



## **Centennial Meeting of The Association of Field Ornithologists, October 2022**

Abstracts are listed in alphabetical order by last name of the presenting, first author (names are in bold). Abstracts are organized into three sections: (1) oral presentations, (2) poster presentations, and (3) symposium presentations. The code in front of the title indicates the session in which the presentation was given where S1 = Session 1. Posters are listed by their poster number before the title.

# Centennial Meeting of The Association of Field Ornithologists

## Oral Presentation Abstracts

Listed in alphabetical order by last name of presenting author (name in bold)

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### **S19: The first documentation of the Nearctic-Paleotropical migratory route of the Arctic Warbler**

**Evan Adams**<sup>1</sup>, *Iain Stenhouse, Andrew Gilbert, Jill Boelsma, George Gress, Scott, Weidensaul*<sup>2</sup>,  
*Charles Grigsby, Emily Williams, Laura Phillips, & Carol McIntyre.*

<sup>1</sup>Biodiversity Research Institute; <sup>2</sup>Ned Smith Center for Nature and Art.

The Arctic Warbler (*Phylloscopus borealis*) is a cryptically plumed songbird with an uncommon Nearctic-Paleotropical migratory strategy. Using light-level geolocators, we provide the first documentation of the migratory routes and wintering locations of two territorial adult male Arctic Warblers from Denali National Park and Preserve, Alaska. After accounting for position estimation uncertainties and biases, we found that both individuals departed their breeding grounds in early September, stopped over in southeastern Russia and China during autumn migration, then wintered in the Philippines and the island of Palau. Our documentation of Arctic Warbler wintering on Palau suggests that additional study is needed to document their wintering range. Our study provides hitherto unknown information on stopover and wintering locations for Arctic Warblers and indicates that this species may migrate further overwater than previously thought.

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### **S2: Overlap among salt marsh nesting bird species nest site and structure hypervolumes suggests subtle differences**

**Samantha E. Apgar** & *Chris Elphick.*

*University of Connecticut.*

Saltmarsh-nesting birds face the twin problems of avoiding both predators and nest flooding. To assess how this might have shaped the evolution of nest microhabitat use, we compared the breeding niches of four saltmarsh birds from three distinct clades, using data from Connecticut, USA. We examined three hypotheses: 1) phylogeny constrains a species' microhabitat use, 2) species converge on the same, optimal, microhabitat conditions, and 3) each species finds different solutions to reproducing in the habitat. We constructed hypervolumes that describe (a) nest site locations and (b) nest structure and determined what characteristics impact the probability of nests flooding. We also reviewed the literature on nest sites and structures for other species within each focal genus. Nest sites and structures overlapped substantially across the four focal species, although differences in the portion of available niche space use by each species did emerge. Our results suggest that there is little competition for space in this system and that species have similar microhabitat use, although some appear to be constrained to a degree by phylogeny.

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**S10: Comparative incubation behavior in Tachycineta swallows: Pace of life and egg temperature**

**Dan Ardia & Rebecca Windsor.**  
*Franklin & Marshall College.*

The Pace of Life Syndrome (POLS) has emerged as an integrative framework to integrate behavior, ecology, physiology, and evolutionary history. Incubation might reflect pace of life tradeoffs through the interaction of environmental conditions with other life history traits. We tested for whether incubation varied across seven species of Tachycineta swallow breeding across a wide swath of latitude from Tierra del Fuego to Canada. By measuring both female incubation patterns and actual egg temperatures, we assessed female behavior and embryonic development conditions. Consistent with general patterns of latitudinal variation in life history, species breeding closer to the Equator spent less time incubating, which could be interpreted as more limited investment in reproduction. However, tropical species maintained higher on-bout egg temperatures, indicating a potentially higher level of investment in embryonic development. Our results suggest incubation variation in a wide-spread single genus reflects complex tradeoffs between parent and offspring. Similarly, pace of life patterns in this group resist a simple latitudinal explanation, indicating the need to nest incubation behavior within larger life history tradeoffs.

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**S10: Investigating extrapair fertilizations in the Louisiana Waterthrush (*Parkesia motacilla*)**

**Jenna L. Alma.**  
*Austin Peay State University.*

While many songbirds form seemingly monogamous breeding pairs, extrapair mating, in which a socially monogamous male or female mates with other individuals outside of their social partnership, is a common occurrence in North American passerines. The occurrence and frequency of extrapair fertilization in the Louisiana Waterthrush (*Parkesia motacilla*), a socially monogamous songbird, have not yet been studied. The Louisiana Waterthrush has relatively long territories along streams and a potentially restricted number of extrapair mating opportunities, providing us with a unique opportunity to investigate the effect of population density on the frequency of extrapair fertilizations. We use microsatellite DNA genotypes to estimate extrapair paternity frequency in 20 Louisiana Waterthrush nests, and aim to determine: (i) whether population density has an effect on the frequency of extrapair offspring, and (ii) whether extrapair offspring are more likely to be sired by adjacent males vs. more distant or floater males.

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**S21: The impact of feather mites on avian hosts: context dependency, host specificity, and an experimental field test to assess a perplexing symbiosis**

**Than J. Boves**, Kevin Jrajcir, Emily Donahue, Alexander Worm, Jacob Wessels, Joseph Youttz, & Alix Matthews.

Arkansas State University.

Most bird-symbiont research has focused on putative “parasitic” symbioses, but for some systems this presumption lacks empirical evidence. The symbiosis of feather mites and their hosts is one such case. Previous host-mite studies, which are typically narrowly focused and exclusively correlational, have led to conflicting classifications of the functional nature of the host-mite relationship (mutualistic, parasitic, or commensal). In addition to sampling limitations, gaps in our understanding of feather mite biology, (e.g., host specificity), may also contribute to these varying conclusions. Host specificity, which ranges from true specialists to multi-host generalists, has not been accounted for in host-mite relationship studies. We conducted two studies that aimed to address these limitations. First, we examined the relationship between feather mite abundance and host fitness in seven Parulidae host species across various ecological contexts. Second, we experimentally manipulated mite abundance on warblers that harbor mites with contrasting host specificities. Together, these studies suggest that environmental context and host specificity may influence the functional nature of this enigmatic symbiotic relationship.

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**S14: Effects of climate, fire, and management on the recovery of a Red-cockaded woodpecker population**

**Reed Bowman**, John W. Fitzpatrick, Greg Thompson, & Angela Tringali.

Archbold Biological Station.

We assessed the relative contributions of climate, fire, cavity management and translocations on the recovery of a small and relatively isolated Red-Cockaded Woodpecker (*Dryobates borealis*, hereafter RCW) population in central Florida. From 1993 to 2022, the population increased from 17 to 49 groups. In addition to frequent prescribed fire, we installed 338 artificial cavities, created 28 new clusters of cavities trees, and translocated 99 birds (54 inter-, 45 intra-population). Mean area-weighted time since fire was  $1.41 \pm 0.44$  years and fire return interval  $2.64 \pm 0.06$  years, with relatively little variation. Neither had an influence on rates of population growth, but frequent fire increased fledgling production. Population growth was most strongly affected by the total number of translocations per year and the number of artificial cavities per group, and both were more successful when La Nina conditions existed in the spring and summer. These three variables explain 52.1% of the variation in annual population growth. Strategic application of these methods, with appropriate fire management (1-3 yrs FRI), can greatly increase population resilience and decrease extinction risk.

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**S6: Social network and dominance interactions in a mixed parid flock along the chickadee hybrid zone**

**Margaret N. Boyle.**

*Villanova University*

Interspecies interactions shape species behavior on population and individual levels. Mixed-species flocks provide an opportunity to study heterospecific social interactions. Black-capped Chickadees (BCCH), Carolina Chickadees (CACH), and Tufted Titmice (TUTI) form stable mixed-species flocks along the chickadee hybrid zone; however, no study has yet analyzed hybrid populations with a dominant third-party species. We expected to find a dominance hierarchy wherein TUTI would dominate the flock, followed by CACH, chickadee hybrids (HYCH), and BCCH. We then created social networks and dominance hierarchies of the parid community at Hawk Mountain, PA. Each species overlaps across the dominance hierarchy, likely due to age and sex; an older male HYCH may be dominant over a young female CACH. Dominance rank had little correlation with network position; central individuals were just as likely to be either dominant or subordinate. Due to climate change, CACH populations expand northward into BCCH range; because climate change can alter the ranges of other taxa, it is important to investigate potential future trends of interspecific dynamics and novel species assemblages that result from rising temperatures.

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**S21: Diversity and abundance of ectoparasites on birds in northeastern Arkansas**

**Paige Brewer.**

*Arkansas State University.*

Parasite conservation is often overlooked due to the cryptic morphology and insufficient data for many species. This is especially characteristic of ectoparasites such as bird lice. Most lice have highly specific associations with particular bird species, which is primarily due to the limited dispersal ability of lice. However, the biodiversity and prevalence of bird lice remain relatively understudied, especially in the southern United States. It is also unknown how the presence of other ectoparasites, such as feather mites, effect bird-lice associations. Here, we assessed the diversity and prevalence of lice from birds in eastern Arkansas by focusing on three questions: (1) Is there variation in louse prevalence and abundance among different groups of birds? (2) What are the most common genera of bird lice? (3) How frequently do lice and mites co-occur on bird host? To address these questions, we searched 680 birds from the A-State collection or from the field. We calculated prevalence of lice and mites and abundance and intensity of lice. We identified lice to genus and extracted DNA from the most prevalent genera, *Myrsidea* and *Brueelia* to reconstruct their phylogenetic relationships. We found that louse prevalence and abundan

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**S1: Genomic data reveals novel insights about the Flame-rumped tanager hybrid zone**

**Maria I. Castano<sup>1</sup>, Albert Uy<sup>1</sup>, & Daniel Cadena<sup>2</sup>.**

<sup>1</sup>University of Rochester; <sup>2</sup>Universidad de los Andes

The recently diverged *Ramphocelus flammigerus* subspecies complex is comprised of two subspecies that exhibit subtle morphological differences, but dramatic variation in carotenoid-based plumage color of the rump along an altitudinal gradient: the Lemon-rumped *R. f. icteronotus* occurs at low elevations along the Pacific, whereas the Flame-rumped *R. f. flammigerus* is found at mid-elevations in the Cauca River Valley. Low passes along the mountain create geographically independent contact zones between subspecies, with only one genetically characterized using mtDNA sequence data. We used genome-wide data to understand the extent of genomic divergence and revisit previous inferences about this system. Despite low genetic divergence between subspecies, we found narrow genetic clines suggesting selection against the hybrids and genetic structuring along the transect. The hybrid zone consists of late-generation hybrids and backcrosses only, implying hybridization has been ongoing. Additionally, discordance in the width and cline center between genome-wide loci and plumage and body size clines suggests introgression from the Lemon-rumped genes into the Flame-rumped genetic background.

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**S5: Developmental cold exposure does not alter body temperature in Tree Swallow nestlings in the cold**

**David A. Chang van Oordt<sup>1</sup>, Conor Taff<sup>1</sup>, Daniel Ardia<sup>2</sup>, & Maren Vitousek<sup>1</sup>.**

<sup>1</sup>Cornell University, 619 N Aurora St Apt 1, Ithaca, NY 14850, USA; <sup>2</sup>Franklin & Marshall College.

Early breeding in temperate birds is correlated with higher reproductive success, but it also increases the chances of facing cold snaps during reproduction. Early developmental exposure to cold temperatures may alter the ability to maintain body temperature. If developmental cold exposure allows maintaining body temperature better when environmental temperatures fall, it could facilitate early breeding in the future. We studied the role of cold exposure during incubation on nestling development in Tree Swallows (*Tachycineta bicolor*), an altricial species. We experimentally reduced the temperature of Tree Swallow nests during incubation and measured the effects on 12–13 day old nestlings. We looked for differences in thermoregulation and respiration during a 10°C challenge, and compared other phenotypic traits, including mass and bactericidal ability. Preliminary analyses showed that cold exposure during early development does not change body temperature during cold challenges or other measured phenotypic traits. We also collected data that will be used to test the hypothesis that the metabolic cost of maintaining body temperature during cold exposure is lower in developmentally cold-exposed nestlings than in control nestlings.

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**S9: Nesting Ecology of Black-crowned Night-Herons within Key Colonies in New Jersey**

*Samantha Collins, Lisa Ferguson, & Lenore Tedesco.  
The Wetlands Institute.*

The Black-crowned Night-Heron has experienced significant population declines in recent decades in New Jersey and statewide aerial surveys show a decrease in the number of active nesting colonies over the last 20 years. Research to investigate habitat suitability and nest success for Black-crowned Night-Heron is considered a priority for this region to provide recommendations on marsh island management and habitat enhancement plans near colony sites. Gull Island and Sturgeon Island, located in Cape May County, contain historic dredged material placement areas that host approximately 46% of all Black-crowned Night-Herons nesting in New Jersey. We investigated nest site selection and reproductive success within these nesting areas for the 2019-2021 nesting seasons. Hatch success was similar between nesting areas ( $\chi^2 = 0.96$ ,  $P = 0.33$ ) but different between years ( $\chi^2 = 6.25$ ,  $P = 0.04$ ). Differences in species abundance and nest initiation was evident within nesting areas between years and evidence of interspecific competition was apparent. With few alternative sites, habitat enhancement and management may be necessary to increase suitable habitat and improve reproductive outcomes.

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**S5: Differential levels of oxidative status between active and resting phases in free living great tits**

*Kyle Coughlan, Ulf Bauchinger, & Edyta Sadowska.  
Jagiellonian University.*

Aerobic metabolism is ubiquitous in virtually all higher organisms; however, it is estimated that during this process 6% of free oxygen molecules created react with free electrons to form radical oxygen species (ROS), toxic molecules that can induce damage to lipids, proteins, and DNA. Current data relating to energy use and oxidative status have provided inconclusive and often contradictory results. We aimed to compare oxidative status in reproducing great tits ( $n=37$ ) between opposing energy usage states, low at night in rest and high while food provisioning their offspring. Oxidative status was assessed in plasma as oxidative damage (d-ROMs), antioxidant capacity (OXY) and uric acid (UA). We hypothesized high oxidative stress to be associated with activity and low oxidative stress with rest. Contrary to expectations we found higher oxidative damage (d-ROMs) during rest compared to activity ( $P<0.05$ ). While we did not observe differences in OXY, we found highly significant differences in UA, a potent antioxidant, with high values during activity and low values during rest ( $P<0.001$ ). Our study demonstrates the modulation of oxidative stress in birds over the day-night rhythm is not necessarily driven by aerobic metabolism.

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**S1: Effects of hybridization on chickadee spatial memory: a field test incorporating social network context in wild birds**

**Robert L. Curry<sup>1</sup>, Shane McFoy<sup>1</sup>, Michael Rowley<sup>1</sup>, David Kozlovsky<sup>1</sup>, Brittany Coppinger<sup>1</sup>, Breanna Bennett<sup>2</sup>, Eli Bridge<sup>3</sup>.**

<sup>1</sup>Department of Biology, Villanova University; <sup>2</sup>Princeton University; <sup>3</sup>University of Oklahoma.

A fundamental question for hybridization concerns fitness consequences for hybrid offspring. Recent work has shown that in captivity, Carolina × black-capped chickadee hybrids perform more poorly than unadmixed individuals in spatial memory tasks, which suggests that cognitive impairment can function as a postzygotic reproductive barrier. Since 2020, we have tested predictions about spatial memory within the natural context of winter social networks among wild hybrid-zone chickadees. Data collection focused on visits by RFID-marked chickadees at automated “smart” feeders that can limit each bird’s access to only one feeder among a clustered set of eight; we score learning that depends on spatial memory based on the change in error rate across cumulative visits. Results to date suggest that wild hybrid chickadees made more errors than birds with unadmixed ancestry. Social network patterns indicate that chickadees are well integrated within winter flocks irrespective of ancestry. This suggests that social relationships within chickadee networks are not likely to affect feeder visitation in ways that obfuscate patterns predicted based on ancestry-dependent cognition alone.

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**S18: Using Double-crested Cormorant colonies to pilot two methods for monitoring environmental health.**

**Evan Dalton<sup>1</sup>, Lisa Sette<sup>2</sup>, Elizabeth Craig<sup>3</sup>, Daniel Solazzo<sup>2</sup>.**

<sup>1</sup>Manomet Inc.; <sup>2</sup>Center for Coastal Studies; <sup>3</sup>Shoals Marine Laboratory.

Although they are ubiquitous and publicly maligned, we make a case for the Double-crested Cormorant (*Nannopterum auritum*) as an ideal colonial waterbird study system and a sentinel for ecological health. Double-crested Cormorants build substantial nests, often incorporating anthropogenic materials. We compared the materials of cormorant nests on a breakwater adjacent to a harbor with an active fishing and tourism industry in the southern Gulf of Maine with those from a remote island five miles off the Maine coast. Our findings reflect an increased availability of man-made detritus in the harbor setting. We also tested the effectiveness of unmanned aerial vehicle (drone) flights as a non-invasive technique for determining colony size and nesting activity. We concluded that drone imagery can be far more effective at determining colony size than expert observer use of traditional, non-invasive methods.



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**S11: Vocal and non-vocal responses to song variation by hybrid-zone male chickadees in relation to their ancestry: An experimental approach**

*Lily A. Day, Brittany Coppinger, & Robert Curry. Villanova University.*

As song can convey species identity, song-species mismatch may be a driver of hybridization. To study the genetic and cultural influences that affect song production in a hybrid zone, we tested for song recognition in male Black-capped (BCCH) and Carolina (CACH) chickadees and their hybrids, because males of these species produce distinct species-typical songs and the two interbreed. We used playbacks of BCCH and CACH songs to assess subject male repertoires and vocal and non-vocal response patterns as a function of ancestral genotype. Male vocal responses often did not correspond with their genotypes: despite many birds being hybrids with >50% CACH alleles, most birds produced BCCH songs. Males responded more intensely to BCCH song, the most common song type produced in the population. Intensity of male response to the two playback songs did not vary with subject ancestry. A male's failure to "honestly" signal genetic identity may complicate dynamics of hybridization: individuals may be unable to determine species identity through song. Quantifying the extent to which members of a species can recognize and adopt the songs of another can contribute to an understanding of hybridization and the drivers of heterospecific mate choice.

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**S16: Are morphometric changes in Saltmarsh Sparrows related to increasing temperatures over time?**

*Joel Eckerson & Deirdre Robinson.*

*Saltmarsh Sparrow Research Initiative.*

Thermoregulation has been suggested as a driver in selecting bill size, since larger surface areas radiate more heat, which may be adaptive for Saltmarsh Sparrows. We explored whether Allen's Rule would apply to morphometrics by comparing 64 modern adults captured in the 2022 breeding season in Warren, RI, with 57 adult museum specimens collected between 1860 and 1930 at similar latitudes. One team member measured the Nalosp, bill Height and Width, tarsus, and wing chord of 121 birds. Bill surface area (SA) was determined by using the formula  $SA=(H+W)/4*N*\pi$ . We calculated means and standard deviations and conducted t-tests. Males are exposed to more UV radiation and heat than females due to behavioral differences; we hypothesized that if selection acts toward larger bill SA, it would likely be evident in males. Except for longer wing chords in males vs females in the modern samples (57.66mm vs. 54.41mm,  $p=0.000$ ), there was no sexual dimorphism. However, we did find a significant decrease in bill SA in modern males vs museum specimens (21.28mm vs. 20.34mm,  $p=0.008$ ), which is counter-intuitive. We also found increasing mean tarsus length over time (19.08mm vs. 20.62mm,  $p=0.000$ ), which may act as a thermoregulatory appendage.

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**S18: Synthesizing the ornithological literature: can we get better at knowing what we know?**

**Chris S. Elphick<sup>1</sup> & Eliza Grames<sup>2</sup>.**

<sup>1</sup>University of Connecticut; <sup>2</sup>University of Nevada.

Evidence synthesis is a core activity in science, and is especially valuable in field ornithology – where data collection can be logistically complicated and time-consuming, meaning that broad conclusions are often possible only when compiling data across studies. Increased awareness of meta-analytical methods has resulted in more quantitative syntheses, but the data compilation that underlies many meta-analyses lacks the rigor that we apply to collection of primary data. Improved information on how to conduct literature reviews in ways that are systematic, comprehensive, and repeatable, is increasingly available, as is software to make literature searching and the extraction of information from papers more efficient. Using syntheses on the effects of forest fragmentation on birds, the importance of food availability for avian reproduction, and the consequences of sea-level rise for coastal species, we illustrate (a) methods for improving reviews, (b) persistent limitations in the ornithological literature, including geographical, habitat, and taxonomic biases, and (c) ways in which “mapping” the literature can both quantify how past work has proceeded and provide guidance on how future work can have the greatest impact.

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**S17: Biologically-salient frightening devices repulse red-winged blackbirds (*Agelaius phoeniceus*) from grain corn fields**

**Janice Enos, Emma Winnicki-Smith, John Swaddle, Michael Ward, & Mark Hauber.**

University of Illinois at Urbana-Champaign.

Biologically-salient frightening devices are commonly used to repulse avian pests from target locations, such as predator models and broadcast of conspecific alarm calls. There is little scientific research, however, on whether broadcast of “natural enemy” vocalizations, such as those of the predators or brood parasites of pest species, can effectively repulse target species from agricultural fields. In 2021, we conducted a playback experiment testing if broadcast of Cooper’s hawk calls (*Accipiter cooperii*, a predator of adult birds), brown-headed cowbird calls (*Molothrus ater*, a brood parasite of many bird species), and/or a “Sonic Net” (frequency-masking pink noise) can effectively repulse red-winged blackbirds (*Agelaius phoeniceus*) from grain corn fields in Illinois during two time periods when crops are vulnerable to avian pests (April-May, July-August). We found that all three frightening device treatments reduced red-winged blackbird abundances in corn fields during both time periods, but cowbird calls failed to reduce red-winged blackbird abundances during July-August. We will repeat our experiment in 2022 with repeat-randomized study sites.

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**S6: The daily life of a hummingbird: Using RFID to track individual movement of the tiniest birds**

**Jay J. Falk.**

*University of Washington.*

Hummingbirds live life at the extremes of avian diversity. Yet their small size and rapid movements have made it difficult to study them in the field. This has occasionally led to widely held, but rarely tested assumptions about their behaviors. For example, hummingbirds are thought to exhibit either territorial or trap-lining feeding strategies which vary by sex and species, yet there have been few attempts to study these behaviors at the individual level. We developed a technique to monitor movement strategies of individual hummingbirds using Radio Frequency Identification (RFID) and gathered data on over 150 white-necked jacobin hummingbirds (*Florisuga mellivora*) and 70,000+ feeder visits in Gamboa, Panamá. We found that individual hummingbirds demonstrate a high degree of flexibility, often shifting their feeding strategies from one day to the next. We also found that females and males are not categorically different in their feeding strategies -- some males exhibit territoriality more often than females, but this was not consistent within nor across individuals. Ultimately, these data represent a powerful technique for studying small birds in the field and offer a more nuanced understanding of the daily lives of hummingbirds.

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**S7: Carolina Wren Parental Care in Rural and Urban Habitats**

**David T. Farris<sup>1</sup> & Diane Neudorff<sup>2</sup>.**

*<sup>1</sup>UMass Amherst; <sup>2</sup>Sam Houston State University.*

Nest boxes have been used to help supplement or replace lost natural cavities, but they can be less insulative and drier than their natural counterparts. Since urban areas maybe warmer and drier than rural areas, boxes placed in these habitats may reflect these differences and influence incubation and feeding behaviors. We compared nest boxes used by Carolina Wrens (*Thryothorus ludovicianus*) to get a better understanding of how differences in habitat affected temperature and humidity in nest boxes and if differences in temperature and humidity drove changes in incubation and feeding behavior as well as nesting success. We placed data loggers once incubation began and removed them when nestlings fledged, or the nest failed. Video recordings of incubation and feeding behavior were taken during morning and afternoon sessions for two-hour periods. We used multiple linear regression and linear mixed models to test whether temperature, humidity, and habitat contributed to any differences in incubation and feeding behavior. Even though we found differences in temperature and humidity in urban and rural habitats, we did not find any differences in incubation behavior, feeding behavior, or nesting success.

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**S15: Conservation priorities benefiting biodiversity, climate mitigation, and human communities**

**Mei-Ling E. Feng**<sup>1</sup>, Brooke Bateman<sup>2</sup>, Joanna Grand<sup>2</sup>, Lotem Taylor<sup>2</sup>, Joanna Wu<sup>3</sup>, Sarah Saunders<sup>2</sup>, Benjamin Sleeter<sup>4</sup>, & Chad Wilsey<sup>2</sup>.

<sup>1</sup>University of Connecticut; <sup>2</sup>National Audubon Society; <sup>3</sup>University of California, Los Angeles; <sup>4</sup>US Geological Survey.

The current US protected area network has not been developed to address issues of climate change or biodiversity loss. Natural climate solutions (NCS) mitigate climate change through conserving natural systems, but also address societal and biodiversity challenges. Opportunities for NCS can help prioritize area-based conservation, such as the goal to conserve 30% of the US by 2030. Considering who may be affected by conservation will help ensure that environmental benefits are equitably distributed and that communities dependent on lands for cultural preservation and livelihoods are included in decisions that define successful conservation actions. We identified areas important for both carbon stabilization and birds under future climate change and looked for overlap with socially vulnerable and land-dependent communities. Half of US protected lands represent bird and carbon priorities and less than a quarter also overlay vulnerable communities facing inequitable wellbeing (3% of US lands). 14% of US lands have unprotected bird and carbon priorities and vulnerable human communities, opportunity for both the current US administration's 30% target and their commitment to dedicate 40% of climate funding to vulnerable communities.

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**S20: Identifying key roost sites and their connectivity for swallows**

**Sarah Fensore.**

*University of New Brunswick.*

Aerial insectivores, a guild of bird species defined by their common method of foraging for insects while in flight, are showing significant population declines in North America, though the causes remain hypothetical and are likely to be multi-faceted. I seek to explore one of those facets, roost ecology, to fill in key knowledge gaps about two species of aerial insectivore: Barn Swallow (*Hirundo rustica*), and Bank Swallow (*Riparia riparia*). Roost sites act as important refugia and refueling sites for these communally roosting species, but little is known about movement between roosts. Using automated radio telemetry, I gathered movement data during the breeding and post-breeding seasons to identify key roost sites for these species in New Brunswick, Canada. This presentation will highlight some of the preliminary analyses used to 1) identify roost sites within the study area and 2) determine which roost sites would have the greatest impact on the potential roost site network if lost.

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**S20: Directional natal dispersal in a trailing-edge population of black-throated blue warblers**

**Heather, E. Gaya<sup>1</sup>, Robert Cooper<sup>1</sup>, Clayton Delancey<sup>1</sup>, Jeff Hepinstall-Cymerman<sup>1</sup>, Betsy Kurimo-Beechuck<sup>1</sup>, William Lewis<sup>1</sup>, Sam Merker<sup>2</sup>, Richard Chandler<sup>1</sup>.**

<sup>1</sup>University of Georgia; <sup>2</sup>University of Connecticut

Warming temperatures are predicted to shift trailing-edge breeding ranges to higher latitudes and elevations. For some species, these shifts may be caused by directional natal dispersal but little information on natal movements is available. To investigate natal dispersal, we fit a Bayesian movement model to the locations of black-throated blue warblers (*Setophaga caerulescens*) first banded as nestlings in the Southern Appalachian Mountains in North Carolina, USA. We found that young black-throated blue warblers tended to move upslope towards cooler and wetter locations unless they were born at the highest elevation sites. In contrast, adult birds showed signs of strong site fidelity between breeding seasons and rarely dispersed between sites regardless of climate characteristics. Our findings suggest that this trailing-edge population of black-throated blue warblers is gradually shifting upslope and the speed of these movements is likely moderated by natal dispersal.

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**S14: Testing the efficacy of saltmarsh restoration for a globally endangered species**

**Frank N. Gigliotti & Chris Elphick.**

University of Connecticut

Saltmarsh ecosystems are declining as sea levels rise. Breeding bird species dependent on these ecosystems, like the saltmarsh sparrow *Ammospiza caudacuta*, are also in decline. Restoration will be a necessary part of conservation for these species, and thin layer placement of sediment (TLP) has garnered interest as a restoration tool. Saltmarsh sparrows require high-elevation marsh for breeding, but restoration will only be beneficial if restored marsh generates habitat and does not negatively impact nest success. We worked with partners to assess impacts of TLP on saltmarsh sparrows using constructed TLP hummocks (n=14) each with multiple vegetation treatments (n=5) at Great Meadows Marsh (GMM). Preliminary results indicate that sparrows nesting in unrestored areas at GMM and at a reference site exhibited high rates of nest failure, hummocks achieved target elevations to promote marsh plant regeneration, and initial vegetation growth on hummocks varied by treatment. These results describe baseline conditions following sediment addition. Data in subsequent years will inform saltmarsh sparrow nest success and breeding behavior post-TLP, enhancing understanding of the use of TLP to reduce nest failure, a driver of species' decline.

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**S17: Unoccupied aerial vehicle use to study breeding marsh birds in Delaware, USA**

**Hailey Glasko, Elisa Elizondo, & W. Gregory Shriver.**  
*University of Delaware*

Unmanned Aerial Vehicles (UAVs) may provide efficient new methods to study wildlife. UAV technology and accessibility is improving for a variety of applications and may be particularly useful in challenging terrains such as wetlands. We used UAVs to study breeding marsh birds focusing on Clapper Rail (*Rallus crepitans*), a secretive species found in eastern North America. We used a UAV and a thermal imaging camera to search for tidal marsh bird nests on the coast of Delaware, USA in 2021 - 2022. We also conducted ground-based systematic nest searches and compared the number of nests detected. In accessible areas, the UAV and ground surveys had similar performance but the UAV outperformed in less accessible areas. We also detected nests of tidal marsh passerines like Seaside Sparrow (*Ammospiza maritima*) and Red-winged Blackbird (*Agelaius phoeniceus*), indicating that UAVs could be used to document species breeding in tidal marshes. Given the current conservation challenge presented by rapid increases in sea-levels, survey methods that can efficiently document and quantify breeding marsh birds can aid in prioritizing marshes for conservation, management, or restoration.

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**S10: Pressure for rapid and accurate mate recognition promotes sexual dichromatism**

**Mark E. Hauber & Alec Luro.**  
*University of Illinois at Urbana-Champaign*

Ecological conditions limiting the time to find a compatible mate or increasing the difficulty in doing so likely promote the evolution of traits used for species and mate recognition. In addition to interspecific character displacement signaling species identity, intraspecific traits that signal an individual's sex and breeding status reduce the challenge of identifying a compatible conspecific mate. Here, we tested this recognition hypothesis for promoting plumage sexual dichromatism in the true thrushes (*Turdus* spp.), a large and diverse genus of passerine birds. As predicted, we found that 1) true thrush species with migratory behaviour have greater plumage sexual dichromatism than non-migratory species, 2) species with longer breeding seasons have less plumage sexual dichromatism, and 3) greater numbers of *Turdus* thrush species breeding in sympatry is associated with more plumage sexual dichromatism.

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**S17: Using drones to measure habitat structure and habitat preferences of Florida Scrub-Jays**

**Meredith Heather**<sup>1</sup>, **Kara Lefevre**<sup>1</sup>, **Eben Broadbent**<sup>2</sup>, **Angelica Zambrano**<sup>2</sup>, **Vivienne Sclater**<sup>3</sup>, & **Reed Bowman**<sup>3</sup>.

<sup>1</sup>Florida Gulf Coast University; <sup>2</sup>University of Florida, <sup>3</sup>Archbold Biological Station.

Habitat structure influences bird movement, foraging, predation risk, and species diversity. In Florida, the Florida Scrub-Jay (FSJ) prefers a 2-10 year post-fire successional window over which vegetation height increases. Because fires are patchy, we sought to understand how fine-scale variation in structure influences FSJ behavior and demography. We used a drone to map fine-scale variation in vegetation height at 29 FSJ territories at Archbold Biological Station. The drone captured mean canopy height at a 30m resolution, and we classified cells as short (<1m), medium (1-2.5m), and tall (>2.5m). We used Shannon Diversity Index to measure variation in vegetation height among territories. We conducted focal watches to examine FSJ use of habitat patches relative to their availability. Structural diversity did not differ with territory size nor was it associated with number of fledglings. However, territories with moderate structural diversity had a greater proportion of optimal habitat. Those with either low or high diversity tended to have more sub-optimal habitat. Understanding how structural variation influences jay behavior and fitness will improve how we manage their habitat.

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**S16: Future habitat availability for an imperiled North American migrant, the Golden-winged Warbler, under future climate change scenarios**

**Jessica N. Hightower**<sup>1</sup>, **Amber Roth**<sup>1</sup>, **Wayne Thogmartin**<sup>2</sup>, **Dolly Crawford**<sup>3</sup>.

<sup>1</sup>University of Maine; <sup>2</sup>USGS, <sup>3</sup>Pennsylvania Western University.

Species distributions are shifting to track changes in climatically suitable conditions. It is not guaranteed that areas with suitable climatic conditions will meet other habitat suitability requirements. Golden-winged Warblers (GWWA) breed primarily in early successional broadleaf deciduous forests and their breeding distribution is projected to shift north under future climate change. We used climate models to project distributions of climatically suitable conditions for GWWA under future climate. In future GWWA distributions, we assessed projected land classes and climatically suitable conditions for tree species strongly associated with GWWA (Birch and Aspen). Needleleaf evergreen forest was the main land class throughout future GWWA distributions, with broadleaf deciduous forest constituting a small part of the total area. However, the future distributions of climatically suitable conditions for Aspen species extend into a large proportion of the future GWWA distributions. Climate conditions are projected to be suitable for GWWA associated tree species, even when they are not projected to occur in models of future land classes. Forest management may offer a viable conservation strategy for GWWA under future climate change.

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**S10: Adoption in Loggerhead Shrikes: Can it affect population processes?**

*Chris Hill<sup>1</sup>, Kyle Miles<sup>1</sup>, Katie Maddox<sup>1</sup>, Amy Tegeler<sup>2</sup>.*

*<sup>1</sup>Coastal Carolina University; <sup>2</sup>South Carolina Department of Natural Resources.*

Social relationships beyond the pair bond may in some cases (for example, helpers at the nest, conspecific attraction) enhance reproduction enough to influence population processes. During a three-year study of nesting Loggerhead Shrikes, we documented six instances of adoption out of 150 nesting attempts. In each case, the adopting adult was a male, and young were adopted at the nestling or fledgling stages. In five of the six cases an average of 2.2 chicks survived to independence (40 days old), and in the sixth, we were unable to determine the final outcome but four chicks survived to at least 29 days old. In this small sample, survival to independence was higher than in the population as a whole, and 7.3% of chicks surviving to independence in the population had been cared for by an adoptive parent. Adopting males may have benefitted by acquiring a territory, breeding opportunity, or both. These results and other reports suggest that adoption, while previously undocumented in Loggerhead Shrikes, may be widespread, and might enhance productivity in some populations.

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**S21: Microbial communities of tidal marsh sparrow plumage**

*Alice M. Hotopp<sup>1</sup>, Suzanne Ishaq<sup>1</sup>, Serita Frey<sup>2</sup>, Benjamin King<sup>1</sup>, Michael Kinnison<sup>1</sup>, Adrienne Kovach<sup>2</sup>, Brian Olssen<sup>1</sup>, & Kristina Cammen<sup>1</sup>.*

*<sup>1</sup>University of Maine; <sup>2</sup>University of New Hampshire.*

Melanin pigments make feathers more resistant to degradation, and it has been hypothesized that melanization may be a defense against keratinolytic microorganisms. Tidal marsh sparrows of North America's Atlantic coast exhibit adaptations to saltmarshes, including increased feather melanization. As groundwork for testing the hypothesis of keratinolytic microbes and feather melanization, we used 16S and ITS metabarcoding to characterize feather microbial communities of Nelson's (*Ammospiza nelsoni*), saltmarsh (*A. caudacuta*), and seaside sparrows (*A. maritima*). We also sequenced marsh sediment microbial communities. Variation in diversity and community composition of feather microbial communities was found to be limited across various scales. Feather and sediment bacterial communities were distinct, with feather communities having lower diversity and different dominant taxa. Several bacterial taxa with potential functional importance were identified, but no taxa within genus *Bacillus*, a well-studied keratinolytic bacteria, were detected. Feather and sediment fungal communities were similar. Our results provide information for future testing of hypotheses regarding keratinolytic microbes and melanism in tidal marsh sparrows.



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**S5: Experimental cold exposure in adulthood increases the glucocorticoid sensitivity to future stressors**

*Jennifer Houltz, Maren Vitousek, Monique Pipkin, David Chang van Oordt, Kelly Hallinger, Jennifer Uehling, Cédric Zimmer, & Conor Taff.*

*Cornell University.*

As the global climate shifts, many species are negatively impacted by changing thermal regimes. Despite rising global temperatures, some populations must contend with more frequent cold. The ability to cope with cold may be an important determinant of fitness; however, the mechanisms underlying these phenotypic shifts are not well understood. Prior work found that cold temperatures cause shifts in two potential mediators of thermally-induced plasticity including the hormonal stress response and gut microbiome in wild Tree Swallow nestlings (*Tachycineta bicolor*). Here, we aimed to determine how cold temperatures impact adult Tree Swallow phenotype. We experimentally lowered the internal nest box temperature during nestling provisioning and then subsequently simulated an acute cold snap. Experimental cold exposure impacted the hormonal stress response by upregulating the sensitivity to future challenges. Cold exposure also increased the initial speed and duration of the acute hormonal stress response but did not impact gut microbial diversity. These results suggest that thermally-induced increases in glucocorticoid sensitivity to future challenges may prime individuals to respond more strongly or rapidly to worsening conditions.

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**S9: Cliff Swallow Nest Success in a Declining Population**

*Pamela Hunt.*

*NH Audubon*

As is the case with many populations of aerial insectivores, Cliff Swallows (*Petrochelidon pyrrhonota*) have shown a dramatic decline in New Hampshire since the 1970s, and were state-listed as threatened in 2017. To determine if local conditions affected nesting success, and thus potentially population status, we initiated a breeding season study at three colonies in central NH in 2021. Data on nest contents were collected weekly from late May to mid-August, allowing us to determine the fate of each nest. The proportion of nests that successfully fledged young varied by colony and year but overall was similar in both years (74% and 68%). These numbers are comparable to those available for the species elsewhere in its range and suggest that breeding season events, at least at the study colonies, cannot immediately be implicated in local declines. Noteworthy in the study population was a high percentage of late nests (14 of 51) initiated at the end of June after most first-round nests had fledged. Subsequent work will attempt to identify the source of these birds. This study will continue for several more years, including expansion to additional large colonies in northern NH and comparisons of natural and artificial nests.

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**S13: Preliminary data on terrestrial songbird diet reveals use of emergent aquatic insects in Acadia National Park**

*Allyson K. Jackson, Stephen Harris, Alexa Youre-Moses, & Batya Nightingale.*

*Purchase College*

Emergent aquatic insect subsidies are gaining attention for their importance for many riparian bird taxa. While the majority of research points to the positive impact of emergent aquatic subsidies, research has also shown that emergent insects also move aquatic contaminants, such as mercury. In this study, we used fecal DNA metabarcoding to discover the recent food sources for riparian songbirds at four sites in Acadia. Little is known about the foraging ecology of riparian songbirds in Acadia National Park. Our goal was to characterize the overall invertebrate community consumed by the birds and document any differences among sites or species. We sampled 30 individuals, including 12 species of songbird and found a total of 118 distinct molecular operational taxonomic units (MOTUs). Terrestrial coleoptera were the most frequently observed taxa in our samples but aquatic diptera also were very common. We also compare the percentage of aquatic taxa in the diet to the individual bird's mercury concentration but found no correlation between the percentage of aquatic MOTUs and mercury exposure.

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**S8: Arthropod identity matters in dietary studies of insectivorous birds: A Kenyan story**

*Julie Jedlicka<sup>1</sup>, Bailee Romaker<sup>1</sup>, Audrey Lindsteadt<sup>1</sup>, Christopher Watson<sup>1</sup>, & Matthew Johnson<sup>2</sup>.*

*<sup>1</sup>Missouri Western State University, <sup>2</sup>Humboldt State University*

Determining the ecosystem function of high-order predators is critical for evaluation of food web interactions. We mist netted birds found in Kenyan coffee farms at six sites from Dec 2019- Jan 2020. We collected fecal samples from 23 different species for DNA extraction and next-generation sequencing. While we did not find evidence of predation on the most significant coffee pest, the coffee berry borer by the birds, the species that have the highest number of replicates include Eurasian Blackcap (EUBL, n= 18) and Pale White-eye (PAWE, n= 15). When looking at just these species and their diets classified by order, a PERMANOVA with species and site found that there were significant differences in diet but not site. EUBL and PAWE diets were 71.3% dissimilar, driven by an increased Lepidopteran by PAWE and a lower Dipteran and Sarcoptiformes consumption compared to EUBL. Zooming in and categorizing diet items by family, EUBL and PAWE diets were on average 90.9% dissimilar, driven by an increased Noctuidae and Crambidae by PAWE and a lower Chironomidae consumption compared to EUBL. Our data reveal how prey items are categorized (order, family, or genus) has a meaningful effect on whether there are significant differences in diets.

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**S14: Effects of land-use change on the functional diversity and composition of mixed species avian flocks**

**Melissa G. Jernakoff<sup>1</sup>**, Jessie Knowlton<sup>1</sup>, Boris Tinoco<sup>2</sup>, Bernarda Vásquez-Ávila<sup>2</sup>, & Carlos Espinosa<sup>3</sup>.

<sup>1</sup>Wheaton College; <sup>2</sup>Universidad del Azuay, Cuenca, Ecuador; <sup>3</sup>Universidad Técnica Particular de Loja

Mixed species avian flocks are integral to maintaining both species and functional diversity as they provide participants with greater foraging efficiency and reduced predation risk and can increase ecosystem resilience to environmental change. We aimed to determine the effects of non-native vegetation in agricultural plots and forest regenerating from historical use as pastureland on the composition and functional diversity of mixed species flocks in the tropical Andes mountains of southern Ecuador. We discovered decreased functional diversity in flocks within non-native forest as compared to native and regenerating forests. Functional uniqueness was significantly different among habitat types, while functional richness was not. The community weighted means of four out of five functional traits showed significant differences in one of the three habitat types. Interestingly, taxonomic structure was maintained within flocks across all habitat types, indicating flocking as a beneficial strategy even in areas with extensive anthropogenic activities. Mixed species flocks provide membership benefits that may mitigate impacts of habitat disturbance and alteration and can be considered essential units for conserving avian biodiversity.

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**S14: Rapid Declines of Migratory Songbirds Indicate Need for Hydrological Restoration**

**Erik Johnson<sup>1</sup>**, Katie Percy<sup>2</sup>, David Fox<sup>3</sup>, & Philip Stouffer<sup>4</sup>.

<sup>1</sup>National Audubon Society; <sup>2</sup>Natural Resources Conservation Service; <sup>3</sup>National Parks Service;

<sup>4</sup>Louisiana State University

Louisiana supports 40% of coastal wetlands in the conterminous United States, but 80% of its wetland loss. Maurepas Swamp, one of the largest cypress-tupelo swamps in the country, has experienced decades of deterioration because of disconnectivity from Mississippi River freshwater, nutrients, and sediments. We studied changes in breeding bird communities between 2003-2005 and 2019-2020 by conducting point counts at 60 locations, and used hierarchical distance sampling models to estimate bird density for 16 species. Among 13 species of forest generalists (one short-distance migrant, one long-distance migrant, and 11 residents), only the Carolina Chickadee increased in density, whereas others showed no change through time. In contrast, three long-distance migratory swamp specialists (Prothonotary Warbler, Northern Parula, and Yellow-throated Warbler) decreased by 45.8% to 56.9%, outpacing regional rates of change. These changes may be related to decreases in the frequency of baldcypress leafroller outbreaks as a consequence of decreased tree health. Proposed Mississippi River Reintroduction is anticipated to restore hydrological function, which we suggest is urgently needed to restore ecosystem processes and reverse bird declines.

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**S12: Persistent genotype-repertoire mismatch in dawn chorus songs of hybrid-zone chickadees**

*Claire M. Jones, Ariana Abbrescia, Brittany Coppinger, & Robert Curry.*  
*Villanova University*

Singing in synchrony during the dawn chorus enables neighboring songbirds to assess each other and can be crucial for territory defense and mate attraction. However, for birds to successfully identify conspecifics, a bird's song must accurately represent its species ancestry, which may not be the case within a hybrid zone. Our research examines dawn chorus singing behavior among hybridizing Black-capped Chickadees (*Poecile atricapillus*; BCCH) and Carolina Chickadees (*Poecile carolinensis*; CACH) at Hawk Mountain, PA to determine effects of genotype on song. We collected song data using autonomous recording units placed outside artificial nesting snags and determined the full repertoire for each nest. We used single-nucleotide polymorphisms to determine the species genotype of each chickadee. Most birds produced predominantly BCCH-type songs; only those with a high degree of CACH ancestry sang any CACH-type or intermediate song. The prevalence of BCCH-type song, despite the highly hybridized population, suggests song is culturally passed down and individuals learn the dominant song of their social environment. Mismatch between song and genotype means females may misidentify a male's species, which could facilitate hybridization.

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**S8: Determination of the natal origins of White-crowned Sparrows (*Zonotrichia leucophrys*) using stable isotopes**

*Amanda K. Kemp & Ben Skipper. Angelo State University*

The White-crowned Sparrow (*Zonotrichia leucophrys*) is a migratory sparrow that occurs throughout North America. The timing of White-crowned Sparrow migration has been extensively documented, but migratory routes, orientation, and the strength of migratory connectivity between distinct breeding areas and distinct wintering areas is less understood. Traditional methods, such as banding, provide too low of a recapture rate to trace migratory connectivity. Stable isotope markers in feathers can be used for identifying isotopically distinct regions and for investigating the natal origins of birds. We collected 75 feather samples from migrating sparrows at three different locations in Texas from December 2021 to March 2022. Only hatch year birds (25 per study site) were sampled because the stable isotope values in their feathers reflect the stable isotope values of their natal areas. We used stable isotope analysis of  $\delta^2\text{H}$  in along with an isoscape map to determine breeding origins for White-Crowned Sparrow wintering in Texas. Through this study we were able to geographically assign all individuals to a map and determine the strength of migratory connectivity, thus will providing insight into the migration ecology of this species.

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**S4: Habitat associations of golden-winged warbler and blue-winged warblers during the non-breeding season**

**David I. King<sup>1</sup>**, Michael Akresh<sup>2</sup>, David Murillo<sup>3</sup>, Ruth Bennett<sup>4</sup>, & Richard Chandler<sup>5</sup>.

<sup>1</sup>Northern Research Station; <sup>2</sup>Antioch University; <sup>3</sup>University of Massachusetts; <sup>4</sup>Smithsonian's National Zoo and Conservation Biology Institute; <sup>5</sup>University of Georgia

We studied golden-winged warblers (*Vermivora chrysoptera*) and blue-winged warblers (*V. cyanoptera*) with point count surveys at 57 points along habitat and elevational gradients within a coffee-growing landscape during 2016 and 2017 in Yoro, Honduras. We encountered male golden-winged warblers at 31 points, females at seven points, and blue-winged warblers (all males) at 12 points. Occupancy by male golden-winged warblers did not differ between humid forest, pine oak forest and coffee, but was positively associated with the amount of humid forest/coffee (forest with some dense shade coffee, which were indistinguishable with remote sensing at our sites) in the landscape and marginally positively related to elevation. Occupancy of female golden-winged warblers did not differ among between humid forest, pine oak forest and coffee, yet nearly all sightings were in coffee. Occupancy of blue-winged warblers was higher in coffee than pine oak, higher near rivers and streams, and positively associated with the amount of agriculture in the landscape. These results suggest agroforestry could be a tool for conserving wintering female golden-wings, although the use of shade coffee is reported to elevate predation risk in other migrants.

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**S18: PIT Tags increase detection of Tidal Marsh Sparrows attending nests without negatively impacting survival**

**Alison R. Kocak<sup>1</sup>**, Alexandra Cook<sup>1</sup>, Chris Elphick<sup>2</sup>, Christopher R. Field<sup>2</sup>, Katharine J. Ruskin<sup>3</sup>, & Jonathan B. Cohen<sup>1</sup>.

<sup>1</sup>SUNY-ESF; <sup>2</sup>University of Connecticut; <sup>3</sup>University of Maine

Identification of individuals attending nests is often important, but for secretive species that cannot be easily identified by individual color bands in the field, capture of adults on nests is the primary method for identification but can lead to trap avoidance and nest abandonment. To reduce both costs, we attached a Passive Integrated Transponder (PIT) tag to a band on adult Seaside Sparrows and female Saltmarsh Sparrows in New York, 2014-2019, using Connecticut as a control. We concealed an RFID reader near nests to identify attending adults with PIT bands. To determine if PIT bands were safe, we used CJS models to compare survival and detection rates of individuals with and without PIT bands and developed a logistic exposure nest survival model to determine the impact of RFID captures on nest survival. Survival of birds with PIT bands were the same or higher than for birds without PIT bands. Detection of birds with PIT bands was 23%-110% higher than for those without PIT bands. RFID capture had no negative impact on nest survival at the interval following a capture. Tag loss was low at 2%. 45-people minutes of time was saved per nest using RFID rather than mist nets. PIT bands are safe, effective, and efficient.

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**S12: Urban wild bird feeding: Impacts on avian abundance and diversity in Texas**

***Amanda M. Lamberson & Jennifer A. Smith.***

*The University of Texas at San Antonio*

The provision of supplementary food to wild birds is a common practice. Prior studies of effects on birds have mainly occurred in temperate, non-urban areas, and in the breeding season. In this study, effects of common, locally provided supplementary food on the abundance and diversity of birds were evaluated during the winter in San Antonio, Texas, an urban, subtropical city. Sales data collected on wild bird foods purchased by residents showed that mixed and Nyjer seed were among the most purchased foods. Thus, in the winter of 2019-2020, 36 residential sites were randomly allocated either mixed seed, Nyjer seed, or no food (control). Fixed location counts were conducted to assess bird diversity and abundance and were repeated the following winter in the absence of supplementary food following a reversed Before-After-Control-Impact experimental design. Bird abundance and diversity were greater at fed sites than non-fed sites in Year 1. In Year 2, both abundance and diversity decreased at mixed seed sites. However, Nyjer sites had similar abundance and diversity in Year 2 compared to Year 1. This study demonstrates that supplementary food has a significant effect on bird abundance and diversity, but effects are context specific.

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**S20: Spatial Partitioning of Cassin's Sparrows (*Peucaea cassinii*) Breeding Territories**

***Edward Landi & Claire Ramos.***

*Colorado State University - Pueblo*

North American grasslands are one of the most threatened ecosystems in the world and grassland birds have experienced the largest declines. Grassland species like Cassin's Sparrows (*Peucaea cassinii*) have lost almost half of their population in the past 50 years. In suitable habitat, Cassin's Sparrow breed in high densities which may lead to fitness costs incurred by intrasexual competition between territorial males. Spatial partitioning of home ranges may be used to reduce competition between territorial males. Cassin's Sparrows may be more competitive over nesting sites and areas of high food abundance. To test this hypothesis, we deployed 26 LifeTags in an automatic telemetry network from Cellular Tracking Technologies on male Cassin's Sparrows during the summers of 2021 and 2022. Species of plants known to be used for nests and food like grasshoppers were measured across the field site. A resource selection function was conducted to which resources were used in the highest proportion to what was available. Shrub cover was classified across the entire study site by using Object Based Imagery Analysis on satellite imagery. Preliminary results support Cassin's Sparrows selecting Medium Low Shrub Cover (21-40%) over grass.

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**S11: Functionally referential signaling in the Greater Ani, a communally breeding cuckoo that lives in non-kin groups**

**Joshua B. LaPergola**, Amanda Savagian, Maria Smith, Breanna Bennett, & Christina Riehl.  
Princeton University

Individuals risk drawing a predator's attention when alarm-calling. However, kin selection can explain this altruism if receivers are close relatives. But why should organisms in non-kin groups also use alarm calls? Here we demonstrate use of a functionally referential alarm call in the Greater Ani (*Crotophaga major*), which breeds in social groups of two or more socially monogamous, unrelated pairs that care for a single nest. Over four years, we found that Greater Anis gave one call type only in the context of a flying or actively hunting raptor but not for other threats. Using a playback experiment, we subjected perched focal birds (n = 33 breeding groups) to two ani call treatments, (1) the putative raptor alarm and (2) a scold-like "kaaa", and a heterospecific control (Pale-vented Pigeon, *Patagioenas cayennensis*, song). Most (68%, n = 28) alarm call trials elicited an immediate response of diving/flying to cover while the other treatments rarely ("kaaa": 4%, n = 22) or never (control: n = 21) elicited this response. We suggest that the ani's alarm call is better explained by correlated fitness payoffs (e.g., reciprocity) than by kin selection, a possibility that should be more broadly explored among birds.

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**S17: Go Big Or Go Home: The Use of ARUs to Evaluate Whip-poor-will Response to Forest Management Across Large Spatial Extents**

**Jeffery T. Larkin**<sup>1</sup>, Michael Akresh<sup>2</sup>, Dakotah Shaffer<sup>3</sup>, Justin Kitzes<sup>4</sup>, Sam Lapp<sup>4</sup>, Anthony D'Amato<sup>5</sup>, Darin J. McNeil<sup>6</sup>, Jatin Khilnani<sup>4</sup>, Lauren Chronister<sup>4</sup>, Cameron Fiss<sup>7</sup>, Luke Gray<sup>3</sup>, Halie Parker<sup>3</sup>, & David King<sup>1</sup>.

<sup>1</sup>University of Massachusetts – Amherst; <sup>2</sup>Antioch University; <sup>3</sup>Indiana University of Pennsylvania; <sup>4</sup>University of Pittsburgh; <sup>5</sup>University of Vermont; <sup>6</sup>University of Kentucky, <sup>7</sup>SUNY Environmental Sciences and Forestry.

NRCS's Working Lands for Wildlife (WLFW) targets the creation of young forest on private lands for Golden-winged Warbler and New England Cottontail. Understanding how other at-risk species, like Eastern Whip-poor-will, benefit from WLFW can help direct limited conservation resources. Whip-poor-will response to forest management is difficult to assess across large extents due to its nocturnal activity and brief survey windows. We implemented a monitoring protocol using automated recording units (ARUs) to overcome these challenges. We deployed ARUs across hundreds of private forests enrolled in WLFW ranging from North Carolina to Maine. We developed a machine learned classifier to detect whip-poor-will song and applied it to all recordings to create detection histories for each survey location. We modeled whip-poor-will occupancy while accounting for imperfect detection. Whip-poor-will were detected at 192 (40%) survey locations. Detection was most influenced by Julian date (-) and minutes of recordings (+) and occupancy probability (36-45%) was most influenced by basal area (-), elevation (+), and woody stem density (+). Our project demonstrates the value of using ARUs to evaluate conservation outcomes across large geography.

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**S15: Monitoring the occupancy of spruce budworm-linked warblers in response to budworm insecticides**

**Maria L. Maclvor<sup>1</sup>, Joe Nocera<sup>1</sup>, Robert Johns<sup>2</sup>, & Fawn Maika<sup>1</sup>.**

<sup>1</sup>University of New Brunswick, <sup>2</sup>Canadian Forest Service

Bay-breasted (*Setophaga castanea*), Cape May (*S. tigrina*), and Tennessee Warblers (*Leiothlypis peregrina*) are considered specialist foragers on spruce budworm (*Choristoneura fumiferana*; hereafter “SBW”) and respond numerically to outbreaks. New Brunswick, Canada has implemented the Early Intervention Strategy to reduce/prevent SBW outbreaks and requires areas of relatively higher SBW density (“hotspots”) to be treated with the biological insecticide Btk (*Bacillus thuringiensis kurstaki*). This strategy allowed for comparison of SBW-linked warbler occupancy in sprayed (reduced lepidopteran abundance) and unsprayed sites (unchanged lepidopteran abundance) during the pre- and post-spray periods. I used autonomous recording units (ARUs) and point counts to collect presence/absence data of the SBW-linked warblers. The ARU models for each of the SBW-linked warbler occupancy rates revealed that SBW-linked warblers tend to vacate after Btk application, while the point count models could not make as robust of conclusions. If SBW-linked warblers vacate areas sprayed with Btk, a management suggestion is to ensure there are areas near spray sites that are not sprayed to potentially act as areas of refugia where they can procure prey.

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**S1: Space use by Loggerhead Shrikes as a window into the suitability of urban areas as habitat**

**Katie A. Maddox & Chris Hill.**

*Coastal Carolina University*

Home range sizes can offer insights into habitat quality: as habitat quality increases, birds need less area to meet their needs. This inverse relationship between home range size and habitat quality has been experimentally shown for Loggerhead Shrikes (*Lanius ludovicianus*). Urbanization creates habitat reminiscent of shrikes’ natural foraging habitats: areas with short, sparse vegetation. Between 2018 and 2022, we banded and monitored a population of non-migratory shrikes in an urbanized area of Horry County, South Carolina: at any given moment 90% of the population was banded. We used color-band resightings to measure home range, population density, and nest spacing to understand how shrikes interact with the urban matrix. We found average home range size was 3.3 ha: dramatically smaller than shrikes in rural areas. Compared with previous studies in rural areas, our population density was greater with 2.9 shrikes per square kilometer. On average, nests were only 428m from their nearest neighbor: the closest pair being 43m apart. Our results suggest that Loggerhead Shrikes in our region can capitalize on the novel habitats created by moderate levels of urbanization and utilize space differently than their rural counterparts.



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**S13: The indirect effects of Btk (*Bacillus thuringiensis* var. *kurstaki*) on habitual diet in Bay-breasted and Cape May warblers**

**Fawn Maika<sup>1</sup>, Rob Johns<sup>2</sup>, Joe Nocera<sup>1</sup>, & Maria MacIvor<sup>1</sup>.**

<sup>1</sup>University of New Brunswick; <sup>2</sup>Natural Resources Canada.

The spruce budworm (*Choristoneura fumiferana*, hereafter SBW) is an important prey source for some wood-warblers as it can comprise >90% of their diets during the breeding season. However, due to SBWs cyclic population trends that cause mass amounts of defoliation, Lepidoptera-specific insecticides such as Btk are used to regulate their population density. We investigated the indirect effects this may have on warblers that are known SBW specialists, namely, the bay-breasted warbler (*Setophaga castanea*) and Cape May warbler (*S. tigrina*). We predicted that both species would be forced to exhibit a functional response to compensate for reduced SBW availability. We examined changes in diet using the isotopic signatures of  $\delta^{13}C$  and  $\delta^{15}N$  in fecal samples collected from individuals throughout the 2020 and 2021 breeding seasons. Using stable isotope mixing models we determined relative diet contributions of insect orders collected from Btk treatment and control sites. Preliminary results suggest the consumption of lepidopterans was reduced by ~50% in both Bay-breasted and Cape may warblers after Btk treatments. Future work should seek to determine whether this functional response affects overall fitness and reproductive success.

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**S8: Resource Use and Interspecific Interactions in a Namibian Cavity Nest Web**

**David Millican<sup>1</sup>, Jeff Walters<sup>1</sup>, & Mark Stanback<sup>2</sup>.**

<sup>1</sup>Virginia Polytechnic Institute and State University; <sup>2</sup>Davidson College

Nest web analyses allow for easy quantification of cavity guilds and comparisons of community structures across geographic gradients. Most research has been conducted in temperate forests of Europe and North America, with increasing studies in tropical South America. Little research has investigated web structure in tropical forests of Africa. We investigated a cavity-nesting guild in central Namibia from 2016-2019. We found a small proportion of trees provided a majority of cavities, with a majority of nests (n=130, 79%) found in just three species: shepherd's tree *Boscia albitrunca*, camel thorn *Vachellia erioloba*, and umbrella thorn *Vachellia tortilis*. Small- and medium-bodied species exhibited moderate to strong dependence on bird excavations, while large-bodied species exhibited high dependence on natural cavities and rarely used excavations. Cavity abundance appears limited overall, especially for large species, and some species may depend on temporal resource partitioning to alleviate competition. Our research provides insights into community structure that can aid local management of cavity-nesting guilds, while Namibia may act as a model system for similar forests in arid climates with few excavators.

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**S7: Notes on parental care of cryptic terrestrial birds in the Ecuadorian Choco**

*Eliana Montenegro, Bryan Tamayo, José Añapa, & Juan Pablo Ordoñez.*

<sup>1</sup>*Cornell Lab of Ornithology;* <sup>2</sup>*BirdLife International*

Camera-trapping has been widely used as a non-invasive methodology to monitor fauna across dense forests. Terrestrial birds in the Ecuadorian Choco are cryptic species difficult to find and study. Some of these species present a gap of knowledge over their breeding behaviour. Among Chocoan terrestrial birds are tinamous, quails, wood-quails, antpittas, and cuckoos. From 2020 to 2021, we installed 18 camera traps across 18 transects located in remnant Choco forests at Canande and Tesoro Escondido Reserves in northwest Ecuador. We systematize information on parental care and behaviour on poorly known species including Tawny-faced Quail (*Rhynchortyx cinctus*), Great Tinamou (*Tinamus major*), rufous-fronted wood-quails (*Odontophorus erythrops*), and Berlepsch's Tinamou (*Crypturellus berlepschi*). Camera trapping data could fill gaps of knowledge over cryptic species like terrestrial birds on Neotropical dense forests.

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**S6: Off the Wing: Patterns and Preferences of Wing Folding in American Crows (*Corvus brachyrhynchos*)**

*Sheila R. Moore & Anne Clark.*

*Binghamton University*

Bird flight itself is well studied, but wing-related behaviors and postures outside of flight are not. Wing folding describes the overlap of a bird's wing tips in a resting state. The tips may be parallel (unfolded), overlapping left over right (L/R) or right over left (R/L). American crows may overtly "wing flick" and adjust the wing tips on landing or approaching something, but why they position them as L/R or R/L is unknown. Hypotheses include a) readying a leading wing for flight in one direction or b) having a habitual, individual position preference. We assessed wing fold patterns on video recordings of 11 recognizable crows from four families observed before—while interacting with food or objects—and as they take flight. Preliminary results show wing flicks always resulted in a change in wing fold direction, suggesting a non-communicative function of wing flicking. An R/L fold and take-off to the left was by far the most common relationship between wing fold and takeoff direction. Our results will address both fold-flight patterns and individual wing-fold preferences.

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**S13: Comparing dietary breadth and prey availability among six aerial insectivore species in NB, Canada**

**Patricia R. Nancekivell & Joe Nocera.**

*University of New Brunswick*

Aerial insectivores in North America are experiencing steep population declines. To investigate the effects of phenological mismatch between the nutritional needs of breeding birds and the availability of their insect prey, we will compare the dietary richness of six species breeding in the Tantramar region of New Brunswick, Canada. We hypothesize that species in lesser decline have a greater dietary breadth, allowing them to evade the effects of mismatch by switching to more abundant insect prey. Fecal samples were collected from Bank swallows (*Riparia riparia*), Barn swallows (*Hirundo rustica*), Cliff swallows (*Petrochelidon pyrrhonota*), Tree swallows (*Tachycineta bicolor*), Alder flycatchers (*Empidonax alnorum*), and Least flycatchers (*Empidonax minimus*). DNA metabarcoding techniques will be used to identify the composition of invertebrates in each sample. We will then compare the composition of diet to environmentally available invertebrates sampled from breeding and foraging sites. By comparing diets between many species within the same region, we hope to improve our understanding of the steep declines observed in aerial insectivores and how these declines relate to phenological mismatch and niche differentiation.

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**S19: Can tree composition mitigate negative impacts of urbanization on en route migratory birds?**

**Desiree L. Narango<sup>1</sup>, Susannah Lerman<sup>2</sup>, Elizabeth Rogers<sup>1</sup>, Mariamar Gutierrez<sup>1</sup>, & Alexander Gerson<sup>1</sup>.**

<sup>1</sup>*University of Massachusetts – Amherst;* <sup>2</sup>*USDA Forest Service*

Migratory birds occur in high densities in cities, and urban forests tend to have altered tree and arthropod composition, potentially impacting prey availability. Yet little research has assessed the extent to which urbanization and tree composition affects stopover habitat quality and refueling performance. In spring and fall, we captured migratory birds in forests within Springfield, MA, USA, that varied in surrounding urbanization and oak (*Quercus*) dominance -a disproportionately important tree species for foliage arthropods. We compared prey availability, body condition, plasma metabolites, and stopover duration to test whether oak dominance improves refueling performance in urban landscapes. Our preliminary results show that urban and rural oak-dominated forests support higher insect biomass and improved body condition in some, but not all, insectivorous bird species. However, contrary to predictions, migrant birds in oak forests had longer but more predictable stopover durations, suggesting high behavioral plasticity. Metabolite profiles suggest high variation in insectivory and refueling rates, and our continued work investigates causal links between altered urban habitat and stopover performance via diet shifts.

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**S3: Landscape composition but not configuration modulate annual survival of Turkey Vultures**

**Adrián Naveda-Rodriguez<sup>1</sup>, Keith Bildstein<sup>2</sup>, David Barber<sup>2</sup>, Jean-Francois<sup>2</sup>, Bryan Kluever<sup>3</sup>, Michael Avery<sup>3</sup>, & Francisco Vilella<sup>4</sup>.**

*<sup>1</sup>Mississippi State University; <sup>2</sup>Acopian Center for Conservation Science, Hawk Mountain Sanctuary Association; <sup>3</sup>U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services; <sup>4</sup>U.S. Geological Survey, Mississippi Cooperative Fish and Wildlife Research Unit.*

Annual survival of Turkey Vultures (*Cathartes aura*, hereafter TUVU) may be influenced by landscape heterogeneity. We quantified the effects of landscape composition and configuration on the survival probabilities of the three North American breeding populations (western, central and eastern) of TUVU wintering in the Neotropics during a 17-year period. We used Cox's proportional hazards models with time-varying covariates to estimate spatial and temporal changes in survival rates of adult TUVU. Landscape composition, but not configuration, influenced survival rates in space and time. Annual survival declined from 0.96 (95% CI = 0.78-0.99) to 0.83 (95% CI = 0.7-0.99). Mortalities occurred during the non-breeding and migration seasons. Mortality risk was low in western and central populations but was 3.7 times greater for the eastern population. Mortality risk also was 1.3 and 5 times greater in central and eastern populations inhabiting areas with high diversity. The observed spatial variation in mortality risk may indicate potential ecological traps across the landscape where vultures select suitable habitats for feeding. Further analysis are needed to explore the effects of human developments on survival rates at different stages.

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## **S2: How colonial history has changed breeding patterns of the Acadian Nelson's Sparrow in Atlantic Canada**

**Kiirsti Owen**<sup>1</sup>, Mark Mallory<sup>2</sup>, Nic McLellan<sup>3</sup>, & Joe Nocera<sup>1</sup>.

<sup>1</sup>University of New Brunswick; <sup>2</sup>Acadia University; <sup>3</sup>Ducks Unlimited Canada

The Acadian Nelson's Sparrow (*Ammospiza nelsoni subvirgata*) breeds in saltmarshes from northern Massachusetts to New Brunswick and eastern Quebec. In Atlantic Canada, these birds also successfully breed in dyked agricultural lands ("dykelands") originally created by Acadian settlers in the 1600s. Little is known about how or why these secretive birds use dykelands. To fill this knowledge gap, we attached radio tags to adults (n = 76) in 2021 and 2022 in southeastern NB. We tracked birds' movements using radio telemetry in saltmarsh and dykeland habitats from June to August. We used kernel density estimation to look at habitat use for each individual. Sparrows observed using mainly dykelands used larger areas than those in saltmarsh. Most birds tracked in mainly dykelands were also observed using saltmarshes, but those tracked mainly in saltmarsh were not also observed in dykelands. Our results suggest that dykelands may be poorer breeding habitat than saltmarsh and that individuals using mainly dykelands still require nearby saltmarshes throughout the season. With rising sea levels and ongoing habitat alteration, it is important to understand how populations use natural and human-made habitats to carry out important life stages.

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## **S21: First Detection of the Invasive Asian Longhorned Tick on Migratory Passerines in the Americas**

**Medha Pandey**<sup>1</sup>, Nicholas Piedmonte<sup>2</sup>, Vanessa Vinci<sup>2</sup>, Richard Falco<sup>2</sup>, Thomas Daniels<sup>1</sup>, & J. Alan Clark<sup>1</sup>.

<sup>1</sup>Fordham University; <sup>2</sup>New York State Health Department

The Asian longhorned tick (*Haemaphysalis longicornis*), native to East Asia, was first reported in the United States (US) in 2017 and is now established in 17 states. Outside the US, *H. longicornis* feeds on birds, and migratory birds disperse this tick and tick-borne pathogens. However, early studies in the US did not find *H. longicornis* on migrating passerine birds. The aim of this study was to monitor the emergence of *H. longicornis* populations in Westchester County, NY, and determine whether *H. longicornis* feeds on migratory passerines. Environmental tick sampling was performed on a long-term surveillance grid, and ticks were collected from mist-netted passerines from 2018 through 2021. We report the first discovery of *H. longicornis* on migratory passerines in the Americas. We found 16 *H. longicornis* larvae on 13 birds representing five species in 2021. Dispersal by migratory passerines has long been speculated as an important mechanism of range expansion for ticks and tick-borne pathogens. However, this could be a much more effective mechanism for the range expansion of the parthenogenetic *H. longicornis*, where a single bird-borne tick adventitiously dispersed into new habitat may propagate a new population.

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**S20: Resighting banded Roseate Terns on Great Gull Island to assess breeding phenology and survival**

*Peter WC Paton<sup>1</sup>, Joan Walsh<sup>2</sup>, & Margaret Rubega<sup>3</sup>.*

*<sup>1</sup>University of Rhode Island; <sup>2</sup>Mass Audubon; <sup>3</sup>University of Connecticut*

During the 2022 field season, we assessed the breeding phenology and apparent survival of adult and hatching-year Roseate Terns (*Sterna dougalli*) on Great Gull Island (GGI), NY. We resighted individuals marked with unique plastic-field-readable or metal-field readable-bands from 20 blinds spaced across the perimeter of GGI. We had over 5,000 detections of 1,517 adults from 15 May to 9 Aug 2022. About 50% of adults were first detected after 10 July suggesting many were using Great Gull as a stopover site during post-breeding movements. Return rates for adults <8 yr old were higher than current models predicted, with 21% of three year old adults detected (n=304), and 27% of four year old adults resighted (n=1188). We also monitored movements of A-chicks banded in 2022 (n=100) to estimate productivity. We detected 93 Roseate Tern chicks after hatching, with a minimum of 71 fledglings verified based on observations of chicks away from their nest sites. Resightings provide a valuable tool to document apparent survival rates, productivity, and movement dynamics of this listed species at one of the key breeding colonies in the northwest Atlantic, while simultaneously minimizing disturbance.

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**S8: Response of bird functional diversity and composition to restoration is contingent on habitat type across a savanna-grassland ecotone**

*Jo Peacock, Matt Davies, & Christopher Tonra.*

*The Ohio State University*

Understanding how land-use change impacts bird communities is a key challenge in ecology. To date, assessment has focused on taxonomic or species responses to restoration action. Examining functional elements of diversity may be more effective as traits are generalizable across sites and can imply why communities vary across ecological gradients. We studied functional responses of bird communities to livestock removal over a Bolivian savanna ecotone. Breeding and resource-acquisition traits were classified for 162 species and used to track shifts in functional diversity and composition related to habitat recovery. Response was habitat dependent. In woody savanna, functional richness increased, while functional evenness and variability remained stable. Alongside habitat shifts, specialized resource-acquisition traits increased, while social breeding strategies declined. In open grassland, functional richness didn't change, but evenness and variability declined, resulting in functionally similar communities associated with habitat homogenization. Results suggest livestock removal benefits ecosystem function in woody habitats, but disturbance may diversify habitat and maintain functionally diverse bird communities in open grassland.

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**S12: Cultural Evolution in Songs from the Breeding Range of the Mourning Warbler**

*Jay Pitocchelli<sup>1</sup>, Adam Albina<sup>1</sup>, Alex Bentley<sup>2</sup>, David Guerra<sup>1</sup>, & Mason Youngblood<sup>3</sup>.*

*<sup>1</sup>Saint Anselm College; <sup>2</sup>University of Tennessee; <sup>3</sup>Max Planck Institute for the Science of Human History*

We compared historical patterns of geographic variation in song of the Mourning Warbler from the 1980s, early 2000s with the current pattern to better understand cultural evolution of song differences among populations. Recordings from each period revealed four wide-ranging regiolects (Western, Eastern, Nova Scotia, Newfoundland). Birds within regiolects shared a common song type different from other regiolects. Regiolects, their boundaries and an admixture zone between Western and Eastern regiolects endured throughout the study. Primary syllable types defining each regiolect did not change. However, syllable variants of each syllable type were unstable. Changes in songs and syllables were consistent with neutral drift throughout much of the breeding range. Song differences among regiolects have arisen via extinction of old syllables and establishment of new ones. We also examined evidence for the Acoustic Adaptation Hypothesis (AAH). Frequency and duration variables, typically affected by vegetation, were compared to variation in Landsat measurements from breeding territories. We did not find support for the AAH. No significant relationship existed between Landsat variables and physical parameters of song.

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**S16: Effects of drought on breeding populations of shortgrass prairie birds on the Pueblo Chemical Depot**

*Claire Varian Ramos<sup>1</sup> & Diego Duran.*  
*Colorado State University - Pueblo*

The shortgrass prairie is threatened by anthropogenic environmental changes, including climate change. Climate models indicate increased probability of dryer summers across much of the region. Despite declining populations, shortgrass prairie birds remain understudied. Some species may be able to mitigate the impacts of climate change by avoiding areas experiencing poor rainfall. Here we used point-counts to assess the breeding populations of four shortgrass prairie songbirds, Cassin's Sparrows, Lark Buntings, Lark Sparrows, and Western Meadowlarks at the Pueblo Chemical Depot in southern Colorado. During this study, the area experienced two summer droughts and two wetter summers. Responses to low rainfall varied between species. Lark Buntings only bred at the Pueblo Chemical Depot during wet summers. Cassin's Sparrows and Western Meadowlarks in contrast bred at the site every year, however, there were fewer individuals present in drought years. Lark Sparrows populations at the depot showed no significant response to drought conditions. These differences in response to drought may reflect differences in behavioral plasticity which may make some species better able to adjust to the effects of climate change than others.

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**S3: Colonization and local extinction of two Neotropical migrants in National Capital Region National Parks**

**Hannah Redmond<sup>1</sup>, Jeffrey Buler<sup>1</sup>, John Paul Schmit<sup>2</sup>, & W. Gregory Shriver<sup>1</sup>.**

<sup>1</sup>University of Delaware; <sup>2</sup>National Park Service

Numerous studies have demonstrated patterns influencing Neotropical breeding migrant occupancy, but we know less about factors that influence the dynamic processes of colonization and extinction. We used long-term (2007 – 2019) National Park Service breeding bird monitoring data to understand these dynamic processes of two Neotropical migrants in the D.C. region, the Scarlet Tanager (*Piranga olivacea*) and Wood Thrush (*Hylocichla mustelina*). We found that Tanager colonization and extinction was closely associated with tree age, oak basal area and local NDVI. Colonization and extinction probabilities of Scarlet Tanager were both negatively associated with oak basal area, possibly indicating high fidelity at sites dominated by oak. Wood Thrush colonization probability was positively correlated with local forest cover and distance to edge. Thrush extinction probability was associated with local forest cover, tree age, total and oak basal area, coarse woody debris and local NDVI. These results suggest protecting forests alone may not be enough to protect forest obligate species. Park managers may want to focus on decreasing the amount of edge habitat, increasing forest cover, as well as conserving stands of mature forests and oak.

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**S19: Assessing Migratory Connectivity in Swainson's Warblers**

**Garrett Rhyne & Phillip Stouffer.**

Louisiana State University

Understanding the migration ecology and nonbreeding distributions of threatened Neotropical migrants is crucial for implementing effective conservation strategies. This includes evaluating the degree of migratory connectivity across breeding populations. Swainson's Warblers (*Limnothlypis swainsonii*) are an understudied species of conservation concern that would greatly benefit from full annual cycle tracking. They breed in distinct regional habitats in the southeastern US and winter across the Caribbean to Central America, although migratory connectivity is poorly known. In 2021 we captured territorial male Swainson's Warblers and deployed 86 multi-sensor light-level geolocators across six states. In 2022 we recovered 31 geolocators (36%) and generated wintering distribution maps. Results indicate high levels of migratory connectivity across longitudinal divides. Mississippi Alluvial Valley birds overwintered in the Yucatán Peninsula, Appalachian birds overwintered in the western Caribbean and Central America, and Coastal Plains birds overwintered in the central Caribbean. We also charted migratory timelines based on barometric recordings. Our results contribute valuable life history information for future conservation planning.



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**S5: Field thermography experiments confirm the role of tidal marsh sparrow bills in thermoregulation**

**Mackenzie A. Roeder<sup>1</sup>, Danielle Levesque<sup>1</sup>, Kristina Cammen<sup>1</sup>, Brian Olsen<sup>1</sup>, & Adrienne I. Kovach<sup>2</sup>.**

<sup>1</sup>University of Maine; <sup>2</sup>University of New Hampshire

The Greenberg-Tattersall corollary to Allen's rule suggests avian bill size increases with temperature in freshwater-limited environments due to selection on water conservation and thermoregulation. The seaside (*Ammospiza maritima*), saltmarsh (*A. caudacuta*), and Acadian Nelson's sparrows (*A. nelsoni subvirgata*) live in North America's tidal saltmarshes, have limited access to freshwater, and have significantly larger bills compared to non-tidal relatives. We tested the hypotheses that 1) tidal marsh sparrow bills aid in heat loss and minimize reliance on evaporative thermoregulatory behaviors and 2) the extent of heat loss via the bill varies across species. Within a temperature-controlled chamber, we recorded responses of individuals of each species to increasing temperatures (10 – 35°C) using a thermal imaging camera. As compared to saltmarsh and Nelson's sparrows, seaside sparrows lost heat via the bill at lower temperatures, lost higher overall percentages of heat from the bill, and utilized fewer evaporative strategies. These preliminary results provide support for the Greenberg-Tattersall corollary and suggest evolution has shaped the bills of these birds for their role in thermoregulation and water conservation.

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**S12: Black Vulture Ecology in southeastern North America**

**Scott A. Rush, Adrián Naveda-Rodriguez, & Mike Colvin.**  
*Mississippi State University*

Black Vultures (*Coragyps atratus*; BLVU) have increased in numbers within North America over the last decade and continue to expand their range northward. These changes in abundance and distribution have accompanied expansion in urban development due to increased concentrations of readily accessible feeding sources such as landfills, livestock farms, and roadkill. BLVU provide unparalleled ecological services through disposal of carrion and the mobilization of energy within the landscape. Unfortunately, these birds also create considerable human-wildlife conflicts through collisions with vehicles (aircraft and automobiles) as well as losses in agricultural production. This talk explores the movement ecology of BLVU through mark-and-recapture (n = 410 wing-tagged) and GPS technology (n = 28 GPS-tagged birds), providing understanding of vulture behavior within Mississippi, U.S.A. and with relative context to urban and agricultural systems and areas of human activity. We also explore blood-lead concentrations in birds (n = 390). Collectively, this project focuses on resolving existing, and anticipated human-wildlife conflicts, relative to vulture activities within the study area.

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**S11: Quantitative D note variation in Carolina, Black-capped, and hybrid chickadees**

**Savarina Salartash**, Brittany Coppinger, & Robert Curry.  
Villanova University.

Communication variation between species tells us how genetics influence species-typical behaviors. In Pennsylvania, Carolina Chickadees (*Poecile carolinensis*; CACH) and Black-capped Chickadees (*Poecile atricapillus*; BCCH) overlap in a hybrid zone where admixed offspring often display intermediate behavioral phenotypes. The chick-a-dee call, including D notes, communicate predator threat and social cohesion. CACH and BCCH produce qualitatively and quantitatively different notes, which have not previously been assessed at the individual level with known ancestry. We investigated if hybrids produced D notes of intermediate acoustic structure compared to notes produced by unadmixed individuals. We recorded calls from four sites, using 10 species-diagnostic SNPs to determine species ancestry. Pitch of D notes increased, and note duration decreased, with extent of CACH ancestry; inter-note interval did not vary with ancestry. Results confirmed D note structure varies with species, while showing hybrid birds produce D notes with intermediate properties, support the hypothesis that genetic ancestry influences call development in individual chickadees. Future studies will determine if receivers attend to differences in D note structure.

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**S9: Development of a rapid demographic monitoring protocol for the Saltmarsh Sparrow**

**Arthur Sanchez Jr**<sup>1</sup>, Samantha Apgar<sup>2</sup>, Johnathon B. Cohen<sup>3</sup>, Eliza Elizondo<sup>1</sup>, Chris Elphick<sup>2</sup>, Christopher R. Field<sup>2</sup>, Alice Hotopp<sup>4</sup>, Alison R. Kocek<sup>3</sup>, Adrienne I. Kovach<sup>5</sup>, Rebecca A. Longnecker<sup>6</sup>, Brian Olsen<sup>4</sup>, Mackenzie R. Roeder<sup>4</sup>, Katharine J. Ruskin<sup>4</sup>, & W. Gregory Shriver<sup>1</sup>.

<sup>1</sup>University of Delaware; <sup>2</sup>University of Connecticut; <sup>3</sup>State University of New York College of Environmental Science and Forestry; <sup>4</sup>University of Maine; <sup>5</sup>University of New Hampshire; <sup>6</sup>U.S. Fish and Wildlife Service

Saltmarsh Sparrow population trends have been estimated at a nine percent annual decline, elevating the importance of immediate conservation actions for this vulnerable species. Estimating species vital rates across a large geographic region is logistically challenging. We developed and tested a rapid sampling protocol focused on reproductive metrics to enhance future conservation planning. We used 10 years (2011-2021) of intensive demographic data to estimate daily nest survival, nest period success, and fecundity. We implemented our rapid protocol co-located at intensive sites in 2018, 2019, and 2021 to estimate the number of captured females and juveniles. We used general linear models to determine if we could predict intensive metrics with rapid metrics. We found that the sum of Saltmarsh Sparrow female and juvenile captures predicted daily nest survival ( $\beta = 0.496$ ,  $P = 0.043$ ), nest period success ( $\beta = 0.514$ ,  $P = 0.035$ ), fledglings produced per female ( $\beta = 0.746$ ,  $P = 0.001$ ), and successful broods per female ( $\beta = 0.682$ ,  $P = 0.002$ ). Our analysis suggests that the rapid demographic protocol is an informative and time-efficient sampling method that can aid in making informed management decisions related to sparrow conservation.

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**S18: Collaborating across taxa: what ornithologists and entomologists have to offer each other**

**Danielle Schwartz<sup>1</sup>, Graham Montgomery<sup>2</sup>, Eliza Grames<sup>3</sup>, & Chris Elphick<sup>1</sup>**

<sup>1</sup>University of Connecticut; <sup>2</sup> University of California, Los Angeles; <sup>3</sup>University of Nevada Reno

Insects serve an indispensable role in most terrestrial environments. Because of their importance as food for many birds, ornithologists often collect insect data, though it may not be reported explicitly as such. As global insect decline and its consequences become of increasing concern, it is vital to gather as much data as possible on insect population and biodiversity trends. The EntoGEM birds and insects project seeks to gather long-term datasets on insect population and biodiversity trends through a systematic search of literature relating to birds and insects. Within ornithological studies, we found over 70 datasets on insect populations that span five or more years and that have not been previously included or analyzed in entomological reviews. Almost half span more than 10 years. Several datasets come from regions that are underrepresented in the entomological literature. Examining ornithological studies through an entomological lens has also revealed that standards for insect data collection in bird field studies may not be the most efficient or effective. Working with entomologists to document insect population trends and improve data collection could improve understanding of global insect decline and its consequences.

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**S4: Overwinter survival of a common migrant songbird in Middle Tennessee**

**Nathaniel Selleck & Stefan Woltmann.**

*Austin Peay State University*

Survival rate is an important metric for understanding species' demographics, and breeding-season survival is an obviously important metric to estimate and monitor. However, understanding survival rates during the non-breeding season is just as important because conditions during the winter can have important carry-over effects to the breeding season. White-throated Sparrows (*Zonotrichia albicollis*) are a common migrant species that overwinters in much of the eastern United States. The winter ecology and survival of White-throated Sparrows are not well-studied. During the winters of 2020-2021 and 2021-2022, we used capture-mark-resight methods and Cormack-Jolly-Seber models to estimate the apparent survival of two sparrow populations in Clarksville, Tennessee. We expect to find high survival rates overall, and predict that (1) adult (AHY/ASY) survival rates will be higher than 1st-year bird (HY/SY) survival rates, and (2) male apparent survival may be higher than female apparent survival; our wintering population seems to be male-biased, perhaps as a result of differential migration of the sexes.

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**S3: The Offshore Passerine: Interpreting the Songbirds of Great Duck Island, Maine**

*Levi Sheridan. College of the Atlantic*

We can better understand how songbirds (order Passeriformes) operate in offshore environments by quantifying the size, composition, and habitat preferences of populations on coastal islands. This study aims to: (1) solidify the concept that songbirds exist on islands non-incidentally and (2) identify areas that should be prioritized for monitoring and conserving. During the summer of 2022, using a previous study as a model, I conducted a point-count survey on Great Duck Island. Great Duck Island resides 19 km south of Mount Desert Island, Hancock County, at the edge of Maine's network of coastal islands. Every morning I surveyed 12 unique points for songbirds, sampling different habitats. I observed over 27 species and identified at least 15 as probable breeders: *Melospiza melodia* (Song Sparrow), *Passerculus sandwichensis* (Savannah Sparrow), and *Geothlypis trichas* (Common Yellowthroat) were the most abundant; Song Sparrows were the most ubiquitous across habitats. These results are relevant to past findings but include a higher estimate of breeders and more inclusive list of migrants, suggesting that songbird presence on Great Duck Island (and potentially similar islands) has been historically underestimated.

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**S1: Patterns of reproductive isolation in recently sympatric honeyeaters with neo-sex chromosomes**

*Elise Shogren & Albert Uy.*  
*University of Rochester*

Secondary contact of populations or species provides a compelling test of reproductive isolation. In a system of *Myzomela* honeyeaters in the Solomon Islands, records indicate Cardinal honeyeaters (*M. cardinalis*) colonized the island of Makira from the island of Ugi, becoming sympatric with the endemic Sooty honeyeater (*M. tristrami*) within the last 150 years. Both species possess neo-sex chromosomes, formed by a W-autosome fusion. Rapidly evolving neo-sex chromosomes can shed light on both the evolution and central role of sex chromosomes in reproductive isolation and hybrid incompatibilities. Using a whole genome re-sequencing approach, we characterize the diversity and history of these two species in allopatry, as well as recent hybridization at the individual and genomic level in sympatry. We find evidence for late generation admixed individuals, with more differentiation on Z and neo-sex chromosomes than autosomes. However, introgression of the W sequence is asymmetric, with only *M. cardinalis* W sequences present in phenotypic hybrids and admixed individuals. On-going analyses are exploring the regions of the genome and specific loci resistant to introgression to understand the role of sex chromosomes in speciation.

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**S15: Estimating spatially explicit occupancy and density for a sharply declining marsh bird**

**W. Gregory Shriver<sup>1</sup>, Sam Roberts<sup>1</sup>, Zach Ladin<sup>2</sup>, Whitney Beisler<sup>2</sup>, Liz Tymkiw<sup>1</sup>, Chris Elphick<sup>3</sup>, Brian Olsen<sup>4</sup>, Megan Conway<sup>4</sup>, & Maureen Correll<sup>2</sup>**

<sup>1</sup>University of Delaware; <sup>2</sup>U.S. Fish and Wildlife Service; <sup>3</sup>University of Connecticut; <sup>4</sup>University of Maine

Saltmarsh Sparrow (*Ammospiza caudacuta*) breeding populations are in steep decline challenging conservationists to develop and deliver management actions that can slow and ultimately reverse these declines. Identification of priority breeding areas across the range is an important step in determining where to apply conservation actions. We used point count survey data (2011 – 2014; n = 2,934, 100-m radius survey locations) from the Saltmarsh Habitat and Avian Research Program (SHARP) to develop spatially explicit predictive models of Saltmarsh Sparrow occupancy and density throughout the Northeast, USA. We used a fine-scale (3-m rescaled to 200-m resolution) raster-based vegetation community data layer comprised of seven distinct vegetation types as our predictive surface. We fit occupancy and abundance models within eight SHARP regions based on the effects of the vegetation community types around each surveyed location. We then used region specific models to predict sparrow probability of occupancy and density creating region specific predicted estimates. Model predictions provide novel information regarding region-specific ‘hot spots’ of Saltmarsh Sparrow breeding populations.

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**S4: Dark-eyed Juncos (*Junco hyemalis hyemalis*) in western Massachusetts include year-round residents, winter residents and migrants**

**Daniel Shustack<sup>1</sup>, Edwin Neumuth<sup>2</sup>, & Hannah Wait<sup>1</sup>**

<sup>1</sup> Massachusetts College of Liberal Arts; <sup>2</sup>Hoffman Bird Club

Dark-eyed juncos (*Junco hyemalis hyemalis*) occur in western Massachusetts, USA throughout the year, but the degree to which these are the same or different individuals across seasons and years is unknown. We initiated a color banding and resighting study at the Yard, a bird feeding station in Washington, MA (el. 530 m). Between February 2020 and April 2022, we color-banded (n = 289) and resighted juncos in all seasons. Three males spent the winter and summer at or near the Yard, thus confirming a year-round resident population of juncos. Most juncos captured at the Yard were fall or spring migrants. Overwintering numbers varied substantially from year to year, with nine in winter 2020-2021 to >40 juncos the next winter. Resightings suggest a clear departure of most overwintering Juncos in the last half of March each year, meaning the winter residents (and year-round residents) and the earliest arriving spring migrants overlap at the Yard for at least two weeks. Winter site fidelity is low (~13%; three returns of 22 winter residents). Three juncos were opportunistically resighted or recovered within ~1.5 km of the Yard. Another junco was recovered 185 km away in New Jersey, eight days after being banded during fall migration.

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**S2: Examining the habitat requirements for American woodcock *Scolopax minor* in New Brunswick, Canada**

**Larissa Simulik**

*University of New Brunswick*

The American woodcock *Scolopax minor* is a forest-dwelling shorebird whose population has declined 1% annually since the 1970s, mainly attributed to the loss of young forest across their entire range. Now, the American woodcock is considered to be a priority species for conservation in eastern Canada. However, no field data has been collected on their nesting and diurnal habitat requirements in the province of New Brunswick. We surveyed forests from late April to early June across five different sites in New Brunswick and used thermal cameras to identify nesting and non-nesting woodcock. I took coordinates for each found bird at either the flush point or nest site; we found 13 nests and 33 diurnal sites. At woodcock and control sites (n= 46 for each) we conducted habitat surveys. The survey plots were 0.04 ha and we measure basal area, tree density, shrub and sapling stem density, the height of three trees, canopy cover at a 30 cm height, and soil sampling. Preliminary results indicate a preference for a variety of intolerant hardwood species and they used a greater range of forest ages than expected. Understanding the regional habitat requirements of woodcock will allow for better forest management and conservation efforts.

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**S19: Spring migration stopover patterns in Canada Warblers (*Cardellina canadensis*) at a northern lakeshore site**

**Sarah Smith Pagano<sup>1</sup>, Gabriella Orfanides<sup>1</sup>, & Andrea Patterson<sup>2</sup>**

<sup>1</sup> Rochester Institute of Technology; Braddock Bay Bird Observatory

Habitats along the south shore of Lake Ontario are key stopover sites for migrating birds, including several boreal passerine species with declining populations that are of conservation concern. This project evaluated stopover behavior of spring migrating Canada Warblers (*Cardellina canadensis*) at a lakeshore site, in combination with physiological and health indices that may influence individual departure decisions. Birds were captured at the Braddock Bay Bird Observatory and were blood sampled and fitted with radio telemetry nanotags. We used an integrative assessment of physiological condition by incorporating plasma metabolite profiling and leukocyte profiles to gauge immune status. Stopover duration was determined by using the Motus Wildlife Tracking System and detections at a local receiver. Regional detections at other Motus towers in the array provided migration path information. Correlations of physiological and immune status metrics and stopover duration provide interesting insight into biological factors that may impact migration behavior at this northern location. This holistic approach to the assessment of stopover biology may also shed light on the complex factors connected to Canada Warbler population declines.

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**S21: The effect of urbanization and parasitism on the gut microbiota of Darwin's finch nestlings**

**Gabrielle Mara Solomon<sup>1</sup>, Ashley Love<sup>2</sup>, Grace Vaziri<sup>2</sup>, Sarah Knutie<sup>2</sup>, Jaime Chaves<sup>3</sup> & Johanna Harvey<sup>2</sup>**

<sup>1</sup>Villanova University; <sup>2</sup>University of Connecticut; <sup>3</sup>San Francisco State University

Host-associated microbiota can be affected by urbanization through a shift in host diet and the invasion of non-native parasites affecting the host. We investigated the effects of urbanization and parasitism by the invasive avian vampire fly (*Philornis downsi*) on the gut microbiota of nestling small ground finches (*Geospiza fuliginosa*) in San Cristóbal Island, Galápagos. Since urban finches have a greater diet breadth, we expected that nestling finches in urban environments would have a more diverse gut microbiota to enable digestion of this diet. Because increased gut microbial diversity is often associated with stronger host immune responses, we predicted that the gut microbiota of urban finches would change in response to parasitism. In this factorial study, we experimentally manipulated parasite presence in an urban and non-urban area and collected fecal samples from nestlings to characterize the gut microbiota. Urbanization and parasitism did not significantly affect bacterial diversity. However, the abundance of some bacterial taxa differed between urban and non-urban nestlings. Overall, this study will further our understanding of the complex effects of anthropogenic impacts on birds.

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**S11: The vocal development of a Pacific Island corvid, the Åga (*Corvus kubaryi*)**

**Andria Kroner Stafford & Anne Clark**

*Binghamton University*

Among songbirds, the study of vocal ontogeny has focused primarily on song development. While non-song vocalizations, or calls, are important signals used in many more contexts than song, the ontogeny of calls is understudied. In particular, the ontogeny of calls among species that produce only calls, such as corvids, are especially underrepresented. The Åga (Mariana Crow, *Corvus kubaryi*), is a critically endangered Pacific Island endemic that is actively managed to reverse its decline. This study documents the vocal development of nestling Åga reared in captivity during their first three weeks post hatch, and those of wild-reared nestlings from approximately three weeks post-hatch to fledging (~5-7 weeks of age). Vocalizations of captive and wild nestlings were collected on Rota Island, CNMI, using Automated Recording Units (ARU). Four distinct calls were identified, and Begging was further explored. No significant sex differences in Begging emerged. Rearing environment affected only one acoustic characteristic, bandwidth. As corvids are well-known vocal learners, understanding the early development of Åga vocalizations could provide insight into this species' ability to adjust and build upon their repertoire into adult life.

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**S9: Compensatory growth tradeoffs of experimentally induced asynchronous hatching in a songbird**

**Keegan Stansbury, Caitlin Couvillion, Tosha Kelly, Allison Cannon, Melanie Kimball, & Christine Lattin**

*Louisiana State University*

Many songbirds begin active incubation after laying their penultimate egg, resulting in synchronous hatching of the clutch. However, later in the breeding season, environmental incubation may begin as soon as eggs are laid, causing asynchronous hatching and size hierarchies among siblings. Late-hatched chicks may compensate for this initial size deficit by allocating more resources toward skeletal growth at a cost to growth in other tissues. To test for compensatory tradeoffs, we manipulated incubation temperature in nest boxes of free-living European starlings (*Sturnus vulgaris*), inducing asynchronous hatching (n=10). Control nests (n=10) were not manipulated. We collected nestling morphological measurements at days 3, 6, 9, and 12 post-hatch, and on day 14, we collected spleen, liver, and bursa of the largest and smallest chicks in each nest. By day 12, morphological measurements of the smallest nestlings in heated and control nests were not different, demonstrating compensatory growth. Unexpectedly, relative to tarsus length, the spleen was heavier in the smallest nestlings in the heated group. These results suggest that, in our population, there may not be compensatory tradeoffs between somatic and immune tissue growth.



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**S7: Within-pair patterns of nest defense and breeding productivity among Great Black-backed Gulls**

*Dylan Titmuss*<sup>1</sup>, *Kristen Covino*<sup>2</sup>, *Mary Elizabeth Everett*<sup>3</sup>, & *Sarah Courchesne*<sup>3</sup>

<sup>1</sup>*Woods Hole Oceanographic Institution*; <sup>2</sup>*Loyola Marymount University*; <sup>3</sup>*Gull of Appledore Project*

When threatened, nesting birds often display aggressive behaviors as a deterrent against predation. Further, individuals of varying monogamous species have been found to favor partners with similar traits to their own, suggesting that reproductive success may be linked to mate similarity. As highly territorial birds, Great Black-backed Gulls (*Larus marinus*) have a distinct need for antipredator behaviors; however, they are understudied regarding patterns in their nest defense. As such, this project examines temporal and within-pair variation in aggressive behavior among Great Black-backed Gulls throughout incubation. During four breeding seasons (2018-2022) on Appledore Island in Maine, we conducted repeated behavioral tests (n = 463) to assess the defensive responses of nesting gulls, using a categorical scale to quantify their aggression toward a human “threat.” Analysis revealed a significant decline in aggression over the incubation period, and mated gulls’ responses also correlated with one another more closely than expected at random. Finally, mated pairs with more similar defensive behaviors may have successfully fledged more chicks, potentially exhibiting higher productivity as a function of mate compatibility.

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**S19: High spatiotemporal overlap in the non-breeding season despite geographically dispersed breeding locations in the Eastern Whip-poor-will (*Antrostomus vociferus*)**

*Christopher Tonra*, *Aaron Skinner*, *Michael Ward*, *Ian Souza-Cole*, *James Wright*, *Frank Thompson III*, *Thomas J. Benson*, & *Stephen Matthews*

*The Ohio State University*;

A full annual cycle approach to conservation and understanding of population trends requires an understanding of migratory connectivity. We present tracking data on the Eastern Whip-poor-will (*Antrostomus vociferus*), a Neotropical migrant that has declined by 70%. We utilized data from 52 archival GPS tags deployed at five breeding areas covering a 9.5-degree latitudinal span (~1000 km). We calculated migratory connectivity throughout migration and on the wintering grounds and tested predictions for three latitudinal connectivity patterns. Whip-poor-wills circumvented the Gulf of Mexico, and populations came together in eastern Texas in early October, resulting in decreasing connectivity throughout migration. Breeding-winter migratory connectivity was low, with extensive overlap of core wintering areas in southern Mexico and Guatemala. The overlap of wintering areas suggests that whip-poor-wills are telescopic migrants. Circumventing the Gulf of Mexico funneled individuals into a small region in eastern Texas in migration. Thus, dispersed breeding populations overlap in space and time during migration and winter, and non-breeding season conditions can impact individuals from across the breeding range.

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**S15: A restoration retrospective: using historical habitat management records to understand recovery**

*Angela Tringali & Reed Bowman*

*Archbold Biological Station*

Habitat restoration is critical to recovering populations of Threatened and Endangered species. For the Florida Scrub-Jay, inadequate habitat management is a primary threat to its persistence. Even after massive, statewide protection of scrub habitat in the 1990s, scrub-jay populations continued to decline. The Lake Wales Ridge Wildlife and Environmental Area (LWRWEA), a collection of 13 different sites, relatively small and isolated, were protected during the 1990s and early 2000s. All contained scrub-jay populations, but from 2004-2011, many declined. Since 2011, most populations have been growing, but at different rates. Variation in success may be attributable to management or lack of connectivity. We digitized maps of management actions on the LWRWEA from 2012 – 2021 and overlaid detections of Florida Scrub-Jays from annual surveys. We highlight the importance of prescribed fire and invasive species control on successful habitat restoration for Florida Scrub-Jays and discuss the implications of these findings for habitat management and restoration statewide.

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**S4: Post-breeding ecology in the Prothonotary Warbler: Evaluating potential trade-offs between breeding, molt, and migration phenology**

*Brian Tsuru, Elizabeth Ames, & Christopher Tonra*

*The Ohio State University*

The post-breeding period is a transitional stage of the annual cycle of migratory birds, linking the breeding season with migration to the non-breeding grounds. In this short period of time, migrants must finish breeding, undergo prebasic molt, and prepare for migration. These events may impose competing energetic and temporal demands on individual migrants, potentially forcing birds to make tradeoffs among them. We assess evidence in support of such post-breeding tradeoffs in the Prothonotary Warbler (*Protonotaria citrea*), a long-distance migrant and species of conservation concern. We monitored color-banded Prothonotary Warblers in central Ohio through their breeding and post-breeding activities, recording the dates of major events such as spring arrival and nest fledging. We deployed radio-transmitters on focal adults (n=38) to obtain fall departure dates, which were best predicted by spring arrival date and by the last date of parental care. This indicates that adult Prothonotary Warblers trade-off between breeding effort and migratory phenology in the post-breeding period. These results have implications for how breeding season events carry over to influence individual outcomes in subsequent stages of the annual cycle.

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**S13: Predictors and consequences of diet variation in a declining generalist aerial insectivore**

**Jennifer Jean Uehling<sup>1</sup>, Conor Taff<sup>1</sup>, Jennifer Houtz<sup>1</sup>, Paige Becker<sup>1</sup>, Allison Injaian<sup>2</sup>, & Maren Vitousek<sup>1</sup>**

<sup>1</sup>Cornell University; <sup>2</sup>University of Georgia

Diet variation can have significant consequences for birds' health and fitness. However, for generalists that have a broad range of food choices, the specific dietary characteristics important for health and fitness are often unclear. Here, we use DNA metabarcoding of fecal samples to examine the consequences of diet variation in a declining generalist aerial insectivore, the tree swallow (*Tachycineta bicolor*), and to identify potential drivers of this variation. We focus on two diet characteristics that may be important for generalists: dietary diversity and nutrient content. For nutrient content, we focus on dietary aquatic insect content; aquatic insects contain macronutrients that are thought to be vital for tree swallows. Tree swallow nestling dietary diversity strongly and positively predicted fledge success, but we found no direct link between dietary aquatic insect content and nestling fitness. Adult phenotype did not predict nestling diet, but during the provisioning period, females with lower body mass had more diverse diets. Our results suggest that dietary diversity may be important for this declining bird. Future work should prioritize understanding the importance of dietary diversity for wild generalist species.

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**S6: Urban dark-eyed juncos became less aggressive during the COVID-19 anthropause**

*Marlene Walters, Eleanor Diamant, Felisha Wong, Christina Cen, Pamela Yeh*

*UCLA*

Urban areas often impose strong, novel selection pressures on wildlife. Phenotypic plasticity is an important mechanism helping organisms establish populations in these novel environments. Phenotypic plasticity can be difficult to study in urban wildlife because many urban environmental variables are challenging to isolate and manipulate experimentally. The COVID-19 lockdowns created a natural experiment in which wildlife normally exposed to high levels of human disturbance were released from these stressors. We took advantage of this to assess whether urban birds expressed aggression differently when relieved from frequent encounters with humans. We measured the territorial aggression responses of resident dark-eyed juncos (*Junco hyemalis*) on an urban college campus in Los Angeles, USA. We found that the population overall displayed significantly reduced aggression in pandemic year 2021 compared to the typical year 2019. Furthermore, individuals measured in both 2019 and 2021 showed significantly reduced aggression during 2021, demonstrating that individual birds maintain phenotypic plasticity in this trait. Our results show that human disturbance likely has a significant effect on the aggressive behavior of urban birds.

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**S2: Vegetation structure and predation risk drive Mountain Plover brood habitat selection**

*Casey Weissburg*

*Colorado State University Pueblo*

Previous research shows that chick survival is a vital rate that affects Mountain Plover population growth, yet little is known about how this species selects habitat during the brood-rearing phase. Our research focuses on brood habitat selection as a lens to examine how several environmental characteristics influence this species during this critical period. We hypothesize that Mountain plover brood habitat selection patterns, as well as chick survival rates, depend on variation in predation risk, mediated by forage availability and vegetation structure. Brood monitoring was conducted from hatch until fledging or death was confirmed with daily locations obtained by radio telemetry. To evaluate the three environmental characteristics of predation risk, forage availability, and vegetation structure, data was collected on mammalian and avian predator encounter rates, insect biomass, and three measures of vegetation density. Brood habitat selection was analyzed with a series of a priori mixed-model resource selection functions and evaluated with AICc model selection. Preliminary results from the 2021 field season suggest that Mountain plover broods select for moderate vegetation densities and low predation risk.

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**S7: From selection to seedlings: Tracking the fate of chestnuts and acorns cached by Blue Jays (*Cyanocitta cristata*)**

**Jay Wright<sup>1</sup>, Christopher Tonra<sup>2</sup>, Leila Pinchot<sup>3</sup>, Stephen Matthews<sup>2</sup>**

*Metroparks Toledo<sup>1</sup>, The Ohio State University<sup>2</sup>, U.S. Forest Service: Northern Research Station<sup>3</sup>*

Blue Jay scatter-hoarding behavior is a seed dispersal mutualism shaping oak forests in eastern North America. Two processes of forest change, the ongoing decline of oak and the reintroduction of American chestnut, are likely influenced by the caching behavior of jays. The dispersal quality, however, can vary over many steps, from seed selection to the growth rate of cached seeds. We assess the dispersal effectiveness of jays for chestnut and two species of central Appalachian oaks, white and black oak. We use radio telemetry of seeds to locate cache sites and track seed fate. By planting seeds at cache and random sites we determine habitat preferences of jays, and track the pilferage rates, stem emergence, and seedling growth of planted seeds. Jays preferred to cache in shrubby habitat, and cached the three species at similar rates (~35%). Dispersal effectiveness was limited by pilferage rates (>80%), and first-year seedling survival ranged from 2.6% for white oak to 6.2% for chestnut. Seed shadows did not differ among species, and most caches were within 150m of the origin sites (max distance = 460m). We found some support for the directed dispersal hypothesis, as stem emergence for oaks was greater at caches than random sites.

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**S16: Assessing Climate Vulnerability of Pennsylvania's Peatland Bird Communities**

**David Yeany<sup>1</sup>, Mary Ann Furedi<sup>2</sup>, Ephraim Zimmerman<sup>2</sup>**

*Western Pennsylvania Conservancy<sup>1</sup>, PA Natural Heritage Program/Western PA Conservancy<sup>2</sup>*

More abundant in boreal latitudes; peatlands include bogs, fens, swamps, and forested wetlands that accumulate peat – decaying organic matter within water-logged conditions. In Pennsylvania, we recently mapped 758 potential peatlands. Most are headwaters located in the state's cooler higher elevations and function as refugia for rare boreal plants and animals. Projected climate change effects could alter peatlands and result in the decline or loss of unique boreal species near their thermal tolerance. Our 2016-2018 breeding bird surveys across 50 peatland sites found 110 bird species, 35% of which had "moderate" or "high" boreal affinity and 28% of which are Species of Greatest Conservation Need. Using a climate vulnerability index, we found 78% of peatland breeding bird species also had "moderate" or "high" vulnerability to climate change. We hypothesized that peatland bird community climate vulnerability can be predicted by boreal affinity, such that sites with higher boreal affinity will be more vulnerable to climate change factors. Understanding this relationship should reveal which peatland sites are at greater risk of negative climate change impacts and should be prioritized for climate-focused bird conservation.

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**S16: Using the timing of juvenile captures and brood patch characteristics from mist netting to examine potential shifting in fledging and breeding times due to climate change.**

*Lisa Zinn, Lauren Burg, Katie Lucier*

*Northern Vermont University*

As climate change brings an earlier spring to northern climates, it is important to examine how nesting birds are responding to these climactic shifts. Much of the research on the timing for nesting and fledging is done through nest surveys which are labor intensive. We propose using both historic and current data from mist netting to assess how climatic shifts are changing bird breeding and fledging times. Mist netting for breeding birds has been done for many years to monitor productivity and survivorship. That same data can be used to analyze the number and timing of fledging birds. There is some evidence that bird breeding may be shifting earlier in the spring and perhaps ending earlier in the summer. We are using brood patch data from mist netting as an indicator of when female birds have finished breeding. We have found preliminary evidence that some bird species are starting to molt in their brood patches earlier in the summer likely due to an earlier start to the breeding season.

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# Centennial Meeting of The Association of Field Ornithologists

## Poster Abstracts

Listed in alphabetical order by last name of presenting author (name in bold)  
Posters are listed by their poster number (P) before the title.

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### **P44. Anti-predatory responses of avian species as a function of successional regrowth habitat types**

**Colton Adams**<sup>1</sup>, *Nicole Lussier*<sup>2</sup>, *Todd Freeberg*<sup>1</sup>

*University of Tennessee, Knoxville*<sup>1</sup>, *Kwit Lab at University of Tennessee, Knoxville*<sup>2</sup>

Anti-predatory behaviors are evolutionary traits that serve to maximize the survival of prey species in risky contexts. In the presence of a predator, birds typically respond by eliciting alarm calls, mobbing calls, or by being silent. We studied the vocal responses of bird species following the playback of a gray-lined hawk (*Buteo nitidus*) at Fundación para la Conservación de los Andes Tropicales (FCAT) station in northwestern Ecuador. FCAT has 4 types of habitat based on years of successional regrowth: 2 types of pasture and 2 types of forest. We conducted 40 playback trials with 8 in each type of habitat and 8 on the edge of pasture and forest. A trial consisted of us recording calls with a microphone at a given spot for 9.5 minutes, playing the hawk call through a speaker for 1 minute, and continuing to record for another 9.5 minutes. We are analyzing the type, latency, and repetition rates of the calls for the post-stimulus period following the playback. Preliminary analysis suggests that anti-predatory behavior of bird species differs as a function of habitat type. These results may help us predict the evolution of anti-predatory behaviors in the context of deforestation and restoration ecology in a rapidly changing world.

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## **P42. Social Contexts of Extra-Pair Paternity in Florida Scrub-Jays**

*Tori Bakley<sup>1</sup>, Kelly Roberts<sup>1</sup>, Nancy Chen<sup>2</sup>, John Fitzpatrick<sup>3</sup>, Reed Bowman<sup>1</sup>*

*Archbold Biological Station<sup>1</sup>, University of Rochester<sup>2</sup>, Cornell University<sup>3</sup>*

Extra-pair copulations (EPC) and extra-pair paternity (EPP) is common in socially monogamous birds. EPCs are initiated by females in search of a higher quality male to potentially increase genetic diversity in her offspring. The cooperative Florida Scrub-Jay *Aphelocoma coerulescens* is socially and genetically monogamous, with rare exceptions of EPP. However, intense competition among males for breeding space reduces variance in the quality of breeding males, thus we hypothesize that EPPs are a result of researcher errors assigning social paternity rather than true mismatches between social and genetic paternity. We compare genetic paternity data from 1987-2013 in conjunction with field assignments of social "breeding pairs" and identify 54 cases of mixed paternity in 1,181 nests (4.57%). We describe the social contexts in which mixed or incorrectly assigned paternity occurs and characterize them as consistent with predictions of EPC hypotheses or social contexts in which male breeding status might be incorrectly assigned. Identifying rare social contexts in which males other than the putative breeder attain paternity improves our ability to correctly assign social paternity and understand social structure in Florida Scrub-Jays.

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## **P30. Developing Genotyping-in-Thousands by sequencing panel to study adaptation in tidal marsh sparrows**

*Kayla Barton<sup>1</sup>, Lindsey Fenderson<sup>2</sup>, Alice Hotopp<sup>1</sup>, Mackenzie Roeder<sup>1</sup>, Jonathan Clark<sup>2</sup>, Talia Kuras<sup>2</sup>, Logan Maxwell<sup>2</sup>, Emily Patterson<sup>2</sup>, Kristina Cammen<sup>1</sup>, Adrienne Kovach<sup>2</sup>, Brian Olsen<sup>1</sup>, Benjamin King<sup>1</sup>*

*University of Maine<sup>1</sup>, University of New Hampshire<sup>2</sup>*

Understanding the genetic basis of adaptation to dynamic environments remains a central question in evolutionary biology. Tidal marsh sparrows have phenotypes associated with adaptation to harsh environmental conditions of tidal marshes. To explore how genomic variation is associated with tidal-marsh adaptations we developed a Genotyping-in-Thousands by sequencing (GTSeq) panel that leverages targeted amplicon sequencing to study sequence variation across trait-associated loci in three *Ammodramus* species. We used whole genome sequencing to identify single nucleotide polymorphisms (SNPs) in 97 seaside, Nelson's and saltmarsh sparrow individuals. We focused on candidate genes for tidal marsh phenotypes underlying bill morphology, plumage, osmoregulation, circadian rhythms, reproduction, and major histocompatibility loci. Here we present our pipeline for building a GTSeq panel that will be used to relate genetic variation to phenotype data from hundreds of sparrows. The pipeline entails filtering SNPs with specific criteria, identifying putative amplicons, and designing primers. This pipeline will be a helpful tool for researchers building their own GTSeq panels to explore the genomic basis of traits in other systems.



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**P5. Burrowing Owls on campus: inquiry-driven, field-based curriculum to connect university students to STEM fields**

**Heather Bateman & Adam Stein**

*Arizona State University*

Research indicates that underrepresented student populations benefit from hands-on, in-person education environments. Arizona State University, an Hispanic-serving institution, has introduced colonies of Burrowing Owls (*Athene cunicularia*) to campuses to connect students to nature and science, provide habitat for owls, and link the academy to conservation organizations. Students have logged hundreds of volunteer hours in owl relocation efforts and engaged with local avian non-profit conservation organizations. The Burrowing Owl project has pivoted pandemic online biology laboratories to field-based, active, and inquiry-based exercises. Although owls have only been established for 16 months, the habitat has been improved and owls have remained on site and fledged young. The project launched a Pitchfunder campaign to raise funds for student projects and has logged over 500 volunteer hours. Student-lead research projects have used field techniques (pellet dissection and remote cameras) to evaluate owl diet and behavior. Classes have improved habitat and managed data via open-source platforms. Benefits of the project have facilitated research, connected students to nature and community engagement, and supported academic achievement.

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**P20. Dowitcher Deviations: Differences in southward migration strategies of Short-billed Dowitchers breeding in southern Alaska**

**Rosalyn Bathrick<sup>1</sup>, Nathan Senner<sup>1</sup>, Jim Johnson<sup>2</sup>, Dan Ruthrauff<sup>3</sup>**

University of Massachusetts, Amherst<sup>1</sup>, USFWS Division of Migratory Birds<sup>2</sup>, USGS, Alaska Science Center<sup>3</sup>

Separate breeding populations of the same species can exhibit different migratory strategies, including variation in choice of stopover sites, staging duration, and flight distance. These spatiotemporal distinctions may be influenced by a combination of geographical features, environmental conditions, and phenological differences at breeding sites. We tracked three populations of short-billed dowitchers (*Limnodromus griseus caurinus*) that breed on an east-west gradient in southern Alaska to inform the previously unknown migration ecology of the species and investigate potential distinctions in southward migration timing and strategy. Birds were captured on nests or chicks and affixed with Argos-GPS transmitters that captured locations every few days during southward migration. Departure timing from the breeding grounds and arrival to wintering sites was the biggest difference between birds from different populations: individuals departing from more westerly sites left earlier than those further east, and arrived along the coast of the Sea of Cortez earlier than their counterparts. This distinction demonstrates how slight geographic difference in breeding sites may form the basis for variation in post-breeding migratory strategy.

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### **P3. Microplastic Accumulation in Terrestrial Birds**

***Alexis Baum & Jennifer Smith***

*University of Texas at San Antonio*

Microplastics (<5mm) have deleterious impacts on wildlife and biodiversity. However, little research examines microplastic exposure of terrestrial birds and it is unknown how urbanization relates. This study aims to investigate microplastic exposure of terrestrial birds by examining gastrointestinal contents and the correlation between microplastic loads and ecological traits, such as foraging type. Birds will be collected during window strike surveys in southern Texas. We also will compare microplastic exposure across an urban gradient using Crested Caracaras *(Caracara cheriway)* as a model. During the breeding season, we will collect Crested Caracara regurgitated pellets under nests in San Antonio, Texas. Digestive tracts and regurgitated pellets will be digested in a 10% potassium hydroxide solution. Once filtered, microplastics will be visually counted under a stereomicroscope and Fourier-transform infrared spectroscopy (FTIR) will be employed for polymer identification. We predict that most sampled birds will contain microplastic with higher loads in ground foraging species such as granivores. We also anticipate a correlation between microplastic loads in pellets and urban land usage.

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### **P33. Using simulation to investigate storm-related bias to nest survival estimates in beach-nesting birds**

***Sarah Bolinger***

*University of Louisiana at Lafayette*

Daily survival rate (DSR) is commonly estimated using field evidence. Storms increase the uncertainty of DSR estimates in beach-nesting birds because evidence of true fate may be washed away and failure erroneously attributed to the storm. I used simulated data to investigate how changing storm duration/frequency affects uncertainty of DSR estimates. I simulated nests with randomly assigned initiation dates. The model had a true DSR and a conditional daily failure probability from multiple causes, plus an observation process (nest discovery probability and observation interval). I simulated storms at different frequencies and durations, then compared the bias and variance of DSR estimates from three different models under each scenario. I found that storm frequency has a larger effect on variance than storm duration, although increased sample size mitigates bias in DSR estimates. Reducing the observation interval and using a Bayesian framework also reduced bias. As climate change increases vulnerability of coastal sites as well as duration/frequency of storm events, storm-related bias is important to consider, especially for studies that lack the budget or appropriate location for camera monitoring (such as public beaches).

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### **P34. Build an island - terns will come!**

*David Brinker<sup>1</sup>, David Curson<sup>2</sup>, Roman Jesien<sup>3</sup>, Archer Larned<sup>3</sup>, Kim Abplanalp<sup>3</sup>*

*Maryland Department of Natural Resources<sup>1</sup>, Audubon Mid-Atlantic<sup>2</sup>, Maryland Coastal Bays Program<sup>3</sup>*

In 1991, ~1,250 pairs of Common Tern (*Sterna hirundo*) bred in Maryland's coastal bays; by 2020 this population segment had declined to ~35 pairs. This decline is the result of habitat deterioration from sea level rise accelerated island erosion and loss. In 2021 a 1,024 sq. ft. floating raft was constructed to provide critically needed breeding habitat. The raft was enlarged in 2022 to 2,304 sq. ft. Twenty-three pairs of Common Tern produced 19 fledged chicks from the raft in 2021. Eighty percent of the terns that nested on the raft in 2021 returned to breed on the 2022 raft. The 2022 breeding colony produced 155 nests and fledged ~150 chicks (~1.0 fledglings per breeding pair). Innovative design elements of the raft include dock hinges that allow raft segment articulation to absorb storm wave energy and wheeled dock floats to facilitate raft deployment, removal and storage using a rollback. The raft design withstood sustained winds of 50 mph during tropical storm Elsa in 2021 and a sustained 8-day northeaster in May of 2022. While not an inexpensive solution, artificial islands are an important stopgap conservation technique to provide critical breeding habitat while permanent natural habitat solutions are implemented.

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### **P31. Secondary contact facilitates gene flow between island bird species**

*Paula Brown*

*University of Rochester*

Instances of recent secondary contact between closely related species provide exciting opportunities to study how secondary contact can disrupt or reinforce speciation. One such pair of closely related species are the Solomon Islands' honey-eater birds *Myzomela tristrami* and *Myzomela cardinalis*. These species are hypothesized to have come into secondary contact within the past 200 years. Previous work using a handful of molecular markers found evidence for asymmetric gene flow between the two species; however, whole genome data would provide more robust tests for hypotheses of the degree and history of gene flow resulting from secondary contact. Here, I use whole genome sequence data and the coalescent modeling program *fastsimcoal2* to explore the evolutionary outcome of secondary contact between these closely related species. Based on preliminary results, I found additional evidence that secondary contact was indeed recent, and that gene flow has decreased asymmetrically over the course of secondary contact. This reduction of gene flow after a period of secondary contact may contribute to the maintenance of reproductive isolation, despite extensive range overlap between these two species.

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**P45. Double Defense: Cooperative Responses of Mated Great Black-backed Gulls to a Threat**

*Kayla Cannon*<sup>1</sup>, *Dylan Titmuss*<sup>2</sup>, *Mary Elizabeth Everett*<sup>3</sup>, *Sarah Courchesne*<sup>3</sup>, *Kirsten Covino*<sup>4</sup>

*Bryn Mawr College*<sup>1</sup>, *Woods Hole Oceanographic Institution*<sup>2</sup>, *Gulls of Appledore Project*<sup>3</sup>, *Loyola Marymount University*<sup>4</sup>

The Great Black-backed Gull (*Larus marinus*) is a ground-nesting, monogamous seabird. Mates cooperate to defend a territory and raise chicks, and this study explores the significance of a present, potentially-defending mate to an incubating bird. During the 2022 breeding season, we conducted behavioral tests with breeding pairs of banded Great Black-backed Gulls on Appledore Island, Maine (42.98°, -70.61°). A researcher approached the nest and stood one meter from its edge for 30 seconds. The defensive responses of the incubating gull and of its mate, if present, were rated on a categorical scale. Almost 180 behavioral tests were completed on 20 mated pairs (40 individuals) from throughout the breeding colony. Defensive responses were analyzed in R statistical software with linear mixed-effects modeling. The presence of a mate assisting in nest defense did not affect individual gulls' responses. Yet, when individuals were present but not incubating, they displayed stronger defensive responses than their incubating mates. These findings suggest that both adults being present may be beneficial for the breeding pair. Further research into how mate presence and degree of threat response relates to breeding success is ongoing.

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**P46. Testing the parental investment hypothesis in cavity nesting species**

*Jesus Cardenas & Blake Jones*

*Bennington College*

Across animal taxa, parents face a trade-off between defending their current reproductive effort and surviving to reproduce in the future. Among birds, nest defense plays a critical role in maximizing an individual's fitness by increasing the probability of offspring survival. However, there are inherent risks in defending nests, eggs, and nestlings, from potential predators, namely injury and falling prey to the predators themselves. The Parental Investment Hypothesis states that parents will act depending on the value of their offspring. For example, parents should value nestlings more than eggs. We tested the Parental Investment Hypothesis, in three cavity nesting species across stages of nest development, from empty nests to nests with fully developed nestlings. Using a model snake at the nest, we measure adult willingness to engage in antipredator behaviors to defend their nest. We found that nest contents (i.e, empty, eggs, nestlings) influenced aggressive behavior at the nest. Further, within species, the number of eggs and nestlings correlated with the intensity of nest defense behavior against a potential predator.

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**P28. Breeding Songbirds in Refugia on an Uninhabited Island in Narragansett Bay**

*Jameson Chace*<sup>1</sup>, *Sophie Beauchesne*<sup>1</sup>, *Richard van Winkle*<sup>1</sup>, *Gabriella Von Beren*<sup>1</sup>, *Julia Abbott*<sup>2</sup>

*Salve Regina University*<sup>1</sup>, *Providence College*<sup>2</sup>

Small uninhabited island habitats are known to be predator-free refuges for many species and provide valuable breeding habitats for many nesting birds. In Narragansett Bay Rhode Island, many such islands are state owned and protected from human visitation during the breeding season. In the summers of 2020-2022, we monitored the survivorship and productivity of songbirds using standardized mist-netting procedures. Data were collected on uninhabited Rose Island as well as a comparative site, Sweetflag, in the urbanized portion of Middletown. The island had fewer breeding species. Common species at both sites were used for comparative measures of productivity and survival. There were significantly more hatch-year Common Yellowthroats and Song Sparrows on Rose Island than Sweetflag. Between year survivorship was respectively higher on Rose Island for the Song Sparrow, Yellow Warbler, and Gray Catbird. Preliminary results suggest that the uninhabited island has lower species richness, equal or higher species abundance, and in some cases higher species productivity and survivorship than nearby conserved habitats on large islands or the mainland.

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**P35. I'd Hate to Be Youngest: Factors Affecting Fledging Success in Herring Gulls on Mount Desert Rock**

*Rosie Chater & Marina Schnell*

*College of the Atlantic*

Mount Desert Rock (Lat: 43.97 Lon: -68.13) is a 1.2 hectare island 40 km off the Maine coast, containing 290 breeding pairs of Herring Gulls (*Larus argentatus*). Historically, this colony was actively culled, but it has recovered and is one of two increasing colonies in the region. We focused on the effect of clutch size and hatch sequence on fledging success. We sampled 40 nests, with an average clutch size of 2.7. Once chicks hatched, we weighed them and checked mortality daily. We banded chicks to keep track of individual development. Chicks were considered fledged at 700 g. Three-egg nests fledged an average of 1.8 chicks (n=25 nests), two-egg nests fledged 1.18 chicks (n=11 nests), and one-egg nests fledged 0.25 chicks (n=4 nests). In terms of hatch sequence, first- and second-hatched chicks fledged at a higher rate. 87% of first chicks fledged (n=32 chicks), 83% of second chicks fledged (n=31 chicks), and 66% of third chicks fledged (n=18 chicks). It is possible that the greater success of three egg nests might be associated with older and more experienced breeders. To facilitate long term assessment of age and breeding success we color-banded a large sample of chicks. These will be monitored in subsequent seasons.

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**P27. Effects of Environmental Conditions on Feather Quality in the American Redstart**

*Ivy Ciaburri<sup>1</sup>, Christopher Tonra<sup>1</sup>, Peter Marr*

*The Ohio State University<sup>1</sup>, Georgetown University<sup>2</sup>*

American Redstarts (*Setophaga ruticilla*) have provided insights into the importance of studying full-annual cycle biology for migratory birds. Almost all this research has examined the interaction of nonbreeding on breeding season events and we know little about how breeding-ground environmental conditions affect subsequent phases of the annual cycle. Here, I present the initial findings in evaluating potential carry-over effects from the breeding to nonbreeding season by exploring relationships between feather quality and environmental conditions during molt. Using the 25-year collection of retrices from a population of wintering redstarts located in St. Elizabeth Parish, Jamaica, I measured each feather's structural quality through density, growth rate, and wear, as well as each feather's carotenoid content with spectrometry. I assess correlations between these measures of feather quality and NDVI from the Driftless Area—a region of the U.S. where most of the study population breeds. This expands upon previous research by incorporating more direct indicators of food availability, structural quality of feathers, a dataset that includes a greater variation in climatic conditions, and the known breeding area of Jamaican redstarts.

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**P32. Exploring Genotype-Phenotype-Environment Associations in the Saltmarsh-Adapted Sparrows of Eastern North America**

*Jonathan Clark<sup>1</sup>, Kristina Cammen<sup>2</sup>, Benjamin King<sup>2</sup>, Brian Olsen<sup>2</sup>, Adrienne Kovach<sup>1</sup>*

*University of New Hampshire<sup>1</sup>, University of Maine<sup>2</sup>*

Tidal marsh habitats exert a unique suite of strong selection pressures on avian species and span both latitudinal and saline-brackish gradients. Accordingly, several passerines that breed in tidal marshes have converged on a shared set of adaptations and thereby provide an ideal system to investigate parallel evolution. We are using low-coverage whole-genome sequencing of over 1,000 individuals to investigate genotype--phenotype-environment relationships in six sparrow species (Passerellidae) that breed in saltmarshes from North Carolina to Maine. For each captured individual, we collected data on 3 adaptive phenotypes (bill size, plumage coloration, and urine salinity), as well as environmental data (vegetation cover and salinity). For each species, we will use genome-wide association methods (GWAS) to associate variation in phenotypes with underlying genetic variants and use genotype-environment association methods, such as redundancy analysis (RDA), to identify alleles that vary across environmental gradients. By identifying specific genes under selection within each species, we aim to examine whether the genetic basis of parallel adaptation is shared or is lineage specific among these saltmarsh-breeding sparrows.

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**P13. Bird community structure and ecological roles across a tropical forest regeneration chronosequence in the highly threatened Ecuadorian Chocó rainforest**

*Charlie Darmstadt<sup>1</sup>, Lily Benson<sup>1</sup>, Nicole Lussier<sup>2</sup>, Jessie Knowlton<sup>1</sup>*

*Wheaton College, MA<sup>1</sup>, Kwit Lab at University of Tennessee, Knoxville<sup>2</sup>*

One of the most threatened tropical forests in the world is the Chocó forest biodiversity hotspot of Northwestern Ecuador, where less than 2% of the original forest remains. We examined the reassembly of bird species and their ecological roles across a chronosequence of regenerating Chocó forest. Birds aid in and benefit from tropical forest regeneration, and serve as important indicators of ecosystem function. To examine bird species richness, composition, and diet guilds, we used point counts and mist-netting in 12 plots ranging from 0 to 20 years of regeneration and old growth (>100 years) forest. We hypothesized that bird species richness would increase rapidly with plot age but that species composition and diet guilds would show more variation. Thus far our analysis does not show a difference in species richness and abundance across the restoration chronosequence. However, community composition and diet guilds did vary. Insectivores and frugivores dominated the youngest plots, and granivores and omnivores became more abundant as the plots aged. Understanding how bird communities and their ecological roles change in recovering tropical forest is important for prioritizing restoration sites and key species for conservation.

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**P21. Stopover duration and movements of adult and juvenile Blackpoll Warblers (*Setophaga striata*) during autumn migration: A Motus study at the Braddock Bay Bird Observatory.**

*Mark Deutschlander<sup>1</sup>, Andrea Patterson<sup>2</sup>, Michelle Gianvecchio<sup>1</sup>, Madison Sutton<sup>3</sup>*

*Hobart and William Smith Colleges<sup>1</sup>, Braddock Bay Bird Observatory<sup>2</sup>, Marquette University<sup>3</sup>*

Because of their trans-Atlantic, autumn migration to South America, Blackpoll Warbler (BLPW) migratory behaviors have been well-studied during autumn at coastal sites (i.e., Gulf of Maine, GoM). However, inland migratory behaviors of BLPWs are understudied. For example, whether age differences in movements observed near the GoM are similar at inland locations is unclear. We examined stopover duration and movements of 16 adult (AHY) and 18 juvenile (HY) BLPWs using Motus technology at the Braddock Bay Bird Observatory (BBBO) during autumn of 2020 and 2021. There was no difference in stopover duration between AHYs and HYs (median duration = 7.5 & 8.5 days, respectively,  $U=122$ ,  $p=0.46$ ); most birds departed within 2 weeks. Departures times occurred during day ( $n=12$ ) and night. Direction at departure was significantly different between ages; HYs were primarily to the south-southeast ( $163^\circ$ ,  $r=0.50$ ,  $p=0.01$ ) and AHYs were randomly distributed ( $p=0.6$ ). The more directed local orientation of HYs is similar to BLPWs near the GoM. Seventeen birds (10 HYs) were also detected by Motus towers primarily located southeast of BBBO with coastal locations from Portsmouth, NH to Newport News, VA. Most birds, including AHYs, were south of the GoM.

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**P2. High Prevalence of Neonicotinoid Residues in a Declining Predatory Songbird, the Loggerhead Shrike**

*Emily Donahue, Alexander Worm, Brett DeGregorio, Lorin Neuman-Lee, Than Boves*

*Arkansas State University*

Neonicotinoids are a class of widely used pesticides with the potential to accumulate and cause lethal and sublethal effects within non-target organisms. Documentation of neonicotinoid residues in the systems of vertebrates is sparse. We investigated whether neonicotinoid residues could be detected in blood samples of free-living Loggerhead Shrikes (*Lanius ludovicianus*). Samples were collected from May through July from both an agricultural site consisting of row crops and a semi-natural site containing cattle pastures and restored prairies. In total, neonicotinoids were detected in 24 out of 30 (80%) individuals and concentrations ranged from 0.5 to 4.6 ng/mL. At the agricultural site, two common neonicotinoids, imidacloprid and clothianidin, were each detected in 14 out of 26 samples. Imidacloprid was also detected in 3 out of 4 semi-natural individuals. Neonicotinoids were detected in 79% of adults and 81% of juveniles and exhibited inter- and intra-brood variation in type and concentration. These findings add to current literature documenting widespread prevalence of neonicotinoids in vertebrate systems. Further research is required to determine if neonicotinoids have consequences on Loggerhead Shrike health or fitness.

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**P47. Experimental tests for evidence of interspecific competition between two declining species, Chuck-will's-widows (*Antrostomus carolinensis*) and Eastern Whip-poor-wills (*A. vociferus*).**

*Brandon Dunnahoo & Than Boves*

*Arkansas State University*

Interspecific competition can exclude species from optimal breeding habitat and in some cases cause population declines. It is often difficult to tease competition apart from other possible explanations of range or population contraction. Due to breeding habitat alteration and changes in breeding ranges, Chuck-will's-widows (*Antrostomus carolinensis*) and Eastern Whip-poor-wills (*A. vociferus*) may be competing in areas of recent sympatry. Any interspecific competition between these two species could accelerate declines in overlapping breeding regions. One indicator of competition for resources is agonistic behaviors, which are hostile behaviors that occur during interspecific encounters. We conducted vocalization playback experiments to identify potential interspecific competition between these species in the Ozarks of Arkansas and Missouri. We documented patterns of agonistic behaviors these two species expressed in response to each other's perceived presence and tested for asymmetry. Preliminary data suggests that Chuck-will's-widows display little to no interspecific aggression towards Eastern Whip-poor-wills, but this will require a larger sample size before we become confident in these conclusions.



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**P48. Call structure variation in Carolina chickadees and black-capped chickadees as a function of ancestry: an experimental approach**

*Caoimhe Edmark, Brittany Coppinger, Robert Curry*

*Villanova University*

When closely related species live in the same area, it is important that they, and other species around them, can understand and communicate with each other. In response to a threat, Carolina Chickadees and Black-capped Chickadees produce chick-a-dee calls that differ in note composition between species, however, it is unclear how hybrid Chickadee's call structure varies in comparison to the two parent species. We used a standardized simulated nest threat to elicit alarm calls from parents at our study site nests, and recorded their calls. We scored and analyzed the sonograms of these calls to determine the extent to which note composition differs across the species. Carolina Chickadees produced calls with more introductory notes and fewer D notes per call than Black-capped Chickadees. Chick-a-dee calls produced in the hybrid zone appear to be most similar to calls produced by Carolina Chickadees. These results can help us determine the extent to which these birds, and other animals in their area, understand and interpret calls of closely related species, and if ancestry genotype plays a role in note type usage in chick-a-dee calls.

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**P25. An Analysis of the relationship between BirdNET Prediction score and accuracy**

*Nathan Engida, Stefan Kahl, Connor Wood,*

*Cornell University*

The BirdNet App is an AI-powered citizen science platform that identifies bird species using audio input. Currently, BirdNET can identify around three thousand common bird species worldwide. BirdNET app users can submit a "yes/no/unsure" feedback on the bird identification result. Using the feedback submissions and their corresponding prediction score, my goal is to find out if there is a correlation between confidence scores and prediction accuracy among bird species.

My research employs logistic regression to quantify the relationship between confidence scores and prediction accuracy. My research finding indicates that out of 805 bird species with a minimum of 50 observations, there is a positive correlation between confidence scores and prediction accuracy. The next phase of my research is to filter out the 50 most reliable species that show a positive correlation.

My research will address the rapid increase in the data being generated, currently, greater than 100 million BirdNET observations have been collected worldwide since 2018. Hence, my research will serve as a tool for ecologists working with large data sets by identifying bird species with a strong correlation between accuracy and prediction score.

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## **P22. Northern Waterthrush exhibits “protandry” during migratory passage in Maine.**

**Garrett Erickson-Harris<sup>1</sup> & Patrick Keenan<sup>2</sup>**

*Cornell University<sup>1</sup>, Biodiversity Research Institute<sup>2</sup>*

Many species of North American birds optimize seasonal environmental conditions by migrating between southern wintering grounds and northern breeding sites. Selection may favor protandry, the arrival of certain age/sex groups before others in the spring, and the later departure than others in the fall. In this study, I evaluated the presence of protandry by comparing arrival and departure dates of age/sex groups of *Parus noveboracensis* (Northern Waterthrush) during spring and fall migration at River Point Bird Observatory (RPBO). Further, I used fat scores to measure body condition upon capture to assess the effects of protandry on individuals. I found evidence that male birds arrived earlier in the spring and departed later in the fall than female birds. Similarly, I found evidence that after-second-year (ASY) birds arrived earlier in the spring and departed later in the fall than second-year (SY) birds. However, the comparison of mean fat scores was only significant between HY and AHY males during fall migration, where AHY males retained more stored fat. This study offers new insights into the migratory strategies of the monochromatic Northern Waterthrush, which has received little research attention.

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## **P4. The effect of air pollution on white-crowned sparrow condition during migration in Southern Colorado**

**Julian Golz, Madeline Ballard, Claire Ramos,**

*Colorado State University-Pueblo*

Research has shown that poor air quality can be hazardous to birds. The inhalable particles that cause air pollution are particulate matter (PM). Car exhaust, industrial emissions, and wildfire smoke can create PM. To prepare for migration, birds store energy in the form of fat. Lacking energy can harm the chances of successful migration. White-Crowned Sparrows (*Zonotrichia leucophrys*) are one species of bird in Colorado that may be impacted by PM. If PM is harmful, we predicted that sparrows' weight and fat before migration would negatively correlate with PM levels. Throughout the Fall of 2020, 2021, and 2022, we caught White-Crowned Sparrows at Clear Springs Ranch, Fountain, CO. We recorded the weight of each bird in grams and the fat score on a scale of 1-4. Then, we completed a linear regression between fat, weight, and daily PM levels for each month. We found that there may be a negative relationship between PM and weight but not PM and fat. These results indicate that sparrows may have a harder time gaining and maintaining weight in areas with high PM levels due to the inhalation of pollution particles. The ecological impact of high PM levels in sparrow habitats means the chances of a successful migration are decreased.

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**P6. Bird Feeding and Its Potential Effects on Northern Cardinal and Northern Mockingbird Space Use**

*Lauren Granger & Jennifer Smith,*

*University of Texas at San Antonio*

In urban areas, supplemental food provided via bird feeders is both abundant and aggregated. Providing bird feeders may increase food abundance and predictability, and change the distribution of food. In response, birds may be able to reduce the time spent foraging and the area over which they forage to meet their daily nutritional and energetic demands. Birds are prone to optimize their feeding activities to maximize energy intake; however, empirical assessments of the effects of supplemental feeding on the space use of birds in urban areas are absent.

Our objectives are to evaluate the effects of supplemental feeding on the space use of Northern Cardinals and Northern Mockingbirds. We predict food supplemented Northern Cardinals, a species known to use bird feeders, will have increased space use close to feeders compared to unfed birds. In comparison, we predict supplemental food will have no effect on the space use of Northern Mockingbirds, a species less likely to use bird feeders. We will test our predictions using radio telemetry equipment (Cellular Tracking Technologies) in San Antonio, Texas. We anticipate results will indicate how the space use of birds is influenced by supplemental feeding.

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**P7. Assessing waterbird conservation of alternative rice residue management strategies in the Lower Mississippi Alluvial Valley**

*William Guy & Than Boves,*

*Arkansas State University*

This research aimed to assess the conservation value of the timing of fallow-season flooding along with various other rice residue practices for waterbirds. We conducted waterbird censuses in fallow-season rice fields managed in various ways during the Sep. 2021 to Feb. 2022 season in northeast Arkansas (within the Lower Mississippi Alluvial Valley or LMAV). During censuses, all individual waterbirds in a field were identified to species and counted. Water depth and the percentage of residue remaining in the field were estimated (among other variables). The top linear model explaining variation in species richness included the predictors of water depth and the percentage of residue remaining but did not include the timing of flooding. Increased water depth positively affected species richness, and the percentage of residue remaining in the field had an inverse effect. The timing of flooding is possibly still important, but it may not be a linear relationship, as it may impact diversity both early and later in the season. Ultimately, this research will help facilitate the development of conservation programs across the LMAV and foster a paradigm shift beyond waterfowl-centric conservation to an all-waterbird conservation model.

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## **P26. Using Autonomous Recording Technology to Study Occupancy and Reproductive Success of a Forest Raptor**

***Natia Javakhishvili<sup>1</sup>, Jonathan Cohen<sup>2</sup>, Rebecca McCabe<sup>3</sup>, Justin Kitzes<sup>4</sup>, Jeffery Larkin<sup>5</sup>***

*SUNY College of Environmental Science and Forestry<sup>1</sup>, State University of New York College of Environmental Science and Forestry<sup>2</sup>, Hawk Mountain Sanctuary Association<sup>3</sup>, University of Pittsburgh<sup>4</sup>, Indiana University of Pennsylvania<sup>5</sup>*

Population size and distribution are some of the most important metrics describing the status of forest raptors and their response to environmental changes. However, detection and mapping of nests of widely dispersed, secretive raptors can be time- and resource-consuming. While visual identification of raptors is challenging in dense canopy cover, vocally distinct species such as the Broad-winged Hawk (*Buteo platypterus*) may be more effectively studied using automated acoustic technology.

We evaluated the efficacy of using autonomous recording units and machine learned classifiers to monitor adult and nestling Broad-winged Hawks. We used existing audio recordings from open sources to develop an adult call classifier. For chicks, we located nests (n=15), used automated acoustic units to record audio for 14 hours per day and conducted visual observations of nests to correlate vocalizations to nestling behavior. We then applied machine-learned classifiers to acoustic recordings from >500 locations across Pennsylvania. Our preliminary results suggest that autonomous recording units along with highly accurate machine learned classifiers can provide opportunities to monitor occupancy and reproductive success of Broad-winged Hawk.

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**P52. Lake-crossing behavior of migratory songbirds: Assessing potential collision risk with offshore wind on Lake Erie**

*Zoe Korpi, Stephen Matthews, Ryan Jacob, Molly McDermott, Mark Shieldcastle, Matthew Shumar, Christopher Tonra.*

*The Ohio State University*

Wind turbines present an obstacle to birds and cause a number of casualties every year. The potential impact of offshore wind projects on migratory birds cannot be determined without first understanding their lake-crossing behavior. Using automated radio telemetry and the Motus Wildlife Tracking System, 62 digitally coded nanotags were deployed at three sites across central Ohio during the spring of 2022. The selected focal species were White-throated Sparrows (*Zonotrichia albicollis*), Swainson's Thrush (*Catharus ustulatus*), Blackpoll Warbler (*Setophaga striata*), Tennessee Warbler (*Leiothlypis peregrina*), and Magnolia Warbler (*Setophaga magnolia*). Tags were deployed on four of the five focal species with 53 tags being detected after deployment. Detection data collected over two field seasons (Spring 2022 and Spring 2023) will be used to quantify lake-crossing behavior of spring migrants, to identify pre-crossing sites and crossing routes, and to evaluate the landcover and habitat along the shore of Lake Erie. The overarching goals being to inform management decisions and the development of a spatial tool for collision risk analysis for siting future offshore wind projects within the Great Lakes.

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**P43. Effects of Male Saltmarsh Sparrow Home Range Size and Space Use Patterns on Reproductive Success**

*Talia Kuras, Margaret Yates, Adrienne Kovach.*

*University of New Hampshire*

Saltmarsh sparrow (*Ammodramus caudacutus*) is a highly promiscuous passerine with a polygynandrous mating system. Male saltmarsh sparrows do not defend territories or mates. They instead expend most of their energy searching for mates within their home range. In similarly promiscuous species, male home range size has been identified as a driver of male reproductive success. To investigate the relationship between male saltmarsh sparrow home range and reproductive success we collected space use data for 101 uniquely color banded males during the breeding season at two marshes in the northern part of the species' breeding range. We collected these data by systematically surveying males at 35 points three times per month during the breeding season, recording incidental resightings, and recording mist net capture locations. We will use kernel density estimation to generate male home range sizes and locations. Home ranges will be compared to the location of known saltmarsh sparrow nests. This research provides insight into the role of home range as a driver of male saltmarsh sparrow reproductive success. In future work we will conduct paternity analyses to compare male reproductive success with space use patterns observed in this study.

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**P14. Translocation as a potential tool for genetic rescue and recovery of the Florida Scrub-Jay**

**Natasha Lehr<sup>1</sup>, Sarah Fitzpatrick<sup>1</sup>, Reed Bowman<sup>2</sup>, Nancy Chen<sup>3</sup>, John Fitzpatrick<sup>4</sup>, Karl Miller<sup>5</sup>**

*W.K. Kellogg Biological Station, Michigan State University<sup>1</sup>, Archbold Biological Station<sup>2</sup>, University of Rochester<sup>3</sup>, Cornell Lab of Ornithology<sup>4</sup>, Florida Fish and Wildlife Conservation Commission<sup>5</sup>*

Florida Scrub-Jays (*Aphelocoma coerulescens*) have declined rapidly due to habitat loss, fragmentation, and degradation. The species is non-migratory thus faces genetic risks associated with reduced connectivity and small populations. A small, isolated population in southeastern Florida that underwent a steep population decline was identified as a recipient site for translocations to mitigate risks associated with inbreeding depression and its potential for increased population growth. In 2019-2020, eight birds were translocated from a large, stable population in central Florida to the site with the aim to infuse new genetic variation into the population and potentially induce genetic rescue at the site. The population was monitored throughout 2019-2022 to collect demographic data for both resident and translocated birds. Short-term results based on site fidelity, territory establishment, nest attempts, and survival of translocated birds have been successful. Monitoring at the site continues with the long-term goal of studying population dynamics and to potentially document genetic rescue in action. This study will help inform the extent to which translocations can be used to improve population viability and species persistence.

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**P29. A Proposal for Renaming Bill Types of Bewick's Swans**

**Richard Littauer**

Bewick's Swans (*Cygnus columbianus bewickii*) have patterns of yellow areas on their bills, which can be used to signal sexual fitness and to identify individual birds. When these patterns were first described, names were applied to the different general patterns of coloration on the bill. These bill type definitions have continued to be cited for both Bewick's Swans, Whistling Swans, and for Whooper Swans, in papers as recent as 2018. Unfortunately, one of the definitions used referred to bills that are predominantly black, which are named 'darky' bills (pl. 'darkies') (just as others are named "nobbly", "shieldy", and so on). However, this term is known to be offensive and exclusionary to some underrepresented communities. Following other movements to decolonize and reject antiquated and offensive terms, such as the 'Bird Names for Birds' movement, I suggest here that we change this going forward by recognizing the issue, and simply use another, non-stigmatized term - "dark-billed" - going forward.

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**P10. The composition of mixed-species bird flocks in four habitats in the southern Ecuadorian Andes**

*Nicole Lussier<sup>1</sup> & Jessie Knowlton<sup>2</sup>*

*Kwit Lab at University of Tennessee, Knoxville<sup>1</sup>, Wheaton College<sup>2</sup>*

Mixed species bird flocks are complex interspecies assemblages whose interactions can have major impacts on ecosystems. Mixed flocks are susceptible to anthropogenic habitat change, which can alter the structure and function of flocks. The goal of this project was to determine whether mixed species flock structure and composition varied across various habitat types. We surveyed flocks across four different habitats (native scrub, native forest, non-native forest, and regenerating forest) between 2500 and 3400 m elevation in the southern Ecuadorian Andes between October 2018 and August 2019. In total we observed 389 mixed species flocks composed of 47 different species, with an average of 4.61 species per flock. Sites did not differ in mean flock species richness (range: 4.26 to 4.83 species,  $p > 0.05$ ), however, mean flock size was significantly different among habitats (range: 7.20 to 11.0,  $p = 0.004$ ), with larger flocks found in the native scrub habitat. Additionally, we found diet guilds and body mass varied across habitats. The species with the highest overall abundance in the flocks were the *Atlapetes latinuchus* and *Myioborus melanocephalus* which suggests these species are nuclear species and important for flock formation.

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**P50. Foraging behavior varies with group size among Common Loons during the nonbreeding season.**

*Jay Mager<sup>1</sup>, Sherry Abts<sup>1</sup>, Sarah Armstrong<sup>1</sup>, Nakiah Dague<sup>1</sup>, Jady Funkhouser<sup>1</sup>, Landon Gossard<sup>1</sup>, Devon Jackson<sup>1</sup>, Justin Wagonblott<sup>1</sup>, Brooks Wade<sup>2</sup>, Jim Paruk<sup>3</sup>*

*Ohio Northern University<sup>1</sup>, Jocassee Wild Outdoor Education<sup>2</sup>, Saint Joseph's College<sup>3</sup>*

Among non-breeding Common Loons, sociality probably provides not only benefits associated with vigilance and protection, but also benefits associated with group foraging. These foraging benefits are likely to increase with group size, but likely at greater competitive costs to individuals. To begin to assess these trade-offs, we examined how foraging and agonistic activities varied with group size from diurnal time-activity budgets of 106 loons overwintering at a large freshwater reservoir lacking significant predators in northwest South Carolina between 2019-21. While social loons spent less time foraging, foraged at higher rates, and made shorter dives than solitary individuals, only dive duration was negatively correlated with group size, possibly reflecting greater foraging efficiency among individuals in larger groups. We observed little to no overt aggression among social individuals, let alone changes in behaviors that would indicate greater interference competition with group size. These findings strengthen the argument that sociality indeed provides foraging benefits to loons, and enhance our understanding of factors that may shape group size during the critical non-breeding period of the species' annual cycle.

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**P36. The Herring Gulls Home: Comparing Fledging Success Across Different Habitats on Great Duck Island**

*Jennifer McNamara, Asher Panikian, Hannah Gower-Fox*

*College of the Atlantic*

Great Duck Island, located 19 kilometers offshore in the Gulf of Maine, is home to a colony of Herring Gulls (*Larus argentatus*) that has been monitored for the past 24 years. Herring Gulls are declining around the western North Atlantic. However, the population on Great Duck Island appears to be stable, making it an important place to monitor nesting gulls. The focus of our study was the southern end of the island which has approximately 700 nests with an average clutch size of 2.67. We studied the influence of different habitat types on fledging success and growth curves of herring gull chicks. We subdivided nesting habitat into 3 strata; low vegetation, high vegetation and rocky shoreline. In each habitat we selected between 15 and 20 nests for daily monitoring of chick morphometrics and condition. Clutch size in the three habitats did not differ significantly ( $F=1.58$   $p = 0.32$ ). Our data suggests that for this season birds in all three habitats either did well, fledging two or three chicks, or failed entirely. Habitat and nest density did not affect ultimate outcome, although both may impact pre-fledging chick behavior.

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**P49. Birds recognize alarm calls across species boundaries**

*Mcgovren Moore*

Various avian species commonly use seemingly altruistic alarm calls to alert others to potential threats, often increasing their own risk of predation. Many species regularly respond to the alarm calls of both conspecifics and heterospecifics to decrease their risk of predation. However, it is unclear whether the alarm calls of heterospecifics are as effective as those of conspecifics. Because responding appropriately to perceived threats is adaptive, we hypothesized that individuals respond to con- and heterospecific alarm calls similarly. We tested our hypothesis using a meta-analytic approach, identifying 14 studies that assessed conspecific and heterospecific alarm call recognition, yielding 65 experimental effect sizes. We then compared Cohen's D effect sizes across studies using a Bayesian generalized linear mixed-effects model with Markov chain Monte Carlo. In response to alarm calls, we considered antipredator behaviors including aggressive and fear-like behaviors, vigilance, gene expression, and vocal responses. Alarm calls from con- and heterospecifics elicited similar antipredator behavior regardless of the source. These results suggest that birds learn to appropriately recognize alarm calls across species boundaries.



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## **P1. No microbes? No problem...or is there?: Developmental trajectory of germ-free House Sparrow nestlings**

**Natalie Morris<sup>1</sup>, Brian Trevelline<sup>1</sup>, Jennifer Houtz<sup>1</sup>, Catherine Andreadis<sup>1</sup>, Melissa Rowe<sup>2</sup>, Andrew Moeller<sup>1</sup>**

*Cornell University<sup>1</sup>, Netherlands Institute of Ecology<sup>2</sup>*

The gut microbiome, the bacterial communities of the digestive system, can profoundly influence animal health. A major impasse for avian microbiome research is the lack of a suitable experimental model to investigate microbiome functions in vivo. To fill this knowledge gap, we hand-reared germ-free (lacking intestinal bacteria) House Sparrow (*Passer domesticus*) nestlings and assessed the role of the microbiome in development of digestive organs. Eggs were externally sterilized via ultraviolet and chemical disinfection prior to artificial incubation. Germ-free nestlings (n = 15) were raised to 7 days post-hatch in sterile incubators and fed a sterile semi-synthetic formula, whereas a conventionalized group (n = 13) were fed formula spiked with adult sparrow fecal microbiota. Conventionalized nestlings had significantly greater large intestine width and mass in addition to larger digestive organs compared to germ-free nestlings. A larger intestinal size and mass of digestive organs in conventionalized chicks may indicate increased organ function and digestive efficiency, respectively. Our results suggest a functional role of the gut microbiome in songbirds and could serve as a model system for future studies in avian microbiomes.

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## **P15. Population and Parasitism Rate Estimates for Black-capped Vireos in Kickapoo Caverns State Park**

**Brendan Mulhall<sup>1</sup>, Clay Green<sup>1</sup>, James Giocomo<sup>2</sup>**

*Texas State University<sup>1</sup>, American Bird Conservancy<sup>2</sup>*

The black-capped vireo (*Vireo atricapilla*) was delisted from the U.S. Endangered Species List by the United States Fish and Wildlife Service (USFWS) in 2018. As part of the USFWS Post-Delisting Monitoring Plan, population surveys and brown-headed cowbird parasitism rate estimates were undertaken to estimate current population size to compare with population estimates prior to 2018. Point counts were performed in the months of May and June of 2021 and 2022. We also performed nest searching and monitoring of black-capped vireo nests to examine how many nests were being parasitized throughout the park. Nest monitoring occurred throughout the field season, lasting from May until July of both 2021 and 2022. The 2021 season found a total of 32 singing males at 15 of our 41 survey locations. Also in 2021, a total of 22 black-capped vireo nests were located and monitored, four of these nests were parasitized while ten of the 22 nests succeeded to fledging. This was the first year of a multi-year on black-capped vireo populations on Texas Parks and Wildlife Department managed lands in the Western Edwards Plateau. The study was continued in 2022 with more data to analyze and the goal of informing management decisions for the species.

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## **P51. Developing a Biotic Index for the Upper Tana Watershed, Kenya, using Community Science**

**Edwin Njuguna**<sup>1</sup>, Christina Murphy<sup>2</sup>, Cynthia Loftin<sup>3</sup>, Malcolm Hunter<sup>1</sup>, David Courtemanch<sup>4</sup>, Samantha Horn<sup>4</sup>, Peter Njoroge<sup>5</sup>

<sup>1</sup>University of Maine, <sup>2</sup>U.S. Geological Survey, Maine Cooperative Fish and Wildlife Research Unit,

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<sup>5</sup>National Museums of Kenya

Watersheds are complex systems supporting biodiversity. Measuring ecosystem integrity at a watershed scale may be important to understanding and prioritizing conservation. To date, most watershed integrity indices have relied on aquatic macroinvertebrates, fish, and algae. Despite relatively wide adoption, indices developed from these taxonomic groups may be expensive and time consuming. The popularity of birding and the recent increases in community science projects associated with birds suggest that they may provide a promising alternative. However, it remains relatively unknown to what extent community science generated data on birds can be used to inform watershed bio-assessments. We seek to develop an avian biotic index to assess the status of the Upper Tana Watershed in Kenya as a case study. We are using community science bird data from the Kenya Bird Map project and the habitat characteristics generated from spatial and temporal land cover analysis to examine relationships between landscape composition features and avian diversity. The working draft bird-based Biological Condition Gradient (BCG) matrix includes 6 tiers based primarily on forest bird species. We seek to further explore the variables and tiers that best describe bird community relationships with ecosystem condition. Results of this work may aid in the management and assessment of the status and trends of the Upper Tana River watershed directly, and the avian BCG could provide a framework for wider use of community science bird data as a watershed bioassessment tool globally.

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**P23. Stopover patterns and physiological condition of thrushes at a Lake Ontario stopover site in autumn**

*Gabriella Orfanides<sup>1</sup>, Susan Smith Pagano<sup>1</sup>, Alexandra Bros<sup>1</sup>, Rachael Hoh<sup>1</sup>, Andrea Patterson<sup>2</sup>*

*Rochester Institute of Technology<sup>1</sup>, Braddock Bay Bird Observatory<sup>2</sup>*

Past studies assessing physiological condition of migrants during stopover suggest that lakeshore sites serve as high-quality stopover habitats for songbirds; however, research characterizing migratory behavior of species at lakeshore sites along with potential stressors that birds may encounter at these stopover habitats is limited. We studied the stopover behavior during autumn migration of Swainson's Thrush (*Catharus ustulatus*) at Braddock Bay Bird Observatory on the south shore of Lake Ontario and performed integrative analyses to assess physiological condition and health of thrushes. Stopover duration and departure movements were examined using the Motus Wildlife Tracking System, and we used plasma metabolite profiling to gauge nutritional refueling rates. A PCR-based screening method for haemosporidians was applied to assess infection rates in Swainson's Thrush during stopover, and leukocyte counts were used to quantify potential immunological costs associated with differential refueling behavior and/or parasitism. Data provides insight into important biological, physiological, and immunoeological factors during stopover that may influence overall stopover duration and migratory patterns of Swainson's Thrush in autumn.

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**P16. Ecological indicator for tidal saltmarsh condition: synthesis and application**

*Josh Parrott<sup>1</sup>, Jonathan Cohen<sup>2</sup>, Chris Elphick<sup>3</sup>, Brian Olsen<sup>1</sup>, Adrienne Kovach<sup>4</sup>, W. Gregory Shriver<sup>5</sup>, Zach Wood<sup>6</sup>*

*University of Maine<sup>1</sup>, State University of New York College of Environmental Science and Forestry<sup>2</sup>, University of Connecticut<sup>3</sup>, University of New Hampshire<sup>4</sup>, University of Delaware<sup>5</sup>, University of Maine and Colby College<sup>6</sup>*

We developed a metric to study tidal saltmarsh ecological conditions across the Atlantic coast of the U.S. following previously published methods for freshwater wetlands and forests. The metric is calculated from an index of response functions derived from average bird abundances and a composite variable representing tidal saltmarsh environs. To synthesize the metric, we characterized the environment, the bird community, and how they interact across a large latitudinal range as a snapshot in time. We then used this metric to assess for potential effects of tidal saltmarsh protection and biodiversity management and found that sites within areas managed to foster biodiversity score highest and had more tidal saltmarsh dependent birds, important indicators of quality saltmarsh. We find that although protecting tidal saltmarsh from permanent alteration has potentially led to relatively good environmental conditions, this has not translated into the predicted avian community that such an environment would suggest.

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**P37. Using temperature loggers to assess female nest attentiveness in two tidal marsh sparrows**

*Emily Patterson, Adrienne Kovach, Logan Maxwell*

*University of New Hampshire*

Saltmarsh and Nelson's sparrows, which breed along the Atlantic coast of the United States, have a unique breeding strategy. After mating, all responsibilities involved in incubating and raising young fall on the female so the female must balance incubating her young and providing food for herself. It allows us to look at attentiveness in the two species and their hybrids and learn what behavioral traits are adaptive for survival in the tidal marsh

We searched for and monitored nests at five sites in New Hampshire and Maine from June through August. iButtons set to take a temperature reading every two minutes were placed in each nest. During two seasons, we collected data from 72 females and 117 nests.

I used the R package *incR* to calculate several metrics about female attentiveness from the iButton data. I used these data to evaluate 1) differences in attentiveness between saltmarsh and Nelson's sparrows, and their hybrids; 2) the effect of location, including latitude and inland vs. coastal marsh position on nest attentiveness and 3) the overall accuracy of using iButtons to measure nest attentiveness in a tidal marsh ecosystem. Preliminary findings suggest species and latitudinal differences in nest attentiveness.

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**P24. Should I stay, or should I go? Sex-specific effects on non-breeding ground departure in the Hudsonian Godwit**

*Lauren Puleo & Nathan Senner*

*University of Massachusetts Amherst*

As warming advances the phenology of the resources on which migratory species rely, shifts in migratory timing are vitally important for maintaining fitness and successfully reproducing. Long-distance migrants have shown flexibility in the face of climatic change and population-level shifts in migratory timing have been observed in many species. Yet, little is known about how sex-specific goals throughout the annual cycle may differentially affect the migratory timing of individuals, limiting our understanding of the current and future effects of climatic change on long-distance migrants. The Hudsonian Godwit (*Limosa haemastica*) is an extreme long-distance migratory shorebird that migrates from southern South America to sub-arctic Alaska. We hypothesize that they exhibit sex-specific goals during migration that likely result in differential selection pressures that may affect individuals' migratory timing and strategies. To test this hypothesis, we used a long-term dataset of archival geolocator data from an Alaskan breeding population of Hudsonian Godwits to determine whether departure from their non-breeding grounds has shifted over time – a tactic that can be used to shift migration timing – and differs between the sexes.

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### **P38. Evaluating Nest Box Substrate Preference of Eastern Bluebirds**

***Bailee Romaker & Julie Jedlicka***

*Missouri Western State University*

Eastern Bluebirds (*Sialia sialis*) are rapidly losing nesting habitat as urban sprawl increases. One way to mitigate this loss is by erecting nest boxes. In the United States, most nest boxes are made of wood, while in Europe, the most prominent boxes are Schwegler boxes made of a concrete, clay, and wood mixture. We tested Eastern Bluebird nest box preference between cedar and Schwegler boxes by measuring the number of fledged nestlings. In 2016, students installed 62 nest boxes across Missouri Western State University's campus in pairs of one cedar box and one Schwegler box. Students monitored nest boxes twice weekly during the nesting season and recorded inhabiting species, nest productivity, and reproductive success. Between 2016 and 2021, 203 nestlings fledged from Schwegler boxes. Contrarily, no bluebirds attempted to nest in cedar boxes and therefore zero young fledged. Through collaborating with conservation groups, we can disseminate these findings and potentially increase bluebird populations by encouraging more Schwegler boxes.

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### **P11. Do avian community metrics vary more along forest edges than within interior tropical montane forest over 18 years?**

***Dorian Rose<sup>1</sup>, Michael Akresh<sup>1</sup>, Dusti Becker<sup>2</sup>***

*Antioch University New England<sup>1</sup>, Life Net Nature<sup>2</sup>*

Avian population declines due to habitat loss and climate change have been well documented, with many studies showing declines across guilds. However, there are few long-term studies on tropical birds regarding changes in diversity and abundance over time and interactions with habitat types. Here, we analyze 18 years of data collected from 2004 to 2022 in the Ecuadorian Andes in two broad forest habitat conditions: forest edges and forest interiors. We hypothesize that the forest edge samples would have higher capture rates, higher species richness, and less annual consistency (lower species overlap) than in the forest interior due to higher habitat variation along edges and potential loss of territorial interior forest species. We compare data from wet and dry seasons for the two forest types. We sampled the forest edge by operating 30 12-m mist nets for five hours on two mornings totaling 300 net hours each season. We sampled the forest interior with an equal paired effort. We compare species diversity and composition trends by habitat and season and suggest further analyses that inform conservation efforts. Our findings contribute to a better understanding of tropical avian community dynamics.

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**P39. Distance to treeline negatively influences Eastern Meadowlark nest survival at Harpers Ferry National Battlefield Parks**

*Leah Rudge, W. Gregory Shriver, Marcella Sveltz*

*University of Delaware*

In the mid-Atlantic, National Battlefield Parks provide grassland habitat and an opportunity for grassland bird conservation. Harpers Ferry National Historical Park supports 165 ha of hayfields situated in a mosaic of forest patches, forest windbreaks, hiking trails, and roads. To inform future grassland management plans, we investigated the effects of distance to edges on grassland bird 1) nest site selection and 2) daily nest survival. During the 2022 breeding season we monitored 15 Eastern Meadowlark (*Sturnella magna*) and six Grasshopper Sparrow (*Ammodramus* *savannarum*) nests. We used ArcGIS Pro to measure the distance from each nest to the nearest forest edge, hiking trail, and road. Eastern Meadowlark nests ( $p < 0.05$ ) and Grasshopper Sparrow nests ( $p < 0.05$ ) were further from the forest edge than random locations. We used MCEstimate to estimate daily nest survival and the effects of distance to forest edges, trails, roads, nest vegetation height, and litter depth on nest survival. Eastern Meadowlark nest survival ( $0.99 \pm 0.01$ ) was negatively associated with distance to forest edge. Our results support the importance of cultural parks in maintaining grassland bird breeding habitat in the mid-Atlantic.

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**P8. Tolerance for urban development varies seasonally among Connecticut birds**

*Ketki Samel & Chris Elphick*

*University of Connecticut*

A major focus in community ecology is to identify the mechanisms that structure species assemblages. Habitat factors act as filters, allowing only a subset of the regional pool to persist at a site; a filter's strength is the extent to which its presence reduces the probability of a species' presence. Previous studies suggest that most bird species respond negatively to anthropogenic land cover change, through which naturally vegetated areas become planted or impervious. In temperate regions, urban areas show different characteristics from surrounding areas, including increased temperatures and resources; therefore, filtering may be weaker in winter, when resources are scarce. To test this, we used logistic regression to describe species presence relative to four potential urban filters. Using data from the Connecticut Bird Atlas, we created models for a suite of 85 bird species in relation to four human-related land-cover variables in both summer and winter, and compared the strength of each filter across seasons. Across all species, the impervious-area filter was significantly weaker in winter than in summer, while the farmed filter was stronger in winter. The urban and developed filters showed no significant seasonal pattern.

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**P17. Light inside the box: The effects of color on bird-window collisions in a translucent flight tunnel**

*Isabel San Millan & Blake Jones,*

*Bennington College*

Flight tunnels are often used to test different strategies for preventing bird-window collisions. However, flight tunnels are typically opaque, excluding natural light and creating an environment unlike those experienced by diurnal birds when encountering windows. To more closely mimic the natural daytime environment, we built a light-permeable flight tunnel, in which birds choose between two transparent window exits. We tested the effects of red and blue window markings on 78 birds to test the functionality of our translucent flight tunnel and determine if multiple colors are a more effective deterrent than a single color. All color window panels were effective deterrents when tested side-by-side with clear panels, with no significant difference between the colors used. We also tested single color panels next to a red and blue patterned panel. Birds were equally likely to fly toward a single color window compared to this two color window. Our results suggest that color may not be critical for window marking efficacy and that a translucent flight tunnel can be used to test bird deterrence. This tunnel design may allow researchers to incorporate outdoor factors when testing window markings to better reduce bird-window collisions.

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**P9. American Kestrels (*Falco sparverius*) as Pest Control Agents in an Agriculturally Dominated Landscape**

*Ty Sharrow*

*Arkansas State University*

The ecosystem services provided by native raptors are a potential sustainable alternative to pesticides. American Kestrels (*Falco sparverius*) are widespread generalist predators that occupy agricultural landscapes and are known to consume potential invertebrate and vertebrate pests. Clearing of neighboring forests and tree rows eliminates suitable breeding habitat for kestrels and results in low densities of this raptor in intensive agricultural areas. However, kestrels are easily attracted to new areas by adding artificial nest boxes. In this study, I aim to attract kestrels to an agriculturally dominated landscape in Arkansas to naturally reduce local abundances of small mammals, birds, and arthropods through direct predation and perceived risk of predation. I installed and monitored 24 nest boxes on utility poles in northeast Arkansas throughout the breeding season of 2022. At all nest boxes both occupied ( $n = 6$ ) and unoccupied ( $n = 18$ ) as well as random points ( $n = 6$ ), I conducted small mammal, avian, and arthropod surveys to assess animal abundances from mid-May – July 2022. I anticipate significantly lower abundances of animals at sites with occupied nest boxes than at sites with unoccupied nest boxes and at random points.

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**P40. Adult age recognition and provisioning rate in Tree Swallows**

*Audrey Su, Jennifer Uehling, Jennifer Houtz, Conor Taff*

*Cornell University*

Parental provisioning and the factors influencing this behavior have been well-studied in songbirds. However, the relationship between parental provisioning and adult recognition of nestling age remains poorly understood. Passerines are known to increase their feeding rate as nestlings age, but it is unknown if parents can recognize the age of their nestlings and adapt their provisioning rate to the nestlings' needs accordingly. In this study, I will examine whether Tree Swallow (*Tachycineta bicolor*) nestling brood mass and extent of feather growth predict adult provisioning rate. I will simulate a period of cooler weather by using ice packs in nest boxes to lower their internal temperature. Previous work using this method has shown that cold-exposed nestlings develop slower than controls. Adult provisioning rate will be recorded during the nestling period through the use of RFID systems and PIT tags. I will compare average daily provisioning rates between treatment and control nests to determine if the parents exhibit different provisioning rates. Since provisioning is an essential aspect of parental care, this study will shed light on the effect of increasingly abnormal weather due to climate change on songbird fitness.

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**P53. Improving flight skills in psittacid reintroduction projects**

*Noelia Volpe*

*Centro de Ecología Aplicada del Litoral*

Reintroduction projects frequently rely on captive-bred individuals as source of release candidates. Captive conditions usually result in detrimental effects on birds, as life in confinement can reduce or even stall the development of flight. We present the outcome of the implementation of a novel training technique designed to improve flight performance in the context of the Red-and-Green macaw (*Ara chloropterus*) reintroduction Project in Argentina. Macaws (n = 9) were trained with automatized food dispensers placed 19.2 m apart within a flight tunnel. Training sessions were video-recorded in order to assess changes in flight performance using wingbeat rate (wingbeats/distance travelled) as a proxy to measure changes on muscle condition. The proposed training scheme proved effective to generate improvements in the flight performance of captive-bred Red-and-Green macaws. There was a decrease in average wingbeat rate between the onset and the completion of the training program. In addition, we saw an increase in the average speed at which the macaws flew. We consider that flight training can greatly benefit the adaptation of reintroduced macaws to their new surroundings, increasing their likelihood of survival both by allowing a faster escape from predators and by increasing the area within which they can search for food sources.



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**P18. Assessing the Distribution of a Threatened Marsh Bird in the Everglades to Inform Conservation Planning**

**Forrest Wallace<sup>1</sup>, Kara Lefevre<sup>1</sup>, Adam Smith<sup>2</sup>, Rebekah Gibble<sup>3</sup>**

*Florida Gulf Coast University<sup>1</sup>, American Bird Conservancy<sup>2</sup>, U.S. Fish and Wildlife Service<sup>3</sup>*

Climate change is causing widely-documented shifts in wildlife habitat and distributions. A prime example is the Black Rail, a marsh bird whose eastern subspecies *Laterallus jamaicensis jamaicensis* was recently listed as Threatened under the U.S. Endangered Species Act. Nearly all U.S. populations of Black rails have experienced drastic decline or complete extirpation across the historic range along the U.S. Atlantic and Gulf coasts. Southern Florida is considered to be a potential stronghold for the species and has been identified as a high priority for research. Partnering with the U.S. Fish and Wildlife Service we conducted surveys to establish a baseline of Black Rail presence in strategic areas in the Everglades region. More than 400 point locations were surveyed from February through May 2021/2022 at priority wetlands sites using established protocols for secretive marsh birds. Over 30 detections were observed during two field seasons. Data are still being collected and compiled to assess occupancy and to inform analysis of habitat features that are most important at study locations. This study is intended to support future status assessments and assist land managers in identifying areas for priority protection.

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**P12. The relationship between years of successional forest growth and avian species richness, abundance, and traits in a tropical rainforest**

**Jacob Woodlief<sup>1</sup> & Nicole Lussier<sup>2</sup>**

*The University of Tennessee at Knoxville<sup>1</sup>, Kwit Lab at University of Tennessee, Knoxville<sup>2</sup>*

Forest stage, vegetative structure, and anthropogenic disturbances largely determines avian species richness, abundance, and the distribution of traits within communities. We tested the hypothesis that there will be greater avian species richness and abundance in areas of younger successional forest and that the traits of these species will also differ. To test this, we mist-netted and performed observational surveys in the Choco Rainforest of Northwest Ecuador in naturally regenerating forest sites ranging from 0-25 years and in old growth. We performed generalized linear mixed-effect model analysis to determine differences in richness, abundance, and traits of birds in these different environments. Preliminary data analysis suggests that years of successional forest growth had no significant impact on the species richness ( $p=0.554$ ) or overall abundance ( $p=0.537$ ). Some species traits differed across habitats, including length of the wing cord ( $p=0.0108$ ) and Tarsus length ( $p=0.0421$ ). From this, we can conclude that species living in primary forest and different stages of successional forest exhibit differences in these traits, which likely reflect the different requirements for survival in their respective environments.

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## **P41. Joint-Nesting and Cooperation between a Western Kingbird (*Tyrannus verticalis*) and a Hybrid Western**

*Alexander Worm, Emily Donahue, Than Boves, Andrew Sweet*

*Arkansas State University*

Joint-nesting occurs when multiple adults of the same sex contribute both genetically and parentally to the young raised in a single nest. This behavior is rarely observed under even typical circumstances, when conspecifics share a nest, and is even more unusual to involve heterospecifics. Furthermore, this behavior is rarely confirmed genetically. In most likelihood, it is rare because it results in reduced fitness for both adults involved. This could be especially true for individuals at the periphery of their ranges, where partners are rare and where hybridization is also more likely to occur. Such is the case with Western Kingbirds (*Tyrannus verticalis*) and Scissor-tailed Flycatchers (*T. forficatus*) at the eastern edge of their breeding ranges in eastern Arkansas. Here, we describe and genetically confirm the first documented case of joint-nesting in the genus *Tyrannus*, and the first documented case of a hybrid individual involved in joint-nesting. On June 13, 2021, we observed what appeared to be a pure female Western Kingbird, and a previously genetically confirmed (and color-banded) female Scissor-tailed Flycatcher x Western Kingbird hybrid both apparently incubating eggs in a single nest (at the same time) in Bald Knob, Arkansas.

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## **P19. Initiating Continental Conservation of Evening Grosbeak: A Road to Recovery Pilot Project**

**Matthew Young**<sup>1</sup>, David Yeany<sup>2</sup>, Lucas DeGroot<sup>3</sup>

Finch Research Network<sup>1</sup>, Western Pennsylvania Conservancy<sup>2</sup>, Powdermill Avian Research Center<sup>3</sup>

With a 92% decline since 1970, evening grosbeak (*Coccothraustes vespertinus*) was cited as the steepest declining landbird in the continental United States and Canada in the Partners in Flight 2016 Landbird Conservation Plan. Causes for the decline are not fully understood, but may be a result of several factors including spruce budworm (*Choristoneura* spp.) population cycles, forest alteration and loss, collision and disease mortalities, and climate change factors. Following several conservation listings, evening grosbeak has garnered conservation attention from the recently formed Road to Recovery (R2R) Initiative as it was called out as one of 91 bird Species on the Brink of Endangerment. Here we present the co-production conservation process we are following as an R2R species pilot project. We have begun this process by establishing an international working group and implementing full annual cycle research using cutting edge tracking technologies to begin filling in knowledge gaps. Perhaps most importantly, we are taking an intentional approach at engaging with non-traditional science partners at the start of the process. We hope other efforts can view our R2R project as an example of how this new process can be applied.

# Centennial Meeting of The Association of Field Ornithologists

## Symposium Presentations

Both symposia are described followed by abstracts listed in alphabetical order by last name of presenting author (name in bold)

### **Sym1: Applications of the northeast Motus network in bird research and conservation**

*Organizers: Alison Fetterman, Willistown Conservation Trust; Amber Roth, University of Maine; Carol Foss, NH Audubon; Shelly Eshleman, Willistown Conservation Trust*

This symposium focused on research supported by the Northeast Motus Collaboration since its formation in 2016. The activities of this group rely on the Motus Wildlife Tracking System (Motus), a collaborative global network using automated radio telemetry to track small flying organisms (birds, bats, and insects). The objectives of the symposium are to illustrate various ways that Motus can be used to further regional bird research and conservation and to simulate expanded use of the network. Presenters will demonstrate how Motus can be used to study animal movements at multiple scales and the benefits of a dense network of Motus stations.

### **Sym2: Uncovering Whimbrel migration with advances in tracking technologies**

*Organizer: Stephen Brown, Manomet*

Objectives: Steady advances in telemetry technologies in the last two decades have made it possible to track individual Whimbrels throughout their migratory year with a precision never achieved before. This symposium brings together field scientists leading the work on the Western Atlantic subpopulation of the species to understand previously unknown aspects of staging ecology, migration routes, migratory connectivity, and exposure to threats.

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**Sym2: In-flight behaviors of Whimbrels during migration in the Central Flyway**

*Paula Cimprich & Jeff Kelly*

*University of Oklahoma*

While traveling through airspace, migratory birds must navigate dynamic atmospheric conditions such as temperature, pressure, wind speed and direction, and humidity. These variables directly affect the cost of transport, physiology, flight route, and timing of flight by migrants. As climate change continues to alter patterns of environmental conditions, our understanding of migratory bird response will become contingent upon our knowledge of the atmospheric constraints of optimal migration. While weather surveillance radar studies are advancing knowledge about population-wide trends, nuances such as species specific and time-series data for individuals aerial habitat selection during migration are lost. Here I describe migratory in-flight behaviors of 18 Hudsonian Whimbrels (*Numenius phaeopus hudsonicus*) tracked with GPS-GSM tags collecting high frequency data, including altitude, during spring 2022. Whimbrels were captured on their staging grounds in eastern Texas to record migration behavior through the central flyway.

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**Sym1: Tandem ground tracking of nanotagged Swainson's Thrush reveal microhabitat associations in northwestern Pennsylvania**

*Lucas DeGroot<sup>1</sup> & David Yeany<sup>2</sup>*

*Powdermill Avian Research Center<sup>1</sup>, Western Pennsylvania Conservancy<sup>2</sup>*

Swainson's Thrush are among Pennsylvania's rarest songbirds with fewer than 3,000 breeding pairs. The Olive-Backed group of Swainson's Thrush nests in conifer forest throughout Canada and NE United States; particularly mature or old-growth. In Pennsylvania the species has a strong affinity for mature hemlock forests, but their specific microhabitat associations here are not well-known. We studied breeding and post breeding movements of three populations in Pennsylvania's Allegheny National Forest. We deployed 21 Lotek nanotags on breeding Swainson's Thrush in June and July 2019. We tandem ground-tracked birds; recording observer location, detection distance if known, gain, and signal strength. Using 126 locations with detection distance, we estimated a significant linear relationship between signal and detection distance ( $-0.34 \text{ m/RSSI}$ ,  $p < 0.01$ ). We used the 80th quantile linear model to assign uncertainty buffers to 260 additional detections. Breeding territories were overlapping and associated with large hemlocks and dense understory. The importance of this habitat for Swainson's Thrush breeding in Pennsylvania highlights the importance of conserving old-growth hemlocks threatened by hemlock woolly adelgid and climate change.

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**Sym1: Growth and history of the Northeast Motus Collaboration's telemetry network**

*Michelle Eshleman<sup>1</sup>, Allison Fetterman<sup>2</sup>, Scott Weidensaul<sup>2</sup>, Aaron Coolman<sup>3</sup>*

*University of Delaware<sup>1</sup>, Willistown Conservation Trust<sup>2</sup>, Ned Smith Center for Nature and Art<sup>3</sup>*

The Northeast Motus Collaboration (NMC), a partnership of Willistown Conservation Trust, the Carnegie Museum of Natural History's Powdermill Nature Reserve, the Ned Smith Center for Nature and Art and Project OwlNet, was founded in 2016 to address the lack of Motus Wildlife Tracking System (Motus) receiver stations in the interior Northeast United States. With funding from private individuals and foundations, state agencies and the U.S. Fish and Wildlife Service, the NMC has installed more than 120 receiver stations in 11 states from Maryland to Maine with an expected total of 140 by the end of 2022. Funding also supports numerous Motus projects for Species of Greatest Conservation Need to better understand post-breeding and migration ecology, stopover locations, and local and regional movements. Now, with a dense network of stations in the Northeast, the NMC Motus network alone has logged millions of detections, encompassing more than 100 species. Collaboration and partnerships are at the core of the NMC, from hosting stations to assisting similar regional Motus network builds in the U.S., Latin America and the Caribbean. Working to maintain and facilitate growth of the Motus network will remain a priority for the NMC.

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**Sym1: Post-breeding, migration, and stopover behavior of Rusty Blackbirds**

*Carol Foss<sup>1</sup>, Levi Burford<sup>1</sup>, Anna Peel<sup>1</sup>, Elora Grahame<sup>2</sup>, Patricia Wohner<sup>3</sup>*

*NH Audubon<sup>1</sup>, University of Guelph<sup>2</sup>, Oregon State University<sup>3</sup>*

The Rusty Blackbird (*Euphagus carolinus*) is a declining songbird that spends its entire life cycle in North America. This species breeds in spruce-fir forests from Alaska to the Maritime Provinces and winters in the Mississippi Alluvial Valley and on the Atlantic Coastal Plain. We are using Motus to study post-breeding and migratory movements of individuals from a northern New England breeding population.

We deployed 12 nanotags in 2019 and 20 in 2021 on breeding adult Rusty Blackbirds. Fifty-two receiving stations from Maine to Georgia detected fall migrants, 21 detected spring migrants, and eight detected both. Fall departures ranged from 5 October to 5 November (median = 11 October). Local receiving stations documented spring returns on 5 and 21 April.

We used mobile equipment to track eight fledgling and six adult Rusty Blackbirds during 10 June to 30 August 2022, locating individuals on six to 39 days (mean = 21). Tracked birds spent multiple days within various small drainages and moved <35 km from their nest sites.

We will discuss benefits and challenges of using Motus to hand-track songbirds in a mountainous landscape and will share post-breeding and migration travel routes of selected Rusty Blackbirds.

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**Sym2: The daily commute: the influence of a central nocturnal roost on diurnal habitat selection strategies in Atlantic coast Whimbrel**

*Maina Handmaker<sup>1</sup>, Nathan Senner<sup>1</sup>, Felicia Sanders<sup>2</sup>, Andrew Johnson<sup>3</sup>, Abby Sterling<sup>4</sup>, Adam Smith<sup>5</sup>, Mary Catherine Martin<sup>2</sup>, Janet Thibault<sup>2</sup>, Ethan Shealy, Natasza Fontaine*

*University of Massachusetts Amherst<sup>1</sup>, South Carolina Dept. of Natural Resources<sup>2</sup>, Cornell Lab of Ornithology<sup>3</sup>, Manomet<sup>4</sup>, American Bird Conservancy<sup>5</sup>*

Migratory species are often faithful to a small network of sites, a strategy that can increase foraging efficiency and reduce costs of selecting habitat when time to rest and refuel is limited. Shorebirds using intertidal habitats rely on these familiar sites for both food and safe places to roost. Building off our recent discovery that Deveaux Bank in South Carolina, USA supports nearly half of the Atlantic coast population of Whimbrel *Numenius phaeopus* each night during peak northward migration, we set out to learn how far Whimbrels disperse from this roost to feed during the day, and to investigate individual site fidelity to these nocturnal and diurnal sites. We tracked individuals with GPS transmitters from 2020 – 2022, and found that Whimbrels that share this 250-ha roost at night spread out across a 60 km stretch of coast during the day. Individuals commuted an average of 10 km one way between the roost and foraging grounds, though some commuted up to 40 km. Individuals exhibited extreme site fidelity to the nocturnal roost and to these diurnal foraging territories, both during a single staging period and between seasons and years, emphasizing the importance of both nocturnal and diurnal sites to migratory stopovers.

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**Sym2: Defining Whimbrel migration staging hubs on the US Gulf Coast: realm of the crawfish**

*Alan Kneidel<sup>1</sup>, Samantha Wolfe<sup>1</sup>, Brad Winn<sup>1</sup>, Shiloh Schulte<sup>1</sup>, Jeff Kelly<sup>2</sup>, Paula Cimprich<sup>2</sup>*

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Whimbrel populations that use the Western Atlantic Flyway have declined by an estimated four percent per year since the 1990s. For over a decade, we have worked along the Atlantic Coast to identify critical staging areas, establish monitoring efforts within these areas, and seek opportunities for conservation action. In 2021-22, we expanded these efforts to the Gulf Coast, a region of importance for northbound “Atlantic” Whimbrel. Using eBird and satellite tracking data, we identified two priority staging areas in Texas and Louisiana that consist of rice-crawfish fields and shallow water coastal impoundments. We located nocturnal roosts of Whimbrel within each staging area and conducted repeated counts to determine minimum population estimates. In spring 2022, we deployed 20 satellite transmitters on Whimbrel in Anahuac, Texas and conducted follow-up field surveys of live-transmitting birds to document daily site use. These preliminary surveys showed clear patterns of foraging site preference, as well as provided us with the opportunity to engage with land use managers to improve our understanding of the workings of this complex landscape. We believe this effort is a critical step in building a conservation plan for Whimbrel.

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**Sym1: Using Motus to track birds and bats offshore**

***Pamela Loring***

*U.S. Fish and Wildlife Service*

The Motus Wildlife Tracking System ('Motus'; <https://www.motus.org>) is an international collaborative research network that uses cooperative automated radio telemetry to track transmitters on coordinated frequencies. With funding from New York State Energy Research and Development Authority, we are leading an interdisciplinary effort to develop standardized protocols for using Motus to monitor birds and bats in offshore environments. The products will be released publicly in Fall 2022 and are intended to be living documents that are updated as new information and technology becomes available.

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**Sym1: Fall migration timing and strategies for Bobolinks in the Northeast US**

***Amber Roth<sup>1</sup>, Noah Perlut<sup>2</sup>, Michelle Eshleman<sup>3</sup>, Allison Fetterman<sup>4</sup>, Lisa Kiziuk<sup>4</sup>***

*University of Maine<sup>1</sup>, University of New England<sup>2</sup>, University of Delaware<sup>3</sup>, Willistown Conservation Trust<sup>4</sup>*

The North American Bobolink population has declined by 59% from 1970 to 2014. This collaborative study conducted in Maine, Pennsylvania, and Vermont is focused on improving our understanding of fall migration departure timing from working farm fields and migratory strategies for Bobolink in the Northeast US. In 2021 and 2022, we tagged 20 Bobolinks in Maine, 30 birds in Pennsylvania, and 30 birds at two sites in Vermont. We have identified a potentially important staging area on the Delmarva Peninsula where birds from all three states converged during fall migration. We identified at least two likely migration strategies: 1) birds travel south along the East Coast to the Delmarva Peninsula where many stage before heading across the Atlantic Ocean toward South America, and 2) birds travel south along the East Coast to the Delmarva Peninsula where many stage before continuing south along the coast to the Carolinas or Florida before heading across the Atlantic Ocean toward South America. Confirmation of a staging area on the Delmarva Peninsula based on 2022 migration data would be a significant contribution to the conservation of this species as we can draw attention to grassland protection and restoration efforts in that area.

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**Sym2: Using advanced technology to assess impacts of offshore wind development to migrating whimbrel**

**Alexandra Wilke<sup>1</sup>, Bryan Watts<sup>2</sup>, Chance Hines<sup>2</sup>, Laura Duval<sup>2</sup>, Zak Poulton<sup>1</sup>, Bart Paxton<sup>2</sup>, Mario Balitbit<sup>2</sup>**

*The Nature Conservancy<sup>1</sup>, Center for Conservation Biology at W&M<sup>2</sup>*

Dominion Energy's Coastal Virginia Offshore Wind project (CVOW) will consist of 176 turbines covering 458km<sup>2</sup> of ocean 43km off Virginia Beach, Virginia, USA. The lease area is situated southeast of Virginia's Eastern Shore (ESVA) where over 570km<sup>2</sup> of protected coastal lands provide important migratory staging habitats for hundreds of thousands of shorebirds. The ESVA is a critical staging area for whimbrel (*Numenius phaeopus*) using the Western Atlantic Flyway during both spring and fall migrations, and previous tracking efforts have shown that whimbrel departing the area do transit the CVOW lease area. Higher resolution data is needed, however, to better understand the potential exposure risk for this species. To evaluate this risk, we deployed 14 high-resolution, solar-powered GPS transmitters on whimbrel staging along the ESVA during fall migration in 2022. Resulting data streams are in progress. Advanced tracking technology, including customizable geo-fencing options and the ability to measure altitude, will allow for a thorough evaluation of exposure risk for this species to the CVOW project and will inform future lease placement along the southeast Atlantic Coast. An additional 16 units will be deployed in the fall of 2023.

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**Sym2: Fine-tuning a flyway: Implications for Conservation Delivery**

**Brad Winn, Shiloh Schulte, Alan Kneidel, Stephen Brown**

*Manomet*

Steady advances in tracking technologies over the last decade has allowed dedicated researchers to build a comprehensive understanding of the migratory pathways, staging sites, nesting areas, and tropical non-breeding sites of Western Atlantic Whimbrel (*Numenius phaeopus*). Implementing conservation strategies to stem measured declines and ensure quality habitat availability for this whimbrel population during annual migrations will necessitate detailed local resource use. Recent advances in pin-point tracking devices is enabling the detail needed to understand where conservation effort should be applied. Researchers have developed a robust "flyway" view for this population, but intriguing flight path discoveries continue. Recent GPS tracking data from a breeding site in Northeast Alaska reveals a transition zone where Atlantic and Pacific populations merge. Approximately 60% of Whimbrel nesting in the Arctic National Wildlife Refuge study area migrated west to the Yukon-Kuskokwim Delta and down the Pacific coast to Mexico and then the West Coast of Central and South America. 40% went East through Canada to staging sites ranging from Georgia to Newfoundland before making the Atlantic crossing to the North coast of South America.