acceleration (GPS-ACC) tracking devices, facilitate high-resolution monitoring of complex and long movements, such as migration. Machine learning (ML) has been used to analyze ACC data and classify behaviours, however, some standard ML optimization steps to enhance performance and mitigate overfitting are often overlooked in ecological studies. Our study refines the ML process for classifying migratory bird behaviour by using three primary optimization steps: comparison of ML algorithms, feature selection to select the best input features, and hyperparameter fine-tuning to enhance the model's learning. We refine ML models for four migratory bird species: Greater white-fronted goose (*Anser albifrons flavirostris*), the American black duck (*Anas rubripes*), Atlantic brant (*Branta bernicla*), and Northern pintail (*Anas acuta*). Further, using simulated data, we examined how variability in training data and tracking device settings, such as sampling frequency and recording duration, influenced classification accuracy. Tree-based algorithms, particularly Random Forest and XGBoost, delivered the highest classification accuracy across species. Feature selection proved critical for understanding feature significance in model training and determining which parameters should be retained versus discarded. Hyperparameter tuning modestly improved overall accuracy but substantially improved precision and recall for key behaviours. Classification performance peaked with intermediate variability in training data, highlighting the need for cautiousness when building and cleaning training data to avoid removing natural variability. Sampling frequency and recording duration impacted classification performance, affecting behaviour differently. By refining ML approaches for acceleration data from migratory birds, researchers can anticipate more accurate behavioural classification and summarization, for greater clarity about time activity budgets, which are commonly difficult to estimate. Our work bridges ecological and computational methods, offering adaptability for other research questions and species in movement and avian ecology.

Sara Castro García; Kevin Kardynal; Keith Hobson; Theresa M. Burg SY5.6

Genetic population dynamics of the least flycatcher (*Empidonax minimus*): insights into migratory connectivity

Over the last six decades, avian aerial insectivores in North America have experienced overall ~60% population declines across their breeding ranges. Understanding their population genetic structure and spatial connections across the annual cycle is critical to determining potential factors driving these trends; however, this information is limited for many species. We will use genomics (RADseq) to study population structure and connectivity in least flycatchers (*Empidonax minimus*) across North America. Through field and museum sampling, we collected blood, feather, and/or tissue samples from 22 sites throughout the breeding range and during migration in Canada and the USA, and on the non-breeding grounds in Mexico. We will use principal coordinates analysis (PCoA), STRUCTURE, and Least Cost Path analyses to define population genetic structure and determine how landscape features impact connectivity. We will also analyze samples from individuals captured during migration and on their non-breeding grounds to assess the migratory connectivity of populations over the annual cycle. Preliminary results from a PCoA show some differentiation in genetic structure between Alberta and British Columbia samples suggesting that the Rocky Mountains potentially represent a migratory divide. Birds from the non-breeding grounds clustered with the Alberta population. Future analyses with a larger sample size will further refine population connectivity for this species. This research will increase knowledge of the least flycatcher population connectivity between breeding, migration, and non-breeding sites and estimate levels of genetic differentiation among populations.

Mathieu Gauthier, Georgia Ceaser, Dorothy Hill, Felix Nwaishi, Bin Xu P9

Anthropogenic impacts on migratory bird habitat degradation in the Lesser Slave Lake Region, Alberta, Canada

The boreal forest contains 85% of Canada's wetlands and over 300 migratory bird species depend on these wetlands for breeding habitat. Anthropogenic land use in the boreal forest contributes to the decline of boreal breeding birds. In Alberta, forestry, oil, and gas development create the most pressure on habitat through linear features such as legacy seismic lines, roads, and well pads that span approximately 350 000 kilometers. Roads fragment contiguous habitat, and the mineral substrates used to construct them disrupt hydrologic connectivity and alter water quality, which can lead to significant changes in habitat quality, such as prey availability and vegetation structure. This study aims to measure impacts of linear features in peatlands and the effects on bird species richness. We selected a low impact (LI) research area with few linear disturbances near Lesser Slave Lake and a high impact (HI) research area near Utikuma Lake, replicate sampling plots were set up in both research areas. In the high impact site, the plots followed a disturbance gradient beginning at the edge of roads. In 2024, we collected data on surface water chemistry, vegetation cover and richness by functional group, wetland habitat structure, and bird species richness using autonomous recording units (ARUs). Bird species richness was analyzed through the Cornell Lab of Ornithology's open-source machine learning software BirdNet Analyzer and manually validated using Wildlife Acoustic's Kaleidoscope Lite software. We present a preliminary assessment of disturbance regime impacts on bird species richness and vegetation structure. By quantifying the impacts of linear disturbance on peatland habitats this research will help us understand the drivers behind migratory bird decline in the boreal region and inform land managers and restoration specialists.

Ipshita Gayen; Kimberley Mathot TH2.9

Preparing for winters: Social influences on seasonal caching in Black-Capped Chickadees

Caching (i.e. storing food for later) acts as an external energy reserve, increasing the probability of winter survival in small birds. For many species, high intensity caching occurs in fall when food is comparatively abundant. Theoretical models predict that reduced foraging predictability favours increased caching. Higher-ranked individuals often experience greater predictability in their access to food and are therefore expected to need less caching. We used RFID-enabled feeders to quantify the use of cacheable and non- cacheable food in a free-living, marked population of 91 black-capped chickadees (*Poecile atricapillus*), to quantify the daily and seasonal caching patterns for individuals of different dominance ranks. We used two separate proxies for dominance. First, sex (male or female) because in chickadees, males are dominant over females. Second, we used number of feeders use (multiple or single), based on both theoretical and empirical work suggesting that subordinates require larger foraging areas to meet energy demands, presumably due to their lower ability to monopolize resources. Contrary to our predictions, both measures of dominance suggest that dominants invest more in caching than subordinates. We found that males invested more in caching than females, and within sexes, individuals using a single feeder cached more than individuals using multiple feeders. We also found a decline in caching over the course of the experiments (mid-October to mid-November), which was steeper for dominants compared to subordinates. We suggest that our finding that dominants cache more than subordinates may be because the food provided was perceived as being limited, leading to dominants outcompeting subordinates, and preventing subordinates from realising their caching needs, even with multiple feeders used. Future work manipulating food abundance during the caching period is needed to test this hypothesis.

Elizabeth Gow; DG Blair; Julie Bourque; Jonathan Chu; Ted Cheskey; Krista DeGroot; Tanya Luszcz; Ryan Norris; Anna Skurikhina; Marlee Pyott; Olivia Wilson SY2.3

The status of research on cats and their impacts on birds in Canada: What has been done and what needs to be done

In 2013, studies published in Avian Conservation Ecology showed that domestic cats were the leading unintentional cause of bird mortality by humans (also known as incidental take) in Canada, raising the alarm of the substantial impacts domestic cats have on birds. Research around the world on the impacts of domestic cats on wildlife has drastically increased since 2013, including in Canada. Here, we discuss how research in Canada on domestic cats has taken a collaborative and interdisciplinary approach to understanding the impacts of cats on birds. This has been done by building relationships and collaborations with interest groups across disciplines (e.g. veterinarians, cat welfare workers, ornithologists, conservation organizations, policy makers, and etc) using principles such as translational ecology to identify commonalities and forge a pathway forward to direct and then conduct scientific research. We will summarize some of the specific studies completed in Canada, and how these have contributed to a revision of the 2013 estimates of the number of birds killed by cats, and what we have learned about outdoor cats in Canada. We may also discuss next steps for research on domestic cats and their impacts on birds.

Leanne Grieves P21

What's smell got to do with it? An introduction to avian chemical ecology

Chemical communication is the earliest form of communication. As such, it is taxonomically widespread. Organisms as diverse as microbes and mammals send, receive, and respond to chemical signals. However, it is still commonly believed by many that birds possess a poor sense of smell and hence, that chemical communication is unimportant for them. In fact, all bird species investigated to date have a fully functional olfactory system, and birds use smell for everything from food location and predator avoidance to kin recognition. Preen oil secreted from the uropygial gland, located at the base of the tail in most bird species, is a waxy secretion composed of a complex chemical mixture that contributes to avian body odour. Numerous factors affect the chemical composition of preen oil and, presumably, of bird odour. In my new lab at the University of Saskatchewan, my team will investigate factors (including but not limited to microbes, hormones, diet, health status, and geography) affecting preen oil chemical composition and undertake behavioural experiments testing the ability of birds to discriminate preen oil and other odour types, predominantly in social and reproductive contexts. This poster will serve to introduce folks to the wonderful world of avian chemical ecology, highlight some of my recent research findings, and facilitate a conversation about how you can get involved in this field/my lab, and how we might collaborate!

Katrine Guse; Elly Knight; Erin Bayne P2

Comparing the accuracy of point counts and passive acoustic monitoring of bird species.

Biodiversity monitoring is essential for conservation decision-making, particularly in assessing species presence and abundance. Passive acoustic monitoring (PAM) and the use of autonomous recording units (ARUs) are valuable tools for land managers due to their ability to monitor biodiversity in a non-invasive manner. These tools provide an alternative or complementary method to traditional methods. Quantifying the effectiveness of monitoring techniques and identifying the mechanisms contributing to the error in population estimates can lead to more accurate assessments of wildlife populations. This research will evaluate detection accuracy and survey biases in bird population estimates using PAM and human point counts across varying environments. I will use data from simulated point counts, PAM recordings, and digital point counts to compare estimates of species richness, abundance, and time to first detection. Additionally, I will assess common sources of error in PAM data and point counts by utilizing acoustic localization systems. This work will aim to improve our understanding of survey biases and enhance the reliability of acoustic monitoring techniques. Ultimately, this work will contribute to more accurate and effective biodiversity assessments for conservation planning.

Carrie Gray; Samuel Haché; Jennie Rausch; Kevin J. Kardynal SY3.8

Avian community of Canada's boreal - arctic treeline ecosystem

The treeline ecotone between the boreal forest and Arctic tundra in Canada is expected to undergo substantial change due to climate change (e.g. shrubification, biome shifts) and anthropogenic disturbances (e.g. roads, mining). The ecology of this treeline "ecosystem" is understudied and therefore major gaps remain in our understanding of avian habitat use, distribution, abundance, and environmental factors influencing community dynamics. Given a high diversity of land cover types at the treeline, we expect that it supports a unique and diverse bird community. Documenting the treeline bird community and conservation status of these species would be an important first step to inform monitoring and conservation needs for these species. We used eBird breeding range maps for 122 species to examine patterns of species richness and spatial turnover of species composition in relation to treeline in western Canada. We also used eBird status and trend predictive models to examine broad spatial patterns in relative abundance and test for species-specific responses to distance to the treeline. Preliminary results suggest that species richness is not significantly higher at the treeline compared to more southern parts of the boreal likely due to the well-documented latitudinal effect on species richness of boreal birds. Nonetheless, there was considerable spatial turnover in species composition along the treeline and a relatively large number of species can be considered ''treeline specialists'' which are disproportionately more abundant at the treeline than adjacent ecosystems, and many are species of conservation concern (e.g. Blackpoll Warbler - *Setophaga striata*, Harris's Sparrow - *Zonotrichia querula*, American Tree Sparrow - *Spizelloides arborea*) or data are deficient to support further conservation assessments. We will discuss the implications of these findings and next steps in assessing avian community dynamics including implementation of integrated models using Arctic PRISM and other monitoring datasets, and future targeted demographic research and monitoring.

Mercy Harris; Ann McKellar; Lisha Berzins; Bob Clark SY4.1

Examining the benefits of local habitat management for waterfowl populations in Canada's Prairie Pothole Region

The North American Prairie Pothole Region (PPR) provides critical breeding habitat for waterfowl, supporting approximately two-thirds of the continental population. However, the region has been highly altered by intensive agricultural activity, with up to 70% of wetlands and 80% of native grassland lost in the Canadian PPR. Though conservation efforts have focused on protecting pothole wetlands and upland nesting habitat at local scales, wetlands and native vegetation continue to be lost to agricultural conversion. Further, research suggests that the growth of waterfowl populations observed during the past several decades has plateaued, with several PPR-breeding ducks now declining. To investigate the effect of local habitat conservation on waterfowl in the Canadian PPR, we used long-term waterfowl survey data from Saskatchewan, Canada, to compare waterfowl abundance between 1) a protected area (St. Denis National Wildlife Area [NWA]), where wetlands and upland habitats have been restored and managed for waterfowl, and 2) the surrounding region, where loss of wetlands and native upland vegetation has continued. Our objective is to identify whether temporal trends in waterfowl abundance, richness, and evenness in the protected area differ from those of surrounding areas, thereby reflecting targeted management practices, or whether trends parallel those of the greater region. Preliminary results suggest that dabbling duck abundance has decreased at St. Denis NWA and increased in the surrounding region, while diving duck abundance has remained stable at both St. Denis NWA and in the greater region. Results of this project will improve our understanding of the long-term effects of habitat management on local waterfowl abundance in agriculturally intensive landscapes. Additionally, our results lay the foundation for subsequent analyses in which we are examining how specific management practices, such as re-seeding upland cropland to grass, influences waterfowl communities at St. Denis NWA, with implications for waterfowl habitat management across the PPR.

Taylor Hart, Juan Andres Martinez Lanfranco, Erin Bayne SY3.7

When more isn't better: fragmentation limits the benefit of habitat amount for an at-risk old-forest specialist

Understanding species-specific responses to habitat loss and fragmentation is essential for effective conservation in modified landscapes. We examined how habitat amount and fragmentation independently and interactively influence the occurrence of Black-throated Green Warblers (*Setophaga virens*), a species of conservation concern, in Alberta's boreal forest. We compared models of habitat amount only, fragmentation only, their additive effects, and their interactive effects across three spatial scales (7 ha, 78 ha, 314 ha). For each scale, we tested three increasingly refined definitions of what fragments habitat: large disturbances only, large disturbances plus wide linear features (roads and pipelines), and all disturbances including narrow linear features (seismic lines). Results showed strong evidence that fragmentation impacts occurrence beyond habitat amount alone, with negative effects across all scales. Critically, fragmentation effects intensified at low habitat amounts, supporting the nonlinear fragmentation hypothesis. The most refined fragmentation definition consistently provided the best model fit, indicating Black-throated Green Warblers perceive even narrow disturbances as functional barriers. Effects were strongest at scales relevant to territory selection (7 ha) and home range (78 ha). Our findings demonstrate that conservation strategies focusing solely on habitat area are insufficient for this old-forest specialist; spatial configuration is equally important. This research advances the scientific basis for landscape planning in disturbed forests and emphasizes the need to maintain contiguous forest patches, particularly as overall habitat continues to decline.

Kevin Hawkshaw; Ian Cook; Sean Jenniskens; LeeAnn Latremouille; Kiel Drake SY4.7

The Bird-friendliness Index – measuring impact to enable bird recovery in agricultural working landscapes

Grassland birds are the most imperiled bird group in North America, largely stemming from the conversion of native grassland to annual cropland. This conversion occurs in large part due to the higher economic potential of annual cropland, which ignores the ecological goods and services that grasslands and other native habitats provide. The Bird-friendliness Index (BFI; Michel et al 2020) is a multispecies biodiversity indicator that measures the conservation value of bird life on a farm or ranch, and therefore provides a means of accounting for biodiversity impact in land management decisions. In combination with a variety of policy and market tools, the BFI can help drive positive change for grassland bird conservation. Here, we describe BFI methodology and our results based on data collected across >140 sites in Prairie Canada since 2021. As designed, the BFI is a strong indicator of bird densities, including species-at-risk, and the sites we sampled generally scored higher than their surrounding landscapes. We will also explore the relationships between the BFI and various aspects of habitat found on the Canadian Prairies, as well as our ongoing efforts to implement the BFI on the ground as a tool for conservation.

Deborah M. Hawkshaw, Jan J. Wijmenga, Kimberley J. Mathot FR2.2

Does food availability shape daytime body temperature in overwintering black-capped chickadees?

For small birds that overwinter in cold climates, when ambient temperature is low and food resources are limited, the ability to efficiently manage daily energy budgets is critical for survival. As such, species often exhibit several strategies related to increasing energy acquisition and limiting energy expenditure. For example, black-capped chickadees (*Poecile atricapillus*) use reductions in daytime body temperature in winter, likely to reduce energy expenditure. Currently, this strategy is not well understood, however, more generally, food availability is predicted to shape the use of controlled reductions in metabolic rate and body temperature (often termed torpor). We investigated how food availability shapes daytime body temperature in overwintering black-capped chickadees and whether individuals differed in their response to food availability. If daytime reductions in body temperature are used as an energetic strategy when food availability is limited, we expected that when chickadees have reliable access to an ad libitum food resource such as a feeder, their daytime body temperature would increase. During a single winter, we monitored the daytime body temperature of 23 chickadees during visits to a bird feeder via the use of temperature-sensing passive integrated transponder (PIT) tags. To assess the effect of food availability we manipulated the presence of food at the feeder, such that chickadees experienced alternating 6-day periods where black-oil sunflower seeds were available at the feeder or not. Here, we present results from our experiment, highlighting whether chickadees exhibit adjustments in their daytime body temperature in response to the availability of supplemental food on different timescales (within- versus across-days). To our knowledge, this study is one of the few experiments assessing the role of food availability in shaping daytime body temperatures in small overwintering birds. Consequently, this study will provide insights as to how daytime reductions in body temperature may be used as an overwintering strategy.

Cara Herrington: Gillian Radcliffe P16

Winging it: unexpected migration variations of the Turkey Vulture

Migratory movements are often generalized to the population level, but individual variation in movement strategies can provide fascinating and fun insights into the flexibility of a species. Our GPS tracking data has documented some unique individual migratory behaviours among Turkey Vultures (*Cathartes aura*) that contrast with the typical migratory pattern observed in our study population. While most vultures complete an otherwise direct migration between British Columbia (BC) and Mexico—staying in Mexico for 4 to-5 months before making the return journey to BC—one vulture begins a very early northbound migration to spend the second half of the winter months in a “stop-over” site near the Colorado River Reserve. Another individual has revealed a surprising shift in wintering location this past season, migrating only about half the distance of their previous and expected migratory journey. These findings highlight the importance of considering individual variability in migration studies, as generalizing from a small sample of tracked individuals may overlook critical behavioral diversity. Understanding such differences can enhance our broader understanding of migration ecology and its implications for evolution of new behavioural patterns.

Cara Herrington: Gillian Radcliffe P15

From stagnant coordinates to international coordination

GPS tracking technology has revolutionized the study of avian movement, but the success of long-term tracking projects hinges on more than just data transmission—it also depends on the longevity of the study subjects and, at times, field intervention and device recovery when things go wrong. Our research team has encountered several such challenges in regard to device retrieval. When a GPS tracker on one of our Turkey Vultures (*Cathartes aura*) stops moving, our first priority is always the welfare of the bird followed by hopes of recovering the tracking unit. During the breeding season in British Columbia – where our team is based - we are able to respond quickly to non-movement and enter the field to investigate. These rare but critical local recoveries are crucial not only for identifying potential causes of death but also for preserving valuable tracking units that can still contribute to long-term data collection. But, since we work with a migratory species, not all stories unfold close to home. Occasionally, trackers stop moving in places where recovery seems unlikely, such as in the vultures wintering range in Mexico. In these cases, we’ve learned the value of casting a wide net—and the unexpected power of international cooperation. Through connections with birders and biologists in distant regions, we’ve been able to recover devices under unlikely circumstances across international borders. In an era of costly equipment and limited research budgets, every recovered tracker counts. The experiences and stories we will share underscore the importance of persistence, collaboration, and the benefit of international science networks that can support avian research.

Nathan L. Hobbs; Kimberley J. Mathot TH2.10

Risky business: do chickadees alter the timing and intensity of foraging in response to starvation and predation risk?

Across taxa, the timing and intensity of foraging by an individual is shaped by its relative investment into mitigating both starvation and predation risk. Theory predicts that when starvation risk is high, such as when ambient temperatures are low, individuals will forage intensely earlier in the day. Conversely, the presence of predators is predicted to cause individuals to delay intense foraging to later in the day. If both starvation and predation risk are high, individuals are predicted to display two peaks of intense foraging; one early and one late in the day, with reduced foraging midday. We observed a population of more than 90 individually marked black-capped chickadees (*Poecile atricapillus*) over 36 winter days (January through February 2025). We used radio frequency identification (RFID) systems to automatically record all visits to feeders in the study area, and obtained daily average ambient temperatures from a nearby weather station. Perceived predation risk was manipulated by repeatedly alternating between 6 days of “increased predation risk” playbacks with predator calls (northern shrike, *Lanius borealis*) and chickadee mobbing calls, and 6 days of “control” playbacks from non-threatening and non-competitor congeners (downy woodpeckers, *Dryobates pubescens*, and redpolls, *Acanthis flammea*). We will use these data to test the predictions that individuals shift to later peaks of intense foraging during the predation risk treatments compared to control treatments, but only when ambient temperatures are mild. If ambient temperatures are low, individuals are expected to display a bimodal foraging activity curve, with morning and end of day peaks in foraging activity. This study will provide a direct empirical test of predictions from earlier theoretical models. We will also gain insight into how plastic population level foraging activity patterns can be, potentially improving our understanding of small-bird-in-winter survival strategies.

Triana I. Hohn; David J. Green; Elizabeth A. Gow TH2.12

Nest site selection of urban Spotted Towhees (*Pipilo maculatus*): evidence of an ecological trap or predator shield?

An ecological trap occurs when an animal shows a preference for a habitat that ultimately has negative fitness consequences. Birds nesting in urban areas may be particularly vulnerable to ecological traps. Alternatively, some parts of urban areas may act as shields, when human presence function as a deterrent to some common nest predators. Open-cup, ground-nesting birds are considered particularly vulnerable to disturbance from human recreation and predation by common urban predators. Urban breeding Spotted Towhees (*Pipilo maculatus*) often nest in dense and shrubby habitat along edges. In urban areas, these edges often border walkways which may alter disturbance or predation risk due to human activity. We tested whether nesting decisions of Spotted Towhees breeding in urban greenspaces create an ecological trap or provide a shield from predation. From 2022-2024 we found and monitored 264 Spotted Towhee nests across five greenspaces of varying degree of urbanization within Metro Vancouver, British Columbia. We assessed nest site habitat preference and success of Spotted Towhees and show how daily nest survival and reproductive output are impacted by natural and anthropogenic factors across multiple spatial scales ranging from the level of nest site to the entire urban greenspace. Preliminary results suggest that overall nest success is higher at more urban study sites, supporting the hypothesis that human activity influences nesting success. We discuss whether Spotted Towhees may be experiencing ecological traps or shield effects while breeding in urban greenspaces which would have long-term demographic consequences for the viability of the species' populations in this region and influences on urban habitat restoration and management.

Kyle Horner, Catherine Jardine, Marie-Anne Hudson, Marcel Gahbauer, Adam Smith TH1.2

The State of Canada's Birds: behind the scenes

The State of Canada's Birds (www.stateofcanadasbirds.org) brings together the work of thousands of citizen scientists and professional biologists from across Canada. Launched in October 2024, this new initiative combines the strengths of three existing products (the Status of Birds in Canada website, State of Canada's Birds reports, and the NatureCounts data exploration tools) into a single platform. Developed by Birds Canada and Environment & Climate Change Canada, the State of Canada's Birds is a data-driven product that includes in-depth species accounts and a dynamic summary report. Detailed species accounts provide status assessments for each of the 463 bird species regularly occurring in Canada. To power the creation of these accounts, we amalgamated and standardized over 400,000 trend estimates spanning 50+ years. We developed standardized, peer-reviewed decision trees to establish status and population goal assignments for each species based on these trend estimates. These goals provide a framework for prioritizing conservation efforts and evaluating success. Each account also includes dynamically generated distribution and occurrence information based on 250 million records available through the NatureCounts platform. The summary report distills the information from the species accounts into broad, easily-understood messages centered on 10 species groups. Each group includes a featured species, group-specific trends, threats, and conservation actions. Designed to be accessible and meaningful to people of all backgrounds, the report aims to increase awareness and motivate action. The State of Canada's Birds contains valuable tools and information for everyone, from researchers and conservation practitioners to policy makers and the general public. In this presentation, we will review the methods used to generate the accounts and report, and explore how you can leverage these products and data resources for a variety of initiatives.

Kyle Horner, Catherine Jardine TH1.5

Ditching the clipboard: digital point counts with the NatureCounts App

Point counts are the gold standard in standardized surveys, but that doesn't mean there isn't room for improvement. Birds Canada's NatureCounts app brings point counts into the digital age, combining traditional methodology with modern technology. Gone are the familiar pencil, paper, clipboard, stopwatch, rangefinder, and GPS, all replaced by a single phone or tablet. With the aid of the device's internal GPS and a few taps of the screen, counters can easily plot observations on a satellite image of their surroundings overlaid with distance bands. An integrated timer, optionally broken into discrete time bins, allows the user to watch the clock with barely a glance. Additional information like effort data, weather conditions, and a wide variety of covariates are easily recorded too. Perhaps best of all, when the survey is complete the data are uploaded directly from the field, and can be synced to the user's ebird account. This completely eliminates the need for data transcription, saving time and reducing errors. That means you can focus on what matters: collecting and analyzing data. The NatureCounts app's point count interface has been successfully piloted, and developments are underway to bring this game-changing tool to the broader conservation community. With just a little learning, conducting point counts becomes faster, easier, more efficient, and more accurate. You'll never pick up the clipboard again.

Jeff Houlahan P36

Temporal transferability of land cover models for predicting bird abundance

Land cover is commonly used to model species distributions and abundance, but the predictive stability of such models over time remains relatively unexplored. This study evaluates the temporal transferability of land cover-based models for predicting bird abundance using Breeding Bird Survey (BBS) data across the United States. I modeled the abundance of 42 bird species using 2001 BBS data as a training set, combining it with land cover variables from the USGS National Land Cover Database (NLCD). Generalized linear models with negative binomial error structures were fitted using all combinations of 14 land cover classes across six spatial scales (200–3000m). Model selection was based on Akaike Information Criterion (AIC), resulting in over 3,000 candidate models per species. Performance was assessed across seven test years (2004–2019) using average prediction error (APE). Land Cover Models (LCMs) outperformed null models in both training and test sets for 28 of the 42 species. For these species, the inclusion of land cover predictors improved predictive accuracy by 5–25% on average. Importantly, model performance remained relatively stable over time, suggesting that land cover–abundance relationships are temporally transferable for many species. In contrast, a subset of species, including Bald Eagle and Pine Siskin, had poor predictive performance in both training and test years. These findings indicate that land cover is a valuable, though not universally effective, predictor of bird abundance. The study highlights the importance of evaluating model transferability when applying ecological models to long-term biodiversity monitoring.

Kelsie Huss; Matt Dyson; Paul Link; Karen Machin; Chris Nicolai; Frank Rohwer; Mitch Weegman FR4.1

Comparing the behaviour of dabbling ducks fitted with tracking devices using different attachment techniques

The development of miniaturized tracking technologies has enabled practitioners to study animals in space and time as never before, but devices can have a significant negative effect on birds (e.g., increased energy expenditure). Because transmitter attachment techniques are known to influence individuals differently, it is important to robustly quantify indirect and direct device effects across attachment techniques on birds. In the last 10-15 years, thousands of waterfowl across North America have been fitted with devices using four different attachment techniques. While the most common techniques are (1) single-loop harnesses and (2) double-loop harnesses, researchers are also using (3) subdermal units and (4) implantable tracking devices. We compared the behaviour of mallards (*Anas platyrhynchos*) in midcontinent North America across four attachment techniques by deploying 75 Global Positioning System-acceleration (GPS-ACC) transmitters per technique. Mallards are often considered representative of other dabbling ducks with similar life histories, making them an ideal species for studying device effects. Using a previously developed library of video footage as training data, we developed a machine learning model to classify each ACC fix to a particular behaviour in the collected wild bird data. We then summarized the proportion of time individuals spent feeding and preening across time intervals of ecological significance. Additionally, we examined the proportion of devices that are transmitting in relation to attachment technique, deployment location, and time. Results from this work will contextualize past research and help future practitioners select the attachment technique most appropriate for their work and objectives.

Catherine M. Ivy, K. G. Young, M. F. Dick, J. K. Shoemaker, C. G. Guglielmo FR2.6

Seasonal flexibility along the oxygen cascade supports high-altitude flights in migratory songbirds

Migratory flight is an intensive exercise that requires birds to maintain high aerobic capacities for many hours or days. Maintaining oxygen supply to flight muscles is therefore important during migration, especially since tracking studies have shown that songbirds will ascend to altitudes of 6,000 m during migratory flight where oxygen is less readily available (hypoxia). Whether there are adaptations or seasonal plasticity along the oxygen cascade and hypoxic chemoreflex that allow songbirds to fly at such high altitudes during the migratory season is unknown. My research has shown that migratory songbirds exhibit seasonal plasticity along the oxygen cascade which enhance oxygen uptake and movement to the flight muscle during migration. This includes changes in breathing pattern, haemoglobin-oxygen binding affinity, and muscle fiber size and phenotype. We have also shown that the magnitude of seasonal plasticity may be dictated by migratory distance and/or whether the songbird species is migratory or resident. In Yellow-rumped Warblers and Hermit thrush, two short-distance migrants, the ability to fly at high altitudes appeared to be dictated by the magnitude of seasonal flexibility along the oxygen cascade. Additionally, Yellow-rumped Warblers appear to have a blunted hypoxic chemoreflex in response to flight at high altitude (~3,000 m above sea level). Measurements of adrenaline concentration increased with flight, but were not significantly higher when flight was conducted at high altitude. Together, these findings show that songbirds exhibit seasonal plasticity along the oxygen cascade which would be important for maintaining oxygen movement to the flight muscle during high altitude flight. Current research in the Ivy Lab is investigating how oxygen uptake and seasonal flexibility is impacted by wildfire smoke. This research was supported by NSERC.

Phoebe Johnson; Karen Machin; Bruce Wobeser; Jennifer Provencher; Kirsty Gurney FR2.3

Evaluating the effects of a plastics additive on avian physiology

Wild birds have some of the highest ingestion rates of plastics of all wildlife and are therefore at a higher risk of being exposed to potentially toxic additives which can leach from plastics to organisms. UV-328 is a common plastics additive present in many consumer products that can enter the environment through wastewater treatment plant discharge and plastics debris. In the spring of 2023, UV-328 was declared a persistent organic pollutant (POP) by the Stockholm Convention, due to its persistence in environments and organisms, bioaccumulative potential and toxicity. This additive has been found in various ecosystems and in wildlife tissues, but the biological effects are largely unknown. To understand how UV-328 impacts wild birds captive mallard ducks (*Anas platyrhynchos*, n = 16) were administered 5 ml of 0.0368 g/ml UV-328 in corn oil orally for 10 days, followed by a 16-day recovery period and compared to untreated control ducks (n =17). To assess the toxicological impacts of UV-328 on tissue structure histological sections from heart and liver were examined using light microscopy. At the dose given in this study, UV-328 did not alter heart tissue structure. However, liver tissue from ducks exposed to UV-328 had increased vacuolar lipid accumulation consistent with hepatic lipidosis indicating liver damage, which persisted after removal of UV-328 exposure. Hepatic lipidosis often reflects a functional impairment of the liver, suggesting disruptions to normal metabolic functioning. To fully investigate these potential changes, fecal and serum samples will be analyzed using NMR (nuclear magnetic resonance) spectroscopy to examine metabolic changes in exposed ducks and gain further understanding of the mechanism of action of UV-328. By evaluating the effects of UV-328 on avian health, this study will help to fill key knowledge gaps related to potential impacts of plastics additives on the health of wild birds.

Sydney Marie Jones; Kirsty E.B. Gurney; Yves Aubrey; Theresa Burg; Chris DeSorbo; Margaret Eng; Christian Friis; Jim Johnson; Julie Paquet; Kevin Regan; Pam Sinclair; Ann McKellar SY4.1

Investigating migratory connectivity and genetic population structure in the Upland Sandpiper

Effective conservation of long-distance migratory shorebirds requires a comprehensive understanding of population structure and movement throughout the annual cycle. The grassland-dependent Upland Sandpiper (*Bartramia longicauda*) is declining across its expansive North American breeding range, threatened by habitat loss, agrochemical exposure, and the cumulative effects of disturbance throughout migration. However, limited knowledge of migratory connectivity and genetic structure limits targeted conservation efforts. In this study, we aimed to determine: (i) the strength of connections between breeding and nonbreeding Upland Sandpiper populations (i.e., “migratory connectivity”) and (ii) the genetic distinctiveness of Upland Sandpiper populations across their breeding distribution. To test the hypothesis of weak connectivity, we evaluated data from satellite transmitters deployed at six sites across the Upland Sandpiper’s North American range, spanning from Alaska to Maine. Results indicate scale-dependent spatial separation on nonbreeding grounds, with western (n=23 tracks) and central (n=11 tracks) breeding populations exhibiting overlapping migratory routes through the Central Flyway to shared nonbreeding areas in Argentina and Uruguay. In contrast, the eastern breeding population (n=14 tracks) followed significantly shorter nonstop flights across the Atlantic Ocean to nonbreeding regions in northern South America and central Brazil, almost entirely distinct from those used by other populations. Ongoing genetic analysis of blood samples (n=120) will assess whether spatial patterns of connectivity correspond with genetic structure. Understanding both spatial and genetic structure in the Upland Sandpiper will provide critical insight for conservation planning, including the potential designation of conservation units under COSEWIC. As the first study to assess genetic structure and migratory connectivity in Upland Sandpipers at this scale, this research will also provide key insights into the species’ natural history, including migratory timing, gene flow, breeding site fidelity, and critical habitat use throughout the annual cycle.

Gumin Jung, Andrew Beauchamp, Laura Robayo Noguera, Carrie L Branch P14

Coping with the cold: black-capped chickadees use controlled hypothermia to reduce fat loss overnight

Small endothermic animals have large surface area to body ratios making surviving cold, temperate winters a challenge. These animals face a trade-off between maintaining their body temperature and the amount of fat they lose overnight. Many non-migratory birds survive cold winter nights using their fat reserves to increase their metabolic rate through shivering. Alternatively, they may use controlled hypothermia, allowing their body temperature to fall overnight, to conserve energy rather than maintaining a strict body temperature range. In this study, we examined the trade-off between maintaining overnight body temperature and fat loss under a cold temperature challenge in black-capped chickadees. To investigate this, we brought 10 wild black-capped chickadees into captivity and compared overnight fat loss and body temperature at 20 C versus 3 C using a quantitative magnetic resonance machine and temperature sensitive radio transmitters. Black-capped chickadees showed greater fat loss and reduced body temperature under 3 C compared to 20 C. Furthermore, individuals exhibiting greater decreases in body temperature showed lower overnight fat loss. These results suggest that black-capped chickadees use controlled hypothermia to reduce fat loss overnight and provide valuable insights into the various metabolic strategies non-migratory birds use to survive cold nights.

Tharindu Kalukapuge; Kenneth R. Foster; Christine M. Godwin; James F. Saracco; Erin Bayne SY3.3

Long-term temporal dynamics in boreal bird communities in the Athabasca Oil Sands Region, Alberta, Canada

Ecological communities undergo constant changes over time as a result of both natural and anthropogenic pressures. Long-term monitoring data play an important role in understanding how these changes occur and the extent to which human footprints such as energy sector activities influence bird communities. This understanding has become increasingly important as concerns about the local and cumulative impacts of energy sector development continue to rise. We used more than a decade of bird community data in the Athabasca oil sands region from 34 MAPS (Monitoring Avian Productivity and Survivorship) stations, which are operated under a continent-wide monitoring program. We used different multivariate approaches to quantify temporal variation in the community composition of boreal birds and to understand the direction of community-level changes, underlying mechanisms, and the influence of energy sector footprints. Our analysis suggests that boreal bird communities in the Athabasca oil sands region of Alberta show strong directional changes over time, primarily driven by species replacement. Furthermore, energy sector footprints and wildfire appear to influence these long-term temporal dynamics substantially.

Kevin J. Kardynal; Christy A. Morrissey; Keith A. Hobson SY3.9

Morph matters? Drivers of territory characteristics of a dimorphic songbird in shoreline and upland boreal forests

Shoreline boreal forests may provide higher quality habitat for some avian species due to more and higher-quality food and/or more complex habitat structure that potentially influence space use and density. In these habitats, dominant individuals are expected to outcompete weaker ones for higher quality resources and therefore conform to the ideal despotic distribution (IDD). White-throated Sparrows (*Zonotrichia albicollis*) are dimorphic, occurring as white and tan colored morphs that exhibit different territorial defense behaviors with white morph males being more aggressive than tan morphs. We fit archival GPS tags to white and tan morph White-throated Sparrows in 300 m × 300 m quadrats adjacent wetlands and >600 m from wetlands in the boreal forest of Saskatchewan, in 2023 (n = 45) and 2024 (n = 27). We measured habitat structure and conspecific density as proxies of habitat quality, and plasma long-chain polyunsaturated fatty acids (LCPUFA) as indicators of food quality. We assessed whether these factors drive relationships in territory characteristics (e.g. size, configuration) between habitat types and morphs as a test of the IDD. Territories were significantly smaller in shoreline forests and were associated with higher conspecific density and essential n-3 LCPUFAs with white morphs having smaller territories than tan morphs, and non-significant but smaller territories in upland forests. Our results suggest that habitat quality influences behavioral interactions between White-throated Sparrow morphs, and whether they conform to the IDD may be context dependent.

Kevin Kelly; Jan Huus; Erin Bayne; Elly Knight SY1.2

HawkEars: a high performance avian acoustic classifier

Passive acoustic monitoring is rapidly emerging as a dominant approach for studying acoustic wildlife, with neural networks used as an increasingly common and promising approach for extracting detections of particular species from acoustic recordings. Existing options for avian classifiers include small custom models for focal species or large models that attempt to classify the entire global avian community, which suggests a possible tradeoff between classifier performance and species coverage. We argue that building domain-specific classifiers for particular geographic regions provides improved performance in exchange for reduced species coverage and present HawkEars, a regional avian classifier for Canada that includes 314 bird and 13 amphibian species. A major challenge in classifier development is the weak labeling of open access datasets. We developed a novel solution, using embedding-based search to efficiently generate strong labels. We present our approach and an evaluation of HawkEars performance for bird species relative to two prominent avian community classifiers: BirdNET, and Perch. We found HawkEars had substantially higher performance across all metrics, detected on average two more species per recording minute in our community evaluation dataset, and had a recall of nearly twice Perch and four times BirdNET, given a precision of 0.9, for our vocal activity evaluation dataset. We discuss the potential reasons why HawkEars provides better classification performance and other potential applications like transfer learning from our open-source model. We believe HawkEars will be of great interest to practitioners studying acoustic wildlife in Canada and the northern United States as well as those in other regions interested in building high-quality acoustic classifiers.

Kaitlyn Kemp-Cheevers; Alyssa Wells; Colleen Barber TH2.7

Nestling sex allocation in European Starlings: the role of parental condition and nest greenery

Nestling sex allocation is influenced by parental condition and mate attractiveness in many bird species, such that parents in better condition and those who are more attractive have male-biased brood sex ratios. In facultatively polygynous species, high quality sons confer greater reproductive success as they can attract several mates. Therefore, females in good condition would do best producing more sons, while females in poor condition would produce more daughters. Similarly, activities performed by courting males, such as greenery addition to the nest may also affect brood sex ratio with more greenery resulting in a male-biased brood sex ratio. Male European Starlings (*Sturnus vulgaris*) are a facultatively polygynous passerine species that adds greenery to their nest, likely to signal their attractiveness. This study explored how parental body condition and male greenery addition influenced brood sex ratios across the 2023 and 2024 breeding seasons in Halifax, Nova Scotia, Canada. We predicted that parents in good condition or males who added greenery over more days would have male-biased brood sex ratios. We found no significant relationship between brood sex ratio and either adult male or female condition. However, a significant interaction effect occurred; male condition influenced nestling sex ratios only when females were in poor condition, suggesting female condition modified the effect of male condition on sex allocation. Greenery addition frequency was not associated with brood sex ratio. These findings highlight the role of parental condition interactions in offspring sex allocation, while the significance of greenery addition remains unclear. Future research should examine total mass of greenery in a nest, the amount of greenery added daily, and female responses to greenery additions to better understand the function of nest ornamentation in brood sex allocation.

Aalia Khan; Silvia Colucci; Trina Rytwinski; Eddard Cheskey; Autumn Jordan; Rachel Buxton SY2.6

A global evidence synthesis and meta-analysis of urban bird conservation solutions

Urban areas contain high concentrations of key threats to avian populations. These include window collisions and predation from domestic and feral cats, which are estimated to kill a combined 4 billion birds annually across Canada and the USA alone. Proposed solutions to major threats are advocated for by conservation programs such as Nature Canada's Bird Friendly Cities (BFC) program. However, knowledge of the effectiveness of these proposed solutions, as well as the outcomes of conservation initiatives in general remains limited. Using an evidence synthesis and meta-analysis of peer-reviewed literature on the main certification criteria in the Bird Friendly Cities program, we aimed to: 1) map the academic literature surrounding urban threats and conservation solutions, and 2) evaluate the outcomes of implemented solutions in reducing bird mortality. We followed guidelines provided by the Collaboration for Environmental Evidence to gather papers on the following five leading causes of urban bird mortality: cat predation, bird-window collisions, road mortalities, light pollution, and pesticides. Our synthesis review found that across all topics, few studies (<10%) specifically explore outcomes of conservation solutions compared to those that demonstrate the magnitude of threats. Our meta-analysis compared outcomes for 12 proposed solutions to bird-window collisions, 8 solutions to urban cat predation, 2 solutions to light pollution, and 2 solutions to urban bird-vehicular collisions. Overall findings suggest there is a critical need for greater research on the effectiveness of solutions to all urban threats. Results from the meta-analysis will be used to inform the BFC program's guidelines, ultimately guiding policies and initiatives for urban birds across Canada.

R. Julia Kilgour; D. Ryan Norris; Tyler Flockhart; Elizabeth Gow; Claire Jardine; Lee Niel; Kelsey Spence; Carly Ziter; Quinn Webber SY2.1

The multidimensional problems of free-roaming cats in cities and the need for transdisciplinary action

Domestic cats are highly skilled predators and are considered one of the biggest threats to bird conservation in Canada. Cats further endangered birds through pathogen transmission, serving as reservoirs and potential hosts for emerging infectious diseases, like avian influenza. Despite the major issues, many people continue to sustain outdoor cat populations through unrestricted outdoor access for pets and nutritional supplementation of unowned cats. As such, strategies aimed solely at removing cats from the outdoor environment are unlikely to succeed. However, successful interventions to mitigate conflicts may be possible by applying an integrated, transdisciplinary approach. Systems thinking examines how interactions and patterns among multiple components influence the functioning of a larger system, such as outdoor cats interacting with humans, wildlife, and the urban environment. Investigation of the whole system reveals complex relationships between human behaviour and values, wildlife ecology, landscape features, and a range of municipal policies and practices that relate to outdoor cats. Several components can be addressed in conjunction with efforts to change owner and caretaker practices that reduce numbers of outdoor cats. For example, engaging multiple stakeholder groups in strategies that incorporate the seasonal dynamics of songbirds and are tailored to the natural history of urban wildlife species can help to target initiatives toward vulnerable bird populations. Additionally, improving our knowledge of bird species' dynamics at both backyard and city-wide scales while considering the human values and behaviours surrounding cats and wildlife can result in interventions aimed specifically at areas with high bird predation. Lastly, educational campaigns on proper supplementary feeding techniques alongside enhanced sanitation services in green spaces and urban forests can limit anthropogenic food sources, reducing spatiotemporal overlap between cats and birds. Implementing a range of tactics aimed at different components of the urban environment can reduce cat predation and ultimately protect urban bird biodiversity.

Elly Knight; Tessa Rhinehart; Devin de Zwaan; Matthew Weldy; Mark Cartwright; Sean Hawley; Jeffrey Larkin; Damon Desmeister; Erin Bayne; Justin Kitzes SY1.1

Individual identification in acoustic recordings: applications and opportunities in ornithological research

Recent advances in bioacoustics have resulted in broad-scale implementation of passive acoustic monitoring (PAM); however, the inability to identify individual animals in acoustic recordings remains a barrier. Ecological and evolutionary applications that require individual identity typically rely on traditional methods like mark-recapture that are invasive, labor-intensive, and potentially biased. Acoustic individual identification (AIID) has the potential to revolutionize ecological and evolutionary research of acoustic species by replacing those traditional methods. We reviewed the literature and found strong evidence that acoustic signatures exist across taxa; however, we found a mismatch between the passive acoustic monitoring methods that are required for real-world application of AIID and the methods used in AIID research. We suggest that broad-scale implementation of AIID is achievable in the near future, given recent success in adjacent acoustic disciplines like human speech recognition. The road forward for AIID should include 1) prioritizing efforts towards passive acoustic monitoring, 2) exploration of opportunities for cross-disciplinary and collaborative research, and 3) understanding how AIID affects the outcome of ecological and evolutionary application. We provide concrete suggestions for research and development and show some promising recent developments in AIID.

Elly C. Knight; Steven L. Van Wilgenburg; David Iles; Brandon Edwards; Daniel A. Yip; Tessa A. Rhinehart; Sam Lapp; Justin Kitzes; Erin M. Bayne SY1.5

Insights into detection probability of bird surveys from comparison of point counts and passive acoustic monitoring

Historically, research and monitoring of bird populations has been conducted with short-duration point counts; however, passive acoustic monitoring (PAM) is rapidly replacing point counts in many parts of the world. This methodology shift requires a review of detection processes to confirm statistical assumptions and inform data integration. Our goals were to explore differences in the detection process between point counts and PAM and inform approaches to data integration, using two common approaches to addressing imperfect detection, removal and distance sampling. First, we identified potential differences in the detection process between point counts and PAM. We then explored these differences by applying removal and distance sampling models to point count data and human annotations of PAM. We showed that despite similarities in data structure, point count and human-annotated PAM datasets have fundamental differences in the detection process that lead to differences in detectability estimates. Cue rate estimates from PAM were significantly higher than from point counts due to earlier time of first detection in PAM surveys, the availability of data with higher-resolution time intervals in removal models, and the exclusion of visual detections. Exclusion of visual detections from point count data did not significantly affect estimates of perceptibility. There were no differences in observer effects on cue rate between methods. Cumulative differences in detectability between methods resulted in 14.7% difference in density estimates on average when applied as statistical offsets. We suggest some of the differences in detectability estimates between survey methods are due to human error and/or failure of statistical assumptions and that availability estimates should be preferentially derived from PAM data to reduce bias in density estimates for conservation applications for species that are primarily detected aurally.

Alana Krug-MacLeod; Jonas Hentati Sundberg; Kyle Elliott FR3.5

Impact of Arctic summer decreased diel vertical migration on distribution of prey and seabird predation

Seabirds' visibility makes them useful indicators of ecosystem changes in the Arctic, including changes in prey distribution. Although forage species are key trophic links in wasp-waisted Arctic ecosystems, these species are difficult to monitor in areas without large-scale commercial fisheries. Seabirds are imperfect samplers in part because, as visual predators, their ability to obtain prey depends on light availability. To elucidate how light availability influences seabird-prey interactions, we examined how seasonal changes in light conditions affect the dive-depth and catch per unit effort of thick-billed murres' (*Uria lomvia*) in relation to the density and vertical distribution of fish and invertebrates. To characterize changes in prey species' vertical distribution in increasing light conditions, we used hydroacoustic data obtained from Coats Island, Nunavut in July 2024 during the period of no astronomical twilight or night (a period in which prey can obtain abundant food at the surface but foraging by visual predators is continuously possible). We used echo integration to translate raw backscatter data into a depth-explicit metric to act as a proxy for fish and plankton abundance and interpreted spatio-temporal patterns in relation to daylight amounts and prey species characteristics. To test the match between thick-billed murres' foraging behaviour and vertical distribution of prey as light conditions changed seasonally, we overlaid accelerometry and GPS data from thick-billed murres monitored at Coats Island over the same time period. We expected to find: i) suppressed diel vertical migration (DVM) of prey in periods of limited darkness, ii) signs of alternate predation avoidance strategies, iii) reordering of DVM in prey as daylight hours decreased, and iv) adjustments in murres' dive depth as DVM strengthened. Findings are useful for more accurately estimating prey distribution using seabirds, and ultimately for assessing the stability of Arctic food webs that are especially vulnerable to climate change and upon which seabirds depend.

Isolde Lane Shaw; Steve Cumming SY3.2

Quantifying the birds impacted by the 2023 fire season in Canada

Extreme fire seasons are predicted to become more frequent under climate change. During the 2023 fire season, roughly 15 million hectares burned in Canada, the largest area in the historical record. Populations of many boreal breeding bird species are known to be under pressure from increasing anthropogenic environmental changes, whether in Canada or elsewhere. Less is known about the immediate and long-term impacts of large fires on bird populations. We developed a methodology to estimate the numbers of birds affected by such events. Maps of predicted bird density from the Boreal Avian Modelling Project are intersected with the boundaries of mapped fires. From this, the expected number of breeding pairs affected by the fires can be estimated for each species and summed over strata such as jurisdiction of BCR. The code was built in SpaDES (Spatial Discrete Event Simulator), an ecosystem of R packages for reproducible science. The method can therefore easily be applied to data from historical or future fire seasons; it can also be included in landscape simulation models. We illustrate the methods by estimating the number and proportion of breeding individuals affected by the 2023 fire season for 149 species. Preliminary results indicate that a total of 189 million birds were in the areas that burned, accounting for 2.6% of the total population of these species across Canada. Future work will refine the analysis to focus on losses due to the burning of areas of mature forest, as these will have longer-term impacts on population. We expect this to allow us to pinpoint species that will have experienced particularly widespread long-term habitat changes from the 2023 fires, as well as gain more perspective of the potential magnitude of this event on bird populations in Canada.

Megan G. LaRocque, Jan J. Wijmenga, Kimberley J. Mathot TH2.2

When will the food return? Testing optimal sampling models in a population of Black-capped Chickadees

Animals face uncertainty in every aspect of their lives. Where is the best territory? Who is the best available mate? When and where will food be available? One of the strategies that organisms can adopt to mitigate this uncertainty is to update their information about the state of territory, mates, or resources within their environment, known as ‘sampling’. Optimal sampling models ask: what sampling strategy should individuals adopt to maximize fitness? In a foraging context, we can imagine an individual that encounters a patch that has recently become unprofitable. This individual must then decide how it should behave amidst this uncertainty in food availability. Should it revisit (i.e., sample) this patch later to see if it becomes profitable, or should it visit an alternative food patch? If an individual samples the previously encountered unprofitable patch and the patch remains unprofitable, the individual suffers from sampling error costs (SEC). If an individual instead visits the alternative, but the initially unprofitable patch is now profitable, the individual misses out on exploiting this now profitable patch and experiences overrun error costs (OEC). Theory predicts that both sampling and overrun error costs will influence individual sampling frequency. We tested these predictions using feeder visit data from a free-living winter population of black-capped chickadees (*Poecile atricapillus*). We assessed how chickadee sampling frequency at empty feeders changed as a function of several variables predicted a priori to affect SEC and/or OEC. We found that although some factors influenced sampling frequency as predicted by optimal sampling theory, others did not. I discuss these results and propose predictions for how individual differences in sampling behaviour may influence fitness in our chickadee population.

Steffi LaZerte FR4.3

Practical tips for open science in ornithology

Open data, open-source code, open access, oh my! Is open science just a buzz word? The next big thing? Or completely unattainable? There's a push for open science in Canadian research in many sectors: academic, government and NGO. Open science results in more robust research, greater visibility and wider knowledge transfer. It can lead to more opportunities for collaboration and the chance for early career scientists to demonstrate a wider set of skills. But sharing your work openly can be a vulnerable experience and it's not always clear how to do so. It sometimes feels like if you don't do it perfectly, you might as well not do it at all. However, open science is a continuum, not a matter of all or nothing. It is a skill, and like any other you can start small and learn as you go. Beyond publishing open access papers, there are many other things that can be done to bring open science to your research, from posting code and data online or in a repository, open collaborations, sharing manuscripts through preprint servers, and even sharing the manuscript creation process. Drawing on examples from my experiences in ornithology and related fields I'll discuss how open science can benefit science in general and ornithologists in particular, why it can be so hard to get started, and provide an overview of practical ways to bring open science to your research. It's not all or nothing and a little can go a long way!

Isabelle Lebeuf-Taylor; Juan Andres Martinez Lanfranco; Erin Bayne SY3.5

Scale-dependent responses of songbird communities to habitat heterogeneity in managed boreal forests

The distribution and configuration of boreal songbird habitat in managed forests of Alberta can be largely affected by concomitant industrial landscape modifications. While annual rates of timber harvest and creation of linear features are low, they tend to be spatially aggregated, creating areas where spatial heterogeneity of habitat is driven by both natural processes and anthropogenic landscape alterations. Using passive acoustic monitoring with distance-based truncation, we investigate how anthropogenic stand-altering patterns affect species richness of songbird communities, and whether their response to habitat heterogeneity and amount changes as the spatial extents at which both response and landscape heterogeneity are measured. We show that at fine spatial scales (< 13 ha), upland bird communities respond negatively to increased heterogeneity in the distribution and configuration of habitat, where this effect is stronger when habitat amount is lower. At broader spatial scales (> 16 ha), a shift in the direction of effect of heterogeneity metrics on bird species richness indicates a change in the way communities perceive heterogeneity. The interaction between habitat amount and heterogeneity were weaker at broader spatial extents. Across response scales greater than 6 ha, bird communities responded most strongly to landscape heterogeneity well outside the area they occupied during the survey. We found that indices for heterogeneity could either be associated with an increase or decrease in bird species richness, depending on the scales at which bird communities and landscape heterogeneity are surveyed. Our findings demonstrate that the relationship between habitat heterogeneity and songbird diversity is scale-dependent, with important implications for conservation planning and the evaluation of forest management practices aimed at maintaining biodiversity in industrial landscapes.

Lionel Leston; Erin Bayne SY3.4

Using boreal birds and remotely sensed data as ecological indicators of footprint reclamation for wildlife

Effects of human footprint on wildlife are increasingly understood; however, apart from harvest, how long it takes for wildlife to reoccupy different reclaimed and revegetated footprints is unknown. We used environmental and bird survey data to explore footprint reclamation effects on wildlife in Canada, extracting year-specific predictors to point counts on or near footprint in three regions. For potential monitoring, we identified 2,449 point count locations within oil sand mines, 4,219 locations near such mines, and 1,861 locations within or near other vegetated oil-gas footprint in northeastern Alberta; 3,582 locations on or near abandoned mines in British Columbia; and 2,309 locations on or near mines in Sudbury, Ontario. We conducted an ordination analysis of bird community data and variables associated with vegetation regrowth on point counts in different footprint types varying in time since harvest or reclamation. We found that younger and older harvest significantly differed in bird communities from and had greater vegetation regrowth than oil-gas footprints. However, we found some evidence of increasing normalized differential vegetation index, related to vegetation amount, within reclaimed mines in each study region. Using species distribution models for Alberta, we found that 45 out of 100 species – generally associated with older forests - were predicted to be less abundant currently than historically within quarter-sections with mining footprint in northeastern Alberta. Six percent of species that were more abundant currently than historically in these quarter-sections were generally associated with open or recently disturbed lands. When we simulated conversion of oil-gas footprint to natural vegetation within an oil-gas lease, 15 percent of species decreased from 2019 to 2179, while 67 percent of species increased over time. Our results can inform future wildlife monitoring, models, and reclamation efforts; identify when footprint effects “disappear”; and enable reclaimed lands to be incorporated within conservation and land use planning.

Ryan Leys; Liam McGuire FR2.5

Shallow torpor use in North American songbirds during migratory stopover

Migratory flight is energetically demanding, but birds expend twice as much energy during stopovers, largely driven by thermoregulatory costs. Birds have been assumed to be homeothermic, which would present an extreme challenge in maintaining fat stores, their primary migration energy source, on cold nights, when low ambient temperatures increase the energy required to maintain homeothermy. Early-arriving and late-departing insectivorous migrants face additional challenges when cold ambient temperatures reduce prey availability, and, therefore, energetic input. Further, heat loss is greater in smaller species due to their high surface area to volume ratio. I hypothesized that migrating passerines may not be strictly homeothermic and predicted that small species that migrate northward earlier and southward later use shallow torpor as a mechanism of energy conservation. To test this hypothesis, I focussed on Brown Creepers (*Certhia americana*), Golden-crowned Kinglets (GCKI: *Regulus satrapa*), Ruby-crowned Kinglets (*Corthylio calendula*), and Yellow-rumped Warblers (*Setophaga coronata*). In experiment one, I measured body temperature using temperature-sensitive PIT tags and measured metabolic rate using open-flow respirometry at 2, 7, 12, and 25/30°C in a temperature-controlled cabinet. In experiment two, I measured the skin temperature of GCKIs using temperature sensitive radiotelemetry. During experiment one, all species regularly used shallow torpor (69 – 98% of nights), reducing body temperature by >3.2°C. Metabolic rate increased at colder temperatures, but varied 20 – 42% within a temperature treatment. During experiment two, GCKIs regularly used shallow torpor (97% of nights), which led to energy savings between 8 – 46% during the rest phase of stopover. Shallow torpor reduces the amount of energy expended on thermoregulation, which aids in the maintenance of fat stores and may allow birds to increase their net refuelling rate by allocating more ingested energy to fat store accumulation. Increasing refuelling rate leads to a reduced stopover duration and overall speed of migration, which increases fitness.

David M. Logue; Juleyska Vazquez-Cardona; Heath Petkau; Samantha Huang; Pablo Sosa-Negrón; Karla Vilches Castaño; Kenneth X. Rodriguez-Rivera; Juhi Patel; Lamisa; Oluwatosin Ogundimu; Jade Nelson; Rylie Mooney; Tyler Bonnell TH2.11

Song type sharing, song type matching, and collective themes in a dawn chorus communication network

Songbirds often “match” the song type that their neighbour last sang. The function of song type matching remains unclear, in part because we lack robust descriptive studies in natural communication networks. We recorded male Adelaide’s warblers’ (*Setophaga adelaidae*) communication networks to describe matching in nature and test hypothesized functions of song type matching. Six recordists simultaneously recorded songs and locations from neighbouring, color-banded, males during their dawn chorus. Song type sharing was high among immediate neighbours and dropped off quickly with distance. Males matched their neighbours’ song types above chance expectations. Males were more likely to match songs sung by nearby neighbours, and song types that they themselves had recently sung. The hypothesis that matching functions to signal aggressive intent does not apply to this system, because males do not fight during the dawn chorus. We found little support for the hypothesis that matching functions to facilitate the comparison of vocal performance. Temporal correlation analysis revealed an unexpected pattern: several neighbouring males converge on a set of song types for about a minute, before transitioning to another set. We conclude that “song type matching” emerges from this more general phenomenon. Convergence on clusters of song types is a novel network-level phenomenon, whose mechanisms, development, and function(s) await discovery. This study demonstrates that naturalistic, observational studies of animal communication networks can challenge assumptions and reveal phenomena that were previously hidden from view.

Spencer Lott, Vicki Friesen P25

Fledgling species among North American shorebirds

The dramatic expansion and recession of glaciers throughout the Pleistocene glacial cycles have been identified as having an important role in generating subspecies-level diversity in high-latitude breeding shorebirds. However, the precise role of these cycles remains unclear, with both the breakup of previously continuous populations during glacial maxima and dispersal during interglacial periods appearing to have contributed. My study will examine the population genetics of two North American shorebird species that have disjunct breeding distributions in regions profoundly affected by Pleistocene glaciation: Marbled Godwit (*Limosa fedoa*) and Short-billed Dowitcher (*Limnodromus griseus*). Both species have geographically disjunct breeding populations which overlap during the nonbreeding season. I will generate whole genome sequences from DNA extracted from frozen tissues held in museum collections and use them to model divergence times and gene flow between populations. ithin each species, it is expected that population divergences occurred between 900,000 and 19,000 years ago, which correspond to the onset of intensified Pleistocene glacial cycles, and the last glacial maximum, reflecting vicariance of ancestral populations during glacial cycles. Individual populations' migratory routes are expected to be conserved, restricting gene flow. Understanding the influence of Pleistocene glacial cycles on speciation in shorebirds gives us insight into how shorebirds' migratory routes may shift in response to environmental changes. The genetic sequences generated by this study also will enable the origin of nonbreeding birds to be identified, helping conservationists better understand the habitat requirements of individual populations. This work is particularly urgent due to the declining and vulnerable populations of the focal species and the unresolved taxonomic status of the western James Bay population of Marbled Godwits.

Katelyn Luff; Corie White SY4.9

Two decades of active Piping Plover management at a large reservoir in prairie Canada

The prairie subspecies of Piping Plover (*Charadrius melodus circumcinctus*) are Endangered under Canada’s Species at Risk Act and nest along gravel shorelines of western Canada and the Great Lakes. Lake Diefenbaker is the largest reservoir in southern Saskatchewan, providing water for ~60% of the province. It also supports one of the largest single-site breeding populations of Piping Plovers in Canada, which are sensitive to water management practices. Monitoring and management of plovers have occurred at this reservoir since 2005 to reduce nest failure and to monitor chick productivity. Multiple risk reduction activities are utilized to enhance Piping Plover productivity as part of the reservoir operating plan. These activities range from the passive use of predator exclosures to active nest translocation. Risk assessments incorporate nest location data, nest age, and nest elevation derived from LiDAR to inform flood risk and translocation efforts throughout the breeding season. Active management through nest translocation has reduced nest flooding risk by 65% since 2005. Nest exclosures are utilized as a passive approach to reduce predation pressure and limit late renests, which may be challenging to translocate. Annually, a minimum of 80% of nests are exclosed, with this threshold exceeded in 84.2% of years. On average, 101 nests are monitored, and the lake produces 0.89 fledged chicks/pair per year. Lake Diefenbaker remains an important nesting site for Piping Plovers in prairie Canada. Continued monitoring and management of this species at this location aligns with the population objectives outlined in the federal species recovery strategy.

Rory D.J. Macklin; Devin R. de Zwaan; David Bradley; Danielle Ethier; TH1.3

International collaboration facilitates risk assessment of vessel activities on overwintering coastal waterbirds

Global increases in vessel activity are significantly impacting nearshore environments. For marine birds, vessels have known localized impacts, ranging from energetically costly disturbances to deadly strikes and pollution. However, the overlap of regional bird distributions and areas of high vessel traffic is often poorly known. Using openly available vessel density data and citizen science avian data from British Columbia (BC), Canada, and Washington (WA), United States, we applied a dynamic occupancy modeling approach to explore differences in occupancy and occupancy trend for 24 overwintering piscivorous and benthivorous coastal waterbird species in the Salish Sea between 2011-2023. We asked whether occupancy and trends differed between Canada and the USA, and then investigated whether areas of low or high vessel traffic exhibited differing occupancy and trends across the region. We identified a number of species exhibiting regional occupancy declines and found that occupancy trends varied frequently when compared across the international border. All examined coastal waterbird families exhibited some degree of overlap with areas of high vessel traffic, though some families, such as cormorants (family Phalacrocoridae), were more closely associated with high vessel traffic areas. With particular attention to regionally declining species, we discuss the degree of risk faced by each family in high vessel traffic areas. These results provide crucial regional conservation insights and offer resource managers a broadly applicable roadmap for investigation into the distributional overlap of coastal waterbirds and vessel traffic in nearshore environments across the globe.

Alex MacPhail, Corrina Copp, Mike Packer, Chad Klassen, Erin Bayne SY1.1

WildTrax: a platform to manage, store, process, share and discover environmental sensor data

As environmental sensors become essential for monitoring bird populations, managing these large datasets requires robust and transparent tools. WildTrax is a web-based platform for storing, processing, sharing, and analyzing environmental sensor data at international scales. It enables the scientific community to explore broad ecological questions through novel analytical approaches, while also providing the ability for users to customize questions and projects. WildTrax also contributes to the CanAvian network, fostering collaboration and data sharing for bird conservation in Canada. This presentation will cover the platform's core principles, applications, and workflows, helping users maximize the value of their acoustic avian data.

Maggie MacPherson SY5.8

Advances in studying Neotropical austral migrants

The Tyrannus (a suboscine genus in the most diverse bird family: Tyrannidae) is exceptional for studying the evolution of migration because it comprises Nearctic, Neotropical, and Intratropical migrants and several partially migratory species. Using this Neotropical genus, I tested several hypotheses explaining the evolution of migration through measuring and tracking individual birds. In a phylogenetically constrained study, I found that migrants are morphologically distinct with longer and pointier wings (following expectations of aerodynamic theory). By tracking two long-distance migratory Tyrannus using geolocators, I discovered that Tyrannus track with high rainfall across their annual cycles. Long-distance migrations of a Nearctic and austral migrant that both track with rainfall patterns regardless of hemisphere speaks to the evolution of migration in this tropical genus where seasons are driven by rainfall. When comparing austral migratory to sedentary subspecies, I found a dietary shift from fruit to invertebrates during their single annual moult. While trophic niche shifts are common in temperate migratory birds during hyperphagic fueling in preparation for migration, the switch to protein-rich foods for moult highlights the importance of moult especially in suboscines that only moult once per year. Recently, we have found flashier plumage patches in migratory compared to sedentary taxa with migrants having higher carotenoid concentrations in crown and belly patches. While carotenoid-based signals often reflect evidence of sexual selection, in monochromatic taxa such as many Neotropical austral migrants, these signals may be more agonistic and reflect increased interspecific conflict. In practice, this work identifies patterns in Neotropical austral migrants that improve our understanding of selective drivers for bird migration. Much of the work relates to dietary needs of long-distance migrants (i.e., bill shape, tracking with rainfall, trophic niche shifts, dietary carotenoids), highlighting the need to better understand bird diets, food availability, and impacts of climate change on food resources.

Nancy Mahony; Alyssa Bohart; Scott Wilson SY4.6

Grassland bird diversity and abundance in relation to landscape and crop type across the Canadian prairies

Grassland birds are declining more steeply than other bird groups in Canada due to on-going native grassland loss and agricultural intensification. Our objective was to explore relationships between diversity and abundance of grassland breeding birds and landscape cover and crop type in the Canadian prairies, using BBS and the Annual Crop Inventory (AAFC) datasets. Analyses were done for 3 bird groups: all species; grassland generalists; and grassland specialists. Diversity of all species and generalists declined most strongly with increasing linear woody features (LWF) but was positively related to grassland, pasture, and crop diversity. Specialist diversity increased with increasing grassland and pasture cover. The abundance of all three groups had negative relationships with LWF and positive relationships with grassland, pasture, and crop diversity. When exploring the effects of crop types, all three groups were negatively affected by oilseeds, with the strongest effect on specialists. All species and specialist diversity had negative relationships with pulses and cereals generalist diversity also decreased with increased pulses. Abundance of groups declined with increased oilseeds and cereals but it with increased pulses. These results show the expected positive relationships between grassland birds and the retention of native grassland and pasture in the agricultural landscape, but also with increased crop diversity. A novel finding of this study was the negative relationship between grassland birds and linear woody features, likely planted as field windbreaks and around farmsteads. Such planting is often a positive conservation measure in other biomes, but we show negative effects in the grassland ecosystem where such features are naturally rare. Some crops, especially oilseeds, had strong negative influence on diversity and abundance but others such and pulses showed a mixed response with a negative effect on bird diversity but a positive one on abundance, demonstrating the influence crop-planting decisions have on grassland bird communities.

Katherine A. Marthens; Eric T. Reed; Amelia Coxe; Michael L. Casazza; Cory T. Overton; Jay A. VonBank; Tracy Davison; Mitch D. Weegman SA1.2

Drivers of transitions among habitats during breeding and staging periods in an Arctic-Nesting goose

Understanding habitat use can provide important perspective about drivers of survival and reproductive success, particularly in Arctic-nesting migratory bird species, because resource availability on breeding areas is relatively brief. We studied habitat use of lesser snow geese (*Anser c. caerulescens*, hereafter snow geese) breeding in the western Canadian Arctic during 2023 and 2024. The western Arctic snow goose population has increased substantially over the last 10 years, and indigenous communities in northern Canada are concerned that snow geese are outcompeting caribou and muskox, which are declining. Advances in tracking technology now provide high resolution information to study habitat use in space and time as never before. Between 2018 – 2024, over 100 GPS collars were deployed by the US Geological Survey and Environment and Climate Change Canada; collars collect GPS and acceleration data on 15-minute intervals. Using a Markov model in a Bayesian framework and data collected by these devices, we assessed how behavioural decisions (i.e., proportions of time spent on different behaviours) influenced movement among different landcover types during summering periods as well as during northern staging periods in spring and fall, which are relatively understudied. Combining GPS and acceleration data allows for unprecedented insight into behavioural shifts at different annual cycle periods. The understanding of habitat use gained from this data will help to contextualize the influence snow geese have on Arctic ecosystems. Further, information gained from this study will inform future analyses linking to caribou and muskox distributions, quantifying relationships between snow geese and these at-risk species and informing future conservation planning to maximize muskox and caribou distributions.

Christy Mckay; Josef Schmutz; Ed Rodger; Kevin Read; Christy Morrissey P38

From field notes to digital archives: a collaborative effort for preserving data

The preservation and accessibility of historical ecological data is crucial for advancing our understanding of species distributions and changes over time. This project focuses on the transcription and digital preservation of the lifetime bird-banding work of Dr. C. Stuart Houston, whose meticulous field observations span over seven decades from 1943 to 2017 in a series of 53 field notebooks. The handwritten notebooks contain invaluable observations and notes on 254 bird species found in Saskatchewan, particularly species such as the Bohemian Waxwing, Swainson’s Hawk, Great Horned Owl, and Tree Swallow. While the primary focus of the notebooks was bird-banding, they also include detailed nest data such as clutch size, prey items, nest substrate, and nest location, much of which remains largely inaccessible for current research. The first phase of this project involved digitizing the notebooks by photographing them in the University of Saskatchewan archives and uploading them to a digital repository for long-term preservation. Following digitization, each notebook was then indexed by species and nest observations. Currently, a team is transcribing and organizing the Houston field data into a usable dataset with a focus on documenting nest-related data which is often unreported. This data represents a significant and untapped resource for studying avian ecology in the prairies. Our aim is to both preserve the data and create an accessible resource for current and future researchers interested in subjects like avian populations, reproductive success, and species distribution. This project is important for accessing rich data sets which can enable comparative analyses across time and contribute to the conservation and monitoring of several species in Saskatchewan.

Ann E. McKellar; Christian Roy; Kristin Bianchini; Amelia R. Cox; Scott A. Flemming; Fred Tremblay; Adam C. Smith SY3.1

Examining large-scale environmental drivers of population dynamics in declining waterbirds

Understanding the drivers of population dynamics in migratory birds is essential for their conservation and management, but population trajectories and the importance of environmental factors can vary spatially and temporally over vast species ranges. Such linkages can be examined by combining climate indices with large-scale, long-term databases, such as the North American Breeding Bird Survey (BBS) and the Audubon Christmas Bird Count (CBC). The BBS is valuable when species are readily detectable during the breeding season and when the survey coverage encompasses the majority of the breeding grounds, such as for the Black Tern (‘tern’; *Chlidonias niger*), whereas the CBC is valuable when species breed in inaccessible or under-surveyed areas, but winter primarily within continental North America, such as for the Horned Grebe (‘grebe’; *Podiceps auritus*). In this study, we used Bayesian hierarchical models to examine regional variation in population trends and the relative influence of breeding and wintering ground climate on terns and grebes. We uncovered significant regional variation in trends, with population declines in terns being particularly prominent in peripheral areas of the breeding range, and wintering populations of grebes showing increases in the interior, but stability or decreases in coastal areas. For terns, there was a strong positive effect of spring moisture on breeding abundance, especially within the prairie core of the breeding range, while there was a weak negative effect of the winter North Atlantic Oscillation Index on breeding abundance. For grebes, precipitation in the boreal forest during the breeding season and warmer winter temperatures were associated with greater winter abundance. Our results highlight complex species-specific and regional differences in the effects of climate indices on waterbirds and underscore the need for more focused research on migratory connectivity and on the portion of the species’ breeding ranges within the boreal forest.

Janine M. McManus; Josiah Van Egmond; Barry G. Robinson SY4.3

Weathering a dry spell: variable population-level responses of grassland birds to drought in a fragmented landscape

Grassland birds face a combination of threats including impacts from climate and land-use change. The frequency and intensity of droughts are predicted to increase with climate change which can compound the impact of continued conversion of grassland and perennial cover to cropland. Understanding how drought and land-use interact across the entire breeding range of mobile species will allow us to better predict species response to continued habitat loss and climate change. We evaluated the influence of drought using an integrated product from the North American Drought Monitor (NADM) that uses multiple precipitation and temperature metrics as well as other drought indicators developed in the agriculture and water management sectors. We used detectability offsets to combine multiple breeding season point count datasets from across the Great Plains that include both on-road and off-road surveys from 2005 - 2024. Here, we model the density of five declining grassland songs as a function of spatio-temporally matched environmental covariates to a) evaluate the response of bird densities to the severity, timing, and length of drought and b) quantify spatial shifts in population centers of abundance between years and determine if species populations shifted toward areas of lower drought. For species that respond to drought with dynamic range shifts, we propose methods for incorporating those shifts in grassland conservation prioritization. This may require protecting more geographically dispersed large parcels of grassland habitat to buffer against increasing drought severity.

Janine M. McManus, Barry G. Robinson, Steven L. Van Wilgenburg SY1.4

Efficient tag validation to reduce false-positive and false-negative errors

Autonomous Recording Units (ARUs) are widely used to survey birds and other taxa. While ARUs allow the collection of high spatial and temporal coverage datasets, data processing can include identification errors known to bias estimates of occupancy. Verifying all individual detections can be cost prohibitive, necessitating efficient approaches to directing verification efforts. Using human processed recordings, we developed a model to estimate the probability that transcribers would agree on an identification in order to derive a random sampling-based approach to direct verification effort. We found that agreement probability was positively influenced by listener skill, identification confidence, species commonness and certain song types. Agreement probability was lower when an acoustic signal was classified as a trill. We evaluated our model on independent data where all species detections were verified and verification effort was quantified. Our model performed well at predicting transcriber agreement on the independent data (AUC = 0.71). We applied our model to randomized subsets of the independent data to compare the cost benefit of three approaches to tag verification under varying effort. We show how modelling probability of transcriber agreement can be used to more efficiently direct verification of species acoustic tags. Our general approach is well suited to more efficiently verifying species identifications from either human processing or automated classifiers such as BirdNet or HawkEars to quantify and reduce species misidentifications by directing efforts toward tags that have a higher likelihood of being incorrect.

Avery Meeker; Lorien Nesbitt; Elizabeth Gow; Krista De Groot P1

Avian biodiversity in a changing landscape: the impacts of development and recreation in metro Vancouver, BC

Birds in urban areas act as indicators of environmental quality and ecological function. Birds are not equally distributed throughout the urban environment due to urban planning and development corridors that alter the distribution of green space. Managing urban areas to better serve birds can create stronger urban ecological resilience and increase the well-being of people living close to those avian communities. Urbanization significantly influences avian communities, reducing the quality and availability of habitat for birds, adding noise and buildings to the landscape, altering the availability of food and nesting habitat, and increasing human presence/recreation. The Metro Vancouver region has a rapidly growing population that is projected to increase to 4.21 million by 2050, making it an important region in Canada to study the relationships between bird communities, urban greening initiatives, and urban development. We will present preliminary findings collected in 2025 from our study examining how bird communities vary with a variety of urban greening and urbanization metrics from across Metro Vancouver. Bird communities will be assessed using point counts and ARUs across various amounts of urban density, recreation, and development. Overall, this research aims to provide valuable information to help cities become more resilient and provide spaces where humans and birds can coexist.

Vinuri Mendis; Shasta Corvus; Kira Delmore; Kevin Fraser SY5.7

A nestling phase perspective: understanding how early environmental exposure influences migration timing in songbirds

Do migratory songbirds have the potential to show a flexible, ontogenetic response to photoperiod during their early development and accordingly adjust their migration timing in response to advancing springs? Previous studies show that individual timing schedules can be consistent across long-distance migrations and associated with the phenology of breeding latitude. To investigate if these timing phenotypes are prescribed by environmental cues experienced during the nestling phase, we carried out a reciprocal egg transplant experiment across breeding latitudes (7º latitudinal separation), using a long-distant migratory songbird, the Purple Martin (*Progne subis*). We transplanted 38 individually marked pre-incubation eggs between 20 nests in Manitoba, Canada and 20 nests in Minnesota, USA, matching their lay dates and, using a temperature-controlled setup to maintain a cool ambient temperature while eggs were driven by car. We subsequently outfitted each control and experimental nestling with a radio-transmitting tag (Motus) to determine fledge and migration departure dates. We found that the hatch-success was similar (>80%) for transplanted and unmanipulated eggs in each population, demonstrating that hatch success was not impacted by our experimental treatment. We also found that fledge dates and departure dates of transplanted nestlings were more similar to their 'foster' siblings than their biological siblings from natal nests, suggesting that timing is flexible to and entrained by local photoperiod. Overall, these results suggest that migration timing phenotypes are flexible to local environmental conditions during the nestling phase, which can inform our understanding of timing adaptation to ongoing climate change.

Andrew Miller and Bill Strongarm FR4.6

Ka-papâmasitcik │ka-papamipihsot: “Those That Fly Around”: Plains Cree and Saulteaux Birds

This presentation provides highlights of a 7-year collaboration between Dr. Miller and Plains Cree (nêhiyaw) and Saulteaux (Anishinaabe) Elders of the Touchwood Agency Tribal Council in central Saskatchewan, Canada to document bird names, stories, and cultural meanings. Community Elders shared their understandings of birds as relatives, sources of food, messengers, allies, and possessors of power. Elders recognize that all birds are related to the thunderbird (piyêsiw), and similarly possess mysterious powers of flight, speed, vision, and speech. Cree and Saulteaux ethno-taxonomies include higher-order categories such as waterfowl (sisip), “little birds” (piyêsis), shore birds (seso – “they fly up”) suggest principles of cultural salience and which connect to creation stories. Examination of 19th and early 20th century museum materials from the Touchwood Hills display a rich symbolic vocabulary in their use of bird feathers, bones, bills, and skins. Documentation of Plains Cree and Saulteaux connections with birds provided us with opportunities to recall historic Indigenous economies including the Hudson Bay Company quill trade and their recent exclusion from crown lands.

Sydney M Miller; MW Reudink; RD Carle; M Rubega; M Casazza; D House; R Larson; J Neil; C Overton; M Prather; J Reuland; N van Schmidt; K Tarr; AE McKellar P35

Tracking the long-distance migration and abundance of phalaropes (*Phalaropus spp*.) at saline lakes across the western hemisphere

Wilson's (*Phalaropus tricolor*) and Red-necked phalaropes (*Phalaropus lobatus*) are among the many migratory birds facing challenges throughout their annual cycle, with loss of saline lake habitat threatening their populations. This study aims to track the migration of Wilson's Phalaropes, identify their migratory paths, and understand how habitat and land use influence the abundance of Wilson's and Red-necked phalaropes at saline lakes. In 2023 and 2024, we tagged 45 Wilson's Phalaropes on their breeding and staging grounds, using radio and satellite-transmitting tags, then mapped their migratory routes, and calculated departure dates and travel rates. Additionally, we conducted abundance surveys at six North American staging sites from 2019 to 2024 and used remotely sensed satellite imagery to classify habitat and land use.We found that on average Wilson's Phalaropes depart the breeding grounds on June 29th, travelling at 0.62 km/h and depart the staging grounds on August 29th, travelling at 2.80 km/h. Furthermore, we identified a novel overland migration route through Central America, contrasting the established belief that Wilson's Phalaropes primarily migrate over the Pacific Ocean. With our ongoing habitat analysis we predict that more exposed shoreline will increase phalarope abundance, while higher human disturbance will reduce abundance.This study is the first to track the migration of Wilson's Phalaropes, filling gaps in their migratory behaviour. Furthermore, understanding the habitat needs of Wilson's and Red-necked phalaropes is essential for protecting key features of their environments, helping us to inform conservation strategies for these species and the saline lakes that they rely on.

Rylie Mooney; Raheem Mir; Rindy Anderson; Lauryn Benedict; Jennifer Foote; Matthew Tata; David Logue SY1.8

Using machine learning to classify songtypes in multiple songbird species

Most songbird species sing more than one type of song. Historically, the classification of songs into types has relied on visual analysis of spectrograms, which can be less reliable, hard to replicate, and time consuming. Recently developed deep learning models, like Cornell University's convolutional neural network BirdNET, are able to classify songs to species. We trained BirdNET to classify song types from four songbird species and characterized its classification accuracy as a function of the size of the training set. BirdNET accurately classified songs to type, although its performance varied among species and samples sizes. We conclude that BirdNET is a powerful, easy-to-use tool for song type classification.

Yolanda Morbey; Kevin Hannah; Jeffrey Costa; Stu Mackenzie SA1.6

In the clear: weather drives the northward movement of American Tree Sparrows as spring progresses

The American Tree Sparrow (*Spizelloides arborea*) is a sub-Arctic breeding species that spends the nonbreeding season in temperate regions of North America. To provide new information about their movement ecology and migratory connectivity, we used automated radiotelemetry to track their movements. Following capture on their nonbreeding grounds in southern Ontario, Canada, from January to mid-April, birds interspersed periods of residency with punctuated regional-scale movements biased northwards from early February to mid-May. These movements predominantly occurred during dusk or night, increased in frequency with day of year, and were positively associated with higher temperature, higher atmospheric pressure, less cloud cover, and easterly winds. These characteristics indicate that late nonbreeding to prebreeding migratory movements may serve to track the advancement of spring in our region.

Angela Moreras; Elly Knight; Anna Drake; Mannfred Boehm; Mélina Houle; Junior A. Tremblay; Steve Cumming; Diana Stralberg; Erin Bayne SY3.1

New flexible approach to machine learning for bird abundance models: national and regional implementation

Given rapid environmental changes, estimating species abundance and distribution is crucial to global biodiversity conservation targets. For over 20 years, the Boreal Avian Modelling Centre (BAM) has compiled and harmonized data to predict bird abundance at a fine resolution across the boreal biome. The most recent version of our landbird models integrates a heterogeneous dataset of human point counts, community science data, and passive acoustic monitoring, encompassing over 1 million unique surveys. We used machine learning (i.e., boosted regression trees) to model the abundance of 148 boreal landbird species using environmental covariates representing climate, local- (200 m) and landscape-level (up to 2 km) vegetation composition, land cover, topography and human disturbances. Our models are open-access available and are supported by an R package and online app for access, visualization, and interpretation. Additionally, our model workflow is reproducible facilitating the ability to build custom models to address region-specific objectives. We adapted the model structure to test the effects of forestry roads and spruce budworm (*Choristoneura fumiferana*) defoliation in Ontario, using the Bay-breasted Warbler (*Setophaga castanea*) as a case study. Notably, these region-specific variables ranked among the most influential in the models, suggesting that species may be sensitive to forestry roads and insect defoliators. A regional approach may enhance our understanding of the factors driving variation in species abundances and distribution. These findings highlight the importance of flexible workflows for efficiently producing models tailored to different objectives, as well as the need to account for local ecological processes to improve assessment precision.

Christy Morrissey; Dan Garrett; Shuqi Ren; Sonia Cabezas; John Headley SY4.2

Quantifying insecticide exposure to grassland birds in agricultural regions of Saskatchewan

Declines in aerial insectivore and grassland bird populations across North America have prompted research into potential causal mechanisms affecting those species associated with agricultural farmlands. Combined research evidence suggests two leading drivers of NA farmland bird declines are 1) the frequency and area of pesticide use and 2) destruction of grassland and wetland habitats affecting insect prey. We modelled the agricultural intensity risk across southern Saskatchewan and mapped regions that are predicted to have high versus lower risk based on available metrics for pesticide use, landscape simplification, and water availability. In 2022 and 2023, we also conducted studies on barn swallows and 16 other grassland birds in Saskatchewan through blood and insect sampling to quantify the detection prevalence and concentrations of 5 systemic insecticides. The neonicotinoids clothianidin, imidacloprid and thiamethoxan were routinely detected in blood and insect samples in Saskatchewan. Average detection and concentrations were higher in blood of grassland species (blackbirds, sparrows, and other species) compared to aerial barn swallows. We found that 60% (103/173 samples) of barn swallows and 73% (141/194 samples) representing 14 of the 16 grassland species were above the >MDL for at least one of the tested neonicotinoids. Detection frequencies increased post seeding relative to pre-seeding, and levels in barn swallow blood declined over the season. Concentrations and probability of detection in barn swallows, which covered a large spatial gradient, were not related to agricultural intensity metrics suggesting there needs to be further refinement of risk maps, consideration of individual metabolism, and the ubiquity of neonicotinoid insecticides across the region. However, insects appear to be a sensitive indicator of contamination with >97% (117/120) sample detections which were positively related to metrics of high agricultural intensity. This suggests farmland birds are widely exposed to insecticides through insect prey in agricultural areas which may be contributing to ongoing population declines. Further work using insect monitoring and sampling blood of farmland bird species over larger spatial gradients may be an effective tool to validate agricultural exposure risk for declining farmland birds.

Sarah D Mueller; Daniel J Mennill; Stéphanie M Doucet; Sarah L Dobney; Hayley A Spina; D Ryan Norris SA1.5

Factors influencing post-fledging movement patterns of juvenile Savannah Sparrows (*Passerculus sandwichensis*)

Movements in the post-fledging period, an important first stage of natal dispersal that occurs after juveniles fledge from the nest but before they depart for fall migration, have important implications for survival and future reproductive success. However, relatively little is known about movements during this vulnerable period. Here, we used daily radio telemetry data from 137 juvenile Savannah sparrows (*Passerculus sandwichensis*) between 2022 – 2024 and hierarchical generalized additive models to examine the relationship between movement and age across a 90-day period. We evaluated how movement—distance from the nest and between consecutive daily locations—was influenced by sex, brood number, year, age at fledging, local nest density, nestling mass, and weather variables. Both the distance of fledglings from their natal nest and distance moved between days increased with age post-fledging, most steeply when fledglings became independent, then remained steady for the remainder of the post-fledging period. Movement varied among individuals: some fledglings remained near the nest for extended periods and others traveled long distances soon after fledging. Offspring from second broods traveled greater distances than those from first broods. Nest density also influenced movement, with fledglings from high density areas traveling farther from their nests but, on average, less far between days. Movement patterns were also influenced by year, sex, mass, and daily precipitation. Our results demonstrate how movement patterns can change between the early post-fledging period and the relatively understudied late post-fledging period.

Alexander J. Muth; Alessia L Costa; M. Zachariah Peery; Connor M. Wood; Carrie L. Branch TH1.6

Vocal variation in chestnut-backed and mountain chickadees of the Sierra Nevada

Traits among sympatric species may evolve to reduce interspecific competition or facilitate communication between species, leading to divergence or convergence of these traits. Chestnut-backed (CBCH) and mountain chickadees (MOCH) overlap in the Sierra Nevada, with the range of CBCH moving east into the MOCH range. Drivers of vocal variation among these populations are generally understudied and provide an opportunity to assess the effects of an expanding sympatric zone on vocal variation. Using autonomous recording units deployed across the Sierra Nevada, I compared vocalizations of CBCH and MOCH living in allopatry and sympatry. I predict calls used in conspecific agonistic interactions will diverge, while predator alarm calls will converge in areas of sympatry versus allopatry. This research sheds light on the evolution of vocal variation and provides valuable information for monitoring ecosystem health.

Pat R. Nancekivell; Joseph J. Nocera SY5.5

DNA metabarcoding reveals dietary divergence among sympatric swallows and flycatchers

Aerial insectivore (AI) populations have been in steep decline in North America since the 1970s, with swallows, swifts, and nightjars declining more rapidly than flycatchers. As AI share a common diet of flying insects, reductions in insect abundance are likely one of the major factors driving population decline. Previous studies have shown major dietary differences between swallows and flycatchers; flycatchers have exhibited more diverse, generalist diets than swallows. However, no study has directly compared the diets of sympatric swallows and flycatchers using the same method of dietary analysis. To investigate these differences, we compared the diets of six AI species living in sympatry during the breeding season. We collected fecal samples from adult *Riparia riparia* (Bank Swallow), *Hirundo rustica* (Barn Swallow), *Petrochelidon pyrrhonota* (Cliff Swallow), *Tachycineta bicolor* (Tree Swallow), *Empidonax alnorum* (Alder Flycatcher), and *E. minimus* (Least Flycatcher). We used DNA metabarcoding to identify the taxonomic composition of invertebrates in the feces and compared the richness of genera by insect order, insect family, and dipteran family between all species. Through a Bray-Curtis distance-based redundancy analysis, we identified significant differences in dietary composition between bird species at all three levels; however, the greatest amount of dissimilarity is seen in the dipterans consumed. *E. alnorum*, *E. minimus*, *H. rustica*, and *T. bicolor* had broader, more generalist diets than *P. pyrrhonota* and *R. riparia*. By comparing the diets between multiple species living in sympatry, our study improves our understanding of a possible cause of disproportionate population declines observed among AI species.

Oluwatosin Ogundimu; David Logue SY1.1

Song type preferences during the dawn chorus in Adelaide's Warblers (*Setophaga adelaidae*)

Songbirds sing a repertoire of song types, some of which are shared with neighbours. Songbirds prefer certain song types, but the reasons for these preferences are not well understood. I analyzed 11,800 dawn chorus songs from 14 male Adelaide's Warblers (*Setophaga adelaidae*) to determine if males exhibit preference for specific song types and if these preferences are consistent across recording days. Each male had an average repertoire of 21.57 ± 3.62 song types. All males had song preferences, with the most popular song type accounting for 17% of their song output. Song type preferences were consistent across days. I then omitted recordings that were not amenable to acoustic analysis, resulting in a reduced dataset (n = 9,395), which I used to test whether males prefer (1) widely shared (locally popular) song types, (2) song types with superior transmission properties, or (3) song types with high or low vocal performance. I found strong evidence that males preferred widely shared songs, but the evidence for the second hypothesis was mixed. Males preferred song types with low frequency and low percent sound, supporting two predictions of the efficient sound transmission hypothesis. However, they did not prefer songs with high amplitude or high vocal deviation, negating the other two predictions of that hypothesis. Males preferred song types with low percent sound, as expected by the third hypothesis if they prefer songs with low performance requirement, but amplitude and vocal deviation had little effect on preference. This study supports the Social Dynamics Hypothesis, which states that social factors influence Adelaide's Warblers' song type preference during the dawn chorus. Song sharing within the local communication networks influences male song preferences, although acoustic transmission properties and vocal performance may play a role as well.

Meghan Oliver; Joe Nocera SY4.5

Bobolink (*Dolichonyx oryzivorus*) site selection is a multiscale process in fragmented landscapes

Bobolinks (*Dolichonyx oryzivorus*) rely on nesting habitat created from hayfields and pastures, and the environmental correlates of breeding site selection have been well-studied, particularly in areas of contiguous habitat. However, much less is known about their breeding site selection in areas of limited habitat choices. We examined Bobolink abundance and nest success at nine sites in the Wolastoq/Saint John River Valley near Fredericton, New Brunswick, Canada. This area represents their northeastern range edge, and the agricultural areas here are patchy and surrounded by a wooded matrix. In May to July of 2023, we collected abundance and breeding data using point count surveys and a reproductive index, then used spatial analyses to quantify two patch-level (field size and shape) and three landscape-level (habitat composition, configuration, and isolation) variables at four different spatial extents. Our modelling suggests that no variables predict nest success, further corroborating that haying is the most common cause of nest failure. We found that abundance is predicted by both patch-level variables, as well as metrics of habitat amount and isolation. Unexpectedly, Bobolink abundance increased with field shape complexity and was not impacted by landscape configuration at larger extents, suggesting a weak response to fragmentation. Ultimately, the findings from this study can be used to better inform management plans for this threatened grassland bird in jurisdictions not dominated by agriculture.

Karen Ong; D. Ryan Norris FR3.3

Experimental evidence demonstrating how freeze-thaw patterns affect spoilage of perishable cached food

For the small number of temperate and boreal species that cache perishable food, previous research suggests that increasing freeze-thaw events can have a negative impact on fitness by degrading the quality of cached food. However, there is no experimental evidence that directly links freeze-thaw events to cache quality. To examine how the timing, frequency, duration, and intensity of freeze-thaw events influenced cached food mass loss, a proxy for caloric content, we conducted a series of month-long laboratory experiments by placing simulated caches (raw chicken placed between two pieces of black spruce (*Picea mariana*) bark in programmable freezers. Freeze-thaw treatments were modelled after weather data from Algonquin Provincial Park, Ontario, where a population of Canada jays (*Perisoreus canadensis*), a species that caches perishable food for overwinter survival and to support late-winter breeding, has declined by > 70% since the 1980s. First, we found no evidence that an increased frequency of freeze-thaw events influenced mass loss, suggesting that microstructural damage caused by crystal reformation does not significantly influence cache quality. Instead, our experimental results demonstrated that mass loss was positively influenced by longer individual thaws, which likely reflects increased microbial growth, oxidation, and progressive drip loss. We also found that caches lost more weight when subjected to early freeze-thaw events compared to late freeze-thaw events. Finally, we show that milder freezes led to less mass loss and, unexpectedly, warmer than average thaws post-freeze also led to less mass loss. Our results suggest that longer thaw periods post-freezing and milder freezes cause or lead to significantly increased spoilage of perishable cached food. All of these temperature-related conditions are closely associated with long-term changes in climate and, thus, the effects on cache degradation reported in these experiments should be applicable to species caching perishable food in the wild.

Madeline Parlee; Joseph J Nocera FR2.4

The relationship between biological insecticide control of spruce budworm and the diet of their avian predators

Eastern spruce budworm (*Choristoneura fumiferana*; hereafter SBW) outbreaks have periodically occurred in eastern Canada for millennia. These outbreaks can affect forests through mass defoliation, growth reduction, changes in regeneration patterns, and tree mortality. Atlantic Canada is undergoing a trial period for the Early Intervention Strategy (EIS) that optimizes uses of *Bacillus thuringiensis* var. Kurstaki (Btk) and tebufenozide as control agents. The Bay-breasted Warbler (*Setophaga castanea*), Tennessee Warbler (*Leiothlypis peregrina*), and Cape May Warbler (*S. tigrina*) are known as “budworm-linked warblers”, since they show population increases when SBW populations are rising, likely due to the food abundance that SBW outbreaks provide. Little research has investigated how the use of control products for SBW outbreaks impacts the diets of bird populations in areas being treated. Therefore, the purposes of this study are to 1) determine if there are any differences in the dietary makeup of budworm-linked warblers in treated versus non-treated areas using DNA metabarcoding, and 2) collect samples to investigate the diets of other birds in these forests and determine whether there may be other species that belong to this budworm-linked group. This research will advance our knowledge of SBW control techniques by studying the impact of insecticide application on the diets of bird populations in New Brunswick's forests. Results of this study will allow EIS to be better informed in planning or delivering future SBW control efforts.

Kimberly Parno; Vicki Friesen; Kira Delmore; Kevin Winker P26

Gene flow and genetic adaptation in Swainson’s Thrushes (*Catharus ustulatus*) on Haida Gwaii

Debates are on-going regarding the relationship between gene flow and genetic adaptation. The diversity of avifauna breeding on Haida Gwaii, British Columbia provides a model system to test the influence of gene flow on local adaptation. A morphologically distinct subspecies of Swainson’s Thrush (*Catharus ustulatus*) – a widespread migratory songbird – breeds exclusively on Haida Gwaii (C. u. phillipsi, Ramos 1991). We hypothesize these adaptations either arose rapidly on Haida Gwaii following recession of the glaciers or through long-term isolation in a refugium during the last glaciation. To test our hypotheses, we compare whole-genome sequences of breeding populations on Haida Gwaii with neighboring populations in mainland British Columbia, Vancouver Island, Washington, and Alaska. From the generated sequences, we can determine if populations genetically differ, how they likely diverged, and estimate historical and current levels of gene flow between populations. Finally, we will map the adaptive potential and genomic vulnerability of these populations across the landscape. This research will help answer questions in evolutionary biology and inform conservation efforts for this species amidst future climatic change.

Juhi D. Patel; Lamisa; Juleyska Vazquez-Cardona; Karla Vilches Castaño; Kenneth X. Rodriguez-Rivera; Samantha Huang; Pablo Sosa-Negrón; Heath Petkau; Oluwatosin Ogundimu; Jade Nelson; David M. Logue P6

Song type sharing and geographical distance in Adelaide's Warblers during the dawn chorus

Like many songbirds, male Adelaide's Warblers (*Setophaga adelaidae*) sing repertoires of discrete song types, some of which are shared with their neighbours. This study investigated the relationship between song type sharing and geographical distance to improve our understanding of dispersal and vocal communication in this species. We recorded several dawn choruses from each of 14 males, resulting in 11,662 song recordings. We blindly scored song types based on their appearance on sound spectrograms. We then calculated the song type sharing index (S), and average distance between individuals for all possible dyads. Song sharing was high (S ~ 0.45 – 0.65) among close neighbours, but fell off rapidly with distance, resulting in a strong negative correlation (r = -0.74) between geographic distance and song type sharing. This pattern suggests that males attempt to establish territories close to the males from whom they learned their song types. Our findings are compatible with the hypothesis that shared song types serve an important function in communication among neighbours. Future studies will examine the function(s) of shared song types during the dawn chorus.

Leonard Patterson; Brendan Casey; Erin Bayne P32

Is it a mixedwood? Spatially-explicit responses to gradients in habitat structure and composition in three boreal bird species

Conventional definitions of mixedwood forests are based solely on tree species composition, consider species composition at a relatively coarse grain, and do not explicitly address spatial scale. Such definitions may oversimplify the habitat complexity perceived by avian species, potentially biasing past attempts to identify mixedwood habitat associations. To address this knowledge gap, we used a spatially-explicit approach to understand how three boreal bird species–Black-throated Green Warbler (*Setophaga virens*), Tennessee Warbler (*Leiothlypis peregrina*), and Bay-breasted Warbler (*Setophaga castanea*)–respond to continuous gradients in deciduous-coniferous composition, the spatial arrangement of coniferous trees, and forest age within mixedwood forests in Alberta, Canada. We used a boosted regression tree model to assess the influence of these habitat characteristics across multiple spatial extents (150 m, 500 m, 1000 m) and grain sizes (10 m^2 and 30 m^2) on bird relative abundance. For both black-throated green and Bay-breasted Warblers, the proportion of conifer at the fine grain and local extent was the strongest driver of abundance. In contrast, Tennessee Warbler abundance was most strongly influenced by the proportion of conifer measured at the broadest scale. The spatial configuration of conifers and forest age exhibited scale-dependent effects that varied among species, with an important interaction occurring between the proportion and spatial configuration of coniferous trees for Bay-breasted Warbler. Our results demonstrate that relying solely on coarse classifications of stand composition may obscure important variation in how birds perceive and use habitat, highlighting that spatially explicit definitions of mixedwood forests will vary among species. As such, preserving or restoring intimate mixtures of conifer and deciduous species at fine spatial scales may be particularly beneficial for species like Bay-breasted Warbler, which exhibit strong scale-dependent responses to spatial configuration.

Victoria A Pepe; Lauren M Weeks; Natasha L Barlow; Liam P McGuire SY5.2

Where the Whip-poor-wills will: third and fourth order habitat selection in a migratory nightjar

Species of conservation concern face population declines influenced by anthropogenic habitat loss and degradation, making it essential to understand habitat selection for conservation planning. Defining habitat for highly mobile species such as migratory birds can be especially difficult as they travel long distances and occupy different habitat seasonally. The Eastern Whip-poor-will (*Antrostomus vociferus*) is a species of aerial insectivore that has experienced population declines of approximately 70% throughout its range since the 1970s, but little is known about their habitat selection. We tracked Eastern Whip-poor-will breeding on restored farmland to 1) determine home ranges and local movement patterns on breeding grounds (3rd order habitat selection) and 2) define nest-site selection preferences (4th order habitat selection). We found nest sites of incubating birds and surveyed vegetation at multiple spatial scales to compare with random, unused habitat. We recorded 31 variables for each location, including percent leaf litter, canopy cover, percent tree (vegetation > 2m) and percent shrub (vegetation < 2m). In 2024 we tracked 11 birds (3 females, 8 males) with a cumulative total of 383 home range points and found 7 nests. Preliminary results indicate there may be overlap in breeding territories, with multiple males seen defending territory in the same location. Preliminary analysis also indicates selected nest sites are associated with greater canopy cover than random sites, but with a limited sample size no other differences have been noted at this stage. We will conduct additional fieldwork in 2025 to increase our sample size for radiotelemetry and nest site selection. Understanding fine-scale aspects of habitat selection (3rd and 4th order selection) will inform conservation efforts for this species of special concern, providing insights for habitat management and restoration efforts to mitigate population declines.

Joshua K. Pickering; Dr. Rebecca Rooney FR1.2

Assessing resilience: insights from a thirty-year breeding bird census dataset at Long Point, Ontario, Canada

Habitat loss and degradation – driven by ecological disturbance – is the leading cause of global avian population decline, yet there are few studies which have the opportunity to evaluate the long-term response of bird communities following the removal of large-scale disturbance. We take advantage of a long-term community monitoring project at Long Point, Ontario, Canada to investigate changes in breeding bird community diversity, density, and composition during a 30-year period of white-tailed deer suppression. In North America, overabundant deer have been shown to be an indirect but key driver of bird decline by reducing the structure and altering the composition of vegetation communities, which in-turn limits the availability of food resources and nesting opportunities for birds. Still, deer management is not the only factor influencing breeding bird community changes at Long Point, and the complex interactions of invasive species expansion, local climactic fluctuations, and Great Lakes' water level instability present an opportunity to investigate these additional and cumulative effects on the bird community. We employ time series, generalized additive models, and non-metric multidimensional scaling models in addition to a model competition framework to assess trends of the breeding bird community over time at Long Point. Our results are anticipated to support local conservation management as well as regional and national avian community recovery and deer management efforts.

Elizabeth Porter; Shoshanah Jacobs; Adam Smith; Karl Cottenie TH1.1

Transparent attribution of Canadian citizen science bird data in the peer-reviewed literature

Citizen science bird monitoring has generated extensive spatial and temporal datasets that provide insights into long-term trends in bird populations. Substantial ongoing volunteer contributions to citizen science projects have led to some of the oldest (e.g., Christmas Bird Count), most established (e.g., North American Breeding Bird Survey, BBS), and most geographically widespread (e.g., eBird) monitoring programs. In this study, we explored trends in the use of Canadian bird citizen science data for ornithological research by examining the peer-reviewed literature published between 1970 and 2024. Only 51% of the time was volunteer participation transparently attributed. Transparency was not significantly related to which citizen science projects were used, the number of citizen science projects used, or prestige of the journal the article was published in. While there has been improvement over time, there is still a significant increase in instances lacking transparent attribution when controlling for publication year. Our results indicate that the use of citizen science in the peer-reviewed literature is likely underreported, and the reasons for lack of transparency are multifaceted. Since contribution to scientific research is an important motivator for volunteer participation, transparent attribution is crucial to recognize the significant volunteer contributions that make citizen science datasets valuable, and to ensure long-term volunteer commitment.

Nikeet Pradhan; Bikash Adhikari; Madhu Chetri FR1.6

Avifaunal diversity along an elevational gradient in Gaurishankar Conservation Area, Nepal using both conventional and acoustic point count methods

Nepal has 892 bird species, classified into 99 families and 24 orders, accounting for around 9% of the world's bird species. The research was carried out at Gaurishankar Conservation Area's two most popular trekking destinations, Lapchi and Tsho Rolpa. There is currently not much study on bird diversity along the altitude gradient in the Gaurishankar Conservation Area. The study was carried out throughout the autumn season (October and November) using the point count method with the rise in 200m elevation. The study found 830 individuals of 110 bird species from 7 orders and 30 families. In terms of abundance, 74% were uncommon, 24% were frequent, and 2% were common birds in this study region. The region's bird migration was diversified, with 87% resident species, 6% summer visitors, 6% winter visitors, and 1% passage migrants. There were 2 IUCN Red List globally threatened species, 6 National Red List species, and 5 CITES Appendix II species. The conventional point count method identified 100 bird species, but acoustic point count data resulted in 53 species during data collection, and when both methods were integrated, the aggregate data gave 110 species. The Shannon's Diversity Index (H) was greater for the Tsho Rolpa route than for the Lapchi route. The results suggest that the highest diversity of birds is found between 1806m and 2185m, with the most species at 1985m, and that as elevation rises, species diversity decreases. The bird species reported were classified into seven foraging guilds, with the insectivorous guild having the most bird species. This research stresses the region's importance as a habitat for avifauna.

Paul J. Preston; Frances Bonier TH2.5

Individual variation in response to human disturbance predicts reproductive success in urban Song Sparrows (*Melospiza melodia*)

Urbanization is a major driver of global habitat change and has profound impacts on the abundance and diversity of species found in cities. This change in habitat presents a challenge to species that live in cities, and, in general, urbanization leads to a decrease in biodiversity and a homogenization of species. However, some species can cope with these challenges and even thrive in urban environments. The causes of the spectrum of species' responses to urban environments are not fully understood, but one potential factor is how well species tolerate human disturbances. In our study, we experimentally disturbed the nests of urban-dwelling Song Sparrows (*Melospiza melodia*) and observed their behavioral responses, including how quickly they flushed from the nest when approached (flight-initiation distances) and how long it took them to return to their nests after the disturbance. Each nest was disturbed eight times in a day to assess the birds' ability to habituate to the disturbances. We then monitored these nests to assess their reproductive success, seeking to understand if individual variation in behavioural responses to human disturbance predict reproductive success in an urban environment. The results of our study highlight the key role that behavioural flexibility plays in helping birds succeed in urban environments. Urban birds are constantly exposed to human disturbances and understanding whether the ability to tolerate these disturbances predicts success could help explain why some species thrive in cities while so many do not.

Charlotte M. Probst; Isaiah Clark; Kyle Cameron; Matthew Fuirst; Stuart A. Mackenzie; Scott Yanco; Mark Ziebell; Brian C. Weeks SY5.3

Disentangling the drivers of morphological change over 50 years in a population of Tree Swallows (*Tachycineta bicolor*)

Declining body size has emerged as a widespread response to climate change in birds, but the mechanism behind these declines remains elusive. We combine experimental warming manipulations with a nearly 50-year historical dataset to understand the drivers of size changes within a population of Tree Swallows (*Tachycineta bicolor*) nesting at Long Point, Ontario. We experimentally warmed 96 Tree Swallow nests to determine if increased developmental temperature would trigger a plastic response for smaller body size. Pairing this experiment with historical insect abundance and Tree Swallow breeding records from Long Point since 1977, we examined the interplay between temperature, phenological shifts, and insect abundance on nestling and adult body size. This well-studied system allowed us to test three competing hypotheses: that body size declines are driven by 1) temperature-induced phenotypic plasticity; 2) selection for improved thermoregulation; or 3) by environmentally-mediated declines in available insect biomass. Our preliminary analyses found that nestlings developing in warmer nests were smaller at fledge, suggesting some plastic effect of temperature on mass. However, the historical data revealed that Tree Swallows at Long Point have advanced their phenology such that temperature during the nestling period has not increased through time, making warming-driven plasticity an unlikely driver of observed size declines. Instead, our initial analyses suggest that temperature- and precipitation-mediated declines in insect biomass may be leading to reduced size in this population. By examining the drivers of body size change through time in a well-characterized population, we aim to apply these insights to size changes happening in systems throughout the globe.

Jamie A. Quinn; Russell D. Dawson P3

Causes and consequences of variation in egg shape of tree swallows (*Tachycineta bicolor*)

Many studies have examined the causes and consequences of variation in egg size, but relatively few have investigated intraspecific variation in egg shape. In 2024, we measured the shape and size of 333 eggs laid by 53 tree swallows (*Tachycineta bicolor*) at two sites in north-central British Columbia. Using data collected on available insect biomass, weather conditions, and female morphology, we examined how maternal characteristics and environmental conditions experienced during the egg formation period influenced three indices of egg shape: elongation, pointedness, and polar asymmetry. We found all three indices to be significantly and positively correlated, although relationships were weak to moderate. Repeatability of egg shape was significant within clutches, and female identity accounted for more variation in elongation than in pointedness or polar asymmetry. Although heavier eggs were more elongated on average and females in good condition generally laid heavier eggs, female condition was only a marginal negative predictor of elongation. We suggest there may be other morphological characteristics influencing elongation that we did not measure in our study. Female age and available insect biomass averaged over two and three days before an egg was laid were marginally significant negative predictors of pointedness, suggesting both maternal and environmental factors could influence pointedness. Clutch size was a marginally significant predictor of polar asymmetry, and we suggest this could have implications for efficient egg rotation during incubation. Hatching success was not predicted by egg shape, but unbalanced sample sizes limited our ability to draw strong inferences about selection pressures exerted on egg shape. Overall, our results suggest that the three indices of egg shape measured in tree swallows are each influenced by different maternal and environmental factors, but more work is needed to understand the potential fitness consequences associated with egg shape.

Anees Ur Rahman P33

The structure of bird communities in urban parks in Beijing, China

Urban parks play a critical role in conserving biodiversity within rapidly expanding cities. This study investigates avian community structure and its seasonal dynamics across four urban parks in Chaoyang District, Beijing, China. A total of 68 bird species were recorded across four distinct seasons, providing valuable insight into temporal shifts in species composition and park-level habitat use. To analyze the patterns and drivers of avian diversity, we applied multivariate and statistical methods including Redundancy Analysis (RDA), Permutational Multivariate Analysis of Variance (PERMANOVA), and T-tests. RDA revealed strong correlations between vegetation structure and bird assemblages, highlighting the importance of canopy cover, understory density, and tree height in shaping community composition. PERMANOVA confirmed significant differences in species assemblages across seasons and parks ($p < 0.05$), indicating that both spatial and temporal factors influence bird diversity. T-tests further supported seasonal variation, with significant differences in species richness and abundance between winter and summer, as well as between ecologically distinct parks. Our findings emphasize that urban green spaces, if managed with ecological principles in mind, can support diverse bird communities even in heavily urbanized districts. Seasonal fluctuations in avian diversity suggest the need for adaptive park management strategies that accommodate migratory and resident species throughout the year. This research contributes to the growing field of urban ecology by integrating multivariate models and robust field observations to assess urban biodiversity. The outcomes offer practical guidance for urban planners and conservationists aiming to design bird-friendly cities, especially in regions facing rapid urban transformation.

Laura Robayo Noguera; Chloe A. L. Stevenson; Tianconghui Wang; Matteo K. Pasquale; Carrie L. Branch TH2.3

Association between spatial cognitive abilities and secondary sexual traits in wild black-capped chickadees

In seasonally variable environments, enhanced cognitive abilities may allow animals to adjust their behavior to changing conditions. Nonmigratory food-caching birds, like chickadees, rely on specialized spatial cognition to successfully cache and retrieve food items and survive the winter. Previous studies have linked spatial cognitive performance in chickadees to enhanced fitness, including survival and reproduction; however, it remains unknown whether females assess male cognitive ability via direct observation or secondary sexual traits. In this study, we investigated whether variation in common secondary sexual traits of songbirds, song and plumage, serve as indicators of cognitive ability in black-capped chickadees (*Poecile atricapillus*) when accounting for dominance rank. To explore this, we brought wild male black-capped chickadees into captivity, tested their performance in three spatial cognitive abilities (spatial learning, cognitive flexibility, and long-term retention), determined the relative social dominance ranks among all individuals, measured plumage reflectance in six body regions, and recorded their fee-bee songs to assess the relationship between these variables. Our findings show that birds with brighter white plumage and greater contrast between black and white plumage patches performed better in the spatial learning and memory task. In contrast, we found no significant associations between cognitive performance and song variation. Our results suggest that females may use some secondary sexual traits as signals for cognitive performance, although, we suggest direct observation may also be important for mate choice involving cognitive ability in chickadees. This work provides insights into female mating decisions, highlighting the complex nature of sexual selection and female preferences.

Kerry Roe; Vicki Friesen; Jennifer Provencher P24

Investigating geographic variation in climate vulnerability in a widely distributed Arctic seabird

Climate change is a major threat to biodiversity worldwide. Warming at the poles is occurring much faster than the rest of the globe. Many animals living in the Arctic are highly adapted to sea ice and may be more vulnerable to rapid changes in their environment compared to populations of the same species in temperate regions. For example, Black Guillemots (*Cepphus grylle*) are seabirds found across the North Atlantic, including the Canadian Eastern Coast and Arctic. Arctic populations of Black Guillemots rely on sea ice for foraging and may have difficulty adjusting to a rapidly changing climate. I will use a molecular analysis called genomic offset to examine how much a population's current genetic makeup would need to change to adapt to future environments. This will help to identify Black Guillemot populations that may be most vulnerable to climate change. I will generate whole genome sequences (a method to read all the DNA that makes up an individual) for five Black Guillemots from each population across their range. I will map geographic variation in these sequences together with climatic data to identify correlations between genetic variation and climatic conditions that each population experiences. Subsequently, I will use a machine learning algorithm to determine the genetic composition that would be the most beneficial for the predicted future climate in each region. Identifying which populations of Black Guillemots are most vulnerable to decline under rapid climate change is critical to determine whether additional conservation measures are required.

Andres N. Rosales; Ann E. McKellar; Scott Wilson; Kirsty E. B. Gurney SY4.8

Evaluating the effects of agriculture on population trends of a breeding grassland shorebird

Across North America, widespread agricultural intensification has raised concerns about how land use changes are affecting breeding bird populations. Whereas the negative effects of intensification on avian communities are well documented, studies are often regional and species-specific. Furthermore, effects of agricultural land use have been extensively researched in passerine and gallinaceous birds, but there are limited data quantifying these effects on breeding grassland shorebirds. During the breeding season, Upland Sandpiper (*Bartramia longicauda*) are widely distributed across North America and inhabit a range of agricultural landscapes, making them an ideal model for evaluating the effects of agriculture on breeding grassland shorebirds. Although some data suggest an increasing long-term (1970-2018) population trend in this species, there are localized declines throughout Canada, and the extent to which agricultural intensification contributes to these declines is unknown. To test the hypothesis that variation in landscape composition, configuration, and diversity influence local trends in abundance of breeding Upland Sandpiper populations, we combined two key datasets (2012–2022): (i) the large-scale, spatially explicit eBird Status and Trends products, as an index of breeding population trends; and (ii) remotely sensed land cover data, to characterize breeding landscapes across North America. We used Structural Equation Modeling to quantify direct and indirect effects of landscape metrics on trends in abundance of Upland Sandpiper. Preliminary results suggest the simplification of landscapes is associated with declines in Upland Sandpiper breeding abundance, and our ongoing work will contribute to a broader understanding of how large-scale landscape changes shape population trends in breeding grassland-dependent birds.

Jordan Rustad; Alan R. Smith TH1.4

Last Mountain Bird Observatory: over 30 years of songbird monitoring on the prairies

Banding stations provide important long-term datasets about migrating songbirds, allowing researchers to determine migration routes, population trends, and offer education opportunities for the public. Last Mountain Bird Observatory has operated continuously since 1990, and as a member of the Canadian Migration Monitoring Network since 1992. We are the only CMMN station in Saskatchewan and capture boreal breeding warblers and birds from Alaska, Northwest Territories, and northern British Columbia, Alberta, and Saskatchewan. We have contributed to national population trends of 56 species through daily mist netting and census efforts during spring and fall migration for over 30 years. We have also contributed to multiple research projects on stable isotopes and ectoparasites. We will shortly be preparing the 35-year report (1990-2025) for landbird monitoring at Last Mountain Bird Observatory. Since the publication of the 25-year report we have noticed changes in capture rate and net hours. The number of net hours has decreased and so has the number of birds captured but capture rate has remained relatively stable. We will be investigating possible explanations including weather patterns, specifically wind speeds, regional landscape changes, and local habitat. It is our hope that our consistent data set on migrating birds and the 35 year report will inspire further research into local movements through the Last Mountain lake area and the prairies.

Jordan Rustad; R. Mark Brigham; Ryan Fisher SY2.2

Avian species richness and community shifts along a gradient of urbanization in a northern prairie city

Urbanization causes habitat loss, fragmentation, and homogenizes bird biodiversity across the globe, typically leading to decreases in species richness with increasing impervious cover. Regina, Saskatchewan, Canada is a prairie city with large amounts of green space but is completely surrounded by monoculture agricultural crops leading to uncertainty about what patterns of species richness and species abundance may occur in this context. We tested whether species richness, as well as species abundance, was related to impervious cover and other landscape metrics. We deployed autonomous recording units at 28 sites around the City of Regina in 2022 and 2023 for 4-week periods over three seasons each year (spring, summer, fall). Species richness was highest at sites with 10-20% impervious cover where there was a mix of different anthropogenic features and natural/semi-natural vegetation types. However, many grassland- and wetland-associated birds decreased in abundance 30-60% impervious cover. Whereas Red-breasted Nuthatch and Merlin increased with increasing impervious cover, but these species may be responding to increased tree cover in the city, and not impervious cover directly. Our study highlights the need to understand city specific and species-specific responses to urbanization. Urban management for birds needs to include a variety of habitats to encourage bird diversity.

Apoorv Saini; Erin Bayne SY3.6

Effect of off-highway vehicle noise on the spatial distribution of boreal birds

Alberta's boreal forest, a critical habitat for over 200 bird species, faces growing pressures from industrial and recreational activities. Linear features such as seismic lines, initially created for resource extraction, now serve as corridors for off-highway vehicles (OHVs), impeding vegetation recovery and potentially disrupting wildlife. This study examines the effects of intermittent OHV disturbance on the spatial distribution of boreal birds. In June 2024, a sound localization experiment was conducted along a seismic line at the Cold Lake Imperial Site using 24 GPS-synced SM3 Autonomous Recording Units paired with external microphones. Over three consecutive days, bird activity was recorded under three conditions: pre-disturbance (Day 1), during a combined visual and noise disturbance (Day 2), and post-disturbance (Day 3). Responses of two dominant species, the Winter Wren (WIWR) and the Ovenbird (OVEN), were analyzed using generalized least squares models. Preliminary results ($p < 0.05$) indicate species-specific responses: WIWRs moved away from the seismic line during and after the OHV activity, whereas OVENs moved slightly closer. These divergent responses highlight the varying sensitivities of boreal birds to human disturbances, with WIWRs exhibiting stronger avoidance behaviour. By filling a critical gap in our understanding of intermittent OHV noise impacts, our study provides insights that could inform management practices to better protect avian habitats in Alberta's boreal forest.

Angeles Raymundo; Tatiane Micheletti; Samuel Haché; Diana Stralberg; Steven L. Van Wilgenburg; Geneviève Degré-Timmons; Junior A. Tremblay; Eliot J. B. McIntire; Steve Cumming; Ceres Barros SY3.1

Northern landbird communities show geographically constrained resilience to projected climate and forest changes

Given the extensive predicted configuration of avian assemblages driven by climate change, fully understanding its ecological ramifications requires a community-level perspective rather than a single-species focus. We integrated functional redundancy and diversity metrics, enabling us to assess how climate-driven shifts in species composition might alter or maintain key ecological functions. Our research focuses on the Taiga Plain ecozone of Canada, particularly the boreal forest of Northwestern Canada. We used species distribution models and climate-sensitive, spatially explicit models of forest dynamics and wildfire to predict future habitat shifts and their effects on landbird species. These models helped generate yearly habitat layers that were used to project changes in bird densities from 2011 to 209. Guided by the cross-scale resilience model, which emphasizes the importance of functional diversity for community resilience, we classified 72 landbird species based on their dietary habits and foraging strategies. We calculated functional redundancy and diversity metrics to evaluate how species functions might be impacted by climate-driven shifts. Our results show that southern regions of the Taiga Plain may be more resilient, with higher levels of functional redundancy, while northern regions are expected to experience a decline in redundancy and an increase in functional diversity over time. This suggests that northern bird communities are more likely to undergo significant reorganization in response to climate change. Identifying communities with varying levels of resilience to climate change is crucial for guiding conservation strategies. Regions with lower predicted resilience should be prioritized for conservation efforts, focusing on maintaining habitat heterogeneity and connectivity to support potential range shifts and community reorganization. Our findings emphasize the need for spatially explicit conservation strategies that account for regional variations in vulnerability. Further research is essential to explore the underlying mechanisms of these variations and develop adaptation strategies to protect vulnerable bird communities in a changing climate.

Ines Sanchez-Rodriguez; Graham Strickert; Terry Carriere P7

Delta Birds: a game-based boundary object for biodiversity conservation in the Saskatchewan River Delta

Boundary objects play a critical role in participatory research, serving as tools that facilitate dialogue and mobilize knowledge across diverse groups. This study examines the development and application of Delta Birds, an interactive trivia game designed to raise awareness of avian biodiversity in the Saskatchewan River Delta (Saskatchewan, Canada), while promoting conservation through gameplay. Conceived as a boundary object, the game bridges linguistic, cultural, and pragmatic divides related to bird species in the Delta. The iterative design process involved close collaboration with local community members — co-authors of this abstract — particularly those engaged in bird song recording initiatives with the Audubon Society. Our findings suggest that Delta Birds supports meaningful engagement with biodiversity conservation from Indigenous perspectives, helping participants connect with local ecosystems in accessible and immersive ways. In particular, the game has become a tool for mobilizing Indigenous bird knowledge and promoting the use of the Cree language. In addition to being an interactive presentation, we will explore how game-based boundary objects can function both as engagement tools and research methods, contributing to avian biodiversity research that is more responsive to community priorities. More broadly, this work is part of a larger project exploring the potential of boundary objects to deepen the relationship between research, action, and local knowledge systems. As the game evolves, we continue to examine how interactive tools can enhance public engagement in biodiversity conservation and support community-led environmental stewardship. We invite you to learn more about the birds of the Saskatchewan River Delta — one of North America's largest inland deltas, and a vital bird region in Saskatchewan, rich in ecological and cultural significance.

Jacqueline Schoen; Tara Imlay; Kingsley Donkor; Sydney Bliss; Dan Yip; Corrine Genier; Matt Reudink P28

Short-term impacts of the Site C Dam on a declining aerial insectivore: the Bank Swallow

Hydroelectricity is one of the largest sources of renewable energy globally and currently generates the majority of Canadian power. However, dams reduce the availability of low-lying wetlands for foraging and likely cause environmental contamination leading to accumulation of heavy metals in the environment. The Site C Dam, located along the Peace River in British Columbia is BC Hydro's third hydroelectric project. Along this river is one of the largest populations of Bank Swallows (*Riparia riparia*) in the province, with an estimated 60+ breeding colonies. Bank Swallows are listed as a Threatened species in Canada under the federal Species at Risk Act, and since the 1970s, their population has declined by more than 98%. During recent breeding seasons we collected 212 feather and 195 blood samples from 22 colonies, both upstream and downstream of the Site C Dam construction site. We are now investigating the bioaccumulation of trace elements, including heavy metals, in this population and have found evidence suggesting heavy metal burdens on Bank Swallows are influenced by the location and proximity of nesting sites in relation to the dam. We are also evaluating the quality of Bank Swallow diet via analysis of fatty acids to determine if diet has changed in response to the habitat alteration. Overall, we are exploring how the cumulative effects of dam construction may alter the environment and, in turn, affect the health, survival, and fitness of this Threatened species. These potential negative effects of hydroelectric projects on Bank Swallows have not yet been assessed, particularly on a large scale

Nicholas Shephard; David J. Moore; Scott Flemming; Matthew Reudink; Ann E. Mckellar FR3.2

Do Black Tern populations on the periphery of the range act as population sinks? An assessment of breeding productivity across the species range

The Black Tern (BLTE) has experienced long-term population declines that are geographically variable across its North American breeding range, with greater declines on the periphery of the range compared to the core. Research on breeding success from the periphery has shown that productivity is low and appears to be a primary factor driving population declines. Despite this low success, peripheral populations are persisting, potentially due to immigration from source populations. Productivity in the core of the range has yet to be studied. Understanding source-sink population dynamics is critical for a species in decline like the BLTE. In this study, we assessed and compared productivity of individuals at breeding colonies in Saskatchewan ('core' site), and Ontario and British Columbia ('peripheral' sites). The daily survival rates of BLTE nests were calculated using a logistic exposure model in a Bayesian framework with data collected from across a range of 1-4 years at the three sites, including an age effect on the daily survival rate of nests. There was a negative relationship between the daily survival rate of nests and nest age, and vegetation composition surrounding the nest influenced nest survival. Preliminary results suggest that nest survival in the core of the species range is higher than that in the periphery. We will present these results on the differences in nest survival between core and peripheral sites; our results have important implications for the persistence of BLTE populations in North America and will provide insights into where conservation actions may be most beneficial.

Adam C. Smith; Marcel A. Gahbauer; Judith D. Toms; Brandon P.M. Edwards; Elly C. Knight; Barry G. Robinson; Ken Rosenberg FR1.1

Refining population estimates for North American birds: reducing bias from imperfect detection, spatial sampling, and temporal change

Partners in Flight has maintained the Population Estimates Database for North American landbirds since 2005. These estimates have been widely used in support of species status assessments, conservation planning, and communicating the status of North American bird populations. However, broad uncertainty around some estimates and potential biases due to gaps in geographic and temporal coverage have posed some limitations on the database's applicability. Estimating the absolute size of wild bird populations requires adequate survey data and appropriately complex modeling of detection probability to transform field observations into estimates of true density. We have developed a model that integrates formal data-derived estimates of detectability for hundreds of species, range-wide relative abundance surfaces, and spatial information on the locations of data from the North American Breeding Bird Survey (BBS) into a formal Bayesian estimation model. Our improved method combines important elements of the existing PIF population estimates framework, a large database of structured observations that allow formal detectability estimates (NA-POPS), the hierarchical Bayesian count-based trend models applied to the BBS data and high-resolution spatially explicit estimates of relative abundance (e.g., eBird weekly relative abundances). It calibrates a species' relative abundance surface to represent species' density on the landscape and thereby generates population estimates, with associated uncertainties, for any custom portion of the continent or the species' range. This new method works well for territorial songbirds and other species well monitored using point count field methods and observations during the early morning hours. Other species such as colonially nesting birds, crepuscular or nocturnal species, and species with highly specific habitat requirements, will require further model development.

Alisa M. Solecki, Dr. Vicki L. Friesen, and Dr. Amy A. Chabot P34

Variation in migratory restless over time and between environments using nanotags on captive Loggerhead Shrike

Eastern Loggerhead Shrike (*Lanius ludovicianus migrans*) are an endangered subspecies of raptorial songbird whose breeding range has been reduced exclusively to eastern Canada. A captive breeding colony was established in the late 1990's to raise offspring which are released to supplement the dwindling wild population. This captive colony includes breeding facilities in Canada and the eastern USA which provide a unique opportunity to research migratory urge for this cryptic species. Radio telemetry research has been conducted over the past four years at two conservation breeding facilities, one of which is located near the breeding grounds and the other near the purported wintering grounds for this subspecies. This analysis will illustrate how migratory restlessness varies in accordance with age, environment, and sex using Lotek nanotags on birds which are tracked across multiple years. Additional insights into the migratory behaviour of this endangered species and their relevance to conservation actions will be highlighted, such as novel observations of the intermittent patterns of migratory activity which have elevated the potential importance of migratory stopover areas.

Carter W. Stoelzel; Nancy A. Mahony; Margaret L. Eng; Christy A. Morrissey SY4.1

Impact of agricultural practices on Horned Lark (*Eremophila alpestris*) reproduction in southern Saskatchewan

Horned larks (*Eremophila alpestris*) are a common grassland species experiencing steep population declines in Canada. While they frequently breed in agricultural landscapes, the effects of agricultural intensification on their reproduction remain unclear. The objectives of this study are to 1) evaluate territory dynamics in Horned larks in crop fields and pastures in Saskatchewan, Canada to understand how crop and land use, seeding dates, vegetation structure, and modern farming practices including pesticide applications and tillage, affect breeding densities, territory persistence and nest success and 2) to investigate the individual insecticide exposure of Horned larks in relation to land use. For the first objective, field and roadside surveys were conducted up to three times during the breeding season in cropland and pastures (2024: n = 24 fields, 2025: 50 fields) to assess the relative density and persistence of breeding pairs on their territories throughout the growing season. Nests identified during territory field surveys will be monitored until fledging or failure to evaluate nest fate in crop and pasture sites. For the second objective, in 2025, neonicotinoids will be measured in nestling fecal samples and insect prey boluses collected via the ligature method, as well as in insects collected from the surrounding habitat by sweep netting three 25 m transects within 200 m of sampled nests before and after seeding in crop fields. Preliminary results from 2024 indicate that Horned larks persist in their territory throughout the growing season and did not have a significant difference in density between cropland and pastureland. This research will provide insight into how modern agricultural practices may be affecting Horned lark populations and will inform conservation strategies for this and other declining grassland bird species.

Yantong Tan, Kevin Fraser P19

Investigating how daylight availability impacts the duration of migratory flights and nest provisioning in a diurnal, aerial insectivore

The amount of daylight available to diurnal birds for migration or breeding varies seasonally and across latitudes. While selection has generally favoured relatively earlier arrival and shorter duration of travel to the breeding ground in long-distance migrants, it remains uncertain whether longer day lengths at more northern latitudes support a faster migration rate or greater nest provisioning as compared to more southern breeders. I investigated daylight availability in relation to the daily migration and provisioning levels of a diurnal migratory songbird, purple martin (*Progne subis*), across a latitudinal gradient. I predicted that purple martins breeding at higher latitudes are exposed to longer daylight during migration and have longer daily flights and that longer day lengths extend the duration of nest provisioning, resulting in higher fledgling success and/or shorter nesting periods as compared to southern breeders. Using migration data from light-level geolocators (n=308) deployed across the breeding range (~26˚ N to ~53˚ N), I found that birds breeding further north experience longer daily daylength on average (~4 minutes per degree latitude North) during spring migration. I will use GPS tracking tags programmed to collect geographic fixes every 2-4 hours to more precisely examine how the latitudinal differences in daylight availability affect flight duration (excluding barrier crossing and stop-over). Using an RFID tracking system mounted on nestbox entrances, I will access the provisioning effort by purple martins breeding in Manitoba, where purple martins experience longer daylengths but can also encounter extreme temperatures that impact their activity levels. Given that climate change is more pronounced at higher latitudes, exploring the impact of local weather variability on the provisioning effort of long-distance migratory species will help us assess whether northern migrants continue to gain fitness benefits from longer daylength at higher latitudes.

Hannah Tench; Russell D. Dawson SY5.4

Hatching failure in tree swallows (*Tachycineta bicolor*) is driven by embryonic mortality, not infertility

Egg development is a crucial stage in the life cycle of a bird; across species including aerial insectivores, up to 17% of eggs fail to hatch under normal conditions. Hatching failure can be a consequence of either infertility or embryonic mortality; however, methods to distinguish between the two types of unhatched eggs have been underused by researchers. Aerial insectivores that use nest boxes, such as tree swallows (*Tachycineta bicolor*), are an ideal study species in which to investigate hatching failure, as nesting behaviour can be monitored closely throughout the breeding season. In 2022 and 2023, we monitored 1090 eggs from 191 nests at three study sites near Prince George, British Columbia. Using fluorescence microscopy to identify embryonic and sperm nuclei, we determined that 98.3% to 100% of the eggs were fertile, and most cases of hatching failure were therefore due to embryonic mortality, not infertility. Embryonic mortality was most likely to occur during early incubation, before development is usually macroscopically visible. We also examined 114 eggs from 17 clutches laid by tree swallows in 2016 and stored frozen for eight years, except for a brief thaw-freeze event in 2020 due to a freezer malfunction. Importantly, we successfully used fluorescence microscopy on this set of eggs, despite the conditions in which they were stored, and found that the fertility rate of this sample of eggs from 2016 was similarly close to 100%. This study is the first to quantify fertility and developmental stages of embryonic mortality in tree swallows and will provide an opportunity for further investigation into factors contributing to hatching failure in aerial insectivores. Recent advancements in avian fertility testing offer a relatively simple method for determining fertility of unhatched eggs and could allow researchers to enhance their understanding of the reproductive biology of their respective study species.

Amelia R Cox; Fred Tremblay; Andrea Brown; Barbara Frei; Laura Pollock; Kristin Bianchini; Samuel Haché; Tatiane Micheletti; Alex M. Chubaty; Eliot McIntire; Christian Roy SY3.1

Forecasting waterfowl distribution and abundance in the Canadian western boreal in the face of cumulative impacts of climate change

The western boreal forest is a crucial breeding ground for North American boreal waterfowl and is thought to serve as a key refuge for some duck species during drought periods in the Prairies. Climatic changes in the western boreal are expected to have important cascading effects through increased wildfire, drought and associated changes on forest composition and structure. Here, we developed species abundance models using generalized additive models for 17 waterfowl species from fixed-wing transect data from the Waterfowl Breeding Population and Habitat survey (2000-2019) to identify how 14 habitat covariates influenced waterfowl occurrence and abundance. We also selected habitat covariates that were forecasted by other landscape simulation modules implemented in the SpaDES ecological prediction platform, which enabled us to forecast changes in abundance and distribution under different climate change scenarios, accounting for cumulative impacts on waterfowl species. Habitat associations and spatial abundance patterns varied across species, but models performed well and explained on average 40.3% of the deviance (range 20.7-63.1%). Our models forecast declines in boreal specialists (scoters, Ring-necked Duck, mergansers, goldeneye, and Bufflehead) in large areas of their range by 2040, 2070, and 2100. Most of these declines are expected at the southern edge of the western boreal forest and abundance is forecast to remain stable or increase at the northern edge. Conservation planning for the western boreal forest will need to address cumulative impacts of climate change to offset the loss of southern boreal habitat, especially for habitat specialists, if we want to maintain those populations above their NAWMP targets.

Sunny Tseng; Dexter Hodder; Ken Otter SY1.3

Setting BirdNET confidence thresholds: species-specific vs. universal approaches

BirdNET is widely used in avian acoustic research, providing species predictions alongside confidence values that represent the algorithm’s certainty in species identification. Setting thresholds for these confidence values can increase precision (i.e., the percentage of true positives out of all the identified predictions) but may decrease the predictions retained and exclude true positives that fall below the threshold. This study evaluates two methods for setting confidence thresholds using a two-year audio dataset from western Canada, focusing on 19 target species: (1) a universal threshold of 0.7 across all species and (2) species-specific thresholds defined as the minimum confidence required to achieve a precision of at least 0.9. The universal threshold yielded precision ranging from 0.7 to 1.0 across species but retained only 17 ± 14% (SE) of BirdNET predictions. In contrast, species-specific thresholds ensured precision above 0.9 while retaining 70 ± 37% (SE) of predictions. Species-specific thresholds varied across species but were generally lower than 0.35. Confidence values associated with BirdNET predictions were found to be species specific, but no clear link was observed between BirdNET’s performance and species' song/call complexity, defined as song duration, bandwidth, and number of inflections. Our results confirm that species-specific thresholds offer higher precision and retain more predictions compared to a universal threshold. We provide a step-by-step workflow, including R code, to help researchers define species-specific thresholds that ensure reliable interpretation of BirdNET outputs. Additionally, we discuss how our workflow aligns with and complements previously proposed approaches for setting BirdNET thresholds.

Alyssa Wells, Colleen Barber TH2.6

Mate and nest site retention in an urban passerine

Keeping the same mate and territory positively impacts lifetime reproductive success of socially monogamous avian species. These benefits are especially pronounced in species with biparental care, due to the increased coordination between the pair resulting from many years of working together in caring for their young. Other benefits to mate retention include earlier laying dates and a higher likelihood of having a second brood in the same season. However, separation from a mate or departure from a territory still occurs. Studies have shown that factors important for mate retention include brood condition, fledging success, and parental age. If brood condition and/or fledging success were poor, pairs were more likely to separate. Similarly, pairs of younger adults were more likely to separate than older adults. We examined the frequency of mate and nest box fidelity in a cavity-breeding population of European Starlings (Sturnus vulgaris) over a 16-year period. We predict that mate retention would occur in broods where: 1) nestlings were in good condition, 2) had high fledging success, and that parents would be 3) older and 4) in better condition than in broods where mate retention did not occur. We had a return rate of 43% (169/396). Of these 169 returning adults, 25% retained either a mate or a nest box, 43% retained both a mate and nest box and 32% did not retain either. We also predicted that males would be more likely to keep a nest box than would females. The implications of our findings provide insight into whether mate or nest box retention enhance reproductive success in this urban passerine.

Luis Gerardo Gomez Vargas P29

The effects of weather on Mountain Chickadee (*Poecile gambeli*; Secwepemctsín: ts'kíkse7) reproduction across a rural-urban habitat gradient: an 11-year study

Urbanization and climate change are affecting all ecosystems on the planet, and species that are unable to acclimate or fail to adapt to these pressures may face extinction. A particularly flexible species, which is able to cope with a wide array of weather conditions and breed in both urban and rural habitats is the mountain chickadee (*Poecile gambeli*). In this study, I examined the effects of temperature and precipitation across a rural-urban habitat gradient to understand how chickadees respond to varying weather conditions throughout the year, and whether the response depends on habitat. Over 11 years, variation in weather was associated with changes in clutch initiation dates, the proportion of eggs hatched, and the proportion of nestlings fledged. Over this period, first-egg date shifted approximately one week earlier in rural habitats, and approximately 4 days later in urban habitats. In addition, urban and rural birds responded differently to temperature and precipitation throughout the year. Following warmer winters, birds in both habitats initiated breeding earlier; however, breeding occurred later in rural habitats when there was more winter precipitation. Higher winter precipitation was associated with reduced hatching success in rural birds but increased hatching success for those in urban habitats. The proportion of nestlings that fledged increased in urban habitats following experienced warmer, wetter winters, and during warmer breeding periods, while fledging success remained mostly unchanged in rural habitats, only experiencing a decrease with winter with more precipitation. Understanding the underlying processes behind these patterns will be crucial for predicting the response of mountain chickadees to ongoing climate change, highlighting the importance of more long-term studies to monitor the effects of weather on resident species, especially those that inhabit both urban and rural environments.

Camryn J. Vestby; Ray T. Alisauskas; Kate H. Martin; Mitch D. Weegman P22

Assessing the influence of environmental drivers and light goose population dynamics on components of king eider recruitment in the central Canadian Arctic

In many relatively long-lived species, variation in population growth is driven by variation in reproductive success and recruitment. Understanding environmental drivers of reproductive rates can provide critical information for practitioners to revise conservation plans that target improvements in population status. Sea ducks remain poorly understood, largely because of their cryptic and/or remote life history. Sea ducks will be among the most vulnerable bird groups in future years because many sea duck species occur for portions of the year or throughout the year in the Arctic, which is rapidly warming. In this project we will assess environmental drivers of components of recruitment in king eiders, which are a sea duck species that breed in the central Canadian Arctic and winter in the Atlantic and Pacific Oceans. We will assess the extent to which climatic indices such as the North Pacific Index, North Atlantic Oscillation Index, and local weather explain cross-seasonal and local consequences of environmental conditions on king eider clutch size and nest success from 1995 to 2019 at Karrak Lake in the central Canadian Arctic. Karrak Lake has comprised one of the largest lesser snow goose and Ross's goose (i.e., light goose) breeding colonies in North America, and their demography has been well studied. Although the breeding ranges of light geese and king eiders mostly overlap in the central Canadian Arctic and subarctic, the consequences of a large nesting colony of light geese on king eider reproductive success have not been well-studied. We will evaluate to which variation in king eider reproductive success has been explained by light goose colony size, density and reproductive success. Understanding the environmental pressures, and potential implications of competition with other species, on sea duck population dynamics will help inform conservation plans and contribute to indigenous understanding of species abundance in a rapidly changing ecosystem.

Maya L. Wade; Cameron D. Eckert; Isla H. Myers-Smith P23

Impacts of climate-driven shrub expansion on birds in the western Canadian Arctic

Climate warming is driving the expansion of woody shrubs across the Arctic tundra, reshaping habitats relied on by over 200 bird species. Shrub expansion could drive changes in avian ranges, behaviours, and population dynamics. However, the effects of shrub expansion on birds remain unclear. Using 35 years of bird survey data (1990-2025) from Herschel Island-Qikiqtaruk Territorial Park in the northern Yukon, we will assess how shrub expansion is impacting avian populations, habitat use, and community composition. By integrating field observations and satellite imagery, we will quantify trends in bird abundance and nesting activity relative to shrub expansion. Additionally, we will use bioacoustic monitoring to analyze species-specific habitat associations. Observations to date indicate increases in nesting songbirds in shrub habitats on Herschel Island-Qikiqtaruk, such as White-crowned Sparrows (*Zonotrichia leucophrys*), Redpolls (*Acanthis flammea*), and Bluethroats (*Luscinia svecica*). Concurrent observations also indicate decreased nesting of bird species that prefer open habitats, such as American Golden-Plovers (*Pluvialis dominica*). Building on these localized analyses, we will scale up our findings by evaluating circumpolar trends in avian responses to shrub expansion using publicly available bird occurrence data from peer-reviewed studies, eBird, and the Global Biodiversity Information Facility. Through niche modelling, we will assess how species distributions align with habitat changes to infer which species are likely to be winners or losers with the loss of open tundra habitats and increasing shrub-dominance in the Arctic. Our research will provide novel insights into the long-term effects of shrub expansion on tundra birds. Our findings will help identify species most vulnerable to continued vegetation changes, inform conservation strategies in Northern protected areas, and enhance our understanding of ecological shifts within Arctic ecosystems.

Cassidy L. Waldrep; John M. Coluccy; Josh C. Stiller; Jacob N. Straub; Mitch D. Weegman SA1.3

Time-activity budgets of eastern Mallards: a full annual cycle approach

Mallards (*Anas platyrhynchos*) are among the most extensively studied dabbling duck in North America. However, most research has focused on mallards breeding in the Prairie Pothole Region, which supports the largest population of this species. In contrast, eastern mallards—those residing along the eastern coast of North America—are less studied and are experiencing a population decline of approximately 9% from the long-term average starting in 1998. This decline is concerning for managers because mallards are a popular harvested species in the Atlantic Flyway. We have deployed over 1,200 GPS-acceleration tracking devices across the flyway during the past four years to study attributes of individuals that we anticipate contribute to the decline, including hypotheses tests about the behaviour, reproductive success, and habitat use of eastern mallards. Our first objective is to categorize behaviours, such as preening, flying, resting, and feeding, seasonally and annually throughout the full annual cycle. To achieve this, I will use machine learning techniques trained using a library of known behaviours to predict the unknown behaviours of tracked individuals. I will examine seasonal differences in behavioural patterns to better understand how eastern mallards allocate their energy, particularly leading up to the breeding season. Additionally, I will compare behavioural differences between individuals that inhabit urban versus rural environments, as eastern mallards occur across a gradient of urbanization. The results of this analysis will provide insight into how mallards distribute their energy across different seasons and landscapes, ultimately informing future analyses linking reproductive success, behaviour and energy expenditure, to inform revised conservation plans that slow or reverse the eastern mallard population decline.

Forrest Wallace; Kara Lefevre; Adam Smith; Rebekah Gibble P10

Assessing Black Rail distribution and habitat in the Everglades: implications for conservation and restoration planning

Human-induced global change has led to significant shifts in wildlife habitat and distributions, exemplified by the situation of the threatened Black Rail (*Laterallus jamaicensis jamaicensis*), a marsh bird recently listed under the U.S. Endangered Species Act. Once widespread across the eastern U.S. and parts of Central America, the species has experienced severe population declines due to wetland loss from landscape transformation, climate change, and sea level rise. Southern Florida, particularly the Everglades, may serve as a stronghold for this species, yet its distribution there remains poorly understood. This study aimed to establish a baseline of Black Rail presence in key areas of the Everglades, in collaboration with National Wildlife Refuges and other land managers, to inform conservation and habitat restoration. Call-response surveys were conducted at over 450 unique point locations from February through May in 2021 and 2022, using established USFWS protocols for secretive marsh birds. Surveys were timed earlier than typical (February vs. April–June) to align with South Florida's subtropical climate. The surveys assessed occupancy and identified habitat features relevant to Black Rail presence. Preliminary results include over 60 detections of Black Rail calls at 43 unique point locations across federal, state, and regional lands, including Big Cypress National Preserve, Fakahatchee Strand Preserve State Park, several National Wildlife Refuges (Ding Darling, Loxahatchee, Ten Thousand Islands), and South Florida Water Management District lands (Southern Glades). Ongoing analysis is evaluating occupancy patterns and the importance of specific habitat characteristics. These findings will inform future status assessments, adaptive management, and prioritization of areas for focused study and protection. The information generated is vital for conservation planning in the face of ongoing land use and climate change pressures.

Lauren Weeks; Victoria Pepe; Natasha Barlow; Liam P. McGuire SY5.1

Investigating the dietary and migratory ecology of a declining aerial insectivore, the Eastern Whip-poor-will (*Antrostomus vociferus*)

Aerial insectivores have experienced the second most extreme declines of any bird group since the 1970s. The conservation of highly mobile species at risk is particularly challenging due to the scale at which they interact with the environment and the unpredictability of their movements. Among aerial insectivores, the Eastern Whip-poor-will (*Antrostomus vociferus*) is a charismatic, yet poorly understood species, listed as a species at risk in Ontario. Its crepuscular nature and remarkable camouflage make it difficult to study, resulting in significant knowledge gaps – particularly regarding females and juveniles. My research examines diet and migration, with an emphasis on understudied age and sex classes. I tracked migration routes with the Motus Wildlife Tracking System (2024, n = 25). While fall departure dates did not differ between sexes, juveniles departed earlier than adults. Most birds migrated south of Veracruz, Mexico for winter, but a subset overwintered in Florida. Insights from spring migration will be available by the time of the conference. Continued migration research will investigate migration routes, migration rate, spring migration phenology, and questions of inter-annual site fidelity. We are also investigating prey selection strategies of the Eastern Whip-poor-will. In 2023 and 2024 we collected 60 fecal samples for DNA barcoding diet analysis. We assessed the available insect prey with light bucket trap sampling and have identified >360 species of moths. However, the prey community was highly uneven, with the five most abundant species comprising 25% of the available moths, and most species represented by fewer than five individuals. Our research will continue for an additional season in 2025, increasing sample sizes and the robustness of our analyses. Combined, our results will enhance conservation for this species at risk and help close the broader ecological knowledge gap surrounding the migratory patterns of female and juvenile birds.

Karen L. Wiebe SA1.1

Effects of sex and weather on migration routes and stopover sites of Snowy Owls

Migration is a component of the annual cycle of many birds so understanding what determines the timing, routes and stopover locations as individuals move over the landscape is important for conservation planning. Snowy Owls in central North America migrate between their breeding grounds in the high Arctic and their wintering area on the Canadian prairies. I studied the migration patterns of 15 Snowy Owls fitted with transmitters between 2015- 2021 in Saskatchewan, testing for differences between the sexes and whether phenology and stopover sites were repeatable within individuals. For both the spring and fall migrations, there was annual effect on departure date and on speed of movement but no difference between the sexes. The annual variation in departure date was related to the amount of snowcover. Owls made 2-22 stopovers on their route and spent 1-14 days at a stopover site. According to Manly's Selectivity Index, individuals avoided contiguous forest and lake ice and selected shoreline habitats during stopovers. Across years, individual owls showed moderate repeatability (r = 0.41) of the longitude of migration routes but were not philopatric to stopover sites. Snowy owls are apparently flexible in the routes they travel but the link between timing and snowmelt suggests that climate change in the future may effect the phenology of settlement and breeding.

Alexa Wiebe; Nicola Koper; Ken Otter P5

Impact of forest structure and retention logging on Pacific Wren (*Troglodytes pacificus*) abundance and singing behaviour

Forested habitats support a diverse community of birds, and traditional silviculture practices like clear-cutting can impact the integrity of forested habitats and retention of forest-associated species. Alternative logging methods, such as partial retention harvesting can help retain bird species. The Pacific wren (*Troglodytes pacificus*) traditionally occupies conifer forests with an abundance of coarse woody debris (CWD), such as logs, stumps, and root wads. They rely on intact, mature forests for breeding and show aversion to fragmented landscapes and cut blocks. They are listed as a specific of least concern in British Columbia, but with projected changes in climate, their numbers are likely to decrease. The John Prince Research Forest (JPRF) in northern British Columbia is experimenting with logging techniques utilizing partial retention and maintaining CWD in cut blocks. Our study compares the use of intact and partial-cut plots by Pacific wrens in the JPRF. Multiple plots, each consisting of three habitat types (clear-cut, partial retention, and mature forest) will be surveyed over a large scale within the research forest to account for spatial variation using a combination of Acoustic Recording Units (ARUs) and active observation surveys. Initially, we will deploy ARUs in mid-April to determine settlement patterns of Pacific wrens, and in early May, we will band individual male wrens and map their territories. We will use the BirdNET Algorithm to identify the presence of wrens from recordings, enumerating the number of days and first detections of wrens in each habitat class. From territory mapping of wrens that do settle, particularly in harvested plots, we will determine how those sites compare in habitat structure to forest plots. This project aims to determine the importance of habitat features, such as CWD, on wren settlement and use of landscapes, and whether this can inform harvesting practices in British Columbia.

Scott Wilson; Sergio Gomez; Simon English; Ana Diaz Bohorquez; Adrian Cabrera; Ana Gonzalez-Prieto FR1.4

Multispecies hierarchical modeling to examine impacts of land use on neotropical migrants in Mexico

Neotropical migratory birds are in decline across taxa with threats on the overwintering grounds being a known cause of decline for some species. Land use change in the Neotropics is a threat for many long-distance migrants, however, we still lack information on how many species respond to land use change. Agricultural expansion will continue over the next few decades, particularly in the tropics, and therefore conservation planning for the protection and recovery of Neotropical migrants requires knowledge on how species respond to land use change for agriculture on the nonbreeding grounds. From 2020-2022, we conducted point counts with distance sampling to survey the migratory bird community across land use types in Oaxaca, Mexico. We then used hierarchical community models to examine migratory bird abundance in relation to the gradient of natural to agricultural land cover at a local scale, forest cover in the surrounding landscape and elevation. Migratory bird abundance as a community was highest in mosaic land covers with a mix of natural and agricultural land followed by shade coffee agriculture; however, individual species varied widely in preferences with some preferring native forest types. Species also varied in their response to landscape forest cover with some species of conservation concern (e.g. Rufous Hummingbird) showing significantly higher abundance in sites with greater forest cover in the surrounding landscape. The migratory bird community showed a wide range of patterns with elevation including mid-elevation peaks and both declines and increases in abundance as elevation increased. Our use of a multispecies hierarchical model helped identify important local and landscape factors shaping community and species-level abundance that will aid conservation planning for Neotropical migrants on the nonbreeding grounds.

Jordan Winter; Lisa Venier; Jennifer Foote SY1.9

Confusion worse than death: using BirdNET to investigate singing behaviour in the Bay-breasted Warbler

Populations of the Bay-breasted Warbler (BBWA) are loosely tied to Spruce Budworm (SBW) outbreaks. Local fluctuations of BBWA populations act as an early predictor of SBW, making them a candidate as an indicator for SBW through bioacoustics monitoring. Despite its potential as an indicator for SBW, there is little information on the singing behaviour of BBWA. Literature suggests that BBWA use a two-song system similar to Chestnut-sided Warblers and Yellow Warblers, however this information is based on field anecdotes, observations of a few individuals, and extrapolation from other warblers in the genus. In addition, little information on song rate or song type variation exists. Automated recording units can be used to take scheduled audio recordings in stereo, without the need of a human field presence beyond initial setup and takedown. While this produces large amounts of acoustic data, interpreting this data can be labor intensive. The potential for individual song variation and similarities of BBWA song to other species makes these interpretations even more difficult. Machine Learning detectors are increasingly being used to help streamline and interpret large amounts of bioacoustics data. We used BirdNET to scan autonomous recordings taken from Gaspe, Quebec to identify BBWA songs. We then used these identified songs to determine how song rates and song types vary temporally and in different levels of SBW outbreak. We found high densities of BBWA in SBW outbreaks with 4-8 individuals identified per site with considerable variation in song types among individuals. Temporal overlap of song types across daily and seasonal scales suggests that, at least at high densities, most BBWA likely sing only one song type. Oscine songbirds such as BBWA are known for the complex learned songs of males and can vary greatly. An understanding of BBWA singing behaviour is needed for effective bioacoustics monitoring.

Yu-Wen Yang; Bin-Yan Hsu; Jing-Chia Guo; Chih-Ming Hung TH2.8

Relative brain size explains migratory/resident tendency in birds: partial altitudinal migration in Asian house martins

Migration is widespread among animals but varies in its manifestation with differences in direction, distance and obligatory nature. Understanding the evolution of migration requires insight into not only the development of this trait but also the loss of it. Partial migration, where some individuals within a population migrate while others stay, provides a unique opportunity to identify the proximate factors determining migratory/resident behaviors. In this study, we tested four hypotheses—the body size, arrival time, dominance, and behavioral flexibility hypotheses—regarding phenotypic contributions to the loss or gain of migration in the Taiwan population of Asian house martins (*Delichon dasypus*). This population exhibits partial altitudinal migration with some martins remaining at mountain breeding grounds year-round and some migrating to lower elevations during winter. Our results most supported the behavioral flexibility hypothesis, which predicts that resident individuals tend to have larger brains than migratory ones, potentially associated with higher levels of foraging innovation. We argue that surviving in the harsh winter condition at mountain areas requires large brains, an energetically expensive trait that may further inhibit migration in resident Asian house martins. We also found that residents tended to have relatively smaller beaks, which likely help reduce heat loss in mountains during winter. Analysis of the published literature reveals that migration is prevalent among all house martin species, with partial migration only occurring in species or populations that perform altitudinal migration. Based on these findings, we propose that partial migration in the Taiwan population of Asian house martins likely resulted from the emergence of residency in large-brained individuals in a previously fully migratory population. Furthermore, we extend the behavioral flexibility hypothesis, traditionally applied to interspecific comparison, to demonstrate its explanatory power for intraspecific variations, thereby illuminating the microevolutionary link between brain size and altitudinal migration.

Daniel Yip; Elly Knight; Chloe Boynton P37

Collaborative monitoring for shared conservation values: a case study from British Columbia's Boreal Bird Monitoring program

In Canada, wildlife conservation and management spans multiple spatial scales ranging from local monitoring of parks and protected areas, to regional cumulative effects assessment and critical habitat identification, to national analyses for species distribution, connectivity, and trend. While different organizations and agencies may have varying objectives and priorities for monitoring, communication and collaboration between these different entities can help identify shared interests and priorities, facilitate the transfer of knowledge and expertise, and work towards common goals and objectives. Here, we provide an overview of Environment and Climate Change Canada's (ECCC) Boreal Bird Monitoring Program (BBMP) for British Columbia, which involves a network of organizations interested in the conservation of birds at varying scales across BC's boreal forest. We describe a simple, standardized data collection protocol that can be used to collect a standardized dataset, and how the data can be used to address the priorities and objectives of different organizations at different spatial scales. We discuss the benefits of collaboration and integrated monitoring including the sharing of data, technical expertise, local and Indigenous knowledge, and resources for the collection of a common dataset on the occurrence, abundance, and diversity of migratory birds. Finally, we provide examples of different organizations within this network, including First Nations governments, provincial and federal government, and not-for-profit organizations, and describe how data collected through the BBMP can facilitate progress towards multiple conservation objectives and goals across varying scales.

Isabella Zeitz; Paul Link; Jay VonBank; Brett Leach; Tom Bidrowski; Kevin Kraai; Mitch Weegman L1.2

Movement ecology and the full annual cycle of midcontinent Greater White-fronted Geese (*Anser albifrons frontalis*)

Previous studies suggest that the behavioural decisions made by an animal in one season influence the outcome of subsequent behavior and decisions made in future seasons. These "carry-over effects" can be modeled using a hierarchical model in a Bayesian framework known as a Full Annual Cycle Model. This model can allow for the quantification of the relative importance of environmental drivers on movements and behaviour, and collectively, those on reproductive success and survival. We plan to apply this modeling framework to the midcontinent population of Greater White-fronted Geese (*Anser albifrons frontalis*). This subpopulation's non-breeding range extends from the Canadian prairies through the American prairies down to the gulf coast. Currently, little is known about how this population utilizes these areas on a broad and regional scale. We hope to leverage dynamic Brownian bridge movement models to better understand habitat use and identify sites of high usage for improved management throughout the non-breeding range. These two models will be employing the use of seven years of GPS and accelerometer data collected using OrniTrack-N38 GPS neck collars, attached to adult female geese. With this analysis we hope to deepen our understanding of the drivers of habitat use and the connections between environmental factors, white-front behaviour and reproductive success and survival.